

## GROUP 13A

# MULTIPOINT FUEL INJECTION (MPI) <4G63-Non-Turbo>

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## GENERAL INFORMATION

M1131000101823

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

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

### FUEL INJECTION CONTROL

The injector drive times and injection 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-ECU provides a richer air/fuel mixture by carrying out "open-loop" control 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-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 SPEED 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-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-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-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.

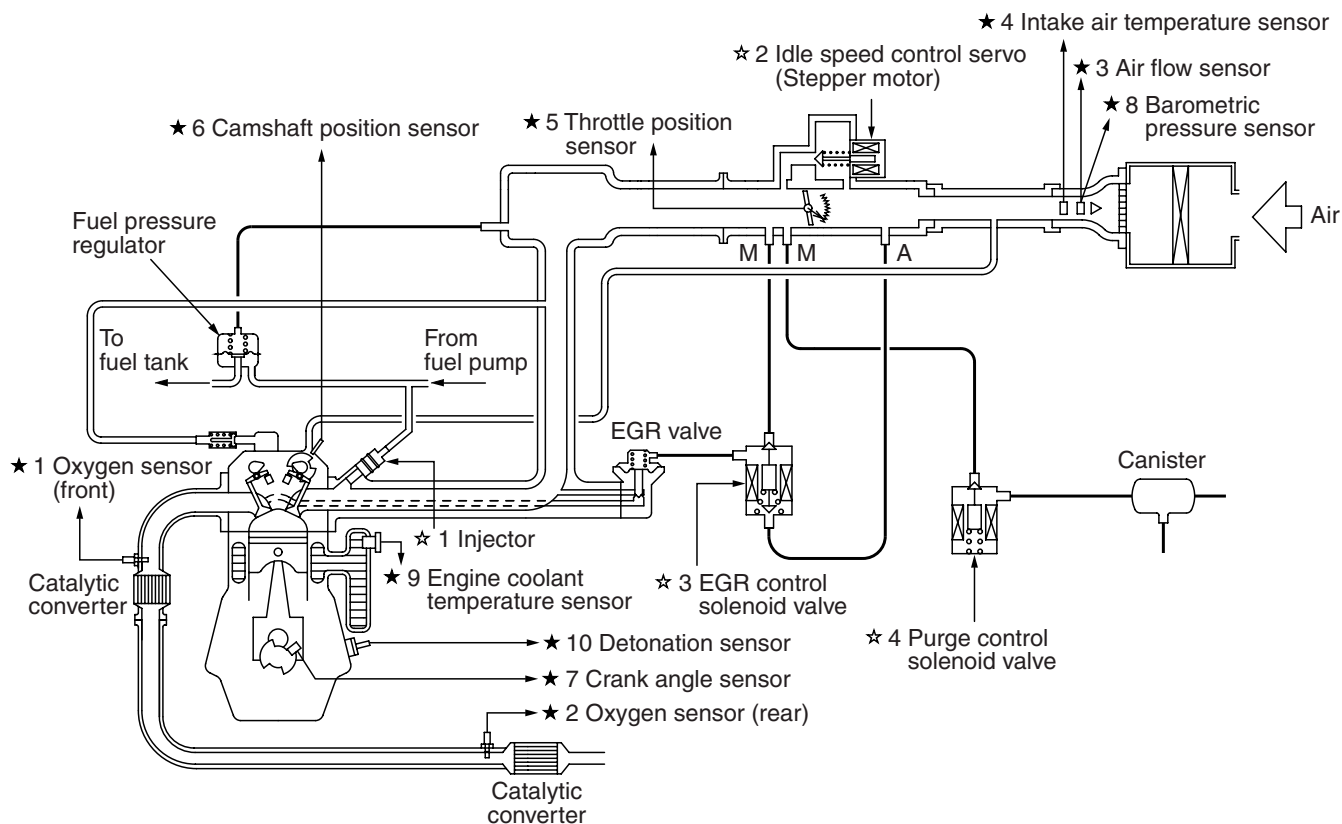
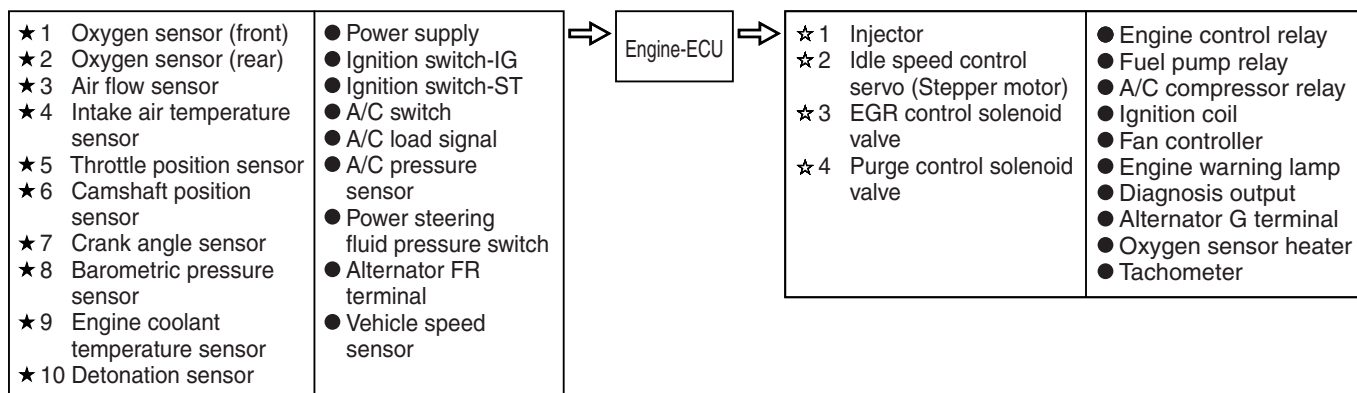
## OTHER CONTROL FUNCTIONS

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 [P.17-60](#), GROUP 17 – Engine And Emission Control – Evaporative Emission Control System).
5. EGR Control Solenoid Valve Control  
[Refer to [P.17-67](#), GROUP 17 – Engine And Emission Control – Exhaust Gas Recirculation (EGR) System].

## GENERAL SPECIFICATIONS

Items		Specifications
Throttle body	Throttle bore mm	60
	Throttle position sensor	Variable resistor type
	Idle speed control servo	Stepper motor type
Engine-ECU	Identification No.	E6T38982
Sensors	Air flow sensor	Karman vortex type
	Barometric pressure Sensor	Semiconductor type
	Intake air temperature sensor	Thermistor type
	Engine coolant temperature	Thermistor type
	Oxygen sensor	Zirconia 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
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	HDA 250E
	EGR control solenoid valve	Duty cycle type solenoid valve
	Purge control solenoid valve	Duty cycle type solenoid valve
Fuel pressure regulator	Regulator pressure kPa	329

## MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM





## SERVICE SPECIFICATIONS

M1131000300772

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		28 – 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
Oxygen sensor output voltage (at racing) V		0.6 – 1.0
Oxygen sensor heater resistance (at 20°C) Ω	front	4.5 – 8.0
	rear	11 – 18
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		10.5 – 13.5

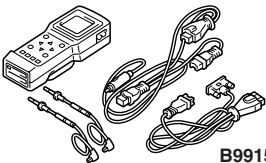
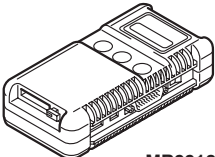
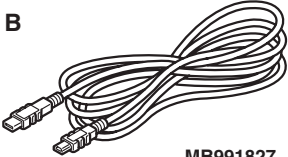

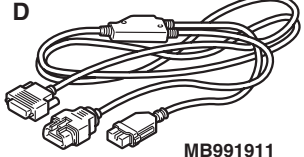
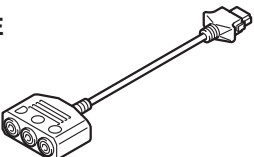


## SEALANT



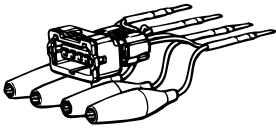

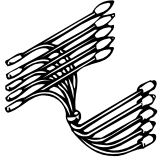
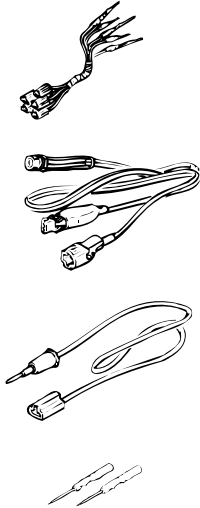
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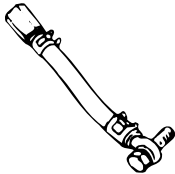


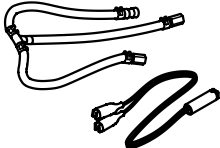
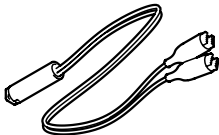
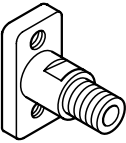
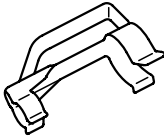
Item	Specified sealant	Remark
Engine coolant temperature sensor Threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

## SPECIAL TOOLS

M1131000600728

Tool	Number	Name	Use
 <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>
<p><b>A</b></p>  <p>MB991824</p> <p><b>B</b></p>  <p>MB991827</p> <p><b>C</b></p>  <p>MB991910</p> <p><b>D</b></p>  <p>MB991911</p> <p><b>E</b></p>  <p>MB991825</p> <p><b>F</b></p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955</p> <p>A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826</p>	<p>M.U.T.-III sub assembly</p> <p>A: Vehicle communication interface (V.C.I.) B: M.U.T.-III USB cable C: M.U.T.-III main harness A (Vehicles with CAN communication system) D: M.U.T.-III main harness B (Vehicles without CAN communication system) E: M.U.T.-III measurement adapter 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>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>

Tool	Number	Name	Use
	MB991709	Test harness	<ul style="list-style-type: none"> <li>• Measurement of voltage during troubleshooting</li> <li>• Inspection using an oscilloscope</li> <li>• Adjusting of idle speed control servo</li> </ul>
	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>
	MD998464	Test harness (4-pin, square)	<ul style="list-style-type: none"> <li>• Measurement of voltage during Troubleshooting</li> <li>• Inspection of oxygen sensor (front)</li> </ul>
 MB991658	MB991658	Test harness	<ul style="list-style-type: none"> <li>• Measurement of voltage during Troubleshooting</li> <li>• Inspection of oxygen sensor (rear)</li> </ul>
 MB991223	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 A: Connector pin contact inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection</li> </ul>

Tool	Number	Name	Use
	MD998709	Adaptor hose	Measurement of fuel pressure
	MD998742	Hose adaptor	
 MB991637	MB991637	Fuel pressure gauge set	
 MD998706	MD998706	Injector test set	Checking the spray condition of injectors
 MB991607	MB991607	Injector test harness	
 MD998741	MD998741	Injector test adaptor	
 MB991608	MB991608	Clip	

## TROUBLESHOOTING

### DIAGNOSIS TROUBLESHOOTING FLOW

Refer to [P.00-6](#), GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

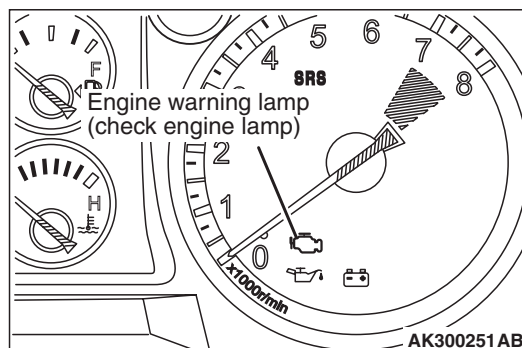
*NOTE: If the engine-ECU is replaced, the steering lock cylinder and ignition key should be replaced together with it.*

### DIAGNOSIS FUNCTION

M1131150000643

M1131155500290

### 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

Code No.	Diagnosis item
–	Engine-ECU
P0100	Air flow sensor system
P0105	Barometric pressure sensor system
P0110	Intake air temperature sensor system
P0115	Engine coolant temperature sensor system
P0120	Throttle position sensor system
P0125*	Feedback system monitor
P0130	Oxygen sensor (front) system <Sensor 1>
P0135	Oxygen sensor heater (front) system <Sensor 1>
P0136	Oxygen sensor (rear) system <Sensor 2>
P0141	Oxygen sensor heater (rear) system <Sensor 2>
P0170	Abnormal fuel system
P0201	No. 1 injector system
P0202	No. 2 injector system
P0203	No. 3 injector system
P0204	No. 4 injector system
P0300	Random cylinder mis-fire detection system
P0301*	No. 1 cylinder mis-fire detection system
P0302*	No. 2 cylinder mis-fire detection system
P0303*	No. 3 cylinder mis-fire detection system

Code No.	Diagnosis item
P0304*	No. 4 cylinder mis-fire detection system
P0325	Detonation sensor system
P0335	Crank angle sensor system
P0340	Camshaft position sensor system
P0403	EGR control solenoid valve system
P0420	Catalyst deterioration system
P0443	Purge control solenoid valve system
P0500	Vehicle speed sensor system
P0505	Idle speed control system
P0551*	Power steering fluid pressure switch system
P1603*	Battery back-up line system
P1610	Immobilizer system

**NOTE:**

- If the engine warning lamp illuminates because of a malfunction of the engine-ECU, communication between M.U.T.-II/III and the engine-ECU is impossible. In this case, the diagnosis code cannot be read.
  - After the engine-ECU has detected a malfunction, the engine warning lamp illuminates when the engine is next turned on and the same malfunction is re-detected. However, for items marked with a "\*" in the diagnosis code number column, the engine warning lamp illuminates only on the first detection of the malfunction.
  - After the engine warning lamp illuminates, it will be switched off under the following conditions.
    - When the engine-ECU monitored the power train malfunction three times\* met set condition requirements, it detected no malfunction.
- \*: In this case, "one time" indicates from engine start to stop.
- For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.
  - Sensor 1 indicates, the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

## METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to [P.00-6](#), GROUP 00 – How to Use Trouble-shooting/Inspection Service Points.

### DIAGNOSIS USING DIAGNOSIS 2 CODES

1. Switch the diagnosis mode of the engine control unit to DIAGNOSIS 2 mode using the M.U.T.-II/III.
2. Carry out a road test.
3. Take a reading of the diagnosis code and repair the problem location.
4. Turn the ignition switch to OFF and then back to ON again.

**NOTE:** By turning the ignition switch to OFF, the ENGINE-ECU will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.

5. Erase the diagnosis codes.

### INSPECTION USING M.U.T.-II/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.-II/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.-II/III, and then start the engine again and carry out a road test to confirm that the problem has disappeared.

## **FREEZE FRAME DATA**

When the engine-ECU detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called "Freeze frame data". By analyzing this "Freeze frame" data with the M.U.T.-II/III, an effective troubleshooting can be performed.

The display items of freeze frame data are shown below.

### **DISPLAY ITEM LIST**

<b>Item No.</b>	<b>Data</b>	<b>Unit</b>
21	Engine coolant temperature sensor	°C
22	Engine speed	r/min
24	Vehicle speed	km/h
80	Long-term fuel compensation (long-term fuel trim)	%
82	Short-term fuel compensation (short-term fuel trim)	%
88	Fuel control condition	Open loop
		Closed loop
		Open loop owing to drive condition
		Open loop owing to system malfunction
		Closed loop based on one oxygen sensor
		OL
		CL
		OL-DRV.
		OL-SYS.
		CL- H02S
87	Calculation load value	%
	Diagnosis code during data recording	-

*NOTE: If malfunctions have been detected in multiple systems, store one malfunction only, which has been detected first.*

## **DRIVE CYCLE**

By carrying out the test drive in the following three drive cycle patterns, the all monitoring can be accomplished for the diagnosis codes that is required by the vehicle driving to identify the fault. In other words, doing such a drive allows to regenerate any kind of trouble which involves illuminating the engine warning lamp (check engine lamp) and to verify the repair procedure has eliminated the trouble [the engine warning lamp (check engine lamp) is no longer illuminated].

### **CAUTION**

**Two technicians should always be in the vehicle when carrying out a test drive.**

*NOTE: Check that the diagnosis code is not output before traveling in the Drive cycle pattern. Erase the diagnosis code if it has been output.*

### **DRIVE CYCLE PATTERN LIST**

<b>Procedure</b>	<b>Monitor item</b>	<b>Diagnosis code</b>
1	Catalytic converter monitor	P0421
2	Oxygen sensor (front) monitor	P0130
3	Other monitor	P0136, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0325, P0501, P0551

## Procedure 1

Catalytic converter monitor	
Diagnosis code No.	P0421
Drive cycle pattern	<p>One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 16 minutes or more.</p> <p style="text-align: right;">AK301815AB</p>
Inspection condition	<ul style="list-style-type: none"> <li>Atmospheric temperature: <math>-10^{\circ}\text{C}</math> or more</li> </ul>
Test procedure	<ol style="list-style-type: none"> <li>Engine: start</li> <li>Accelerate until the vehicle speed is 90 km/h or more.</li> <li>Travel for 6 minutes or more while keeping the vehicle speed at 90 km/h or more.</li> <li>Decelerate until the vehicle speed is within 80 km/h or less.</li> <li>While traveling at 55 – 80 km/h for 10 minutes or more, fully close the throttle at least once in 2 minutes and decelerate for 10 seconds or more. <ul style="list-style-type: none"> <li>Do not repeat deceleration too often.</li> <li>Vehicle speed may go below 55 km/h after the deceleration.</li> <li>Stopping and braking are permitted. (If stopped or drive at 55 km/h or less for more than 5 minutes the monitoring may be stopped. In this case please restart monitoring from the beginning.)</li> </ul> </li> <li>After completing the above deceleration, bring the vehicle speed back to 55 – 80 km/h and keep it in the range until starting the deceleration again. <ul style="list-style-type: none"> <li>Repeat the above deceleration at least 5 times.</li> </ul> </li> <li>Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position.</li> </ol>



**Procedure 2**

<b>Oxygen sensor (front) monitor</b>	
Diagnosis code No.	P0130
Drive cycle pattern	<p>One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 16 minutes or more.</p> <p align="right">AK301816AB</p>
Inspection conditions	<ul style="list-style-type: none"> <li>• Engine coolant temperature: After engine warm up</li> <li>• Atmospheric temperature: <math>-10^{\circ}\text{C}</math> or more</li> </ul>
Test procedure	<ol style="list-style-type: none"> <li>1. Engine: start</li> <li>2. Accelerate until the vehicle speed is 55 – 80 km/h.</li> <li>3. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 55 – 80km/h and travel for 16 minutes or more. <ul style="list-style-type: none"> <li>• Stopping and braking during this operation are permitted.</li> </ul> </li> <li>4. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position.</li> </ol>

## Procedure 3

Other monitor	
Diagnosis code No.	P0136, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0325, P0500, P0551
Drive cycle pattern	<p>One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 21 minutes or more.</p> <p style="text-align: right;">AK301817AB</p>
Inspection conditions	<ul style="list-style-type: none"> <li>Engine coolant temperature: After engine warm up</li> <li>Atmospheric temperature: <math>-10^{\circ}\text{C}</math> or more</li> </ul>
Test procedure	<ol style="list-style-type: none"> <li>Engine: start</li> <li>Accelerate until the vehicle speed is 55 km/h.</li> <li>While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 55 km/h and travel for 16 minutes or more.</li> <li>Return the vehicle to the shop.</li> <li>After stopping the vehicle, continue idling for 5 minutes, and then turn the ignition switch to "LOCK" (OFF) position.</li> </ol>

## READINESS TEST STATUS

The engine-ECU monitors the following main diagnosis items, judges if these items are in good condition or not, and stores its history. This history can be read out by using M.U.T.-II/III. (If the ECU has judged an item before, the M.U.T.-II/III displays "Complete").

In addition, if diagnosis codes are erased or the battery cable is disconnected, this history will also be erased (the memory will be reset).

- Catalyst: P0420
- Oxygen sensor: P0130
- Oxygen sensor heater: P0135, P0141

## **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.

<b>Malfunctioning item</b>	<b>Control contents during malfunction</b>
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.
Barometric pressure sensor	Controls as if the barometric pressure is 101 kPa.
Throttle position sensor	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	Injectors 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)
Oxygen sensor (front)	Air/fuel ratio feedback control (closed loop control) is not performed.
Oxygen sensor (rear)	Performs the feedback control (closed loop control) of the air/fuel ratio by using only the signal of the oxygen (front) installed on the front of the catalytic converter.
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)
Misfiring	If the detected misfiring causes damage to the catalyst, the misfiring cylinder will be shut down.

## **INSPECTION CHART FOR DIAGNOSIS CODE**

M1131151000884

<b>Code No.</b>	<b>Diagnosis item</b>	<b>Reference page</b>
P0100	Air flow sensor system	<a href="#">P.13A-17</a>
P0105	Barometric pressure sensor system	<a href="#">P.13A-27</a>
P0110	Intake air temperature sensor system	<a href="#">P.13A-36</a>
P0115	Engine coolant temperature sensor system	<a href="#">P.13A-42</a>
P0120	Throttle position sensor system	<a href="#">P.13A-49</a>
P0125*	Feedback system monitor	<a href="#">P.13A-57</a>
P0130	Oxygen sensor (front) system <Sensor 1>	<a href="#">P.13A-61</a>
P0135	Oxygen sensor heater (front) system <Sensor 1>	<a href="#">P.13A-67</a>
P0136	Oxygen sensor (rear) system <Sensor 2>	<a href="#">P.13A-72</a>

Code No.	Diagnosis item	Reference page
P0141	Oxygen sensor heater (rear) system <Sensor 2>	P.13A-78
P0170	Abnormal fuel system	P.13A-83
P0201	No.1 Injector system	P.13A-87
P0202	No.2 Injector system	P.13A-92
P0203	No.3 Injector system	P.13A-97
P0204	No.4 Injector system	P.13A-102
P0300	Random cylinder mis-fire detection system	P.13A-106
P0301*	No.1 cylinder mis-fire detection system	P.13A-110
P0302*	No.2 cylinder mis-fire detection system	P.13A-112
P0303*	No.3 cylinder mis-fire detection system	P.13A-115
P0304*	No.4 cylinder mis-fire detection system	P.13A-118
P0325	Detonation sensor system	P.13A-121
P0335	Crank angle sensor system	P.13A-124
P0340	Camshaft position sensor system	P.13A-134
P0403	EGR control solenoid valve system	P.13A-142
P0420	Catalyst deterioration system	P.13A-147
P0443	Purge control solenoid valve system	P.13A-148
P0500	Vehicle speed sensor system	P.13A-156
P0505	Idle speed control system	P.13A-159
P0551*	Power steering fluid pressure switch system	P.13A-164
P0622	Alternator FR terminal system	P.13A-169
P1603*	Battery back-up line system	P.13A-174
P1610	Immobilizer system	P.13A-176

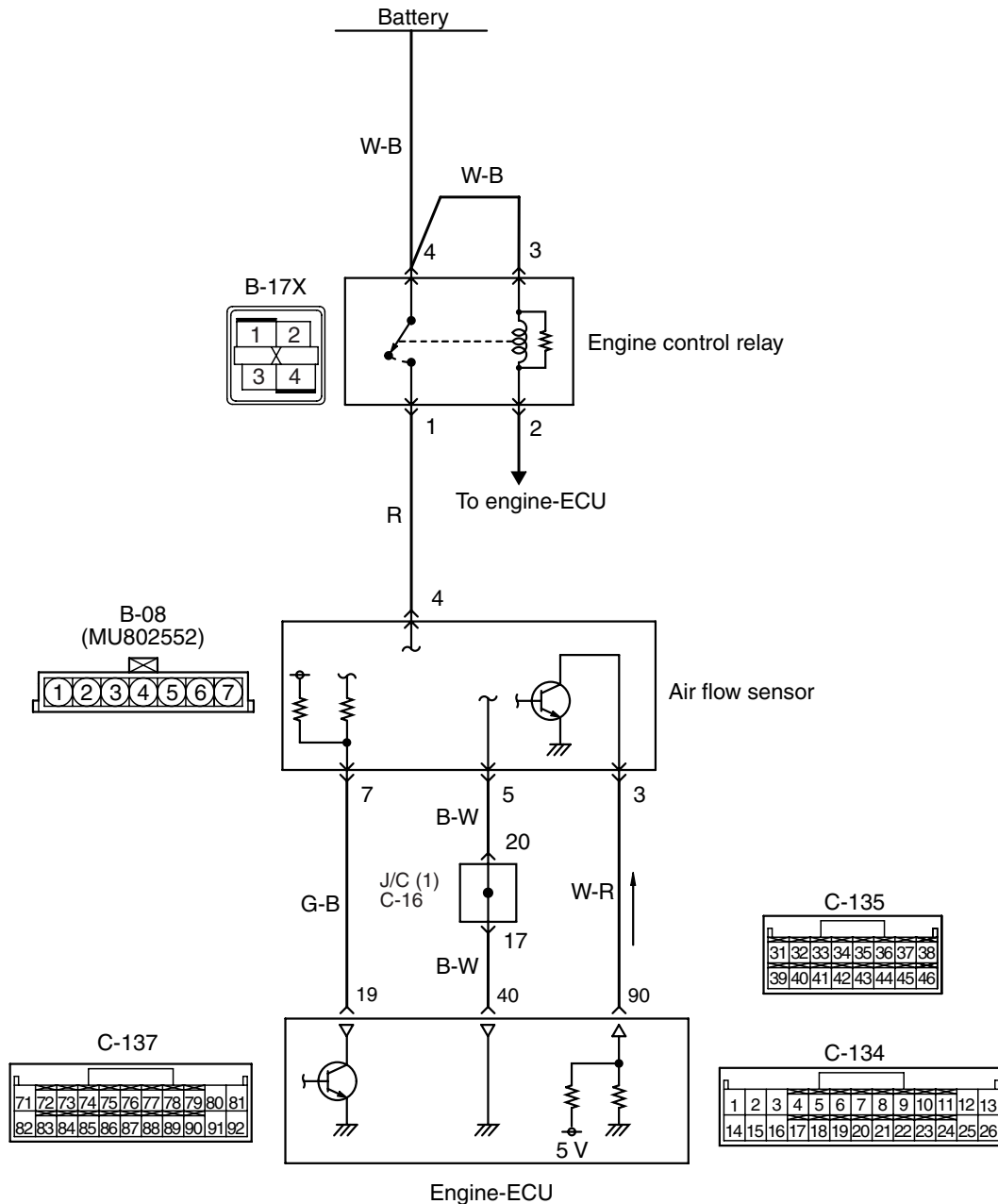
**NOTE:**

- Do not replace the engine-ECU until a through terminal check reveals there are no short/open circuit.
- Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.
- After the engine-ECU has detected a malfunction, a diagnosis code is recorded the next time the engine is started and the same malfunction is re-detected. However, for items marked with "\*", the diagnosis code is recorded on the first detection of the malfunction.
- Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

## INSPECTION PROCEDURE FOR DIAGNOSIS CODES

### Code No. P0100 Air Flow Sensor System

Air flow sensor circuit



**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-ECU (terminal No. 40) 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-ECU (terminal No. 90).
- An air flow sensor filter reset signal is inputted to the air flow sensor (terminal No. 7) from the engine-ECU (terminal No. 19).

**FUNCTION**

- Air flow sensor outputs a pulse signal proportional to the intake air flow rate.
- The engine-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-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 is 500 r/min or more.

**Judgment Criterion**

- Sensor output frequency of 3.3 Hz or less for 2 seconds.

**PROBABLE CAUSE**

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

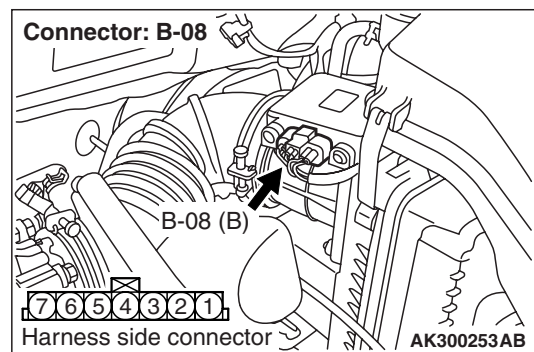
**DIAGNOSIS PROCEDURE****STEP 1. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).
  - Item 12: Air flow sensor

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

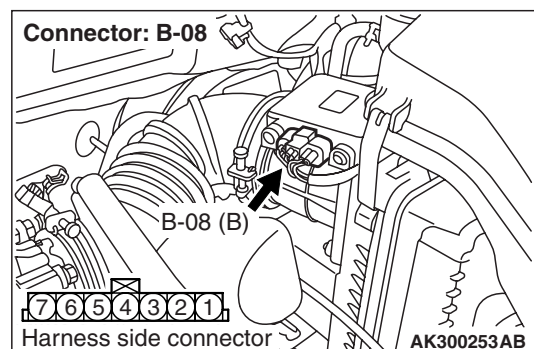
**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**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.

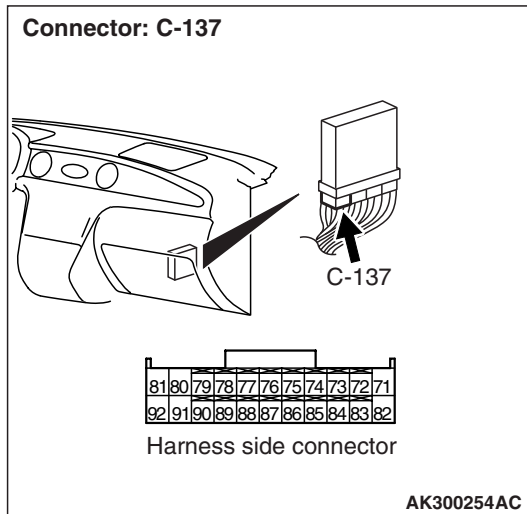
**OK: 4.9 – 5.1 V**

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

**YES** : Go to Step 9 .

**NO** : Go to Step 4 .

**STEP 4. Perform voltage measurement at C-137 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 90 and earth.

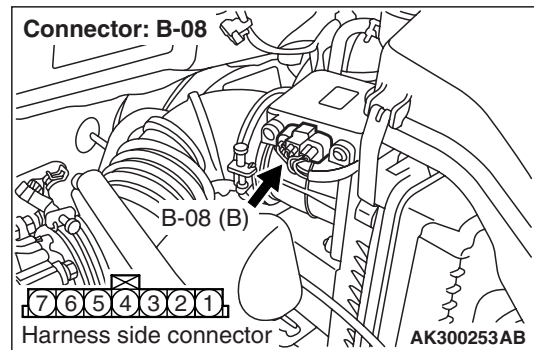
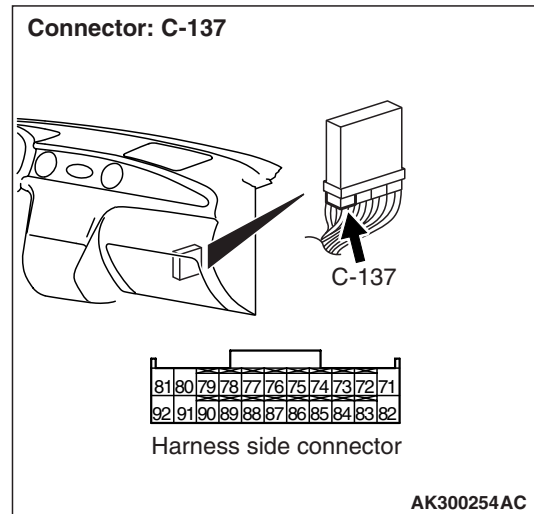
**OK: 4.9 – 5.1 V**

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

**YES :** Go to Step 5 .

**NO :** Go to Step 6 .

**STEP 5. Connector check: C-137 engine-ECU connector**

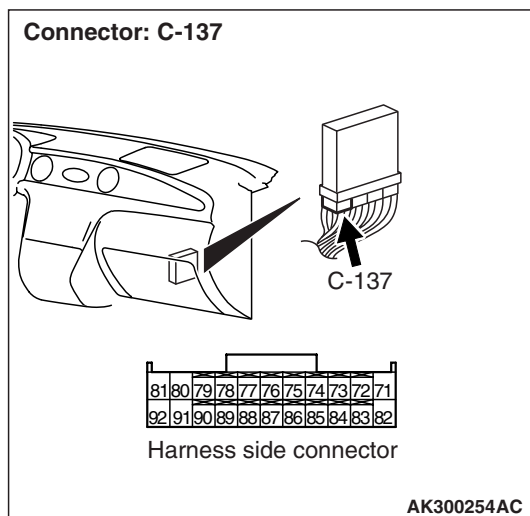


**Q: Is the check result normal?**

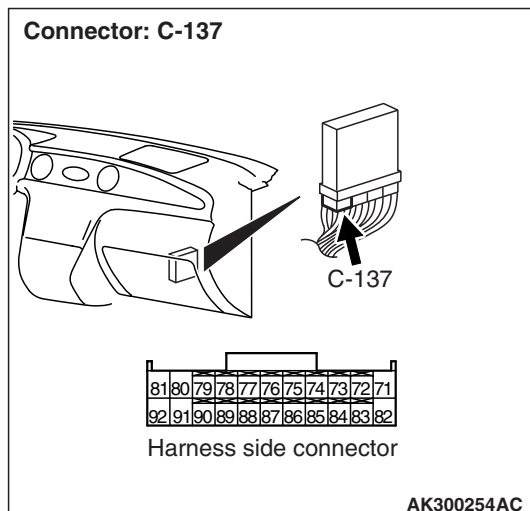
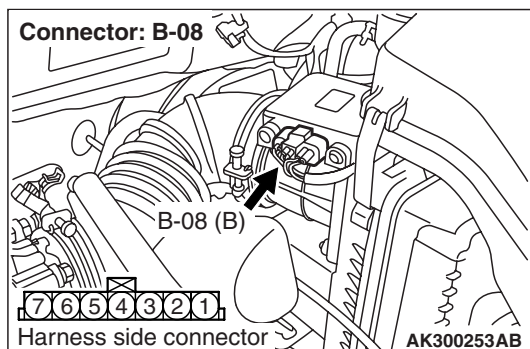
**YES :** Check and repair harness between B-08 (terminal No. 3) air flow sensor connector and C-137 (terminal No. 90) engine-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 6. Connector check: C-137 engine-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-137 (terminal No. 90) engine-ECU connector.**

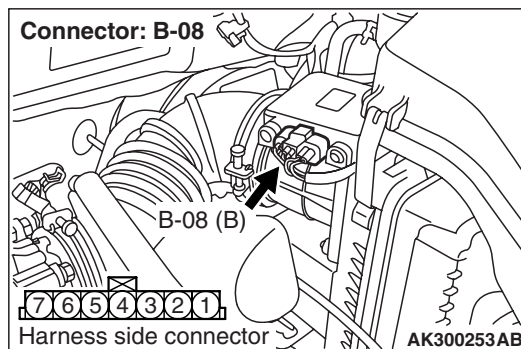
- Check output line for short circuit.

**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-293](#).  
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.00-6](#)).  
**NO :** Replace engine-ECU.

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

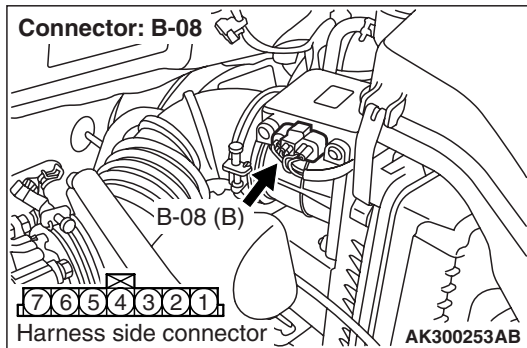
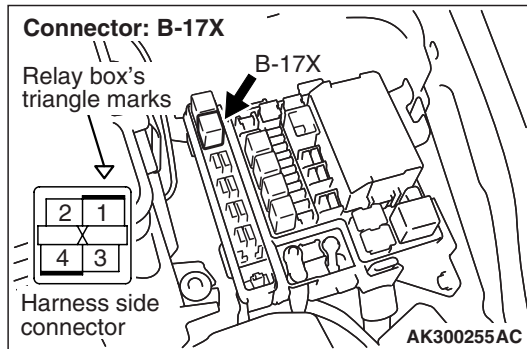
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

**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**



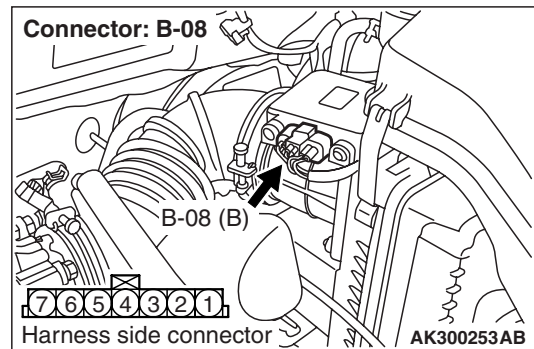
**Q: Is the check result normal?**

**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. Perform resistance measurement at B-08 air flow sensor connector.**



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

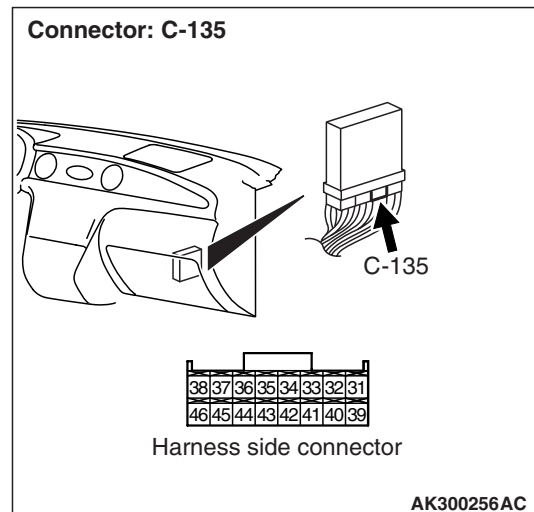
**OK: Continuity ( $2\ \Omega$  or less)**

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

**YES :** Go to Step 14 .

**NO :** Go to Step 12 .

**STEP 12. Connector check: C-135 engine-ECU connector**

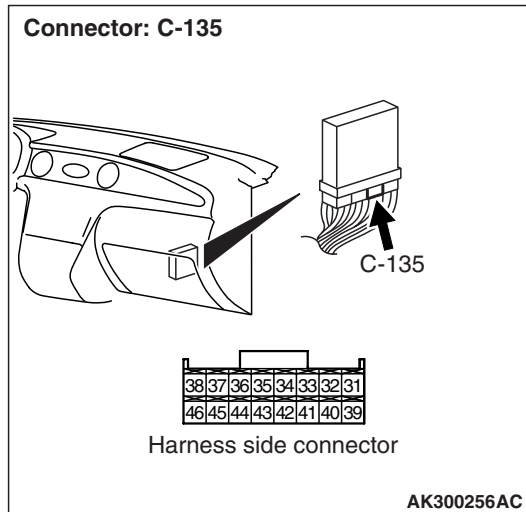
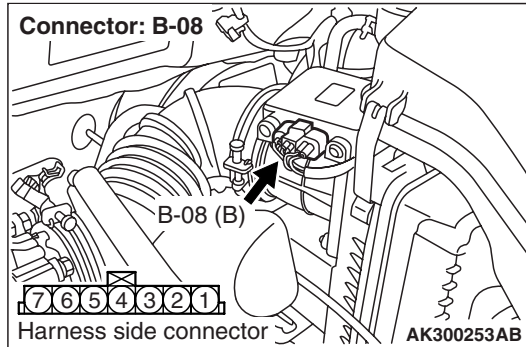


**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Repair.

**STEP 13. Check harness between B-08 (terminal No. 5) air flow sensor connector and C-135 (terminal No. 40) engine-ECU connector.**



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

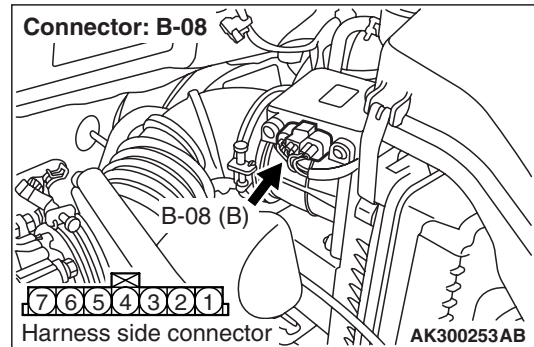
- Check earthing line for open circuit and damage.

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

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 14. 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.

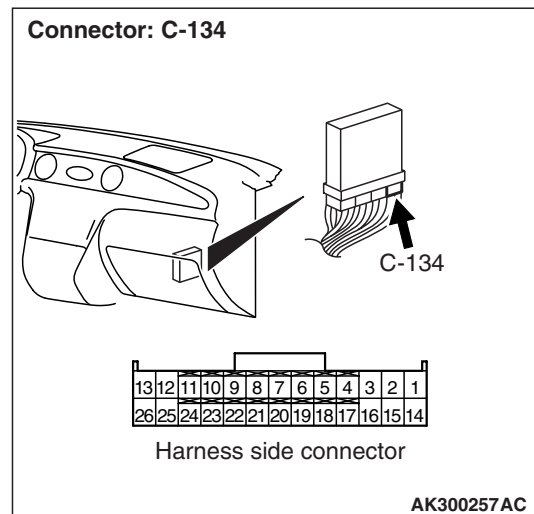
**OK: 7 – 8 V**

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

**YES :** Go to Step 17 .

**NO :** Go to Step 15 .

**STEP 15. Connector check: C-134 engine-ECU connector**

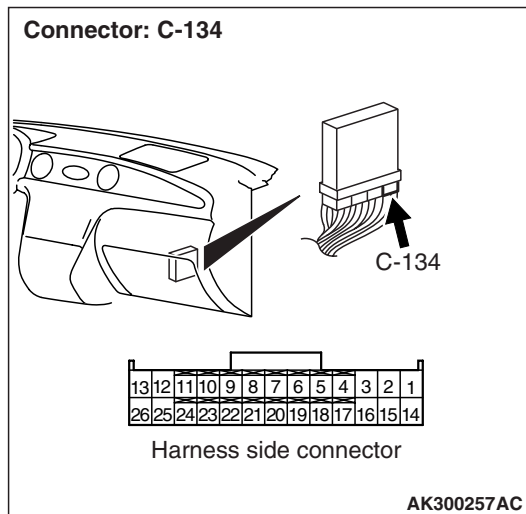
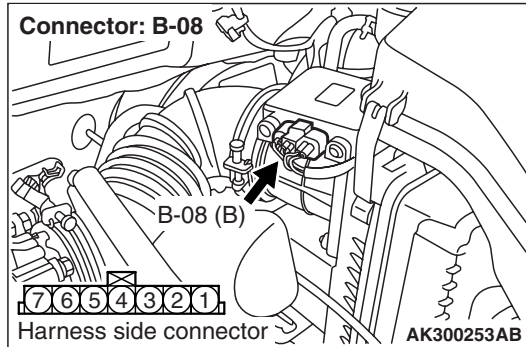


**Q: Is the check result normal?**

**YES :** Go to Step 16 .

**NO :** Repair.

**STEP 16. Check harness between B-08 (terminal No. 7) air flow sensor connector and C-134 (terminal No. 19) engine-ECU connector.**



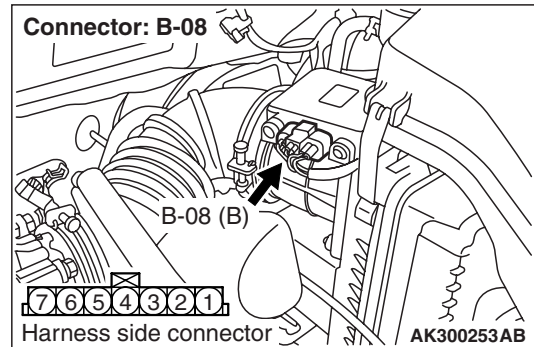
- Check reset signal line for short circuit.

**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.
- Transmission: Neutral
- Voltage between terminal No. 7 and earth.

**OK:**

**0 – 1 V (Engine: Idling)**

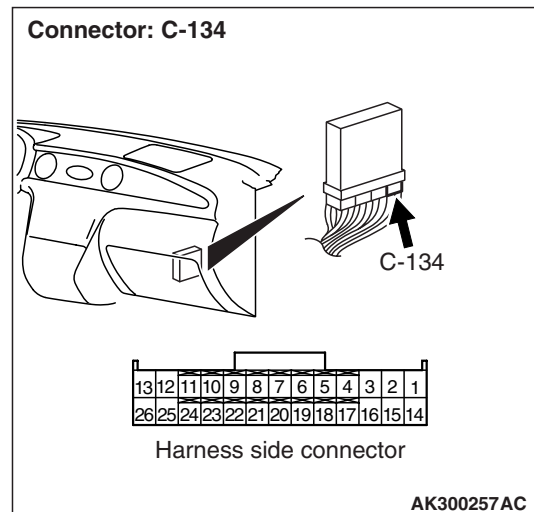
**6 – 9 V (Engine: 3,000 r/min)**

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

**YES :** Go to Step 20 .

**NO :** Go to Step 18 .

**STEP 18. Connector check: C-134 engine-ECU connector**

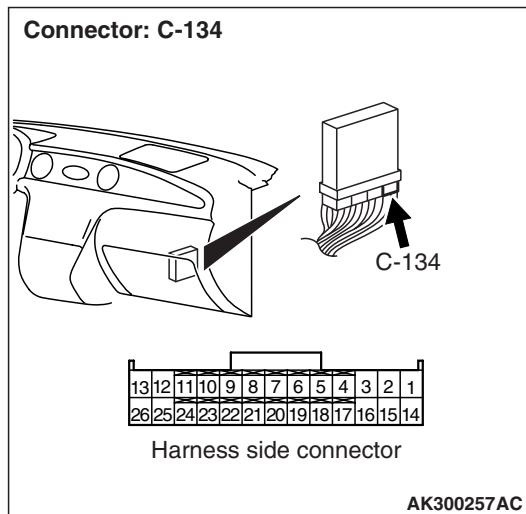
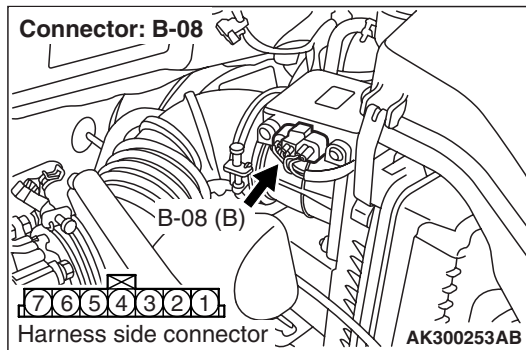


**Q: Is the check result normal?**

**YES :** Go to Step 19 .

**NO :** Repair.

**STEP 19. Check harness between B-08 (terminal No. 7) air flow sensor connector and C-134 (terminal No. 19) engine-ECU connector.**



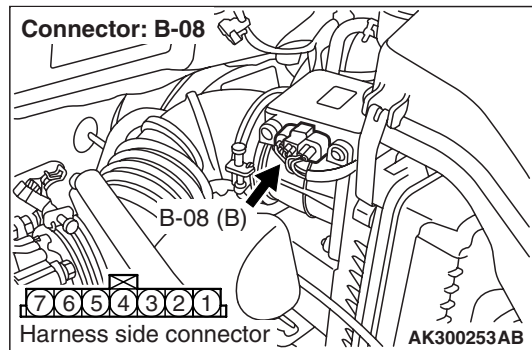
- Check reset signal line for open circuit and damage.

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

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 20. Perform output wave pattern measurement at B-08 air flow sensor connector (Using an oscilloscope).**



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

**OK: Waveforms should be displayed on inspection procedure using an oscilloscope (Refer to P.13A-305) and noise should not be displayed in the waveform.**

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

**YES :** Go to Step 8 .

**NO :** Go to Step 21 .

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

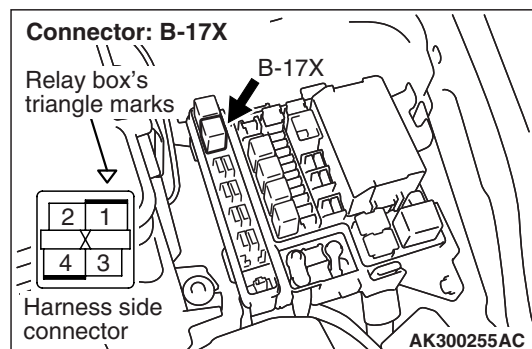
- After replacing the air flow sensor, re-check the trouble symptoms.

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

**YES :** Go to Step 22 .

**NO :** Check end.

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

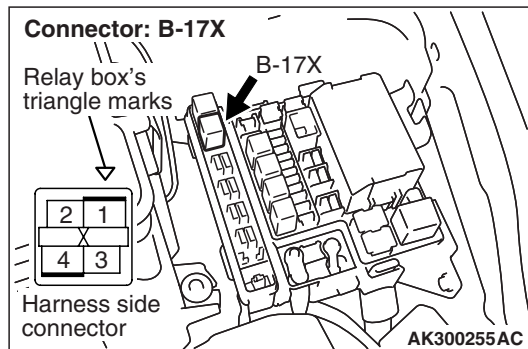
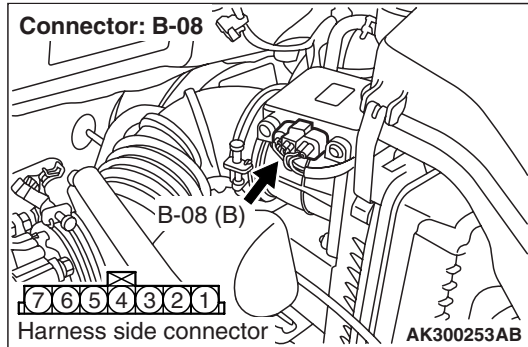


**Q: Is the check result normal?**

**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.**



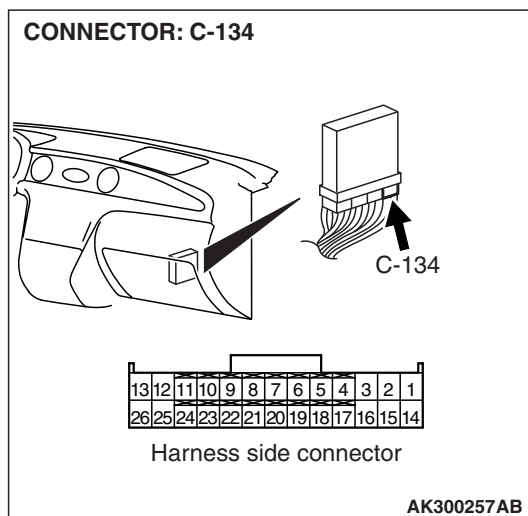
- Check power supply line for damage.

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

**YES :** Go to Step 24 .

**NO :** Repair.

**STEP 24. Connector check: C-134 engine-ECU connector**

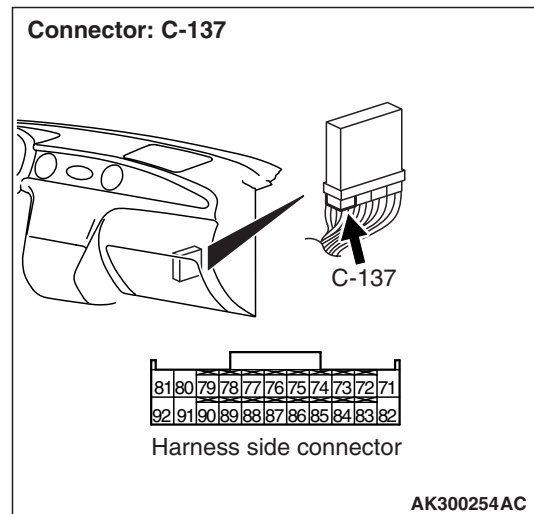
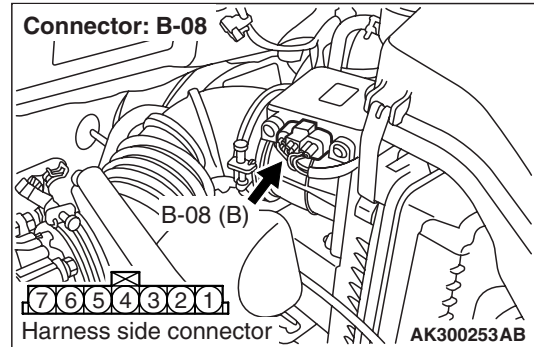


**Q: Is the check result normal?**

**YES :** Go to Step 25 .

**NO :** Repair.

**STEP 25. Check harness between B-08 (terminal No. 3) air flow sensor connector and C-137 (terminal No. 90) engine-ECU connector.**

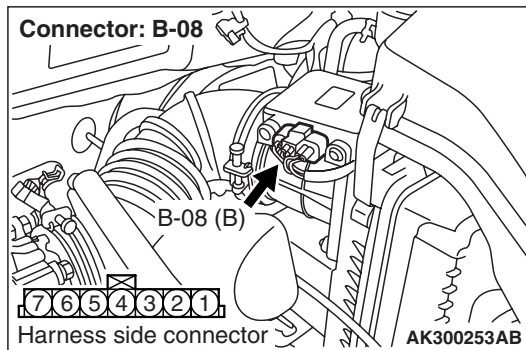
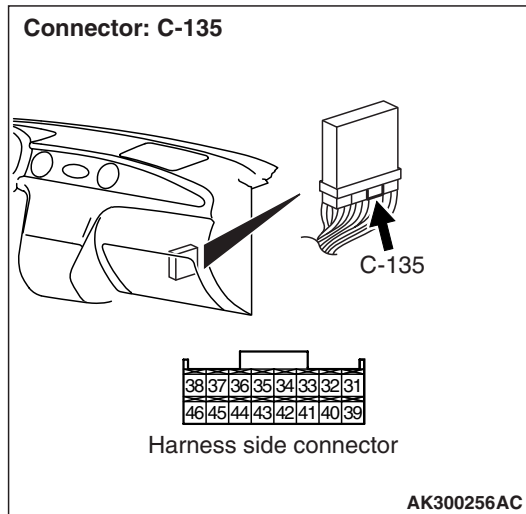


- Check output line for damage.

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

**YES :** Go to Step 26 .

**NO :** Repair.

**STEP 26. Connector check: C-135 engine-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-135 (terminal No. 40) engine-ECU connector.

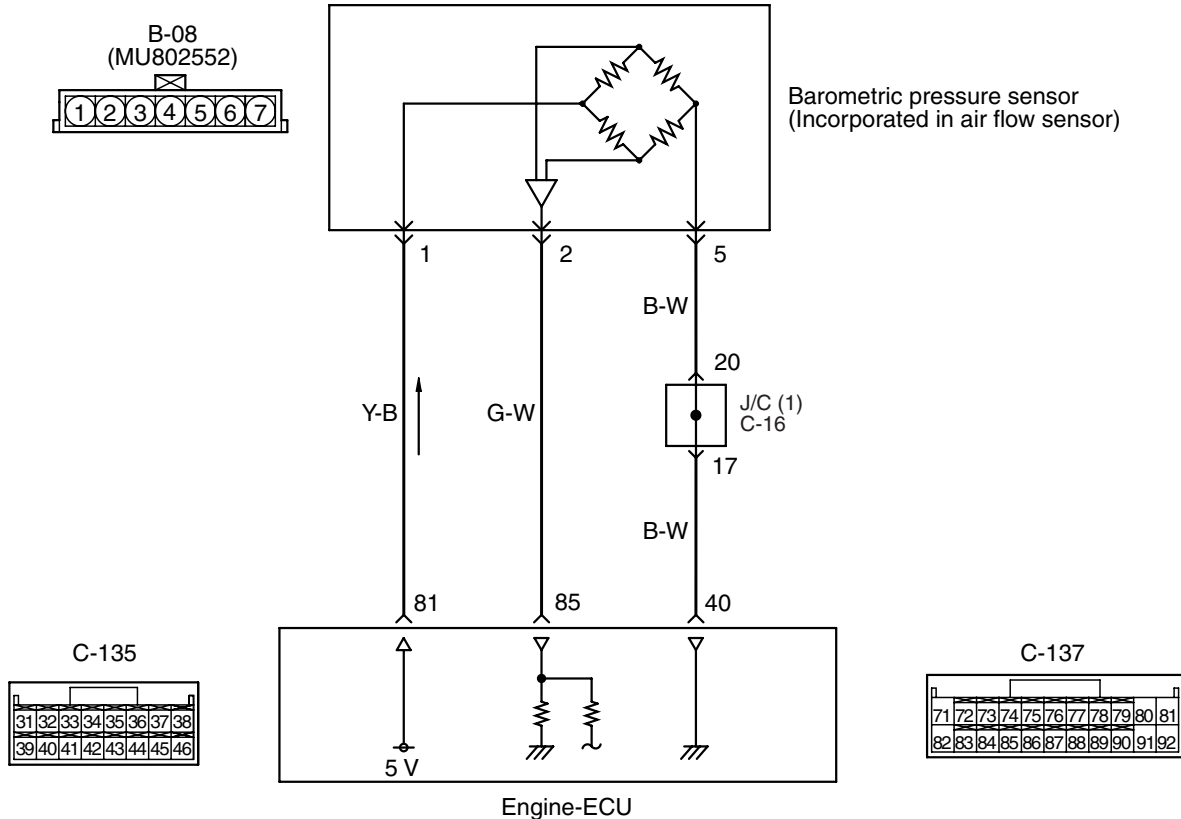
- Check earthing line for damage.

**No :** Repair.



**Code No. P0105: Barometric Pressure Sensor System**

**Barometric pressure sensor circuit**



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401025 AB

**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-ECU (terminal No. 81) and earthed to the engine-ECU (terminal No. 40) from the air flow sensor (terminal No. 5).
- The sensor signal is inputted to the engine-ECU (terminal No. 85) 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-ECU.
- In response to the signal, the engine-ECU corrects the fuel injection amount, etc.

**TROUBLE JUDGMENT**

**Check Condition**

- 2 seconds later after the ignition switch has been in "ON" position or the engine has started up.
- The battery voltage is 8 V or more.

**Judgment Criterion**

- The sensor output voltage is 4.5 V or more (Barometric pressure of above 114 kPa or equivalent) for 2 seconds.

Or

- The sensor output voltage is 0.2 V or less (Barometric pressure of below 53kpa or equivalent) for 2 seconds.

**PROBABLE CAUSE**

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

## DIAGNOSIS PROCEDURE

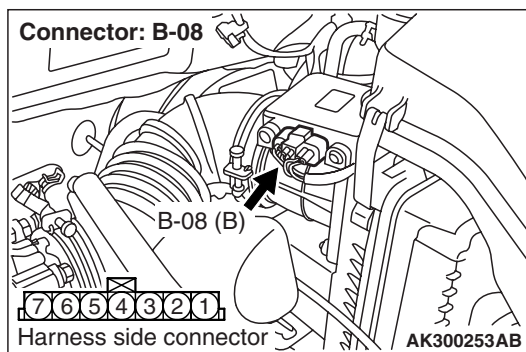
**STEP 1. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).
  - Item 25: Barometric pressure sensor

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

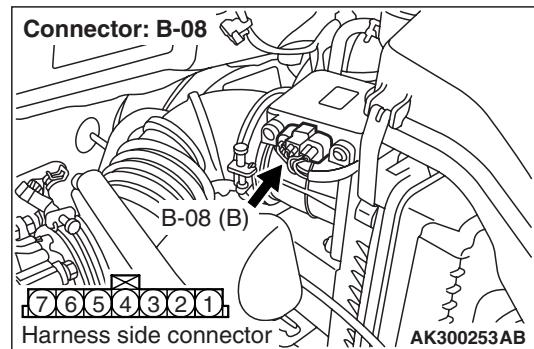
**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**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.**

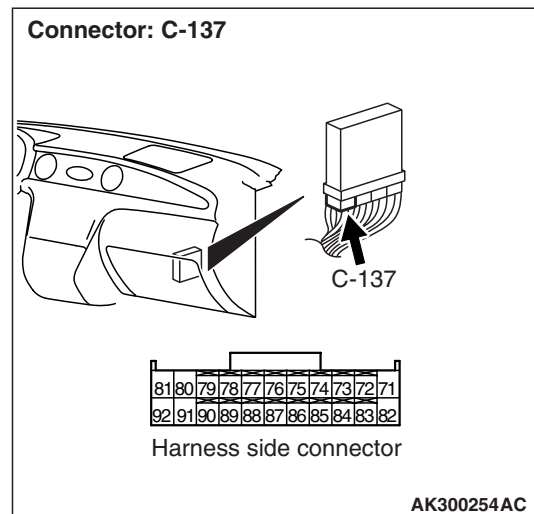
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**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-137 engine-ECU connector.**

- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 81 and earth.

**OK: 4.9 – 5.1 V**

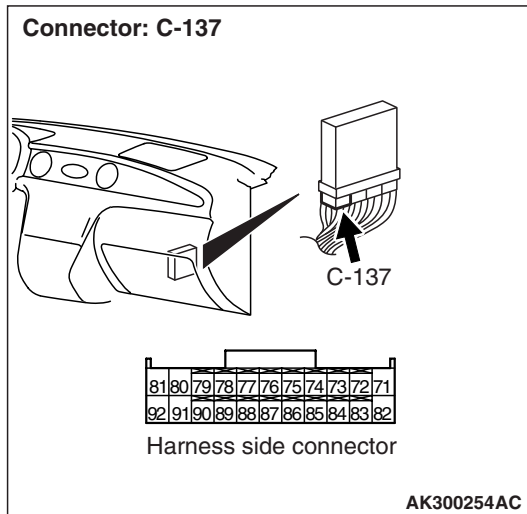
**Q: Is the check result normal?**

**YES :** Go to Step 5 .

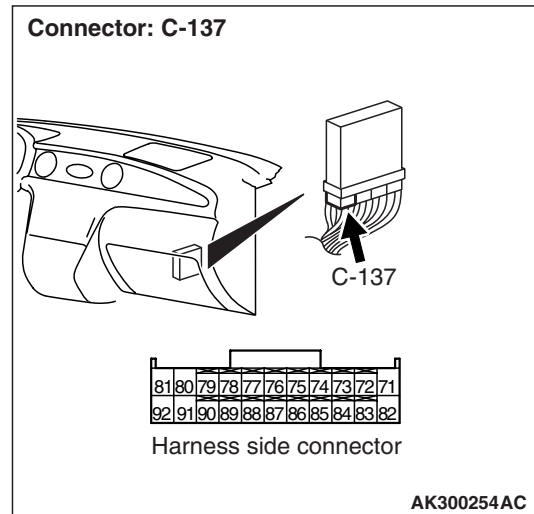
**NO :** Go to Step 6 .



**STEP 5. Connector check: C-137 engine-ECU connector**



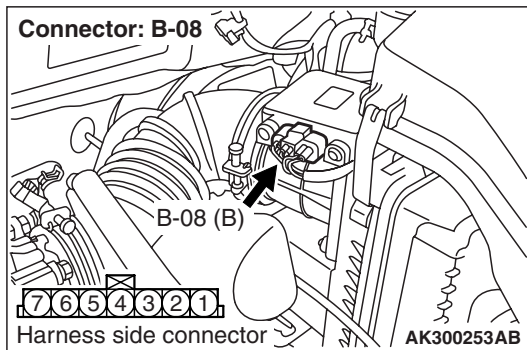
**STEP 6. Connector check: C-137 engine-ECU connector**



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

**YES :** Go to Step 7 .

**NO :** Repair.



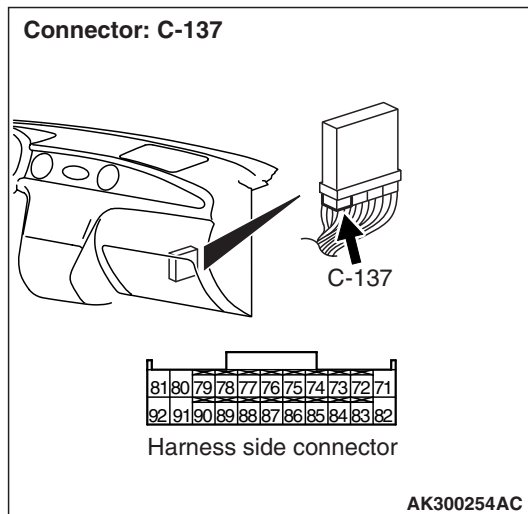
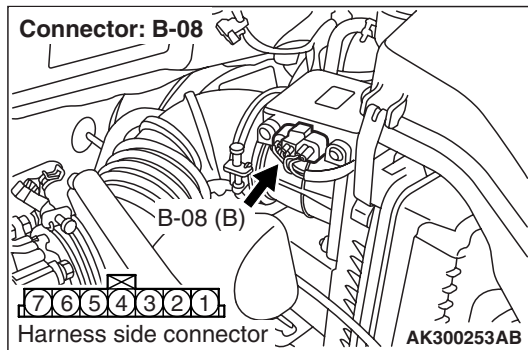
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-08 (terminal No. 1) air flow sensor connector and C-137 (terminal No. 81) engine-ECU connector.

- Check power supply line for open circuit.

**NO :** Repair.

**STEP 7. Check harness between B-08 (terminal No. 1) air flow sensor connector and C-137 (terminal No. 81) engine-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

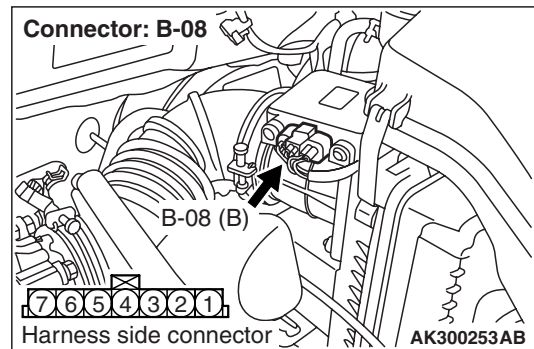
- Refer to Data list reference table [P.13A-293](#).
  - Item No. 25: Barometric pressure sensor

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

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



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

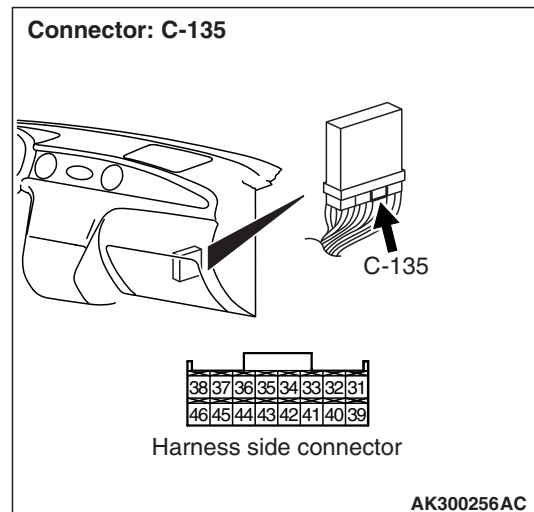
**OK: Continuity (2  $\Omega$  or less)**

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

**YES :** Go to Step 12 .

**NO :** Go to Step 10 .

**STEP 10. Connector check: C-135 engine-ECU connector**

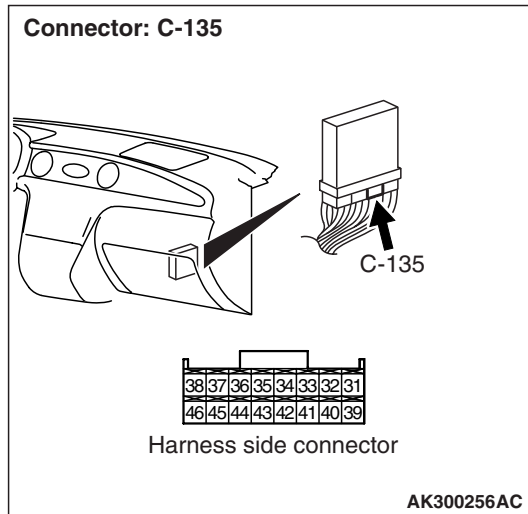
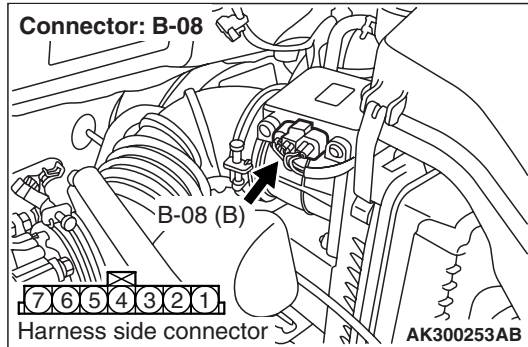


**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. Check harness between B-08 (terminal No. 5) air flow sensor connector and C-135 (terminal No. 40) engine-ECU connector.**



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

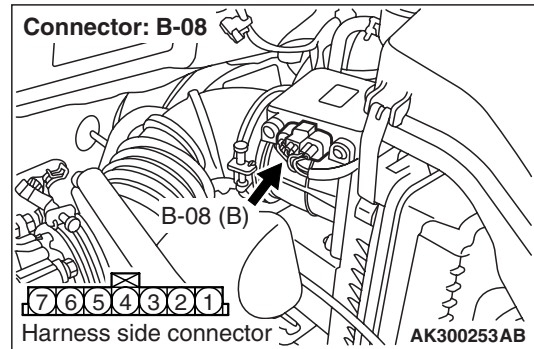
- Check earthing line for open circuit or damage.

**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.**



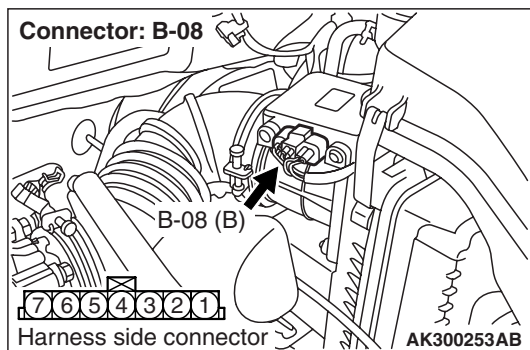
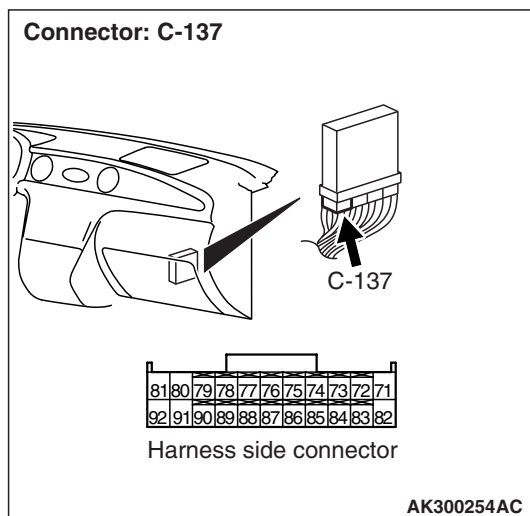
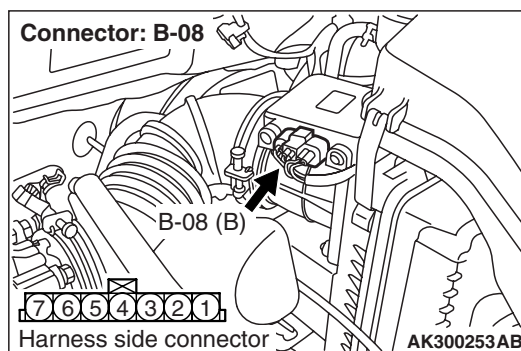
- Use special tool test harness (MB991709) to connect only terminal No. 1, No. 2 and No. 5, and then measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: 4.9 – 5.1 V**

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

**YES :** Go to Step 14 .

**NO :** Go to Step 13 .

**STEP 13. Connector check: C-137 engine-ECU connector****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.

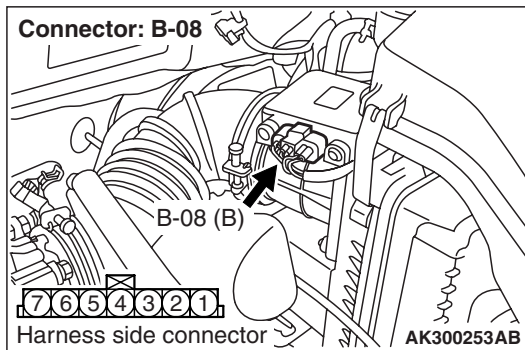
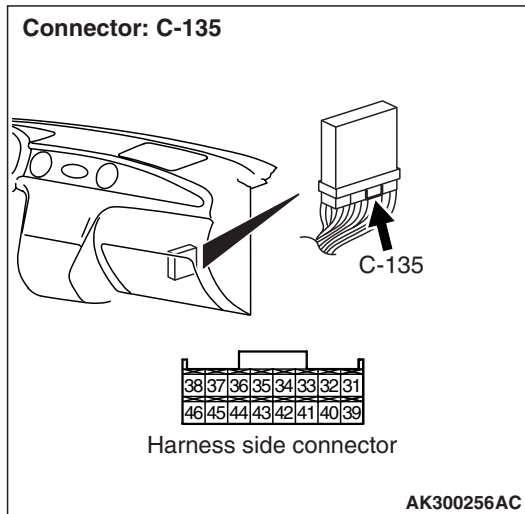
**OK: 0.5 V or less****Q: Is the check result normal?****YES** : Go to Step 16 .**NO** : Go to Step 15 .**Q: Is the check result normal?**

**YES** : Check and repair harness between B-08 (terminal No. 1) air flow sensor connector and C-137 (terminal No. 81) engine-ECU connector.

- Check power supply line for damage.

**NO** : Repair.

**STEP 15. Connector check: C-135 engine-ECU connector**



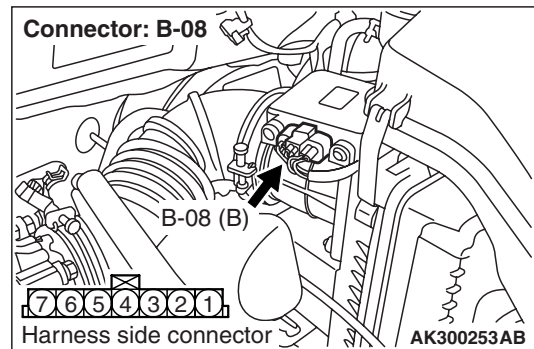
**Q: Is the check result normal?**

**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-135 (terminal No. 40) engine-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 0m: 3.8 – 4.2 V**

**Altitude 600m: 3.5 – 3.9 V**

**Altitude 1,200m: 3.3 – 3.7 V**

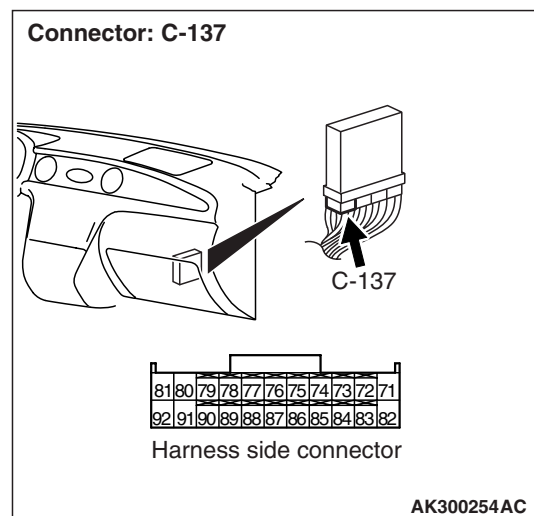
**Altitude 1,800m: 3.0 – 3.4 V**

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

**YES :** Go to Step 19 .

**NO :** Go to Step 17 .

**STEP 17. Connector check: C-137 engine-ECU connector**

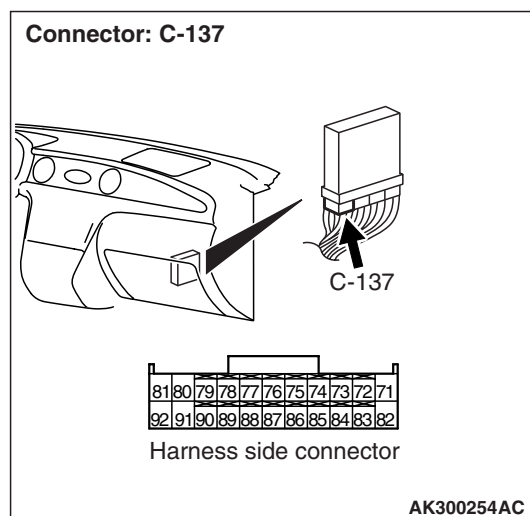
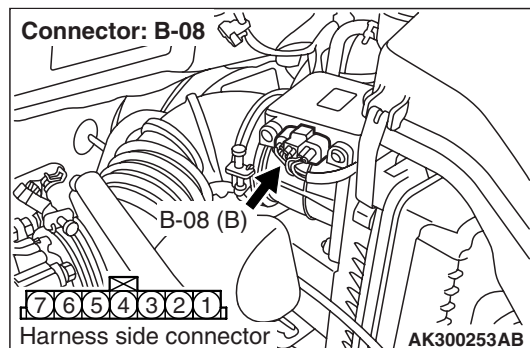


**Q: Is the check result normal?**

**YES :** Go to Step 18 .

**NO :** Repair.

**STEP 18. Check harness between B-08 (terminal No. 2) air flow sensor connector and C-137 (terminal No. 85) engine-ECU connector.**



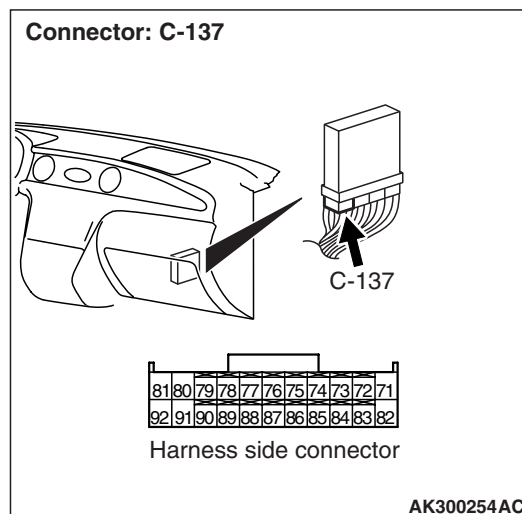
- Check output line for short circuit and damage.

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

**YES :** Replace air flow sensor.

**NO :** Repair.

**STEP 19. Perform voltage measurement at C-137 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 85 and earth.

**OK:**

**Altitude 0m: 3.8 – 4.2 V**

**Altitude 600m: 3.5 – 3.9 V**

**Altitude 1,200m: 3.3 – 3.7 V**

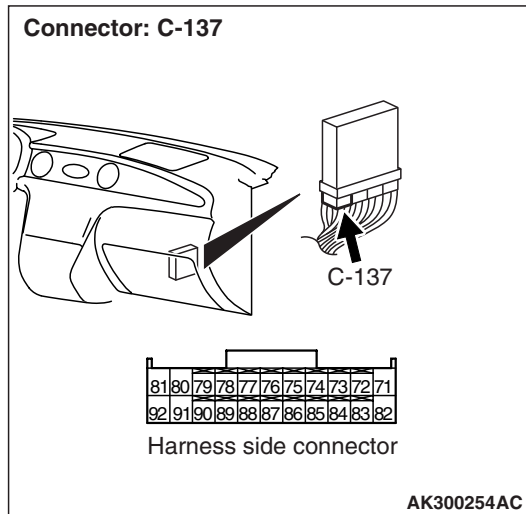
**Altitude 1,800m: 3.0 – 3.4 V**

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

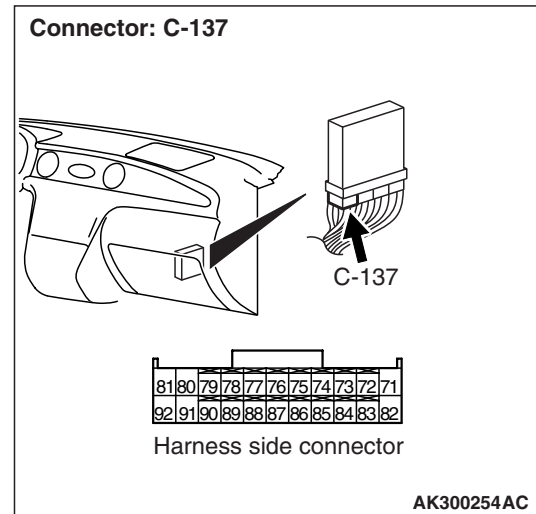
**YES :** Go to Step 21 .

**NO :** Go to Step 20 .

**STEP 20. Connector check: C-137 engine-ECU connector**



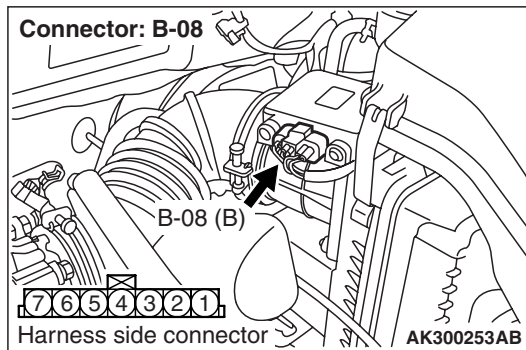
**STEP 21. Connector check: C-137 engine-ECU connector**



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

**YES :** Go to Step 8 .

**NO :** Repair.



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

**YES :** Check and repair harness between B-08 (terminal No. 2) air flow sensor connector and C-137 (terminal No. 85) engine-ECU connector.

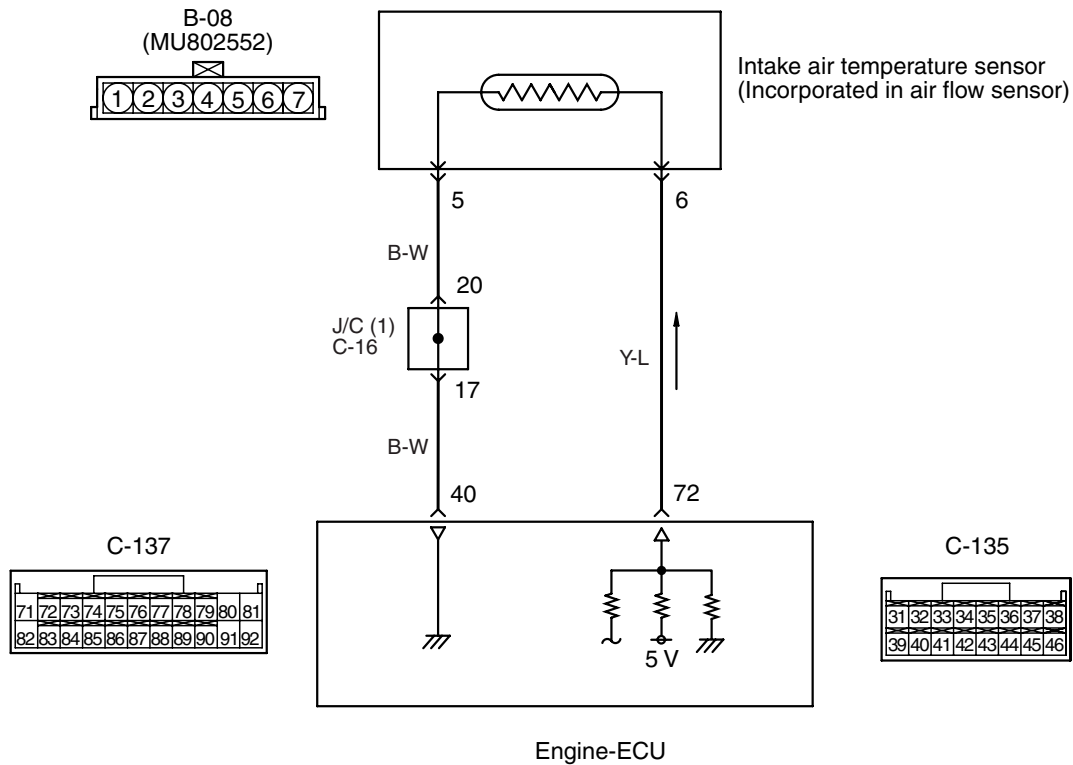
- Check output line for open circuit and damage.

**NO :** Repair.



## Code No. P0110: Intake Air Temperature Sensor System

Intake air temperature sensor circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401026 AB

**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-ECU (terminal No. 72)
- The power voltage is earthed to the engine-ECU (terminal No. 40) 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-ECU.
- In response to the signal, the engine-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**

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

**Judgment Criterion**

- The sensor output voltage is 4.6 V or more (intake air temperature of below  $-45^{\circ}\text{C}$  or equivalent) for 2 seconds.

Or

- The sensor output voltage is 0.2 V or less (intake air temperature above  $125^{\circ}\text{C}$  or equivalent) for 2 seconds.



## PROBABLE CAUSE

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

## DIAGNOSIS PROCEDURE

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

- Refer to Data list reference table [P.13A-293](#).  
a. Item 13: Intake air temperature sensor

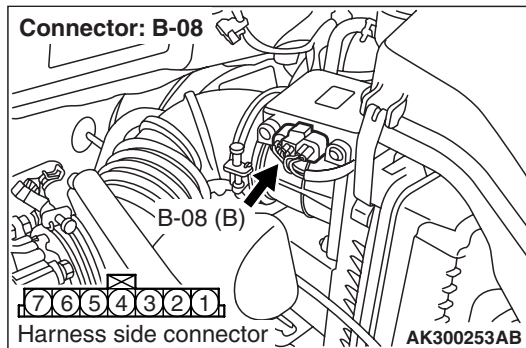
**OK: At ambient temperature (atmospheric temperature) or equivalent.**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**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.

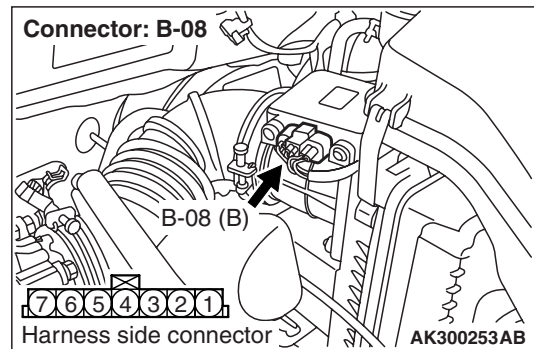
- Check intake air temperature sensor itself (Refer to [P.13A-321](#)).

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

**YES :** Go to Step 4 .

**NO :** Replace air flow sensor.

### STEP 4. Perform resistance measurement at B-08 air flow sensor connector.



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

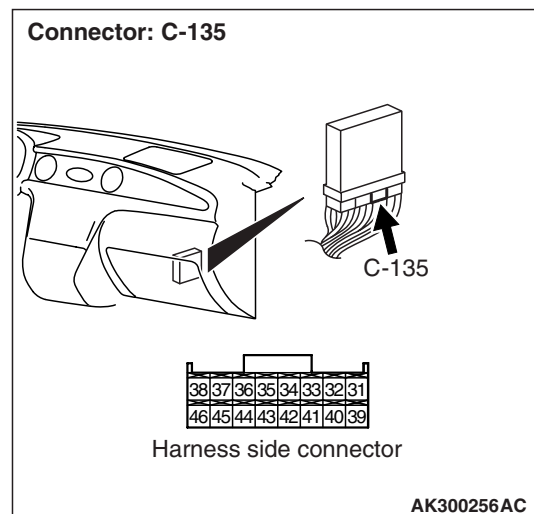
**OK: Continuity (2  $\Omega$  or less)**

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

**YES :** Go to Step 8 .

**NO :** Go to Step 5 .

### STEP 5. Connector check: C-135 engine-ECU connector

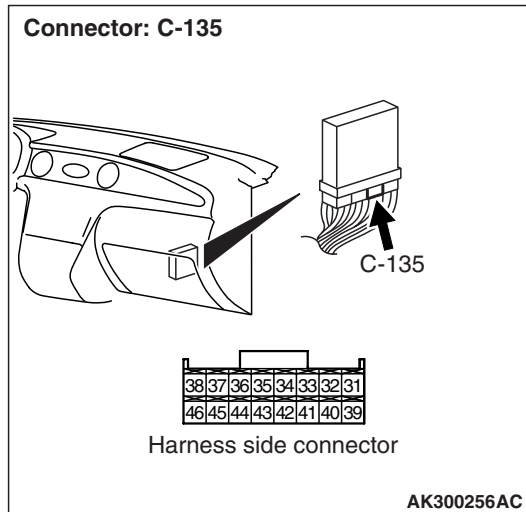
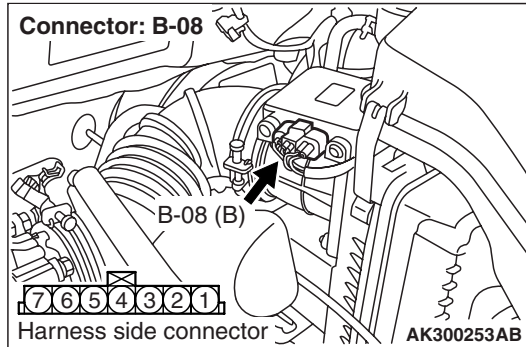


**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Repair.

**STEP 6. Check harness between B-08 (terminal No. 5) air flow sensor connector and C-135 (terminal No. 40) engine-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 7 .

**NO :** Repair.

**STEP 7. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).
  - a. Item 13: Intake air temperature sensor

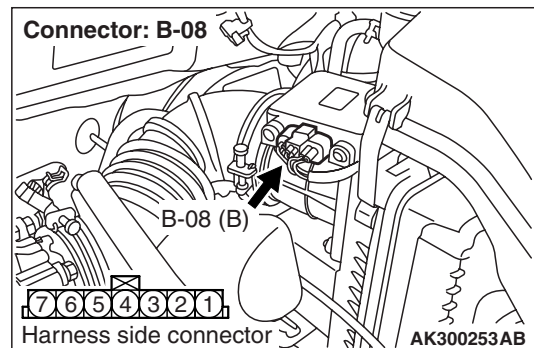
**OK: At ambient temperature (atmospheric temperature) or equivalent.**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

**STEP 8. Perform voltage measurement at B-08 air flow sensor connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 6 and earth.

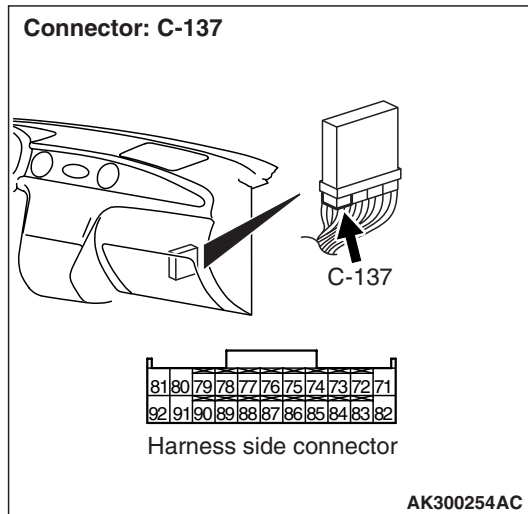
**OK: 4.5 – 4.9 V**

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

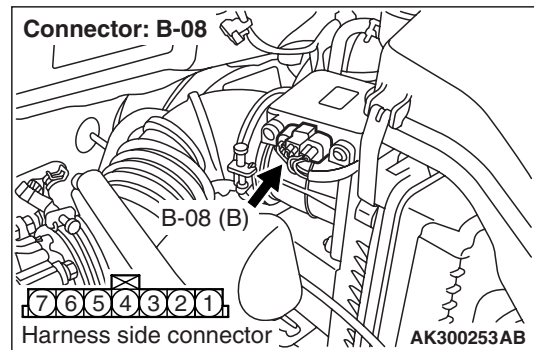
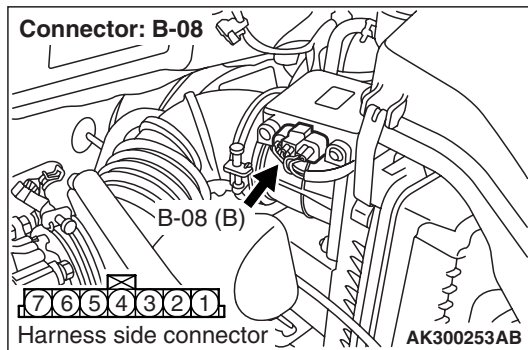
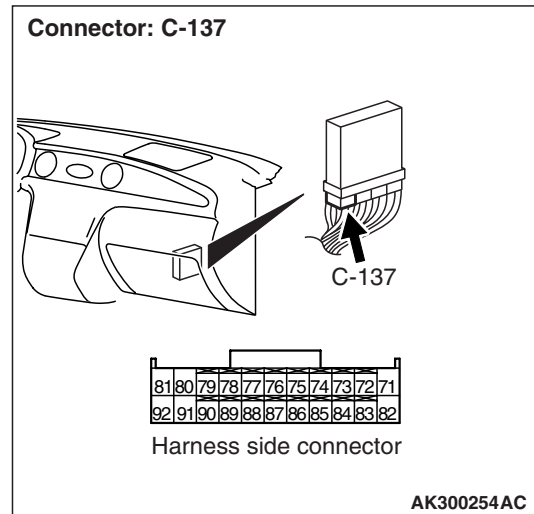
**YES :** Go to Step 13 .

**NO :** Go to Step 9 .

**STEP 9. Perform voltage measurement at C-137 engine-ECU connector.**



**STEP 10. Connector check: C-137 engine-ECU connector**



- Measure engine-ECU terminal voltage.
- Disconnect B-08 air flow sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 72 and earth.

**OK: 4.5 – 4.9 V**

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

**YES :** Go to Step 10 .

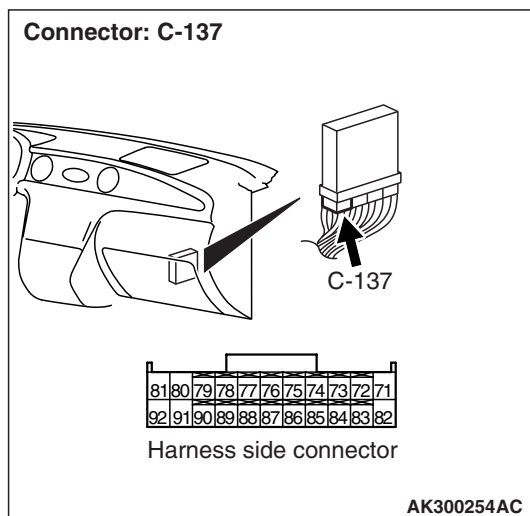
**NO :** Go to Step 11 .

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

**YES :** Check and repair harness between B-08 (terminal No. 6) air flow sensor connector and C-137 (terminal No. 72) engine-ECU connector.

- Check output line for open circuit.

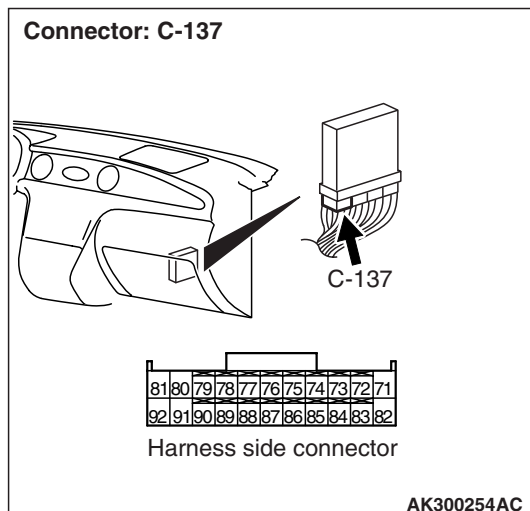
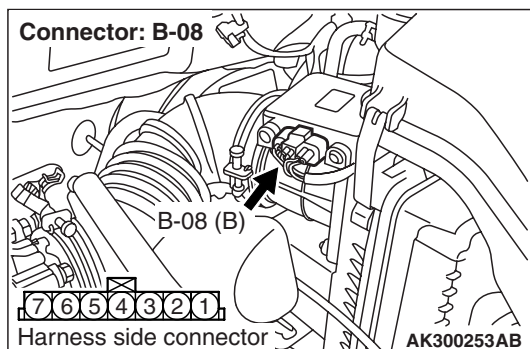
**NO :** Repair.

**STEP 11. Connector check: C-137 engine-ECU connector**

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

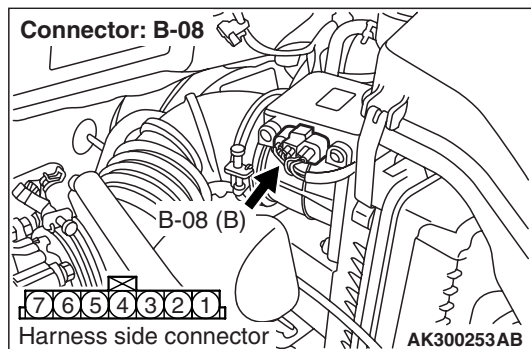
**STEP 12. Check harness between B-08 (terminal No. 6) air flow sensor connector and C-137 (terminal No. 72) engine-ECU connector.**

- Check output line for short circuit.

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

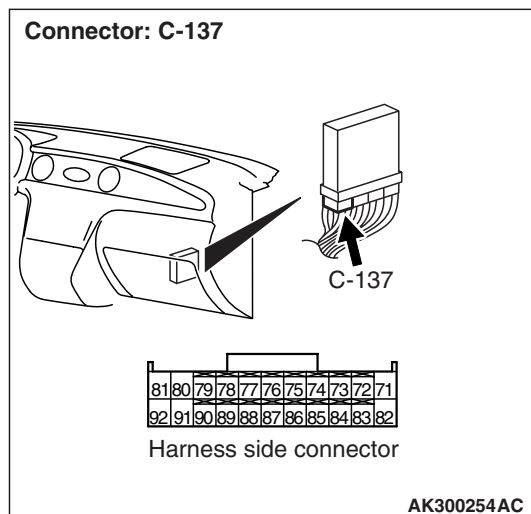
Ambient temperature at  $60^{\circ}\text{C}$ : 0.8 – 1.4 V

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 .

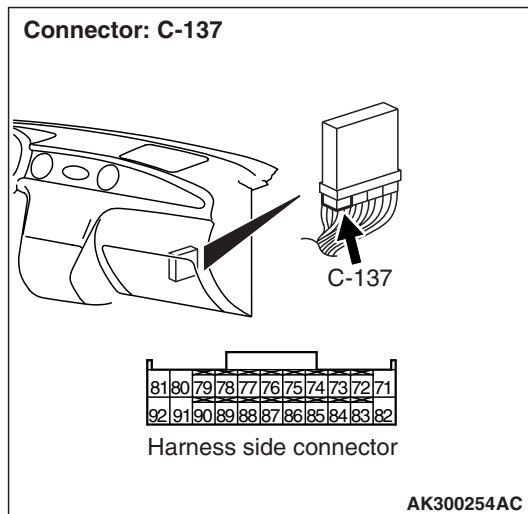
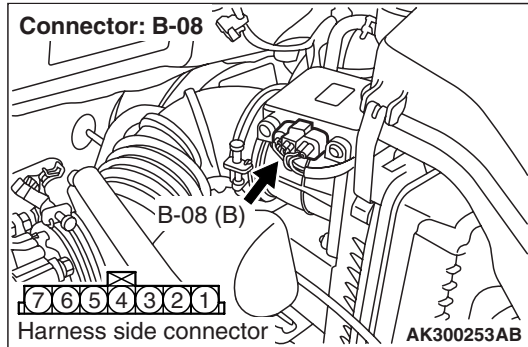
**STEP 14. Connector check: C-137 engine-ECU connector**

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-137 (terminal No. 72) engine-ECU connector.**



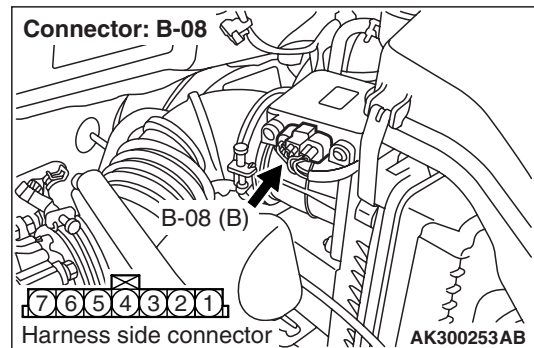
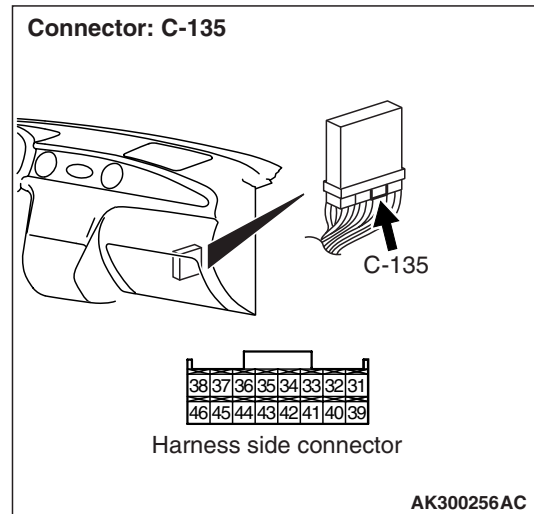
- Check output line for damage.

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

**YES :** Go to Step 16 .

**NO :** Repair.

**STEP 16. Connector check: C-135 engine-ECU connector**



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

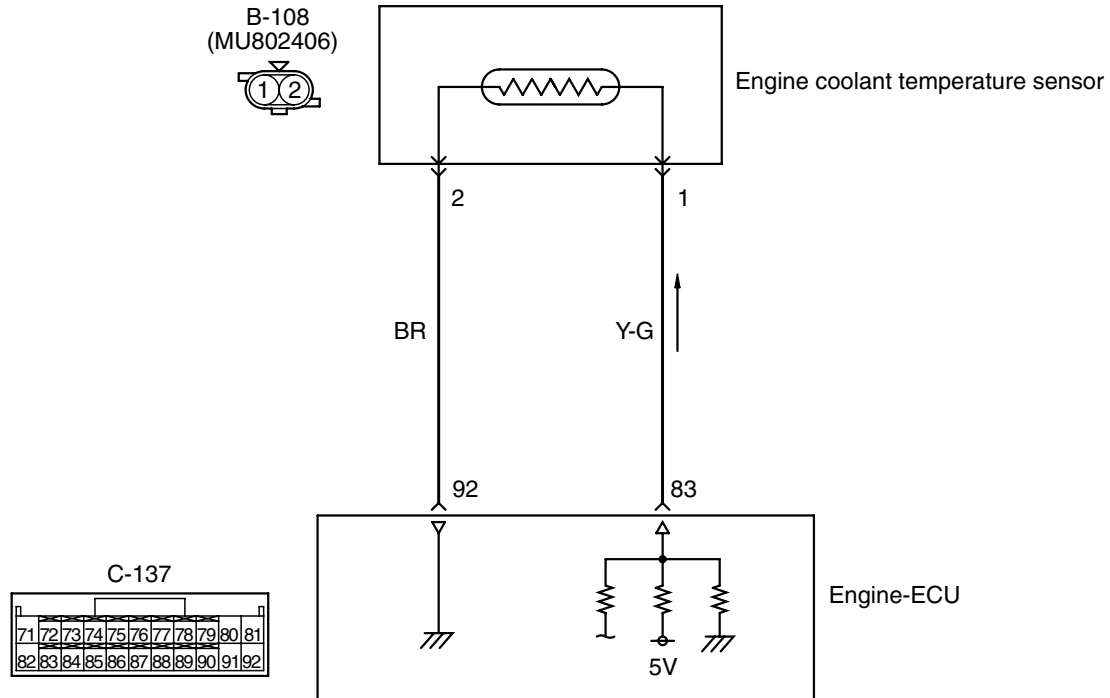
**YES :** Check intermediate connector C-16 and repair if necessary. If intermediate connector is normal, check and repair harness between B-08 (terminal No. 5) air flow sensor connector and C-135 (terminal No. 40) engine-ECU connector.

- Check earthing line for damage.

**NO :** Repair.

## Code No. P0115: Engine Coolant Temperature Sensor System

Engine coolant temperature sensor circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK300260 AB

**OPERATION**

- A power voltage of 5 V is applied to the engine coolant temperature sensor output terminal (terminal No. 1) from the engine-ECU (terminal No. 83).
- The power voltage is earthed to the engine-ECU (terminal No. 92) 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-ECU.
- In response to the signal, the engine-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**

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

**Judgment Criterion**

- The sensor output voltage is 4.6 V or more (water temperature of below  $-45^{\circ}\text{C}$  or equivalent) for 2 seconds.

Or

- The sensor output voltage of 0.1 V or less (water temperature of above  $140^{\circ}\text{C}$  or equivalent) for 2 seconds.



### Check Condition

- After the engine has started up.

### Judging Conditions

- The sensor output voltage rises 1.6 V or more (engine coolant temperature below 40°C or equivalent) from 1.6 V or less (engine coolant temperature above 40°C or equivalent).

### PROBABLE CAUSE

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

### DIAGNOSIS PROCEDURE

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

- Refer to Data list reference table [P.13A-293](#).
  - Item 21: Engine coolant temperature sensor

#### OK:

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

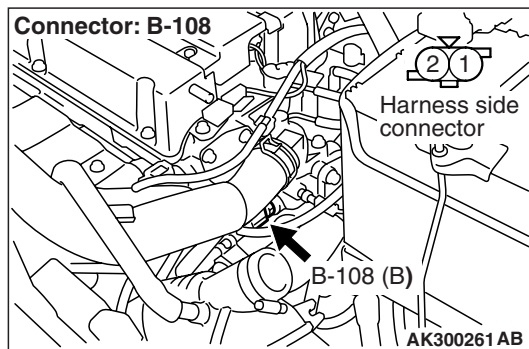
Engine hot state: At 80 – 120°C

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

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

NO : Go to Step 2 .

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

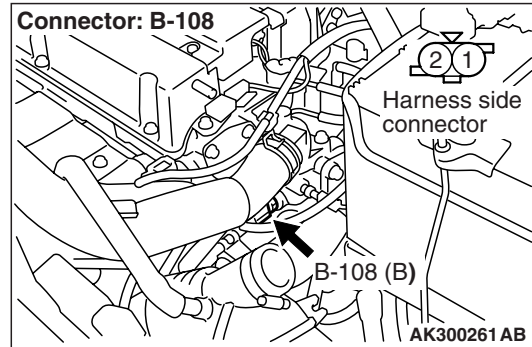


#### Q: Is the check result normal?

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. 2.

#### OK:

Engine coolant temperature at -20°C: 14 – 17 kΩ

Engine coolant temperature at 0°C: 5.1 – 6.5 kΩ

Engine coolant temperature at 20°C: 2.1 – 2.7 kΩ

Engine coolant temperature at 40°C: 0.9 – 1.3 kΩ

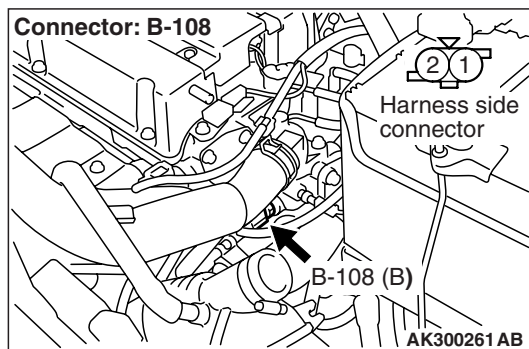
Engine coolant temperature at 60°C: 0.48 – 0.68 kΩ

Engine coolant temperature at 80°C: 0.26 – 0.36 kΩ

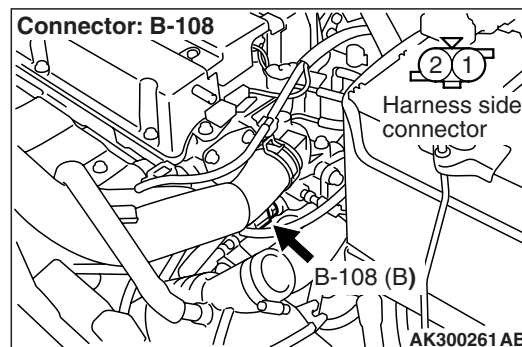
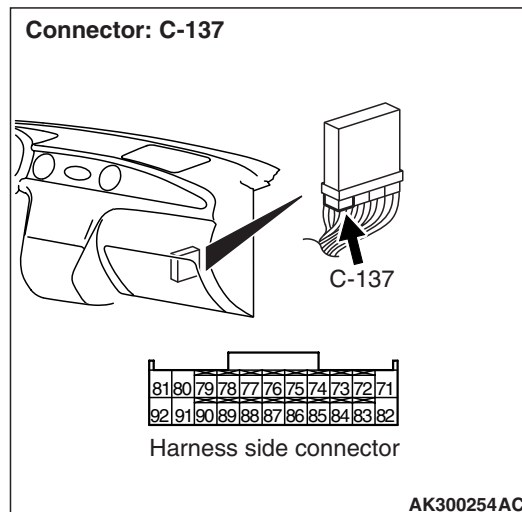
#### Q: Is the check result normal?

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.

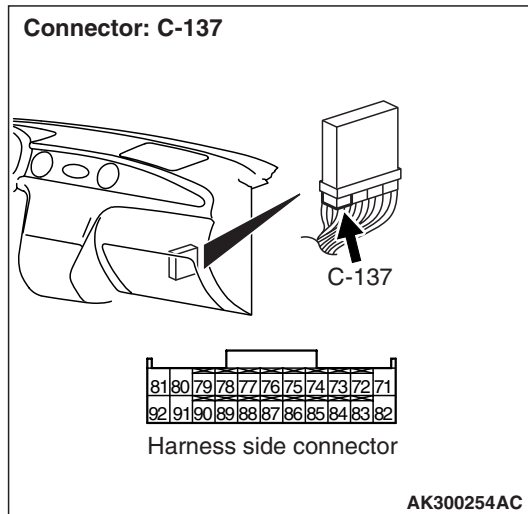
**OK: 4.5 – 4.9 V****Q: Is the check result normal?****YES :** Go to Step 10 .**NO :** Go to Step 5 .**STEP 5. Perform voltage measurement at C-137 engine-ECU connector.**

- Measure engine-ECU terminal voltage.
- Disconnect B-108 engine coolant temperature sensor.
- Ignition switch: ON
- Voltage between terminal No. 83 and earth.

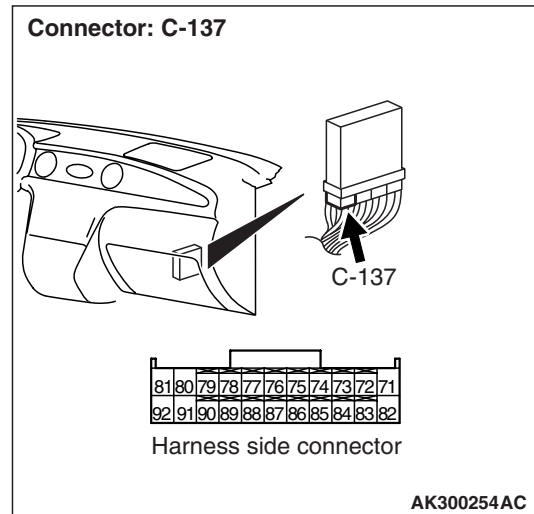
**OK: 4.5 – 4.9 V****Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Go to Step 7 .



**STEP 6. Connector check: C-137 engine-ECU connector**



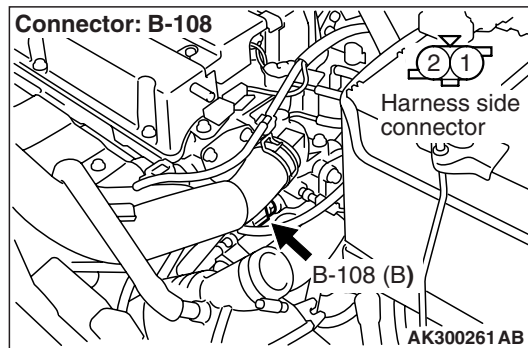
**STEP 7. Connector check: C-137 engine-ECU connector**



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

**YES :** Go to Step 8 .

**NO :** Repair.



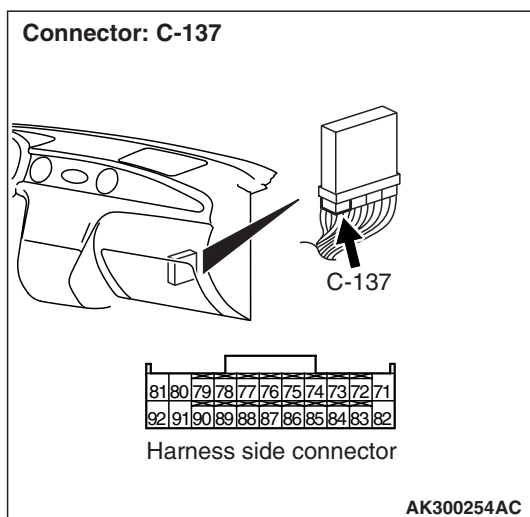
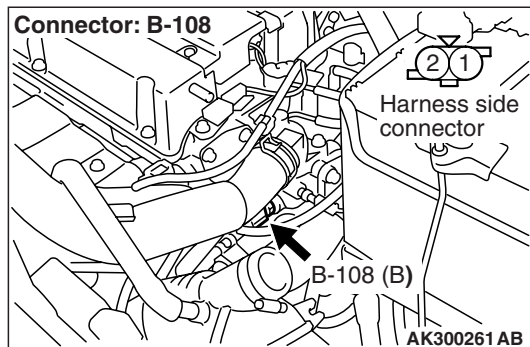
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-137 (terminal No. 83) engine-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 8. Check harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-137 (terminal No. 83) engine-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

- Refer to Data list reference table [P.13A-293](#).
  - Item 21: Engine coolant temperature sensor

**OK:**

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

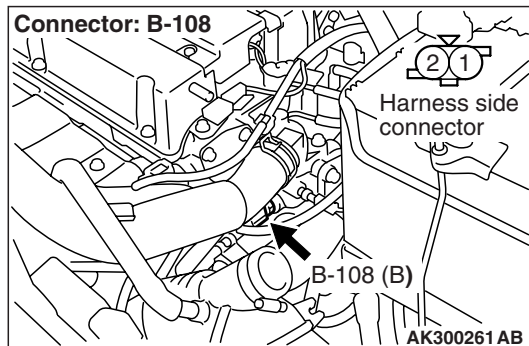
**Engine hot state:** At 80 – 120 °C

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

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



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

**OK: Continuity (2 Ω or less)**

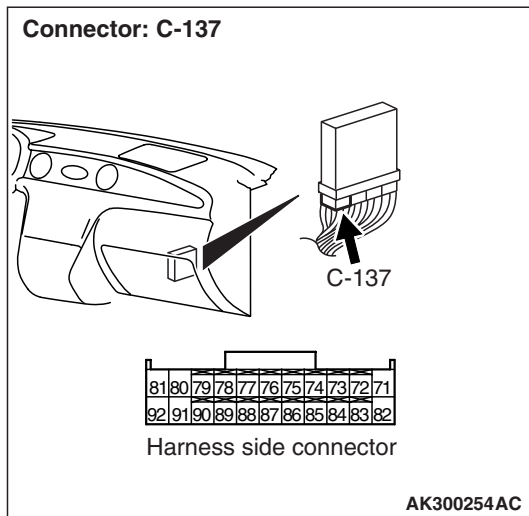
**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Go to Step 11 .

#### STEP 11. Connector check: C-137 engine-ECU connector

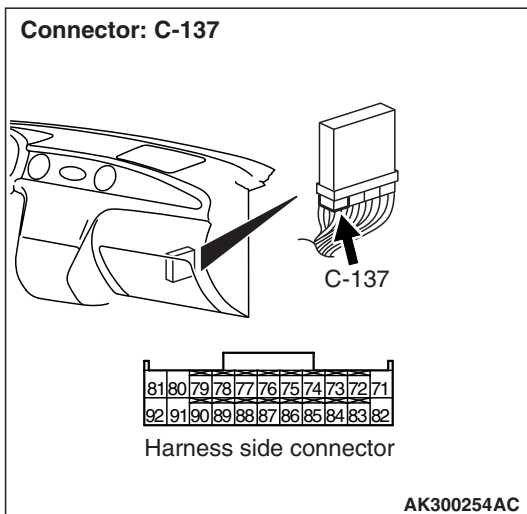
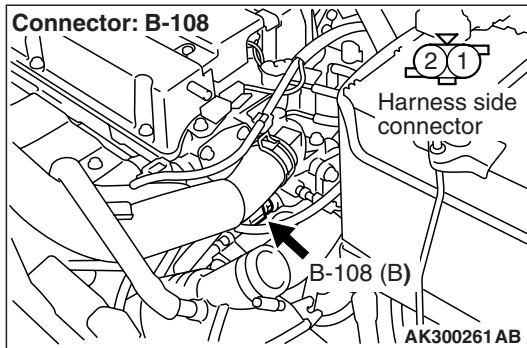
**Q: Is the check result normal?**



**YES :** Go to Step 12 .

**NO :** Repair.

**STEP 12. Check harness between B-108 (terminal No. 2) engine coolant temperature sensor connector and C-137 (terminal No. 92) engine-ECU connector.**



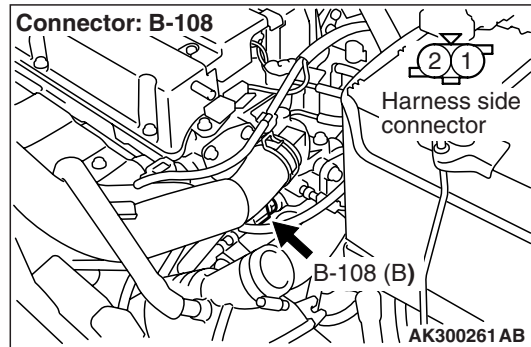
- Check earthing line for open circuit and damage.

**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**

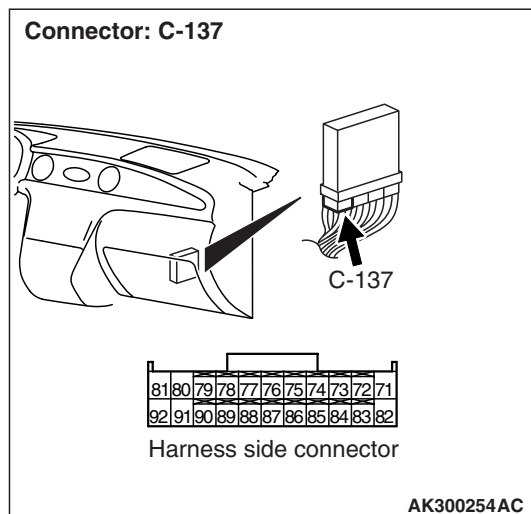
**Engine coolant temperature at 80°C: 0.3 – 0.9 V**

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

**YES :** Go to Step 9 .

**NO :** Go to Step 14 .

**STEP 14. Connector check: C-137 engine-ECU connector**

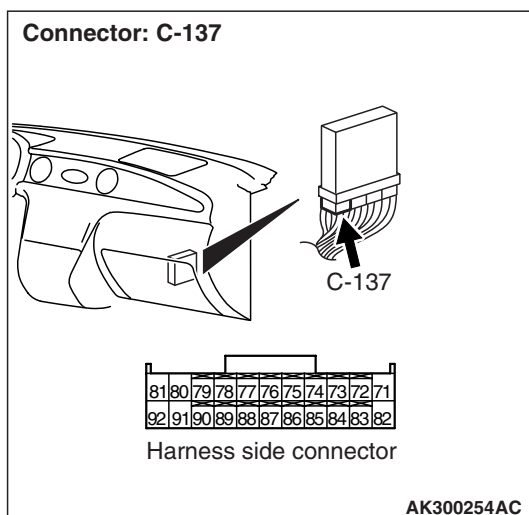
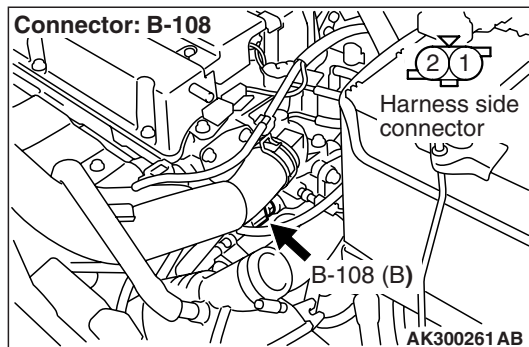


**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Repair.

**STEP 15. Check harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-137 (terminal No. 83) engine-ECU connector.**



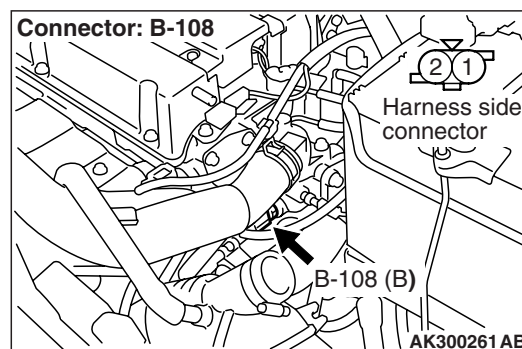
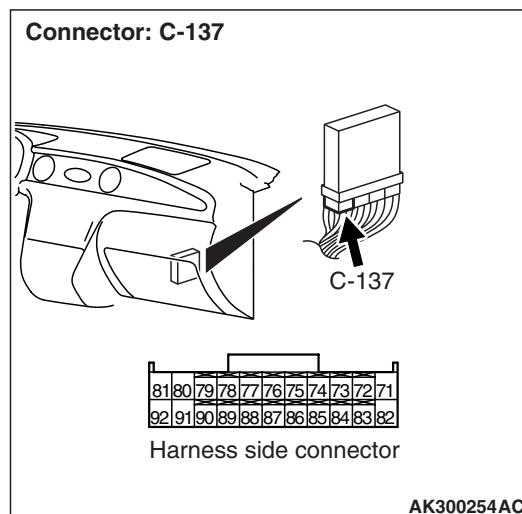
- Check output line for damage.

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

**YES :** Go to Step 16 .

**NO :** Repair.

**STEP 16. Connector check: C-137 engine-ECU connector**



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

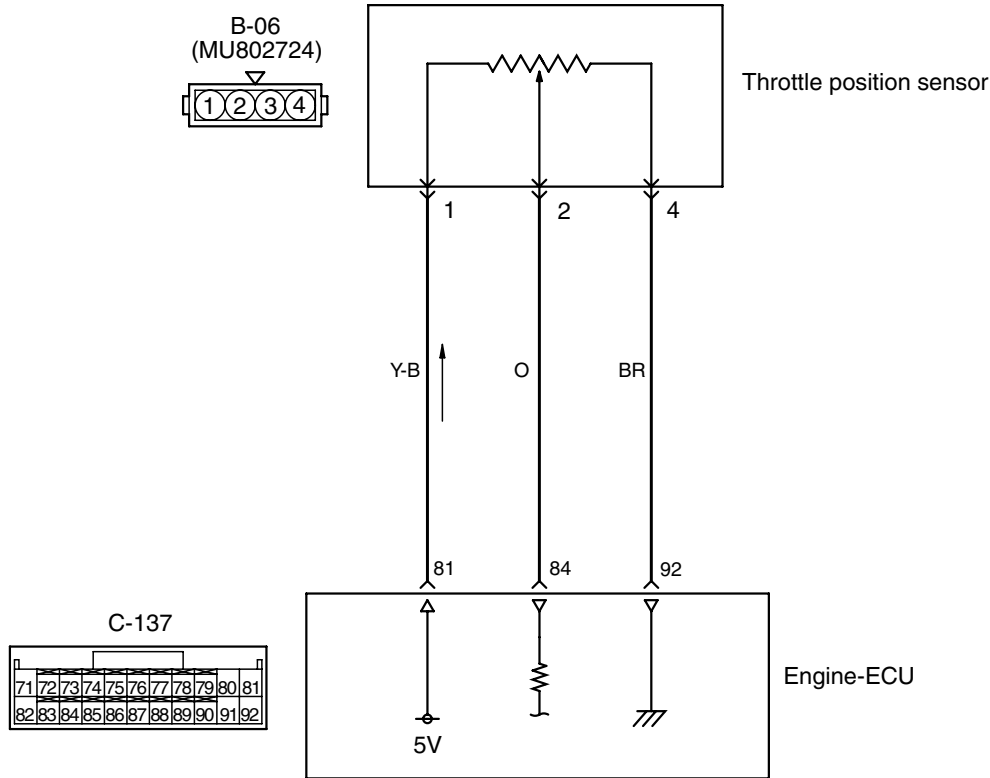
**YES :** Check harness between B-108 (terminal No. 2) engine coolant temperature sensor connector and C-137 (terminal No. 92) engine-ECU connector.

- Check earthing line for damage.

**NO :** Repair.

**Code No. P0120: Throttle Position Sensor System**

Throttle position sensor circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK300262 AB

**OPERATION**

- A power voltage of 5 V is applied to the throttle position sensor (terminal No. 1) from the engine-ECU (terminal No. 81).
- The power voltage is earthed to the engine-ECU (terminal No. 92) from the throttle position sensor (terminal No. 4).
- The sensor signal is inputted to the engine-ECU (terminal No. 84) 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-ECU.
- In response to the signal, the engine-ECU checks the opening of the throttle valve.

**TROUBLE JUDGMENT**

**Check Condition**

- Ignition switch: ON

Or

- Excluding 2 seconds after the ignition switch has been in "ON" position or just after the engine has started up.

**Judgment Criteria**

- The sensor output voltage is 0.2 V or less for 2 seconds.

Or

- When the engine speed is 1,000 r/min or less and the charging efficiency is 40% or less, the throttle position sensor output voltage is 4.4 V or more for 2 seconds.

**PROBABLE CAUSE**

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

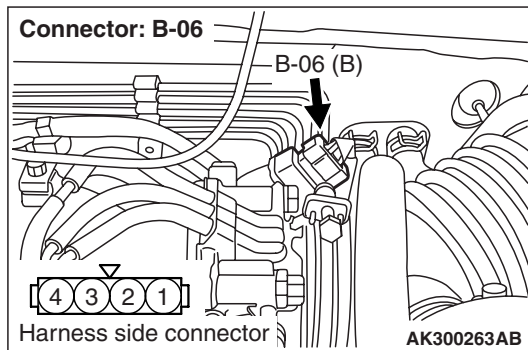
**DIAGNOSIS PROCEDURE****STEP 1. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).
  - 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.00-6](#)).

**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.

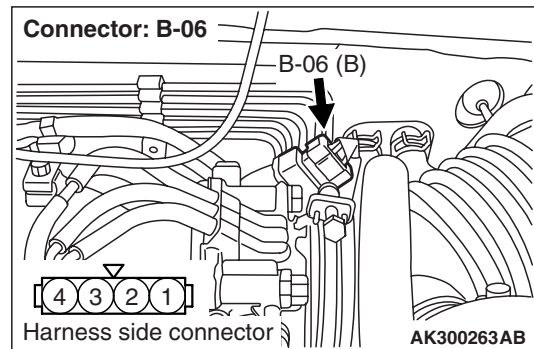
**STEP 3. Check throttle position sensor itself.**

- Check throttle position sensor itself (Refer to [P.13A-322](#)).

**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.**

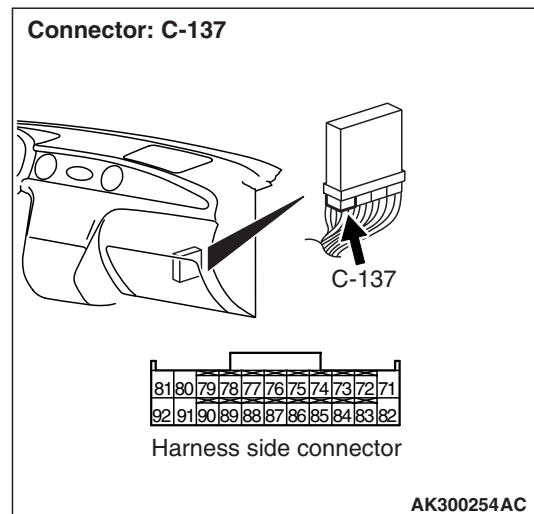
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: 4.9 – 5.1 V**

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

**YES** : Go to Step 10 .

**NO** : Go to Step 5 .

**STEP 5. Perform voltage measurement at C-137 engine-ECU connector.**

- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 81 and earth.

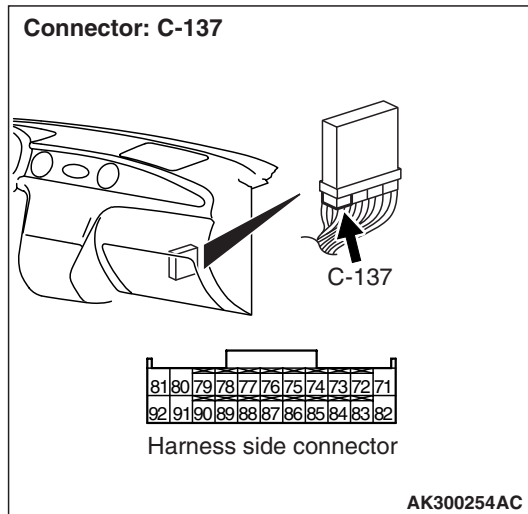
**OK: 4.9 – 5.1 V**

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

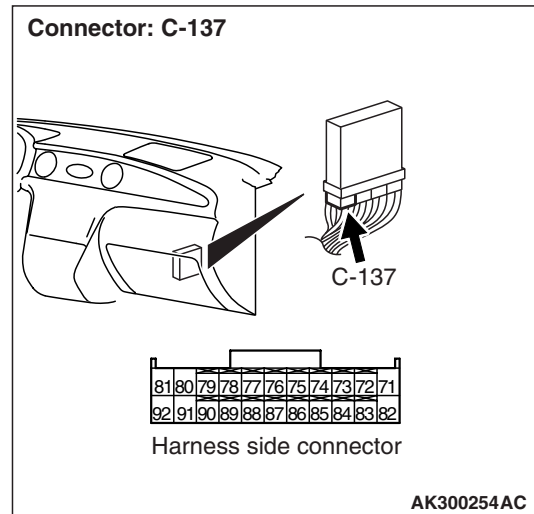
**YES** : Go to Step 6 .

**NO** : Go to Step 7 .

**STEP 6. Connector check: C-137 engine-ECU connector**



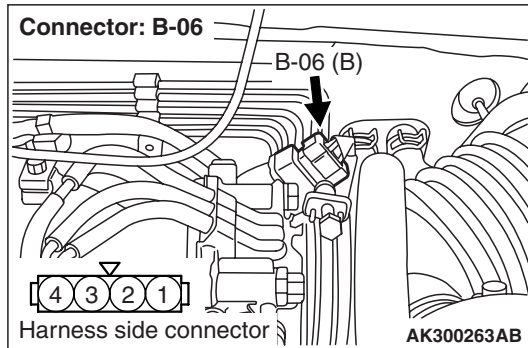
**STEP 7. Connector check: C-137 engine-ECU connector**



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

**YES :** Go to Step 8 .

**NO :** Repair.



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

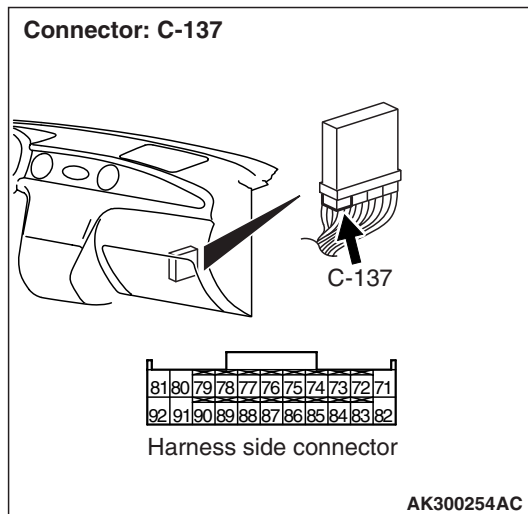
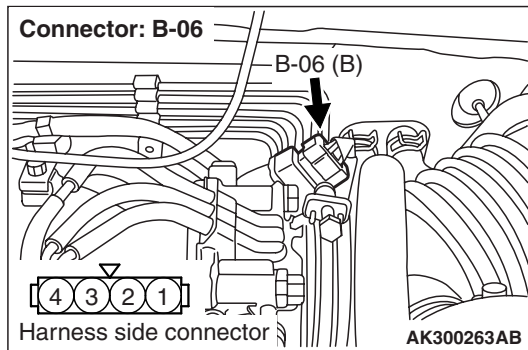
**YES :** Check and repair harness between B-06 (terminal No. 1) throttle position sensor connector and C-137 (terminal No. 81) engine-ECU connector.

- Check power supply line for open circuit.

**NO :** Repair.



**STEP 8. Check harness between B-06 (terminal No. 1) throttle position sensor connector and C-137 (terminal No. 81) engine-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

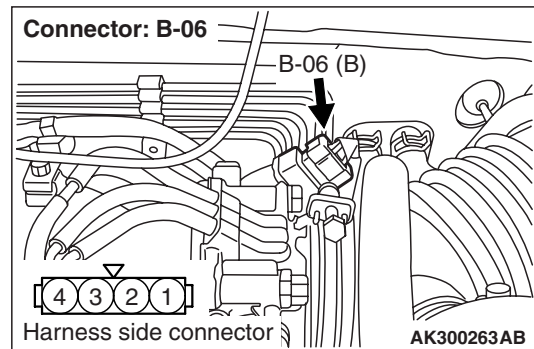
- Refer to Data list reference table [P.13A-293](#).
  - Item 14: Throttle position sensor

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-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.

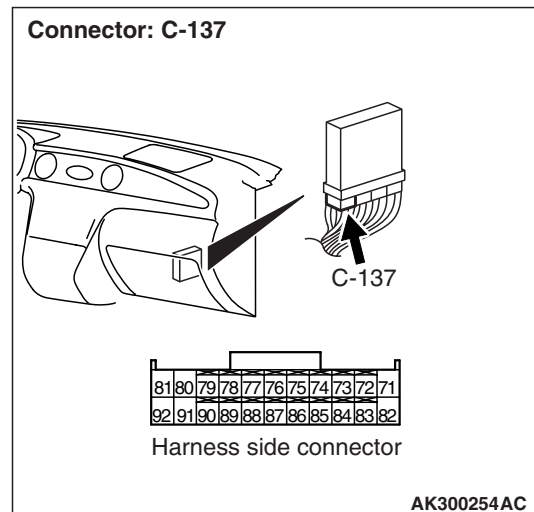
**OK: Continuity (2  $\Omega$  or less)**

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

**YES :** Go to Step 13 .

**NO :** Go to Step 11 .

**STEP 11. Connector check: C-137 engine-ECU connector**



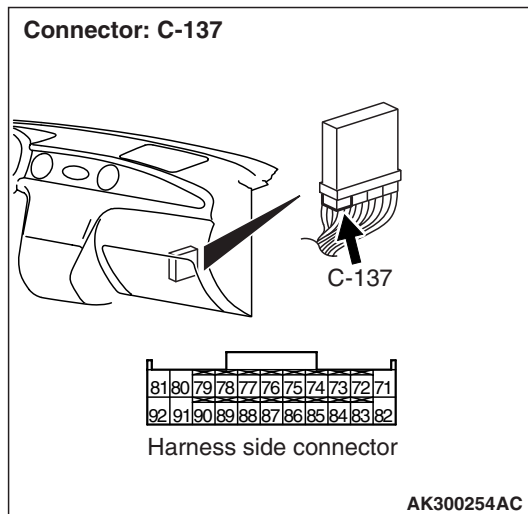
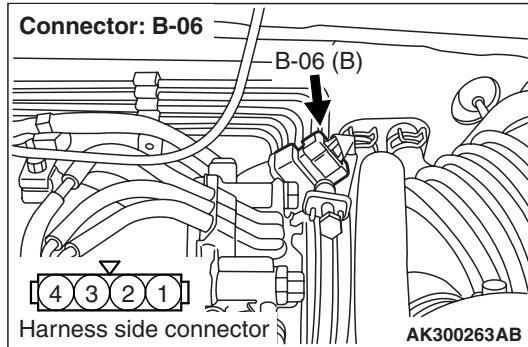
**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Repair.



**STEP 12. Check harness between B-06 (terminal No. 4) throttle position sensor connector and C-137 (terminal No. 92) engine-ECU connector.**



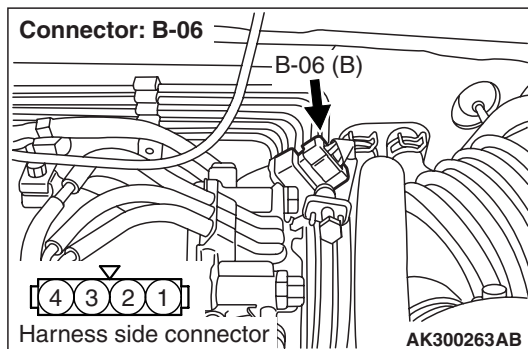
- Check earthing line for open circuit and damage.

**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.

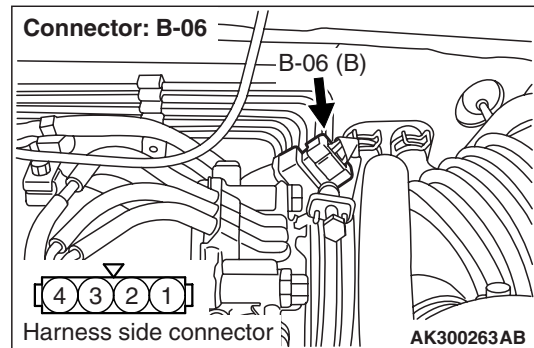
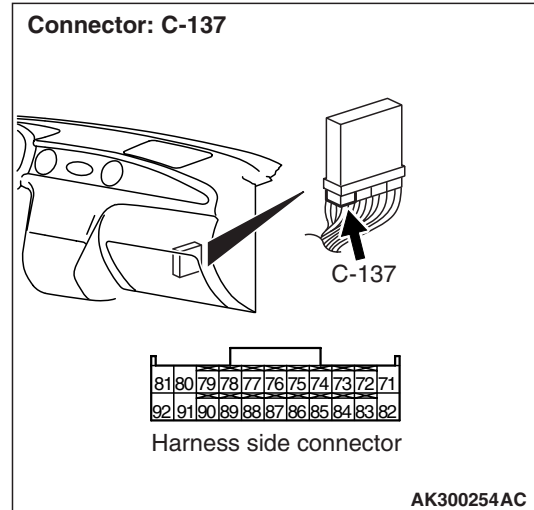
**OK: 4.9 – 5.1 V**

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

**YES :** Go to Step 15 .

**NO :** Go to Step 14 .

**STEP 14. Connector check: C-137 engine-ECU connector**

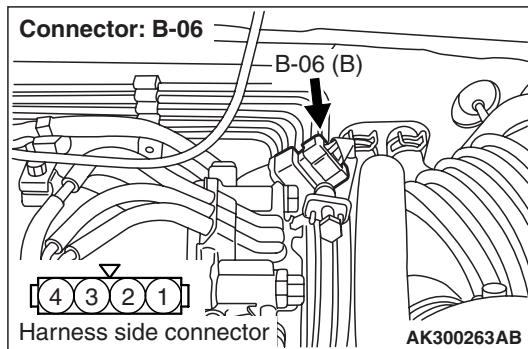


**Q: Is the check result normal?**

**YES :** Check and repair harness between B-06 (terminal No. 1) throttle position sensor connector and C-137 (terminal No. 81) engine-ECU connector.

- Check power supply line for damage.

**NO :** Repair.

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

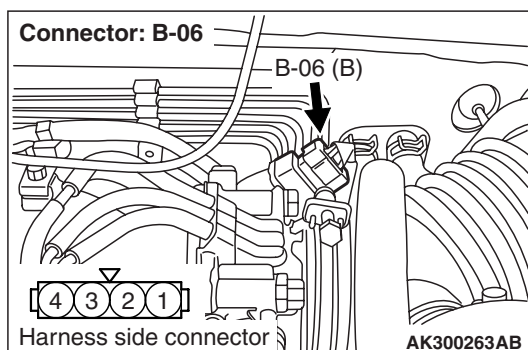
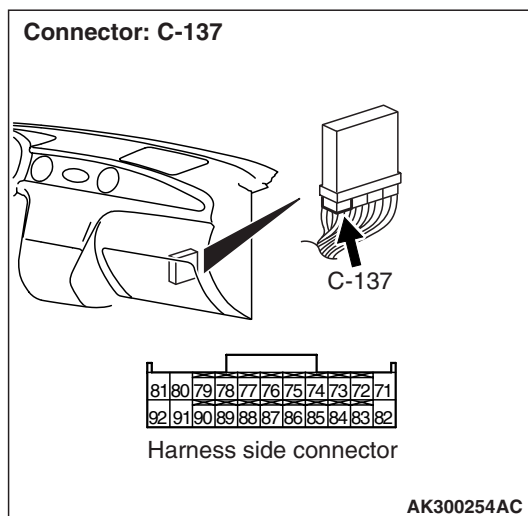
- Use special tool test harness (MB991536) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

**OK: 0.5 V or less**

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

**YES :** Go to Step 17 .

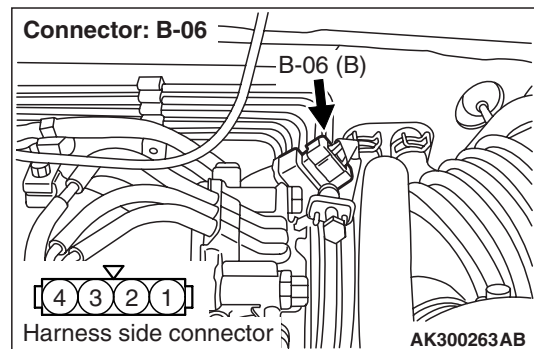
**NO :** Go to Step 16 .

**STEP 16. Connector check: C-137 engine-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-137 (terminal No. 92) engine-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: 0.535 – 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**

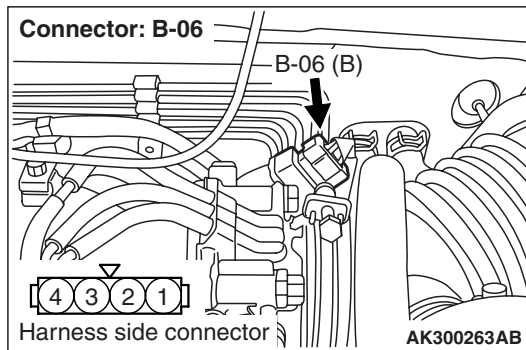
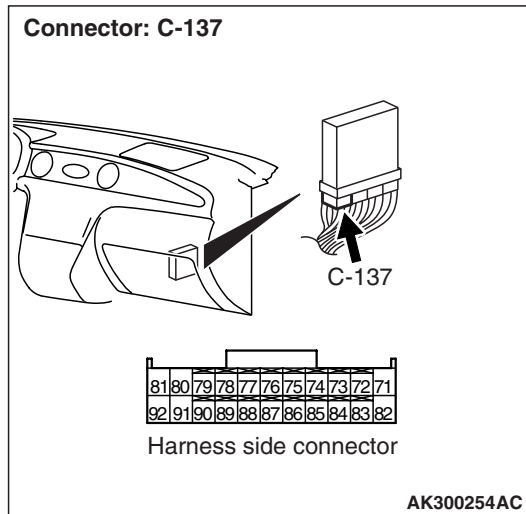
- Adjust throttle position sensor (Refer to [P.13A-315](#)).

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

**YES :** Go to Step 19 .

**NO :** Adjust throttle position sensor.

**STEP 19. Connector check: C-137 engine-ECU connector**



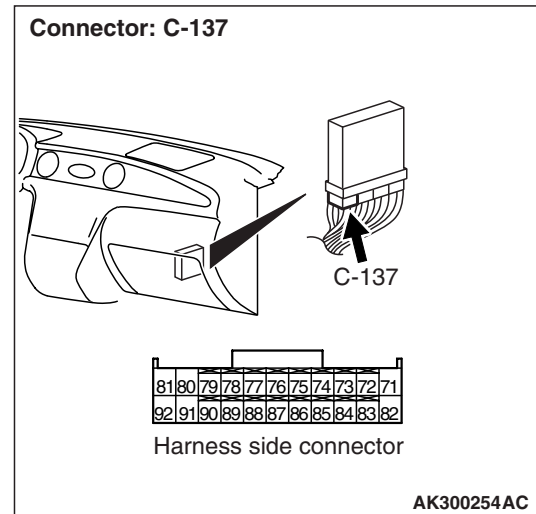
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-06 (terminal No. 2) throttle position sensor connector and C-137 (terminal No. 84) engine-ECU connector.

- Check output line for short circuit and damage.

**NO :** Repair.

**STEP 20. Perform voltage measurement at C-137 engine-ECU connector**



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 84 and earth.

**OK:**

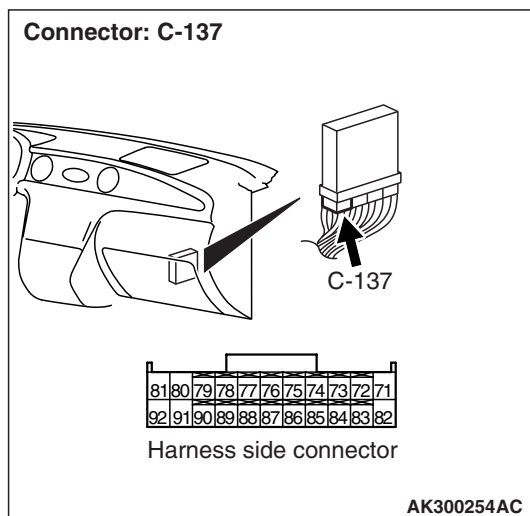
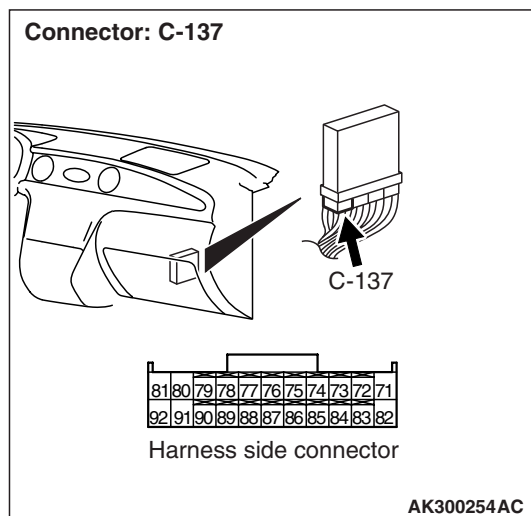
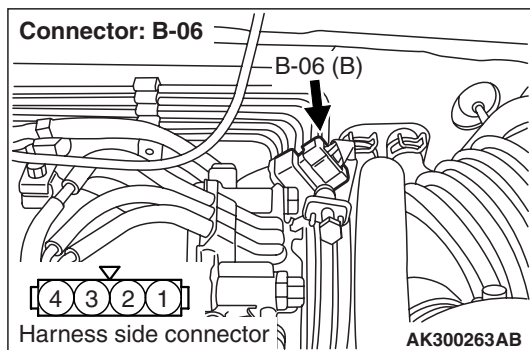
**Accelerator pedal fully released: 0.535 – 0.735 V**

**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-137 engine-ECU connector****STEP 22. Connector check: C-137 engine-ECU connector****Q: Is the check result normal?****YES :** Go to Step 9 .**NO :** Repair.**Q: Is the check result normal?**

**YES :** Check and repair harness between B-06 (terminal No. 2) throttle position sensor connector and C-137 (terminal No. 84) engine-ECU connector.

- Check output line for open circuit and damage.

**NO :** Repair.

---

**Code No. P0125: Feedback system monitor**

---

**OPERATION**

- Refer to P0201 injector circuit [P.13A-87](#).
- Refer to P0202 injector circuit [P.13A-92](#).  
Refer to P0203 injector circuit [P.13A-97](#).  
Refer to P0204 injector circuit [P.13A-102](#).
- Refer to P0130 Oxygen sensor (front) circuit [P.13A-61](#).

**FUNCTION**

- The engine-ECU effects air-fuel ratio feedback control in accordance with the signals from the heater oxygen sensor (front).
- If the heated oxygen sensor (front) has deteriorated, corrections will be made by the heated oxygen sensor (rear).
- diagnosis code P0125 becomes stored in memory if a failure is detected in the above air/fuel ratio feedback control system.

**TROUBLE JUDGMENT**

**Check Conditions**

- The engine coolant temperature approximately 82°C or more.
- Within the range of air-fuel ratio feedback operation.
- Not in low speed operation.

**Judgment Criteria**

- The oxygen sensor output voltage is not deviated from 0.5 V for 30 seconds.

**PROBABLE CAUSE**

- Failed oxygen sensor (front)
- Harness damage in oxygen sensor (front) circuit or loose connector contact
- Failed oxygen sensor (rear)

*NOTE: When the oxygen sensor (front) begins to deteriorate, the oxygen sensor output voltage will deviate from the voltage when the sensor was new (normally 0.5 volt at stoichiometric ratio). This deviation will be corrected by the oxygen sensor (rear). If the oxygen sensor (rear) responds poorly because it has deteriorated, it will improperly correct the oxygen sensor (front). Thus, even when closed loop control is being effected, the fluctuation of the oxygen sensor (front) output voltage decreases, without intersecting with 0.5 volt. As a result, there is a possibility of diagnosis code P0125 becoming registered.*

- Failed fuel system
- Failed exhaust system
- Failed engine-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. M.U.T.-II/III diagnosis code**

- Q: Is any other diagnosis code than P0170 output?**  
**YES** : Inspection chart for diagnosis code (Refer to [P.13A-15](#)).  
**NO** : Go to Step 2 .

---

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

- Refer to Data list reference table [P.13A-293](#).
- a. Item 12: Air flow sensor
  - b. Item 21: Engine coolant temperature sensor
  - c. Item 25: Barometric pressure sensor
  - d. Item 69: Oxygen sensor (rear)

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

- YES** : Go to Step 3 .  
**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-15](#)).

---

**STEP 3.Check for intake of air from intake hose and inlet manifold.**

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

- YES** : Go to Step 4 .  
**NO** : Repair.

---

**STEP 4.Check for leakage of exhaust emission from exhaust manifold.**

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

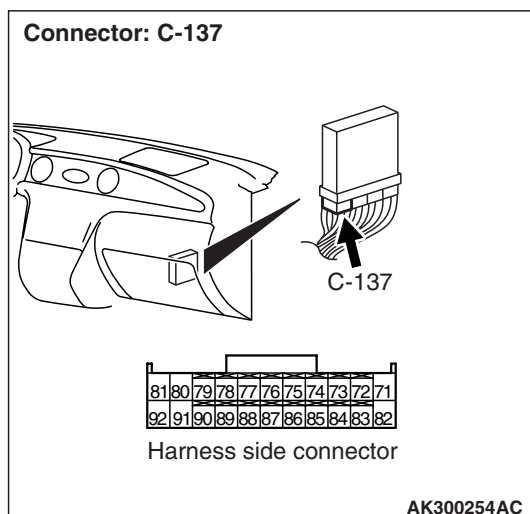
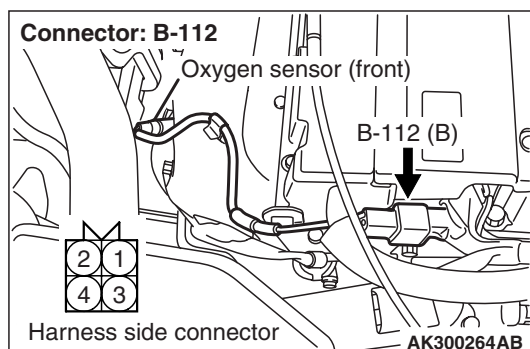
- YES** : Go to Step 5 .  
**NO** : Repair.

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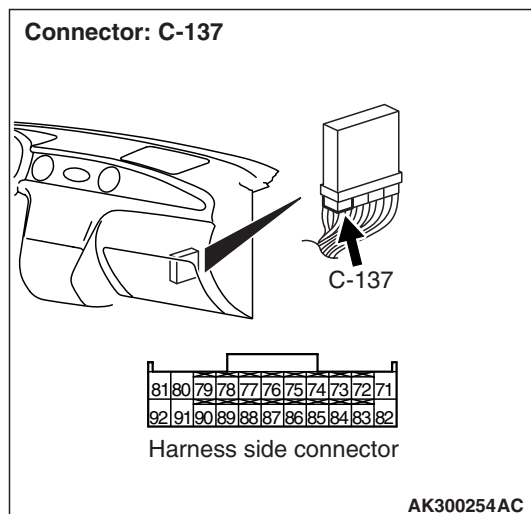
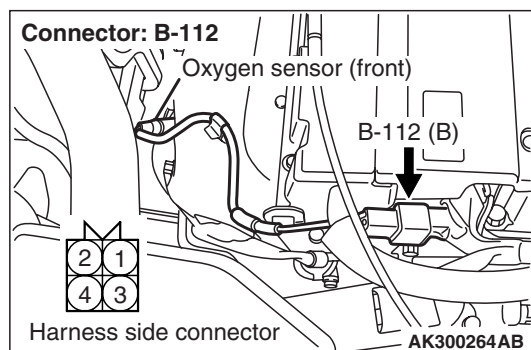
**STEP 5.Check throttle body (throttle valve portion) for contamination.**

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

- YES** : Go to Step 6 .  
**NO** : Clean throttle body (throttle valve portion) (Refer to [P.13A-315](#)).

**STEP 6. Connector check: B-112 oxygen sensor (front) connector, C-137 engine-ECU connector****Q: Is the check result normal?****YES :** Go to Step 7 .**NO :** Repair.**STEP 7. Check oxygen sensor (front) itself.**

- Check oxygen sensor (front) itself (Refer to [P.13A-323](#)).

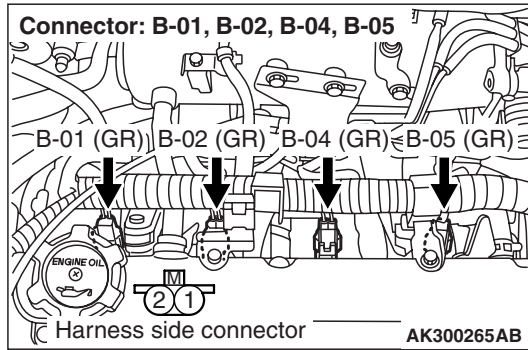
**Q: Is the check result normal?****YES :** Go to Step 8 .**NO :** Replace oxygen sensor (front).**STEP 8. Check harness between B-112 oxygen sensor (front) connector and C-137 engine-ECU connector.**

- Check output line for damage.

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



**STEP 9. Connector check: 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: Is the check result normal?**

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

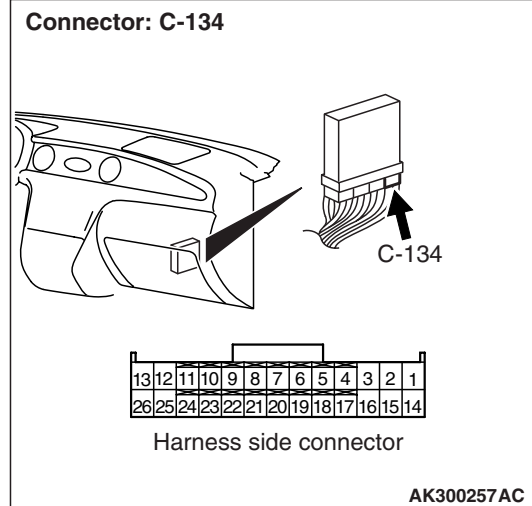
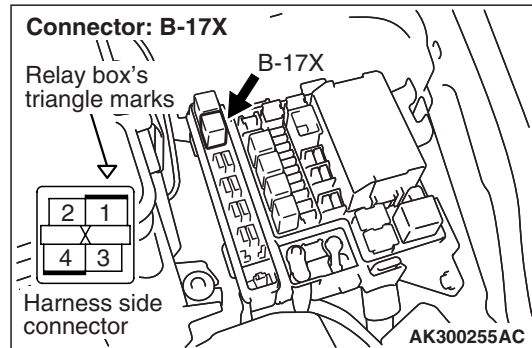
**STEP 10. Check injector itself.**

- Check Injector itself (Refer to [P.13A-325](#)).

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

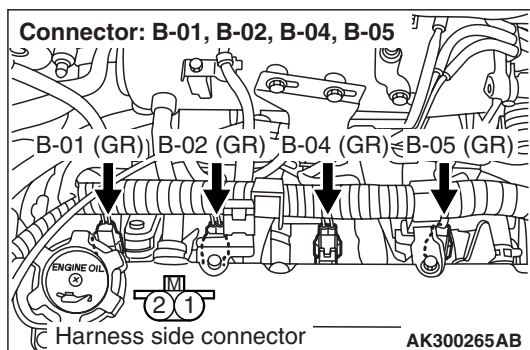
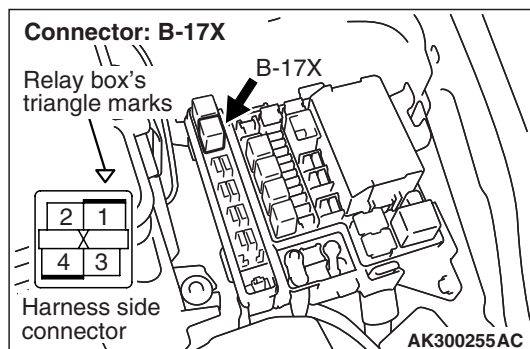
**YES :** Go to Step 11 .  
**NO :** Replace injector.

**STEP 11. Connector check: B-17X engine control relay connector and C-134 engine-ECU connector.**



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

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

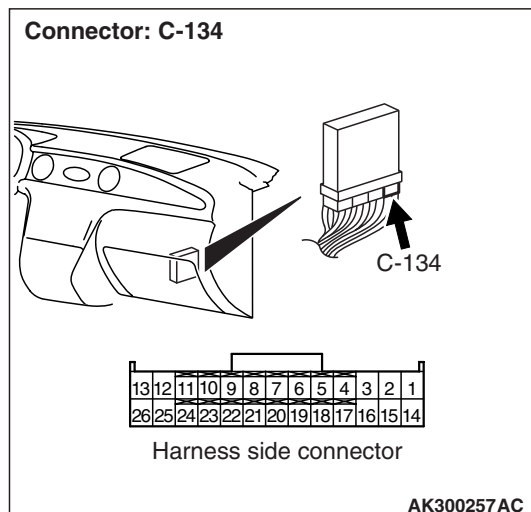
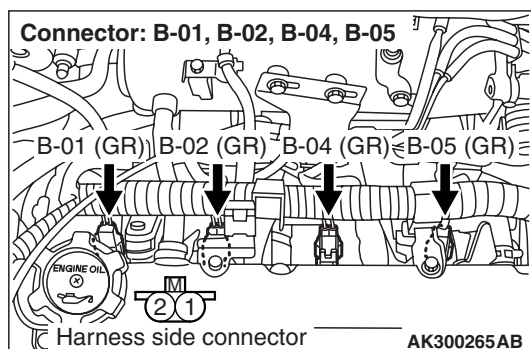
**STEP 12. Check harness between B-17X engine control relay connector and injector connector.**

- 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 13 .

**NO :** Repair.

**STEP 13. Check harness between injector connector and C-134 engine-ECU connector.**

- Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-134 (terminal No. 1) engine-ECU connector.
- Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-134 (terminal No. 14) engine-ECU connector.
- Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-134 (terminal No. 2) engine-ECU connector.
- Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-134 (terminal No. 15) engine-ECU connector.

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

**YES :** Go to Step 14 .

**NO :** Repair.

**STEP 14. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to P.13A-316).

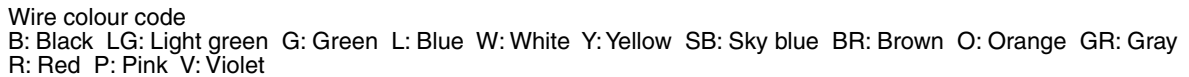
**Q: Is the check result normal?**

**YES :** Repair.

**NO :** Replace engine-ECU



### Oxygen sensor (front) circuit



AK401027 AB

- The engine speed is 1,000 – 3,000 r/min.
- During the air-fuel ratio feedback control

**Judgment Criteria**

- When the oxygen sensor (front) output frequency is 6 or less for 10 seconds on the average.

**PROBABLE CAUSE**

- Failed oxygen sensor
- Open/short circuit in oxygen sensor (front) circuit or loose connector contact
- Failed engine-ECU

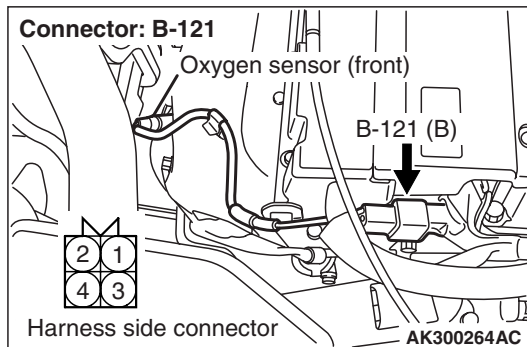
**DIAGNOSIS PROCEDURE****STEP 1. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).
  - Item 11: Oxygen sensor (front)

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

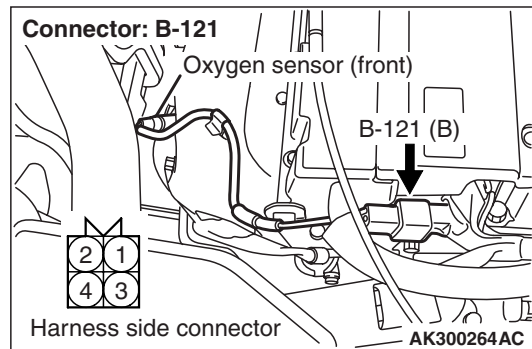
**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Go to Step 2 .

**STEP 2. Connector check: B-121 oxygen sensor (front) connector****Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Repair.

**STEP 3. Perform resistance measurement at B-121 oxygen sensor (front) connector.**

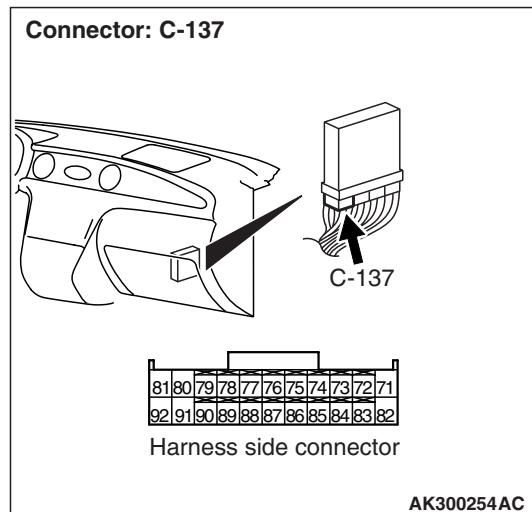
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

**OK: Continuity (2  $\Omega$  or less)**

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

**YES :** Go to Step 7 .

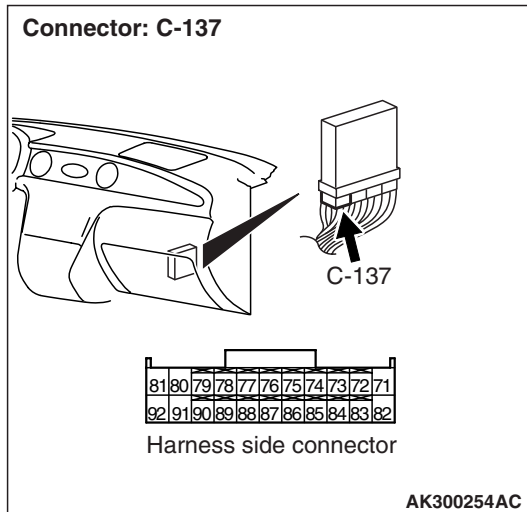
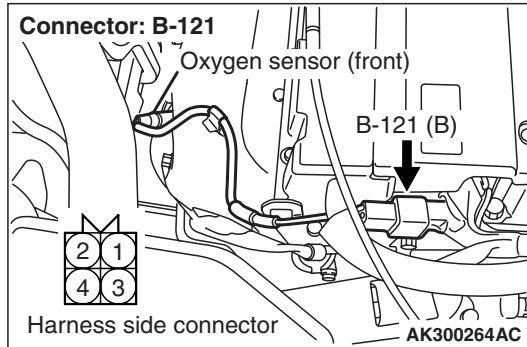
**NO :** Go to Step 4 .

**STEP 4. Connector check: C-137 engine-ECU connector****Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Repair.

**STEP 5. Check harness between B-121 (terminal No. 2) oxygen sensor (front) connector and C-137 (terminal No. 92) engine-ECU connector.**



- Check earthing line for open circuit and damage.

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

**YES :** Go to Step 6 .

**NO :** Repair.

**STEP 6. M.U.T.-II/III data list**

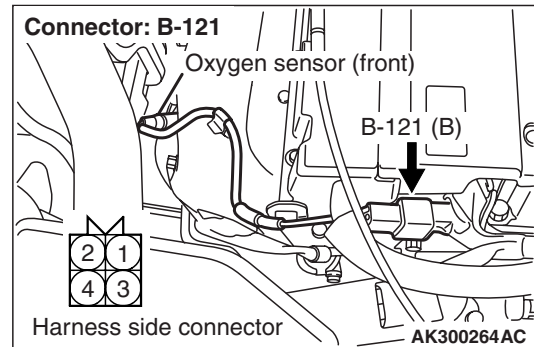
- Refer to Data list reference table [P.13A-293](#).  
a. Item 11: Oxygen sensor (front)

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

**STEP 7. Perform voltage measurement at B-121 oxygen sensor (front) connector.**



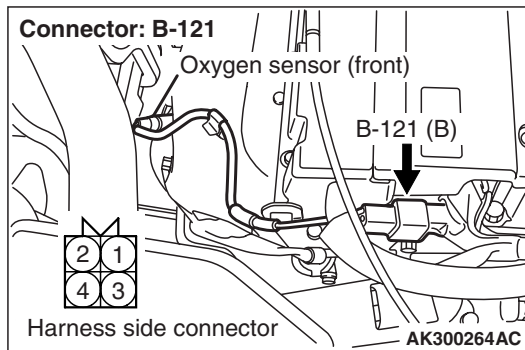
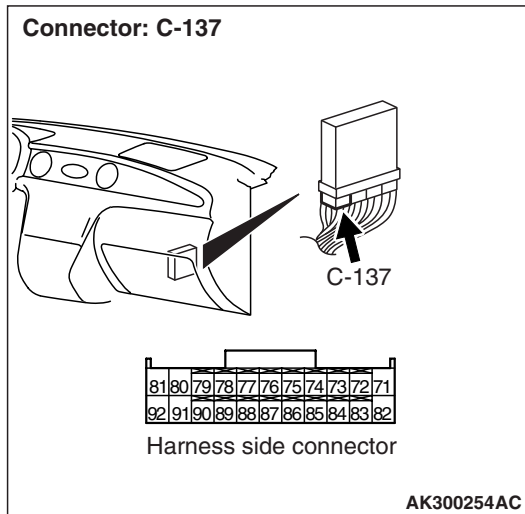
- Use special tool test harness (MD998464) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

**OK: 0.5 V or less**

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

**YES :** Go to Step 9 .

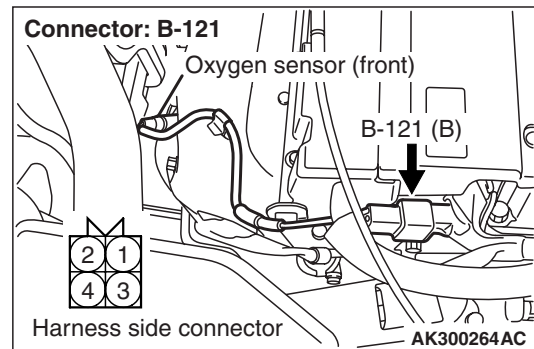
**NO :** Go to Step 8 .

**STEP 8. Connector check: C-137 engine-ECU connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-121 (terminal No. 2) oxygen sensor (front) connector and C-137 (terminal No. 92) engine-ECU connector.

- Check earthing line for damage.

**NO :** Repair.

**STEP 9. Perform voltage measurement at B-121 oxygen sensor (front) connector.**

- Use special tool test harness (MD998464) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Voltage between terminal No. 4 and earth.

**OK:**

**600 – 1,000 mV when 200 mV or lower abrupt racing is done a few seconds after abrupt deceleration from 4,000 r/min.**

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

**YES :** Go to Step 12 .

**NO :** Go to Step 10 .

**STEP 10. Check oxygen sensor (front) itself**

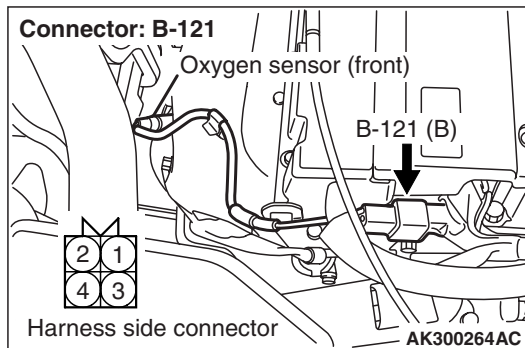
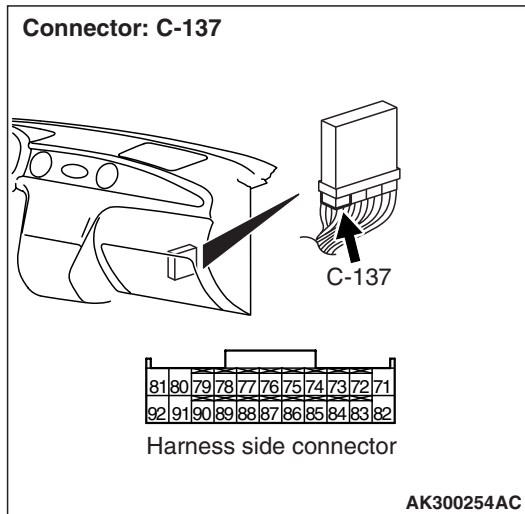
- Check oxygen sensor (front) itself (Refer to [P.13A-323](#)).

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

**YES :** Go to Step 11 .

**NO :** Replace oxygen sensor (front).

**STEP 11. Connector check: C-137 engine-ECU connector**



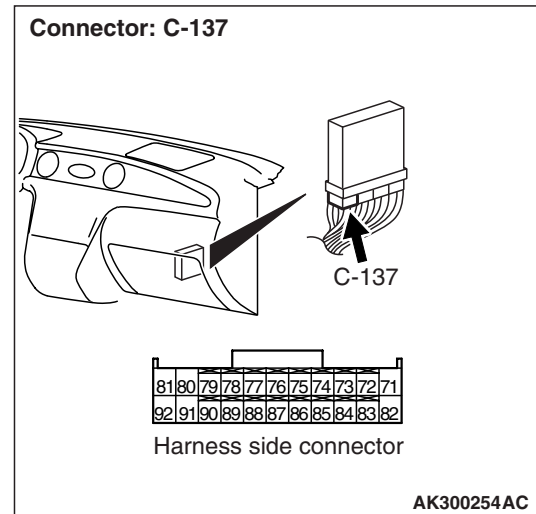
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-121 (terminal No. 4) oxygen sensor (front) connector and C-137 (terminal No. 76) engine-ECU connector.

- Check output line for damage.

**NO :** Repair.

**STEP 12. Perform voltage measurement at C-137 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Transmission: Neutral
- Engine: After warm-up
- Voltage between terminal No. 76 and earth.

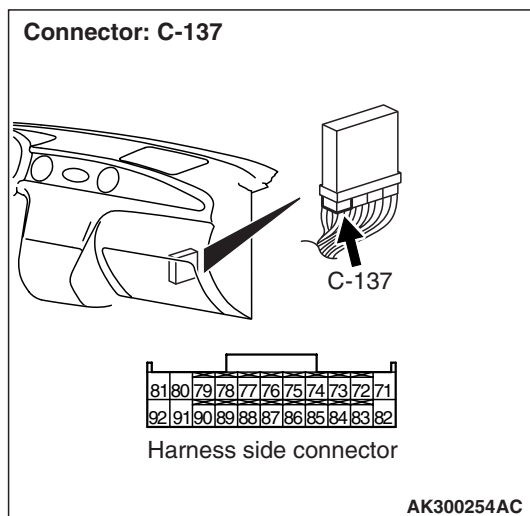
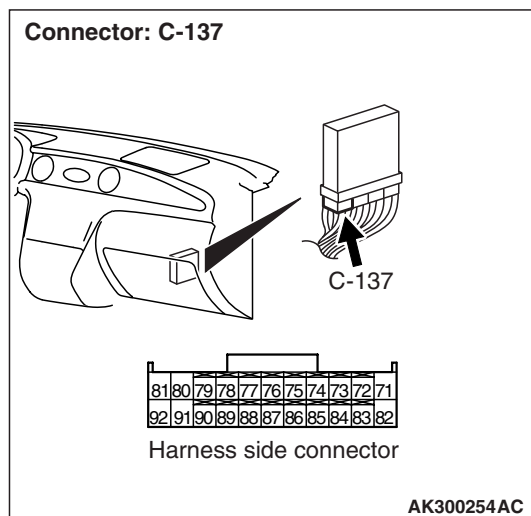
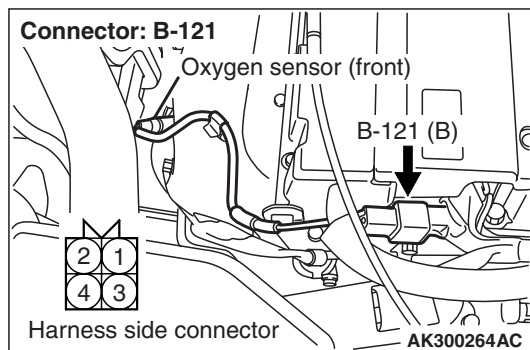
**OK:**

**600 – 1,000 mV when 200 mV or lower abrupt racing is done a few seconds after abrupt deceleration from 4,000 r/min.**

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

**YES :** Go to Step 14 .

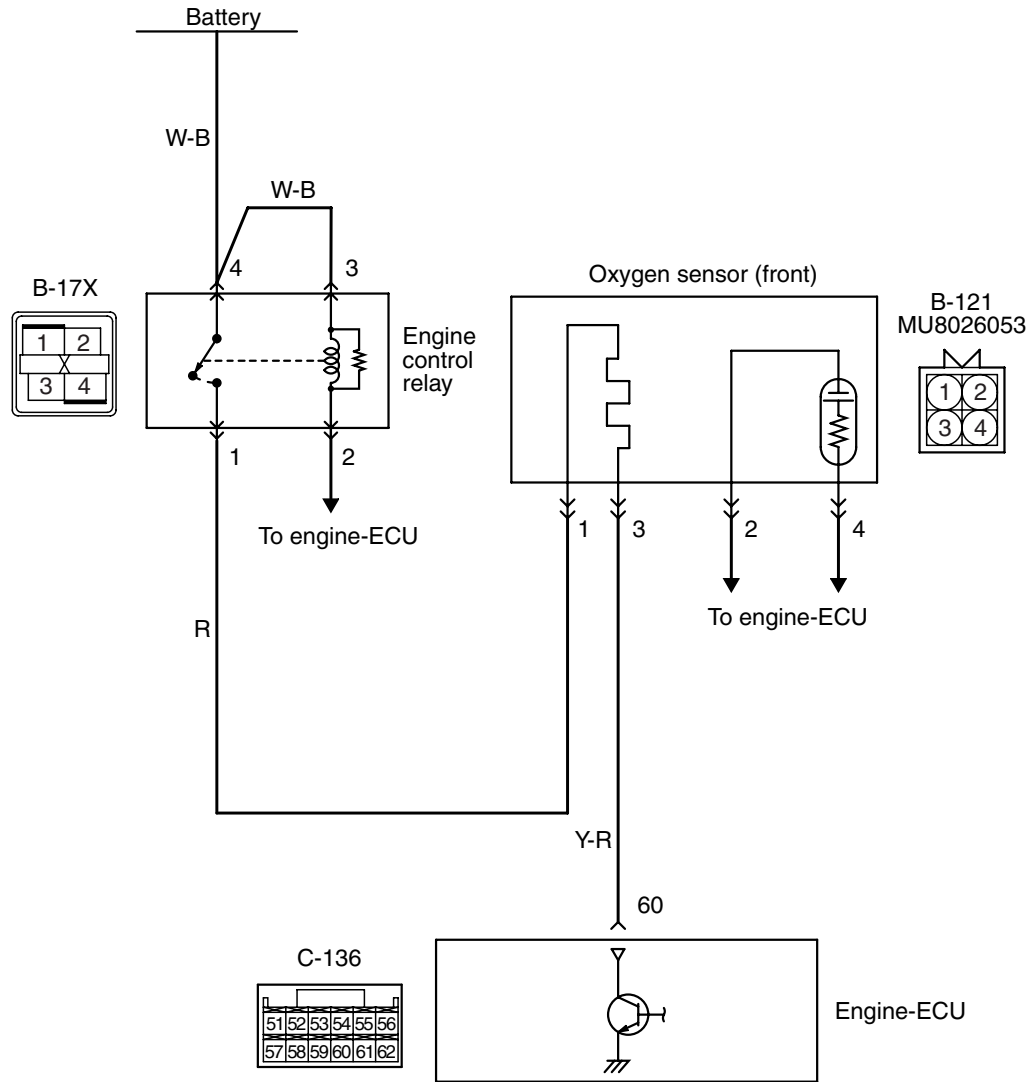
**NO :** Go to Step 13 .

**STEP 13. Connector check: C-137 engine-ECU connector****STEP 14. Connector check: C-137 engine-ECU connector****Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Repair.**Q: Is the check result normal?****YES :** Check and repair harness between B-121 (terminal No. 4) oxygen sensor (front) connector and C-137 (terminal No. 76) engine-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

### Oxygen sensor (front) heater circuit



### Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

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## OPERATION

- Power is supplied to the heater power terminal (terminal No. 1) of the oxygen sensor (front) connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 3) of the oxygen sensor (front) connector is controlled by the power transistor in the engine-ECU (terminal No. 60).

## FUNCTION

- The power supply to the oxygen sensor heater (front) is controlled by the ON/OFF control of the power transistor in the engine-ECU.
- Heating the oxygen sensor heater (front) enables the oxygen sensor to provide good response even when the exhaust emission temperature is low.

## TROUBLE JUDGMENT

## Check Conditions

- The engine coolant temperature is approximately 20°C or higher.
- The oxygen sensor heater (front) is in "ON" position.
- The engine speed is 50 r/min or more.
- The battery voltage is 11 – 16 V.

## Judgment Criteria

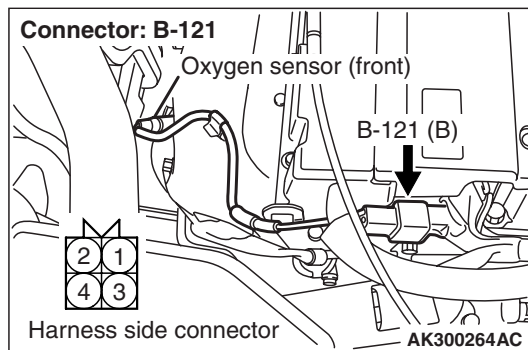
- The heater current of oxygen sensor heater (front) is below 0.15 A or above 7.5 A for 1 second.

## PROBABLE CAUSE

- Failed oxygen sensor heater
- Open/short circuit in oxygen sensor (front) circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

## STEP 1. Connector check: B-121 oxygen sensor (front) connector

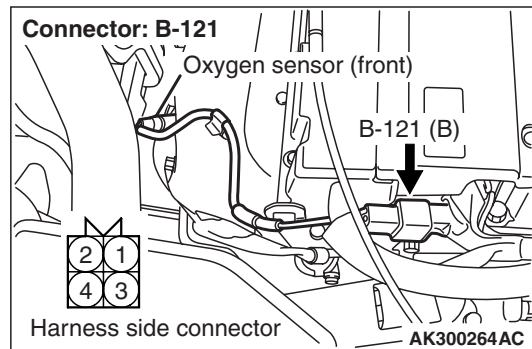


## Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

## STEP 2. Perform resistance measurement at B-121 oxygen sensor (front) connector.



- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 3.

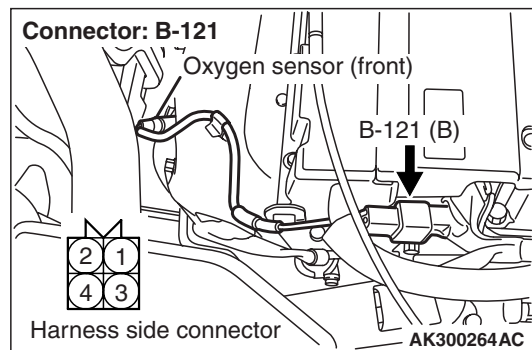
OK: 4.5 – 8.0 Ω

## Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace oxygen sensor (front).

## STEP 3. Perform voltage measurement at B-121 oxygen sensor (front) connector.



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

OK: System voltage

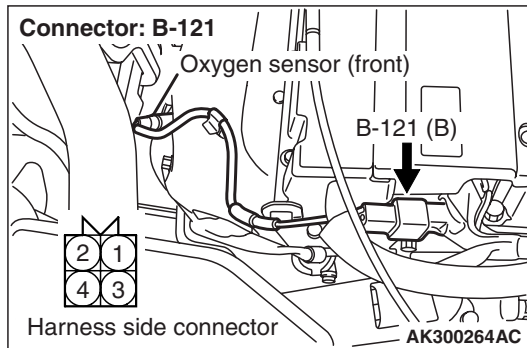
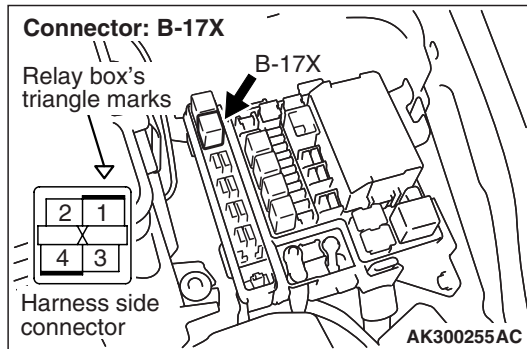
## Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .



**STEP 4. Connector check: B-17X engine control relay connector**



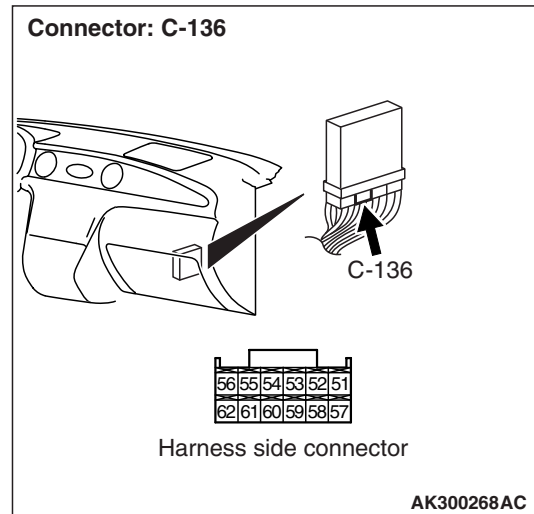
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-121 (terminal No. 1) oxygen sensor connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

**STEP 5. Perform voltage measurement at C-136 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 60 and earth.

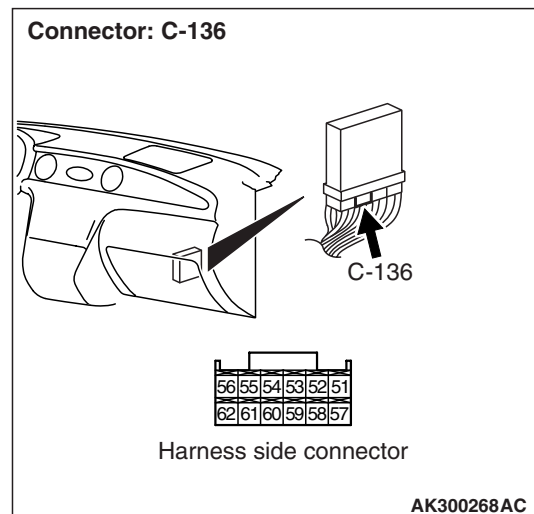
**OK: System voltage**

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

**YES :** Go to Step 8 .

**NO :** Go to Step 6 .

**STEP 6. Connector check: C-136 engine-ECU connector**

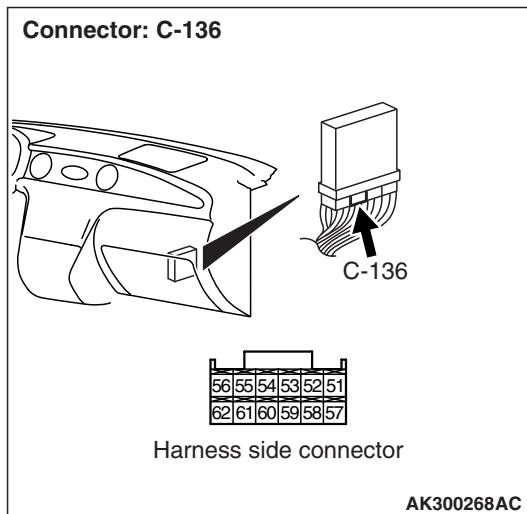
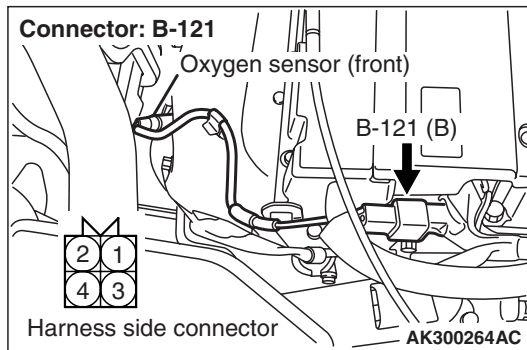


**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

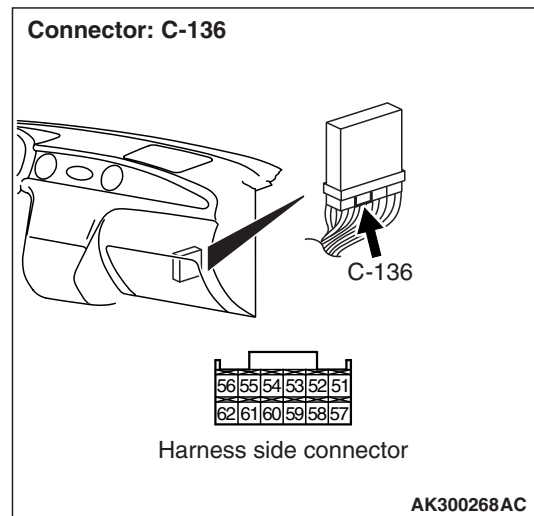
**STEP 7. Check harness between B-121 (terminal No. 3) oxygen sensor (front) connector and C-136 (terminal No. 60) engine-ECU connector.**



- Check earthing line for open/short circuit.

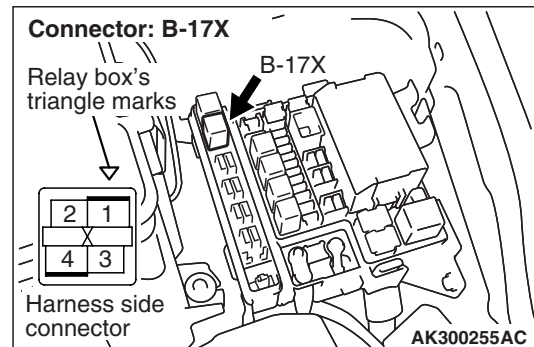
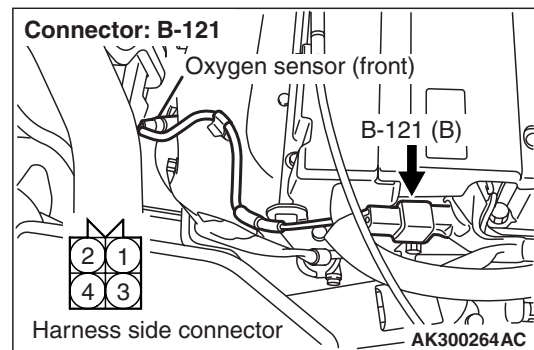
**Q: Is the check result normal?**  
**YES :** Replace engine-ECU.  
**NO :** Repair.

**STEP 8. Connector check: C-136 engine-ECU connector**



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

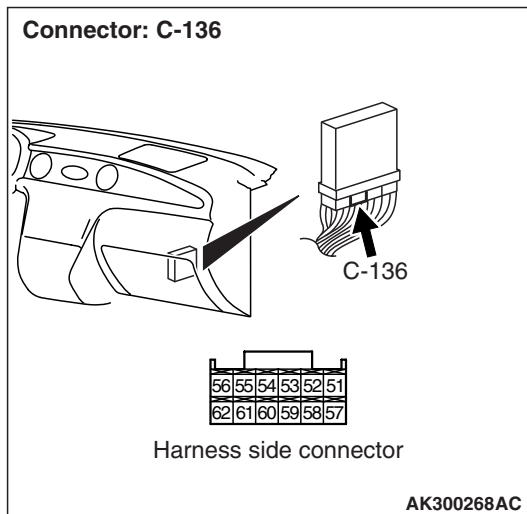
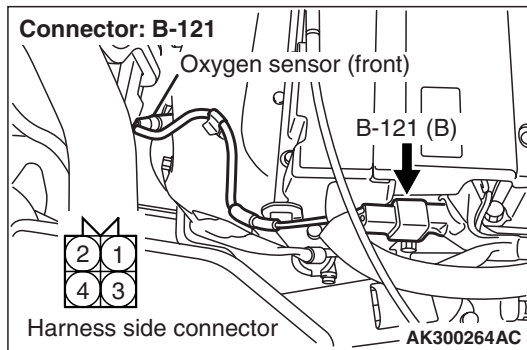
**STEP 9. Check harness between B-121 (terminal No. 1) oxygen sensor (front) connector and B-17X (terminal No. 1) engine control relay connector.**



- Check power supply line for damage.

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

**STEP 10. Check harness between B-121 (terminal No. 3) oxygen sensor (front) connector and C-136 (terminal No. 60) engine-ECU connector.**



- Check earthing line for damage.

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

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

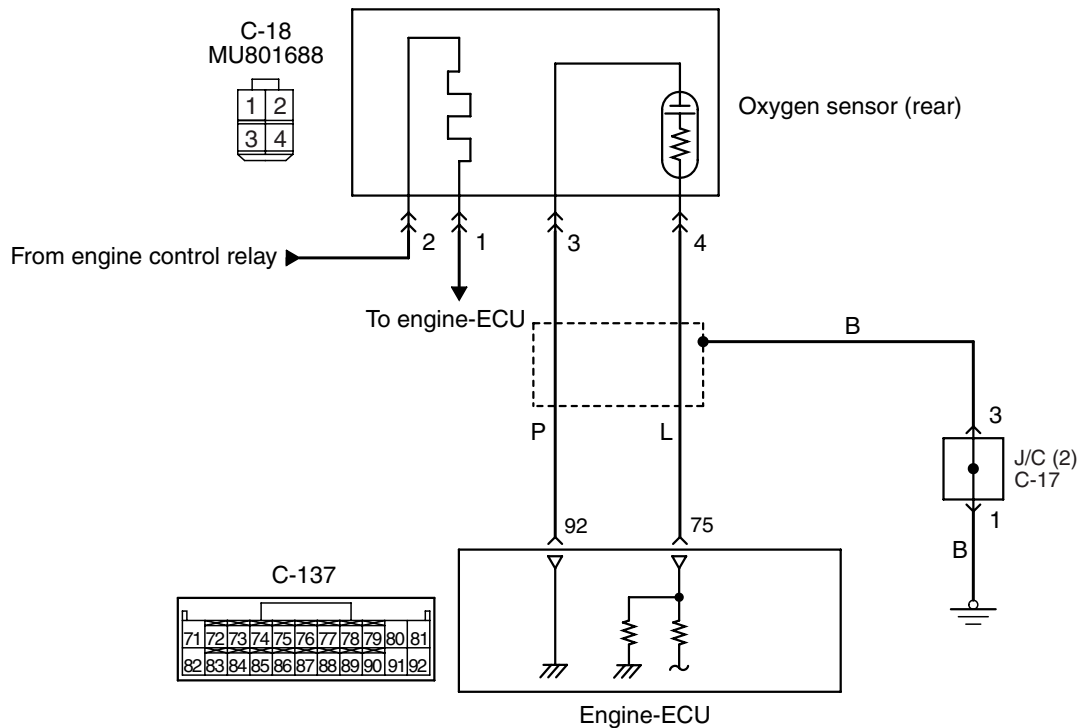
**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use

Troubleshooting/Inspection Service Points

[P.00-6](#)).

### Oxygen sensor (rear) circuit



### Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

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## OPERATION

- The sensor signal is inputted to the engine-ECU (terminal No. 75) from the oxygen sensor (rear) output terminal (terminal No. 4).
- The oxygen sensor (rear) (terminal No. 3) is earthed with engine-ECU (terminal No. 92).

## FUNCTION

- The oxygen sensor (rear) converts the concentration of oxygen in the exhaust emission into a voltage signal and inputs the voltage signal to the engine-ECU.
- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the oxygen sensor (rear) outputs a voltage of about 1 V. When it is leaner than the theoretical air-fuel ratio, it outputs a voltage of about 0 V.
- In response to the signal, the engine-ECU controls the fuel injection amount so that the air-fuel ratio can be equivalent to the theoretical air-fuel ratio.

## TROUBLE JUDGMENT

## Check Conditions

- Above 3 minutes later after the engine has started up.
- The engine coolant temperature is approximately 82°C or higher.
- The engine speed is 1,200 r/min or more.
- The volumetric efficiency is 25% or more.
- The monitoring time is 5 seconds.

## Judgment Criteria

- When the oxygen sensor (rear) output voltage is 0.15 V or less and a power voltage of 5 V is applied to the oxygen sensor (rear) in the engine-ECU, the sensor output voltage is 4.5 V or more.

### PROBABLE CAUSE

- Failed oxygen sensor
- Open/short circuit in oxygen sensor (rear) circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

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

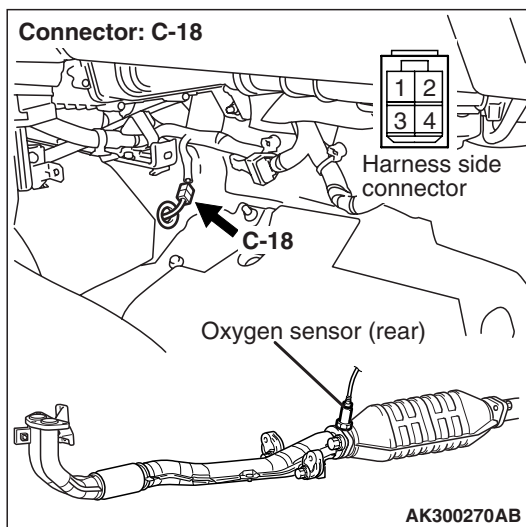
- Refer to Data list reference table [P.13A-293](#).
  - a. Item 59: Oxygen sensor (rear)

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

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO** : Go to Step 2 .

### STEP 2. Connector check: C-18 oxygen sensor (rear) connector

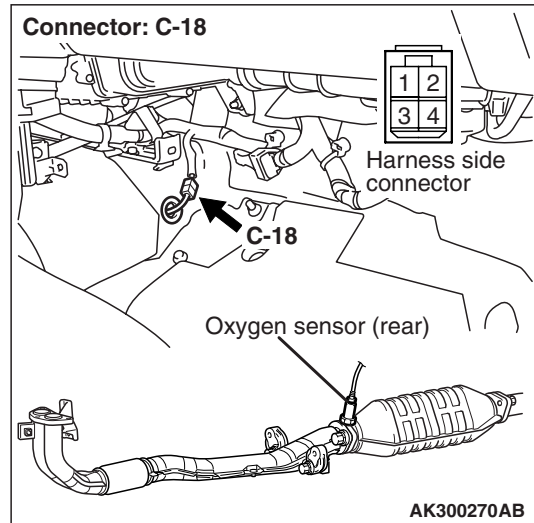


#### Q: Is the check result normal?

**YES** : Go to Step 3 .

**NO** : Repair.

### STEP 3. Perform resistance measurement at C-18 oxygen sensor (rear) connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 3 and earth.

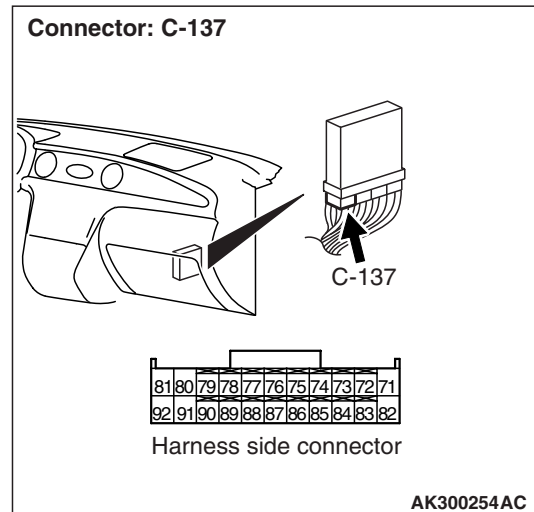
**OK: Continuity ( $2\ \Omega$  or less)**

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

**YES** : Go to Step 7 .

**NO** : Go to Step 4 .

### STEP 4. Connector check: C-137 engine-ECU connector

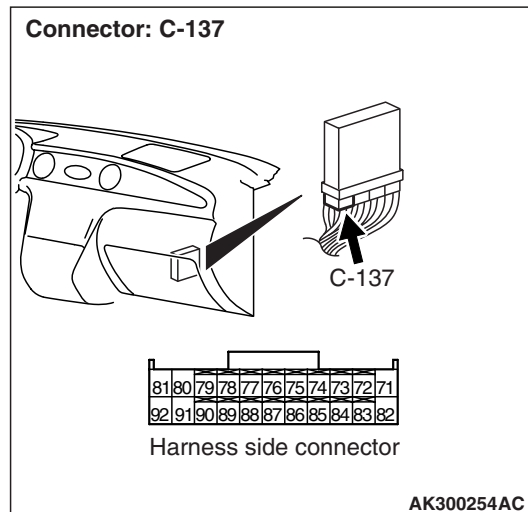
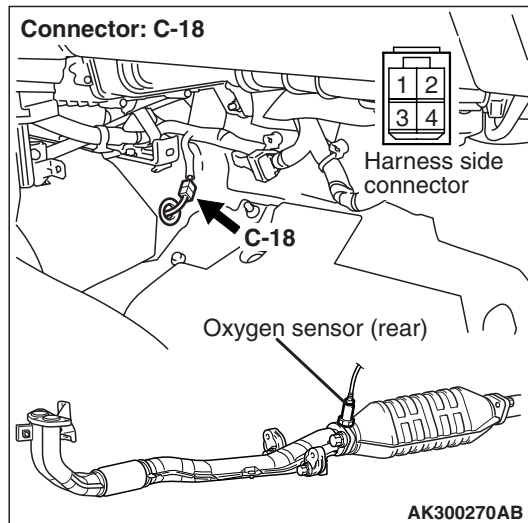


#### Q: Is the check result normal?

**YES** : Go to Step 5 .

**NO** : Repair.

**STEP 5. Check harness between C-18 (terminal No. 3) oxygen sensor (rear) connector and C-137 (terminal No. 92) engine-ECU connector.**



- Check earthing line for open circuit and damage.

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

**YES :** Go to Step 6 .

**NO :** Repair.

**STEP 6. M.U.T.-II/III data list**

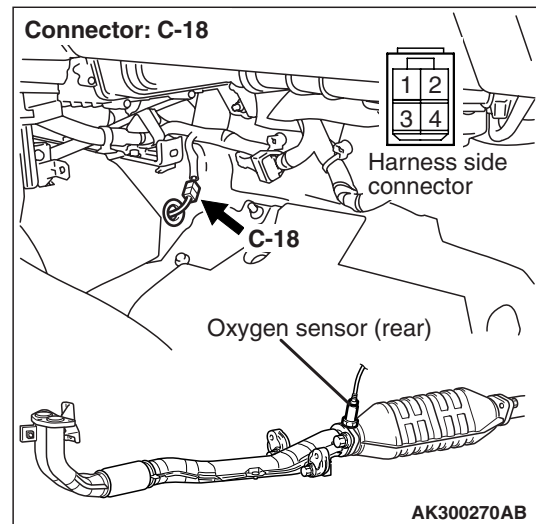
- Refer to Data list reference table [P.13A-293](#).
  - a. Item 59: Oxygen sensor (rear)

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

**STEP 7. Perform voltage measurement at C-18 oxygen sensor (rear) connector.**



- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

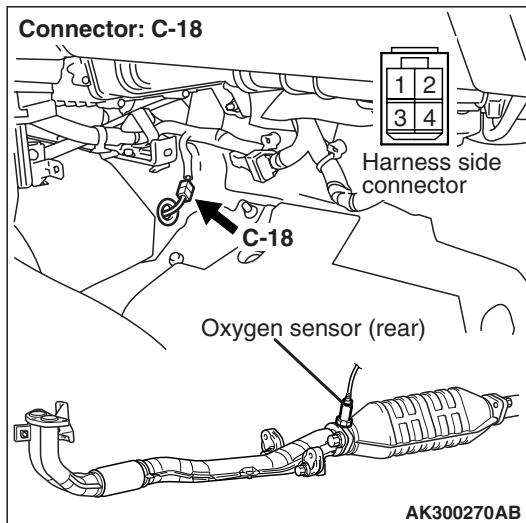
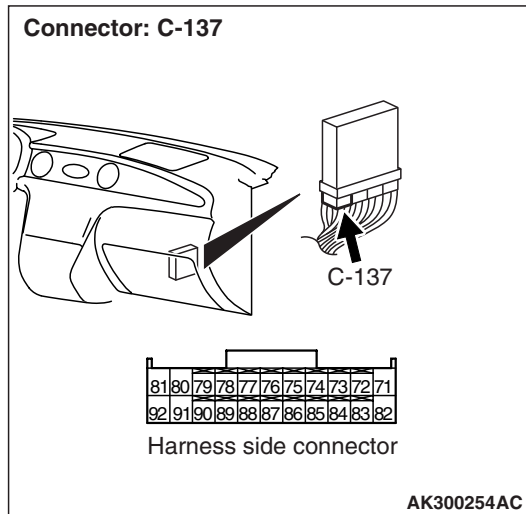
**OK: 0.5 V or less**

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

**YES :** Go to Step 9 .

**NO :** Go to Step 8 .

**STEP 8. Connector check: C-137 engine-ECU connector**



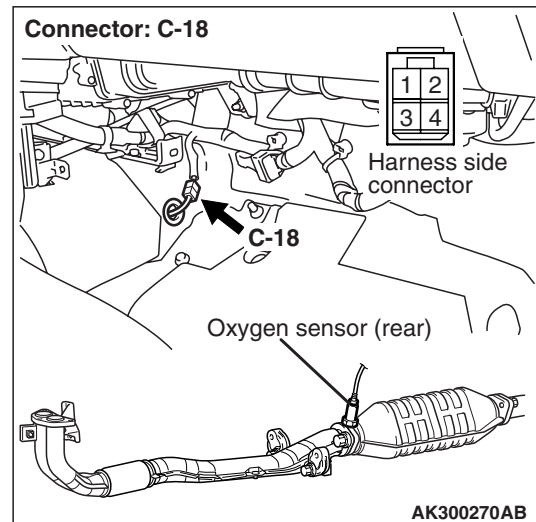
**Q: Is the check result normal?**

**YES :** Check and repair harness between C-18 (terminal No. 3) oxygen sensor connector and C-137 (terminal No. 92) engine-ECU connector.

- Check earthing line for damage.

**NO :** Repair.

**STEP 9. Perform voltage measurement at C-18 oxygen sensor (rear) connector.**



- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Voltage between terminal No. 4 and earth.

**OK:**

**600 – 1,000 mV when 200 mV or lower abrupt racing is done a few seconds after abrupt deceleration from 4,000 r/min.**

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

**YES :** Go to Step 12 .

**NO :** Go to Step 10 .

**STEP 10. Check oxygen sensor (rear) itself.**

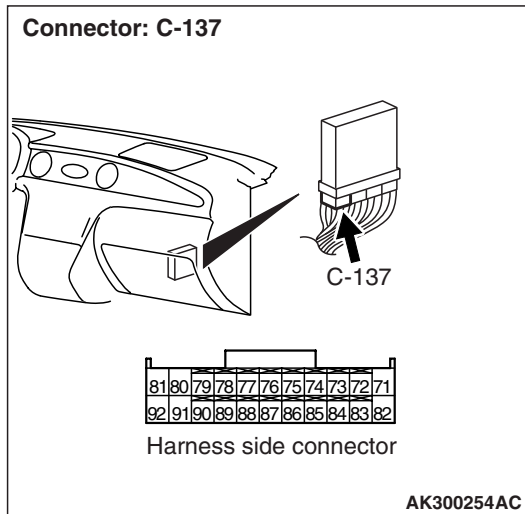
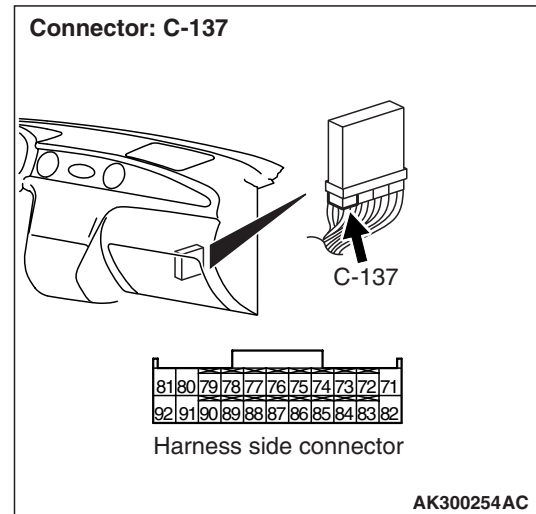
- Check oxygen sensor (rear) itself (Refer to [P.13A-323](#)).

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

**YES :** Go to Step 11 .

**NO :** Replace oxygen (rear) sensor.

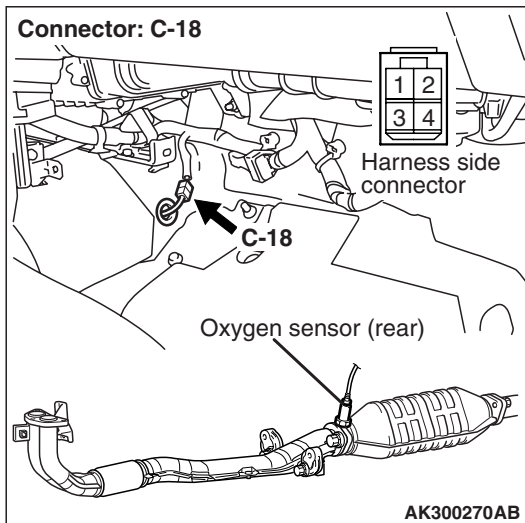


**STEP 11. Connector check: C-137 engine-ECU connector****STEP 12. Perform voltage measurement at C-137 engine-ECU connector.**

- Measure engine-ECU terminal voltage.
- Transmission: Neutral
- Engine: After warm-up
- Voltage between terminal No. 75 and earth.

**OK:**

**600 – 1,000 mV when 200 mV or lower abrupt racing is done a few seconds after abrupt deceleration from 4,000 r/min.**

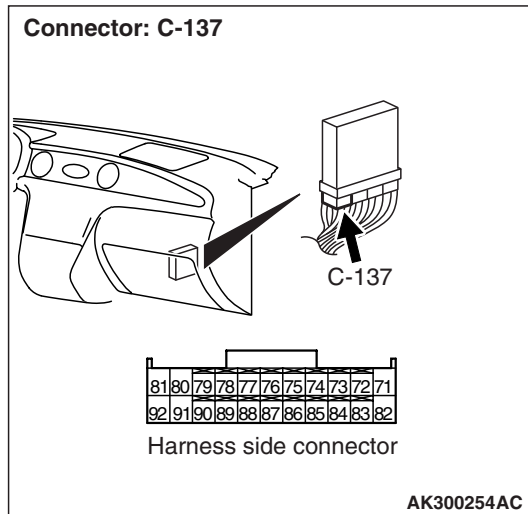
**Q: Is the check result normal?****YES :** Go to Step 14 .**NO :** Go to Step 13 .**Q: Is the check result normal?**

**YES :** Check and repair harness between C-18 (terminal No. 4) oxygen sensor connector and C-137 (terminal No. 75) engine-ECU connector.

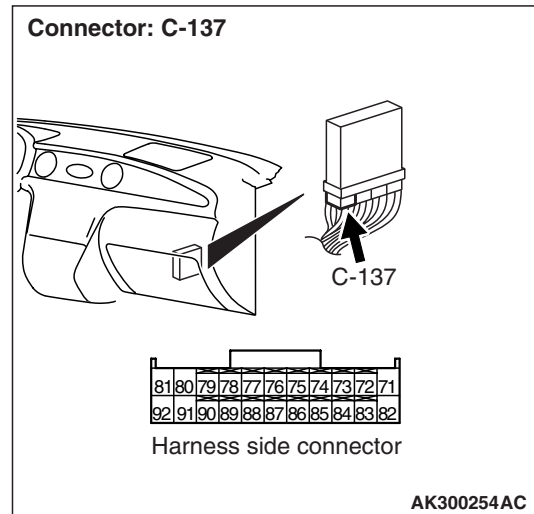
- Check output line for damage.

**NO :** Repair.

**STEP 13. Connector check: C-137 engine-ECU connector**



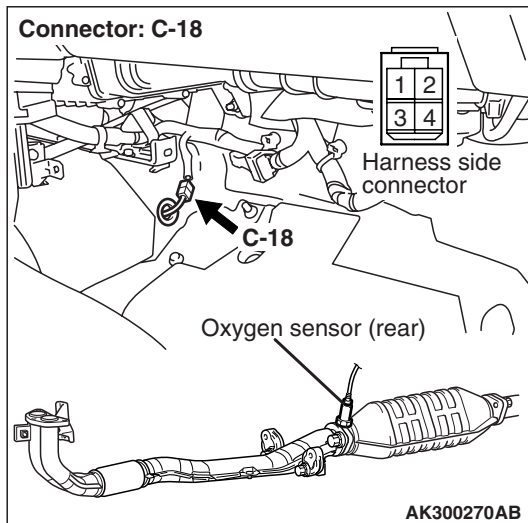
**STEP 14. Connector check: C-137 engine-ECU connector**



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

**YES :** Go to Step 6 .

**NO :** Repair.



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

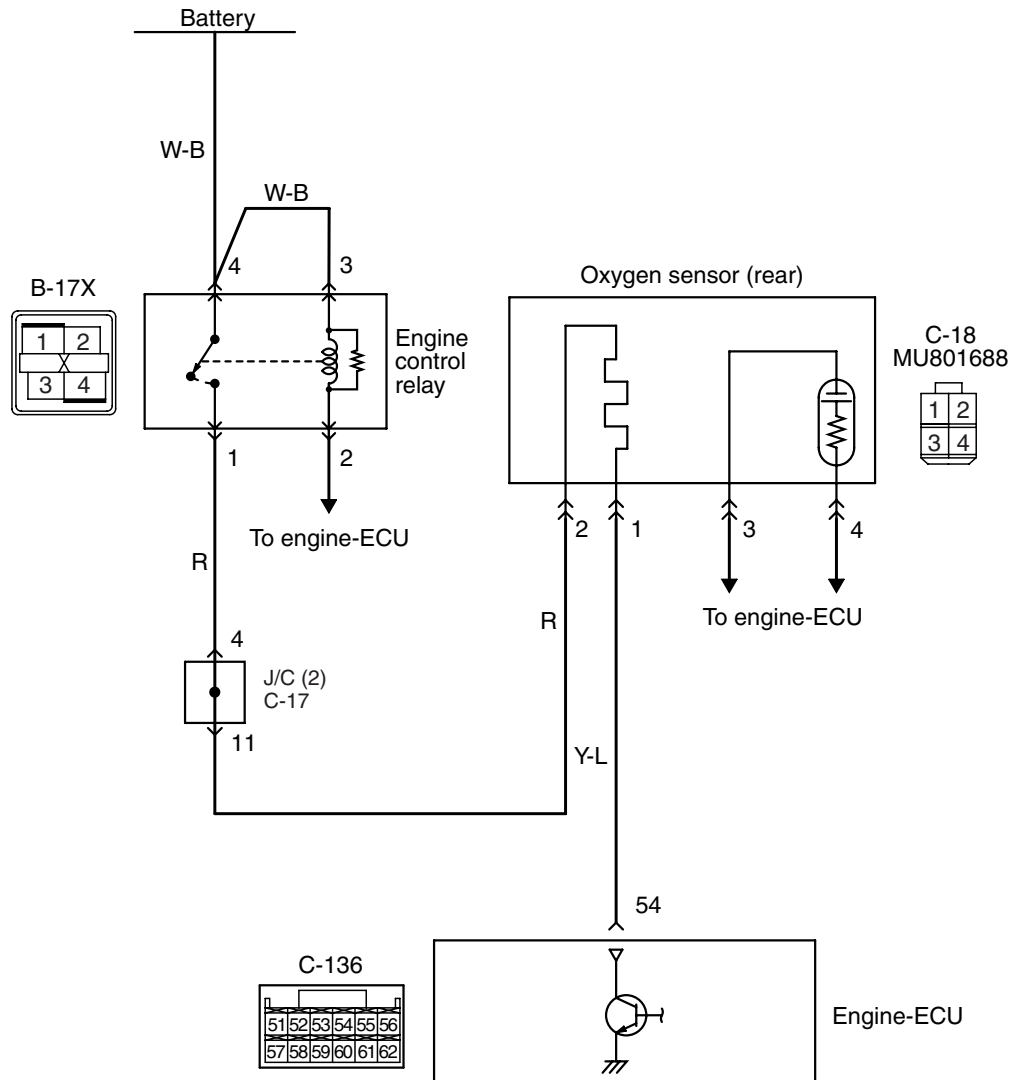
**YES :** Check and repair harness between C-18 (terminal No. 4) oxygen sensor (rear) connector and C-137 (terminal No. 75) engine-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

## Code No. P0141: Oxygen Sensor Heater (Rear) System &lt;Sensor 2&gt;

Oxygen sensor (rear) heater circuit



## Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

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## OPERATION

- Power is supplied to the heater power terminal (terminal No. 2) of the oxygen sensor (rear) connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 1) of the oxygen sensor (rear) connector is controlled by the power transistor in the engine-ECU (terminal No. 54).

## FUNCTION

- The power supply to the oxygen sensor heater (rear) is controlled by the ON/OFF control of the power transistor in the engine-ECU.
- Heating the oxygen sensor heater (rear) enables the oxygen sensor to provide good response even when the exhaust emission temperature is low.

## TROUBLE JUDGMENT

### Check Conditions

- The engine coolant temperature is approximately 20 °C or higher.
- The oxygen sensor heater (rear) is in "ON" position.
- The engine speed is 50 r/min or more.
- The battery voltage is 11 – 16 V.

### Judgment Criterion

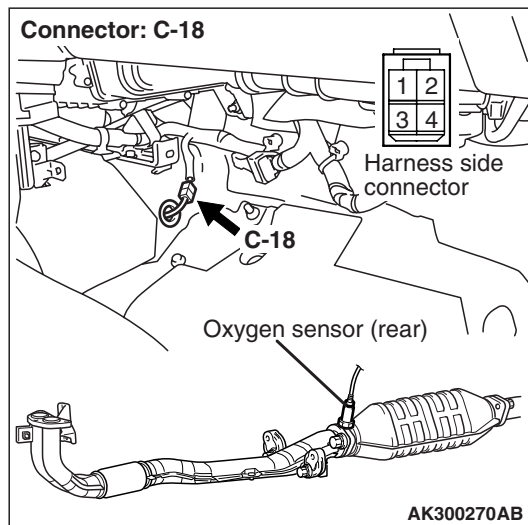
- The heater current of front oxygen sensor heater (rear) is below 0.15 A or above 5.0 A for 6 seconds.

## PROBABLE CAUSE

- Failed oxygen sensor heater (rear)
- Open/short circuit in oxygen sensor (rear) circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

### STEP 1. Connector check: C-18 oxygen sensor (rear) connector

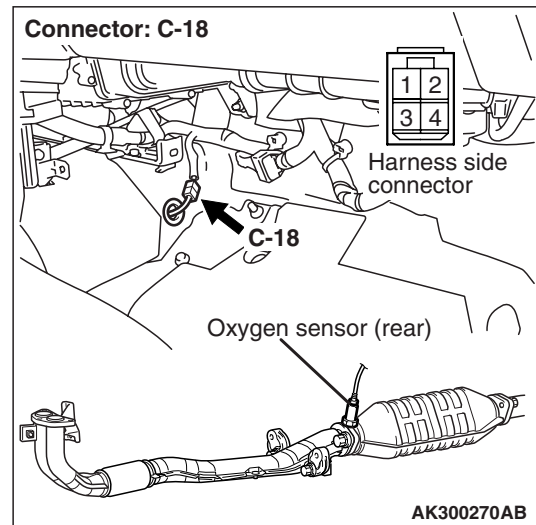


**Q: Is the check result normal?**

**YES :** Go to Step 2 .

**NO :** Repair.

### STEP 2. Perform resistance measurement at C-18 oxygen sensor (rear) connector.



- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 2.

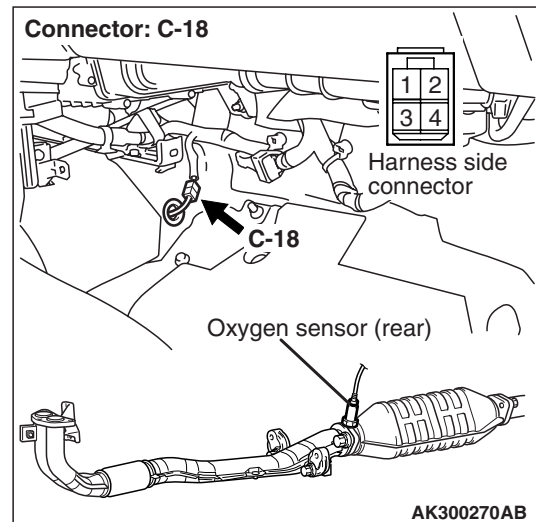
**OK: 11 – 18  $\Omega$**

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

**YES :** Go to Step 3 .

**NO :** Replace oxygen (rear) sensor.

### STEP 3. Perform voltage measurement at C-18 oxygen sensor (rear) connector.



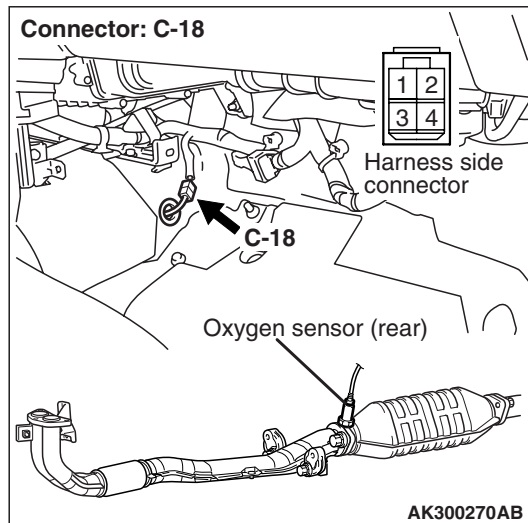
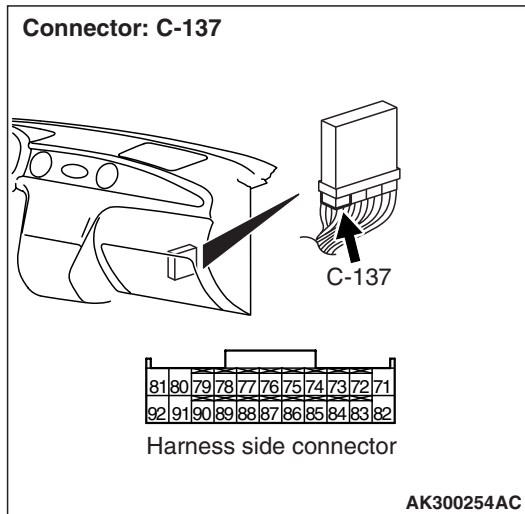
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

**OK: System voltage**

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

**YES :** Go to Step 5 .

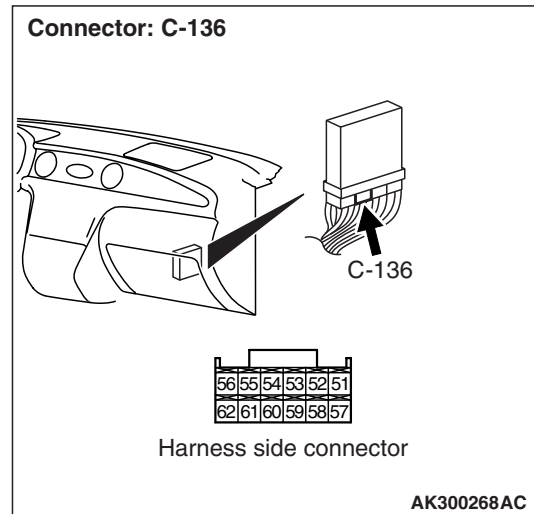
**NO :** Go to Step 4 .

**STEP 4. Connector check: B-17X engine control relay connector****Q: Is the check result normal?**

**YES :** Check intermediate connector C-17, and repair if necessary. If intermediate connector is normal, check and repair harness between C-18 (terminal No. 2) oxygen sensor (rear) connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

**STEP 5. Perform voltage measurement at C-136 engine-ECU connector.**

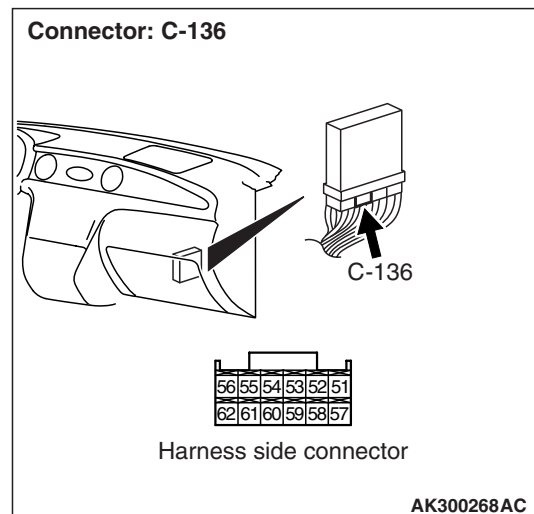
- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 54 and earth.

**OK: System voltage**

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

**YES :** Go to Step 8 .

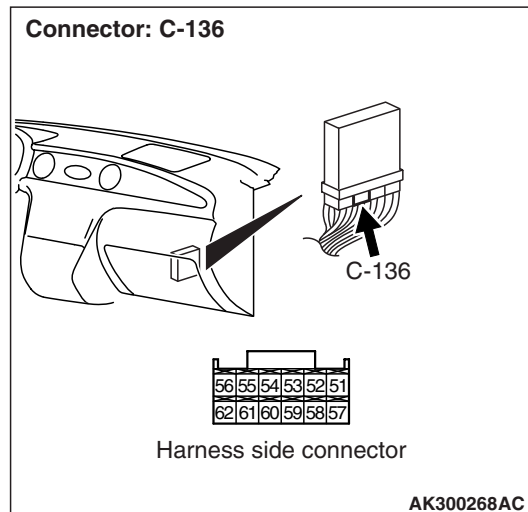
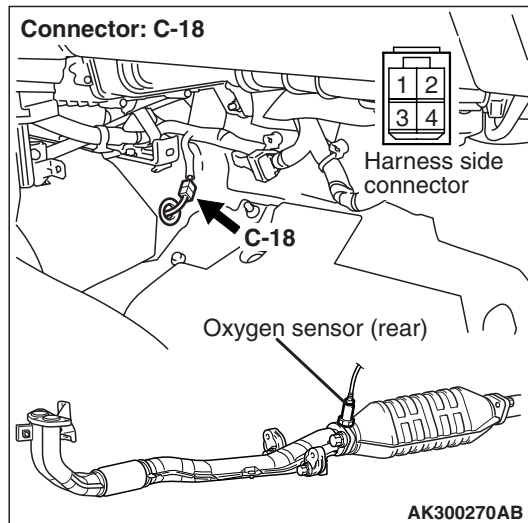
**NO :** Go to Step 6 .

**STEP 6. Connector check: C-136 engine-ECU connector****Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Check harness between C-18 (terminal No. 1) oxygen sensor connector and C-136 (terminal No. 54) engine-ECU connector.**



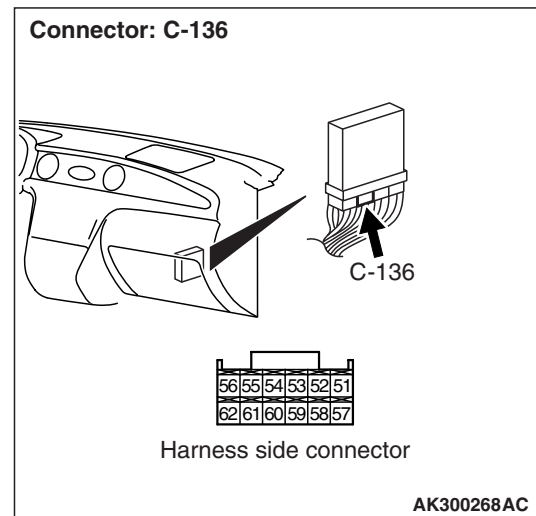
- Check earthing line for open/short circuit.

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

**YES :** Replace engine-ECU.

**NO :** Repair.

**STEP 8. Connector check: C-136 engine-ECU connector**

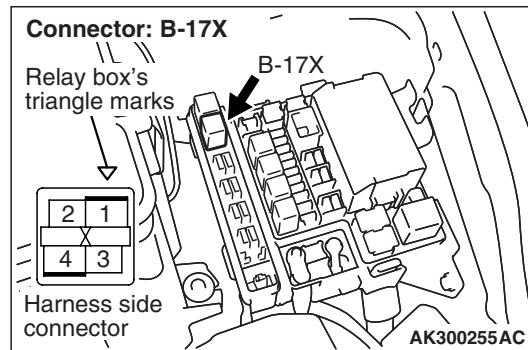
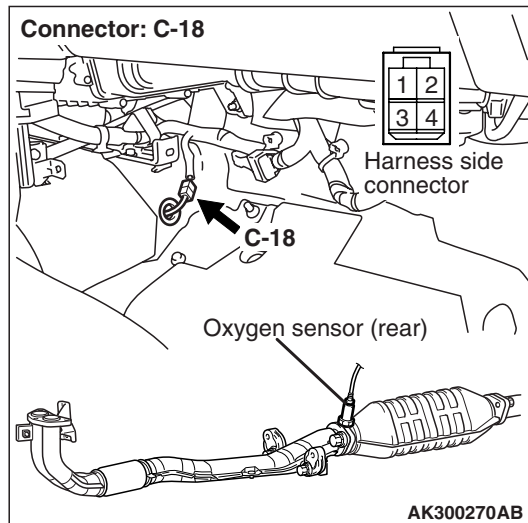


**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. Check harness between C-18 (terminal No. 2) oxygen sensor connector and B-17X (terminal No. 1) engine control relay connector.**



**NOTE:** Before checking harness, check intermediate connector C-17, and repair if necessary.

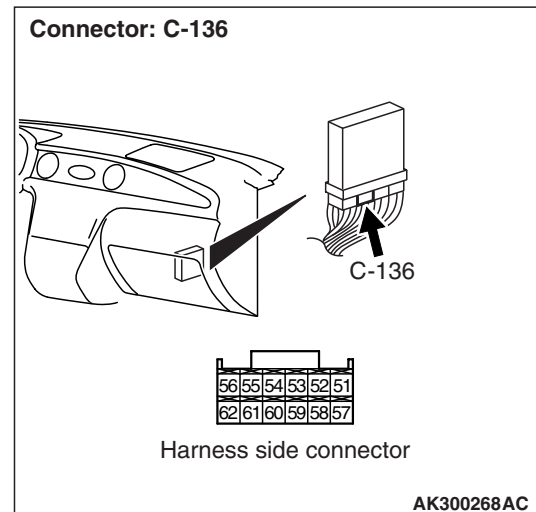
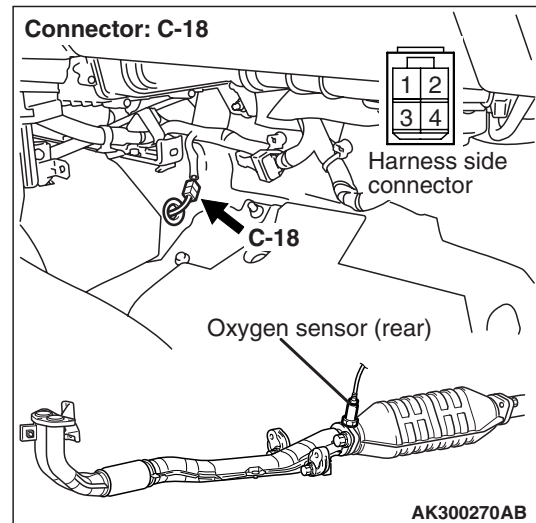
- Check power supply line for damage.

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

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Check harness between C-18 (terminal No. 1) oxygen sensor connector and C-136 (terminal No. 54) engine-ECU connector.**



- Check earthing line for damage.

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

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).



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**Code No. P0170: Abnormal Fuel System**

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**OPERATION**

- Refer to P0201 injector circuit [P.13A-87](#).
- Refer to P0202 injector circuit [P.13A-92](#).
- Refer to P0203 injector circuit [P.13A-97](#).
- Refer to P0204 injector circuit [P.13A-102](#).

**FUNCTION**

- If the fuel system goes out of order, the fuel correction value will become larger.
- The engine-ECU checks whether the fuel correction value is within the standard limits.

**TROUBLE JUDGMENT**

**Check Conditions**

- In learning air-fuel ratio

**Judgment Criteria**

- The compensation value of fuel injection amount is too low for 2 seconds or more.

Or

- The compensation value of fuel injection amount is too high for 2 seconds or more.

**PROBABLE CAUSE**

- Failed fuel supply system
- Failed oxygen sensor (front)
- Failed intake air temperature sensor
- Failed air flow sensor
- Failed purge control solenoid valve
- Failed engine-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. M.U.T.-II/III diagnosis code**

**Q: Is any other diagnosis code than P0170 output?**

**YES :** Inspection chart for diagnosis code (Refer to [P.13A-15](#)).

**NO :** Go to Step 2 .

---

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

- Refer to Data list reference table [P.13A-293](#).
  - 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 3 .

**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-15](#)).

---

**STEP 3. Check for intake of air from intake hose and inlet manifold.**

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

**YES :** Go to Step 4 .

**NO :** Repair.

---

**STEP 4. Check for leakage of exhaust emission from exhaust manifold.**

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

**YES :** Go to Step 5 .

**NO :** Repair.

---

**STEP 5. Check throttle body (throttle valve portion) for contamination.**

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

**YES :** Go to Step 6 .

**NO :** Clean throttle body (throttle valve portion) (Refer to [P.13A-315](#)).

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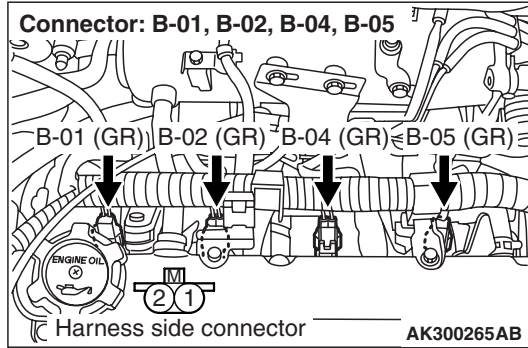
**STEP 6. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).
  - a. Item 11: Oxygen sensor (front).

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

**YES :** Go to Step 7 .

**NO :** Check oxygen sensor (front) system (Refer to [P.13A-61](#), Code No. P0130).

**STEP 7. Connector Check: 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 8 .

**NO :** Repair.

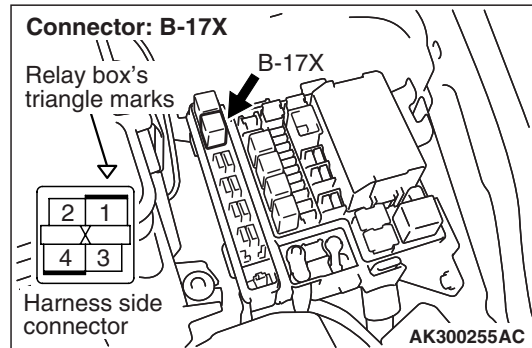
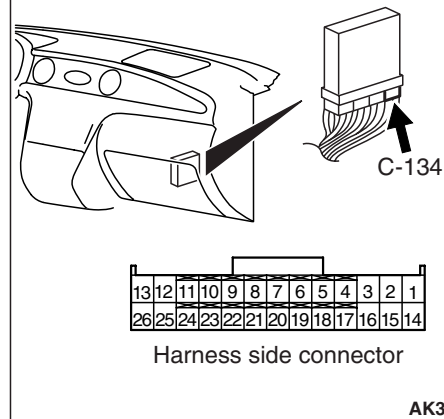
**STEP 8. Check injector itself.**

- Check Injector itself (Refer to [P.13A-325](#)).

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

**YES :** Go to Step 9 .

**NO :** Replace injector.

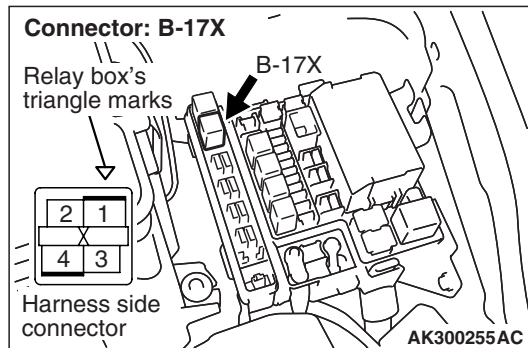
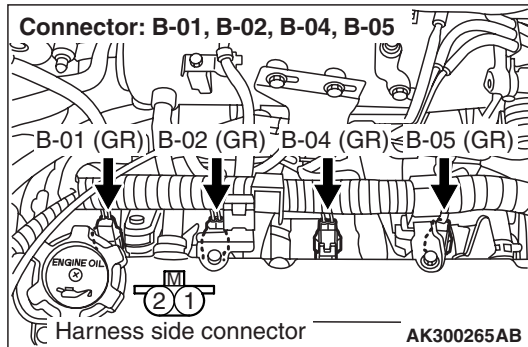
**STEP 9. Connector check: B-17X engine control relay connector and B-134 engine-ECU connector****Connector: C-134**

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

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Check harness between B-17X engine control relay connector and injector connector.**



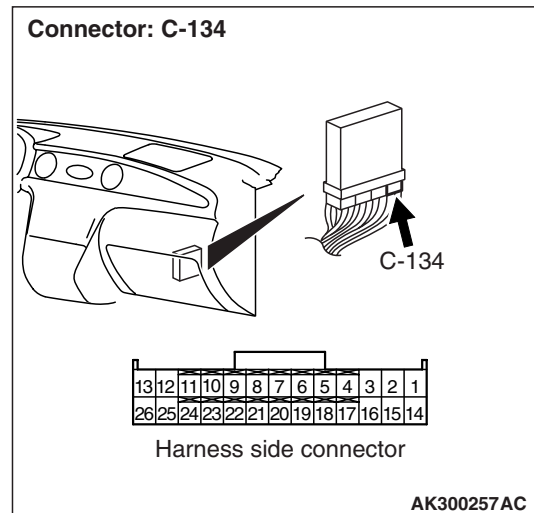
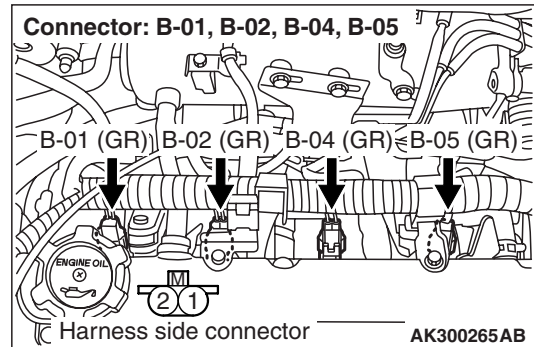
- Check harness between B-17X (terminal No. 1) engine control relay connector and B-01 (terminal No. 1) No. 1 injector connector.
- Check harness between B-17X (terminal No. 1) engine control relay connector and B-02 (terminal No. 1) No. 2 injector connector.
- Check harness between B-17X (terminal No. 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 11 .

**NO :** Replace.

**STEP 11. Check harness between injector connector and C-134 engine-ECU connector.**



- Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-134 (terminal No. 1) engine-ECU connector.
- Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-134 (terminal No. 14) engine-ECU connector.
- Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-134 (terminal No. 2) engine-ECU connector.
- Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-134 (terminal No. 15) engine-ECU connector.

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

**YES :** Go to Step 12 .

**NO :** Replace.

**STEP 12. Check purge control solenoid valve itself.**

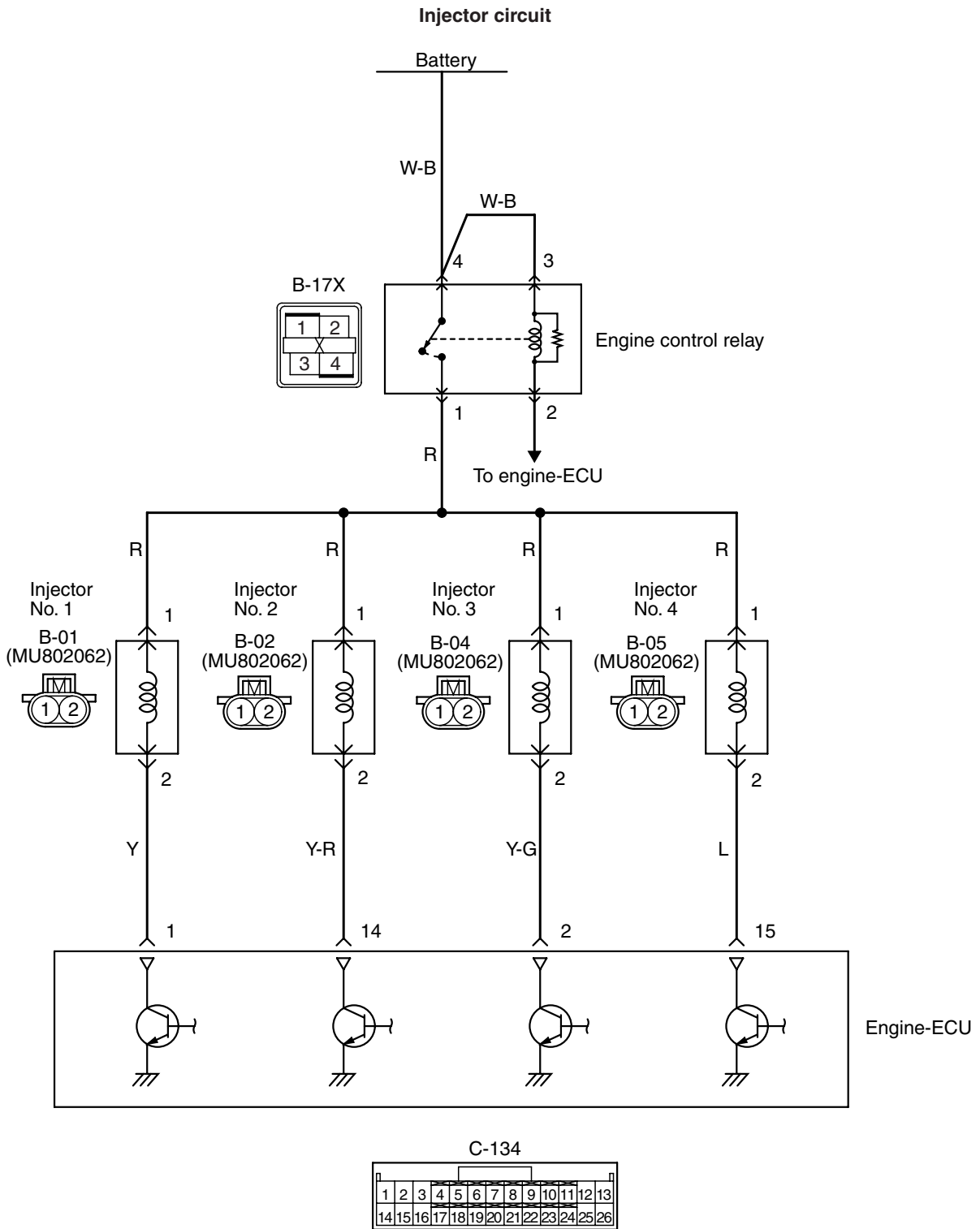
- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System [P.17-65](#)).

**Q: Is the check result normal?****YES :** Go to Step 13 .**NO :** Replace purge control solenoid valve.**STEP 13. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to [P.13A-316](#)).

**Q: Is the check result normal?****YES :** Replace engine-ECU.**NO :** Repair.

Code No. P0201: No. 1 Injector System



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

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**OPERATION**

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 1).

- The engine-ECU (terminal No. 1) 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-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

- The engine speed is 50 – 8,000 r/min.
- The throttle position sensor output voltage is 5 V or less.
- Injector not in forced drive (actuator test) mode

### Judgment Criterion

- No surge voltage of the injector coil is detected for 2 seconds.

## PROBABLE CAUSE

- Failed No. 1 injector
- Open/short circuit in injector circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

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

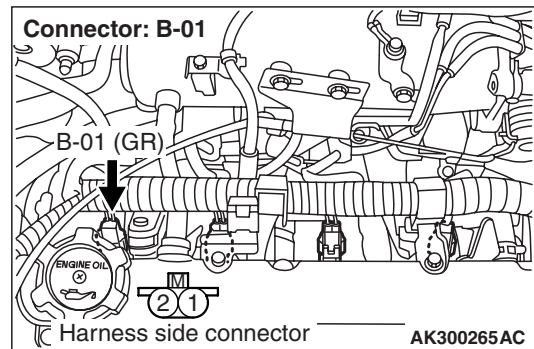
- Refer to Actuator test reference table list [P.13A-299](#).
  - Item 01: No. 1 injector**OK: Idling state varies.**

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

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO** : Go to Step 2 .

### STEP 2. Connector check: B-01 No. 1 injector connector

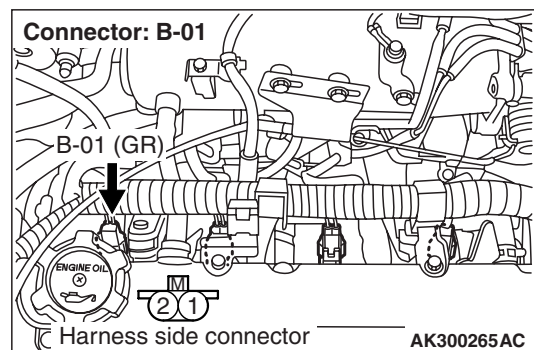


#### Q: Is the check result normal?

**YES** : Go to Step 3 .

**NO** : Repair.

### STEP 3. Perform resistance measurement at B-01 No. 1 injector connector.



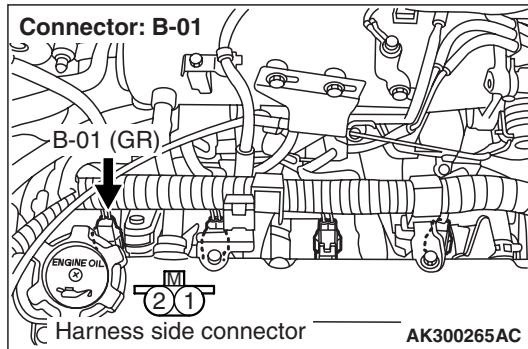
- Disconnect connector, and measure at injector side.
- Resistance between terminal No. 1 and No. 2.  
**OK: 10.5 – 13.5  $\Omega$**

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

**YES** : Go to Step 4 .

**NO** : Replace No. 1 injector.

**STEP 4. Perform voltage measurement at B-01  
No. 1 injector connector.**



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

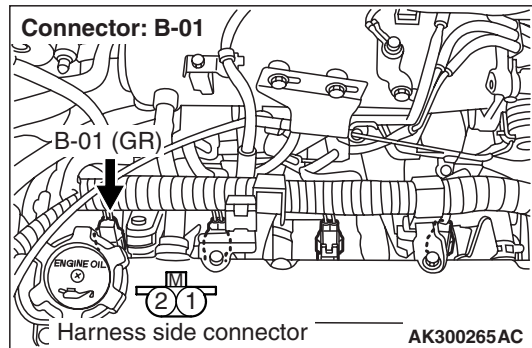
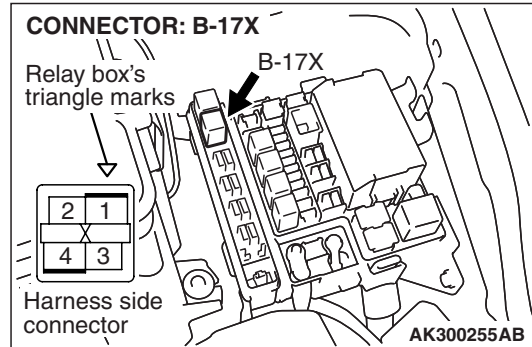
**OK: System voltage**

**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**



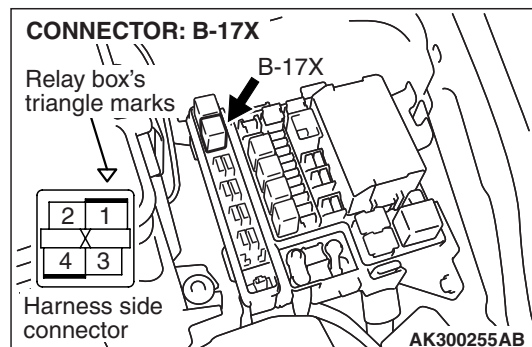
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-17X (terminal No. 1) engine control relay connector and B-01 (terminal No. 1) No. 1 injector connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

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



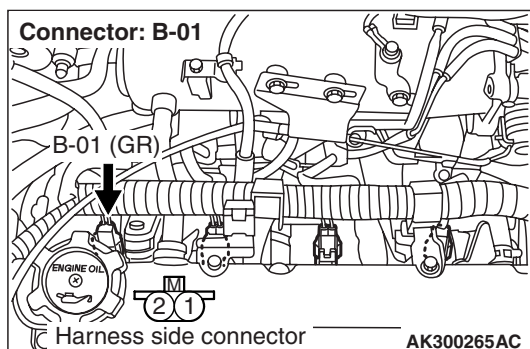
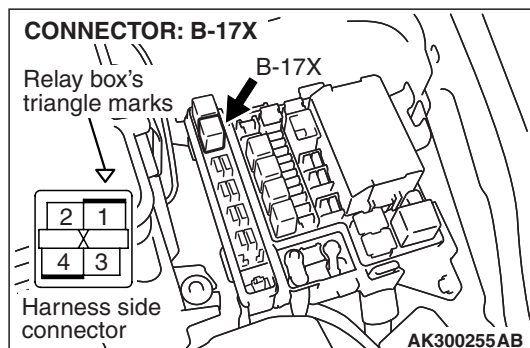
**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.



**STEP 7. Check harness between B-17X (terminal No. 1) engine control relay connector and B-01 (terminal No. 1) No. 1 injector connector.**



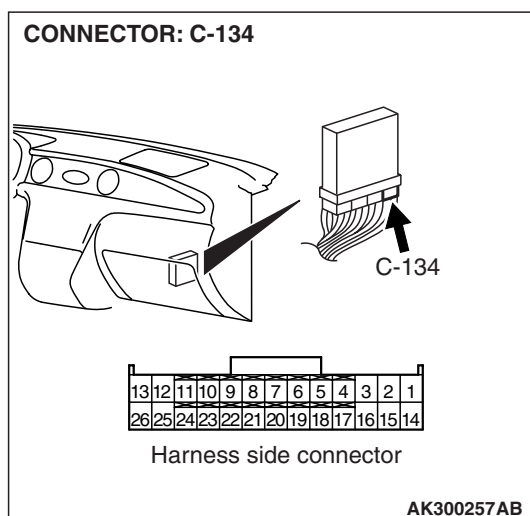
- Check power supply line for damage.

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

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8. Connector check: C-134 engine-ECU connector**

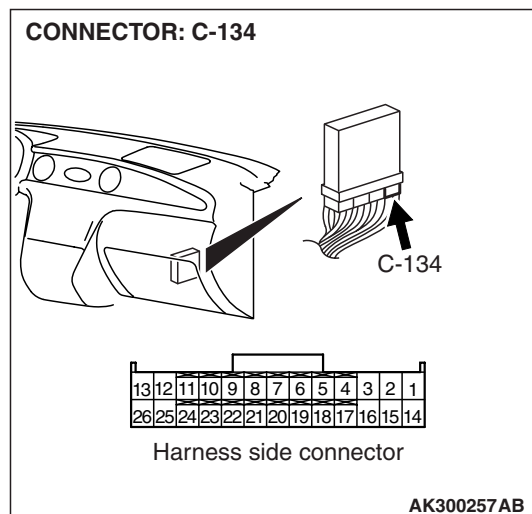
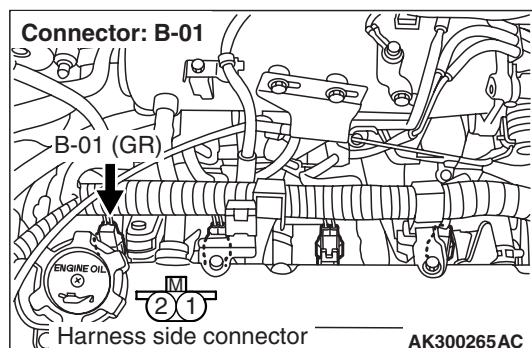


**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. Check harness between B-01 (terminal No. 2) No.1 injector connector and C-134 (terminal No. 1) engine-ECU connector.**



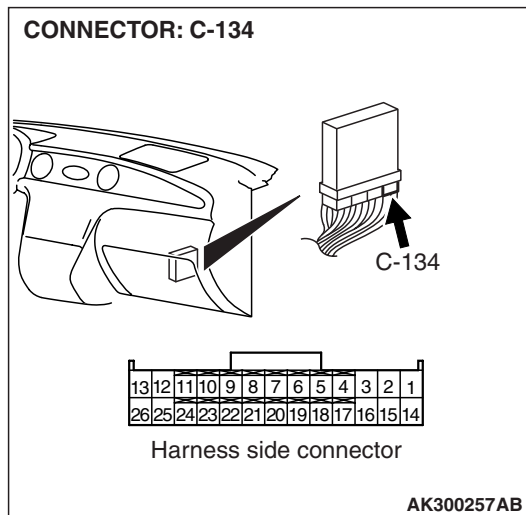
- Check output line for open/short circuit and damage.

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

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Perform signal wave pattern measurement at C-134 engine-ECU connector (Using an oscilloscope).**



- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 1 and earth.

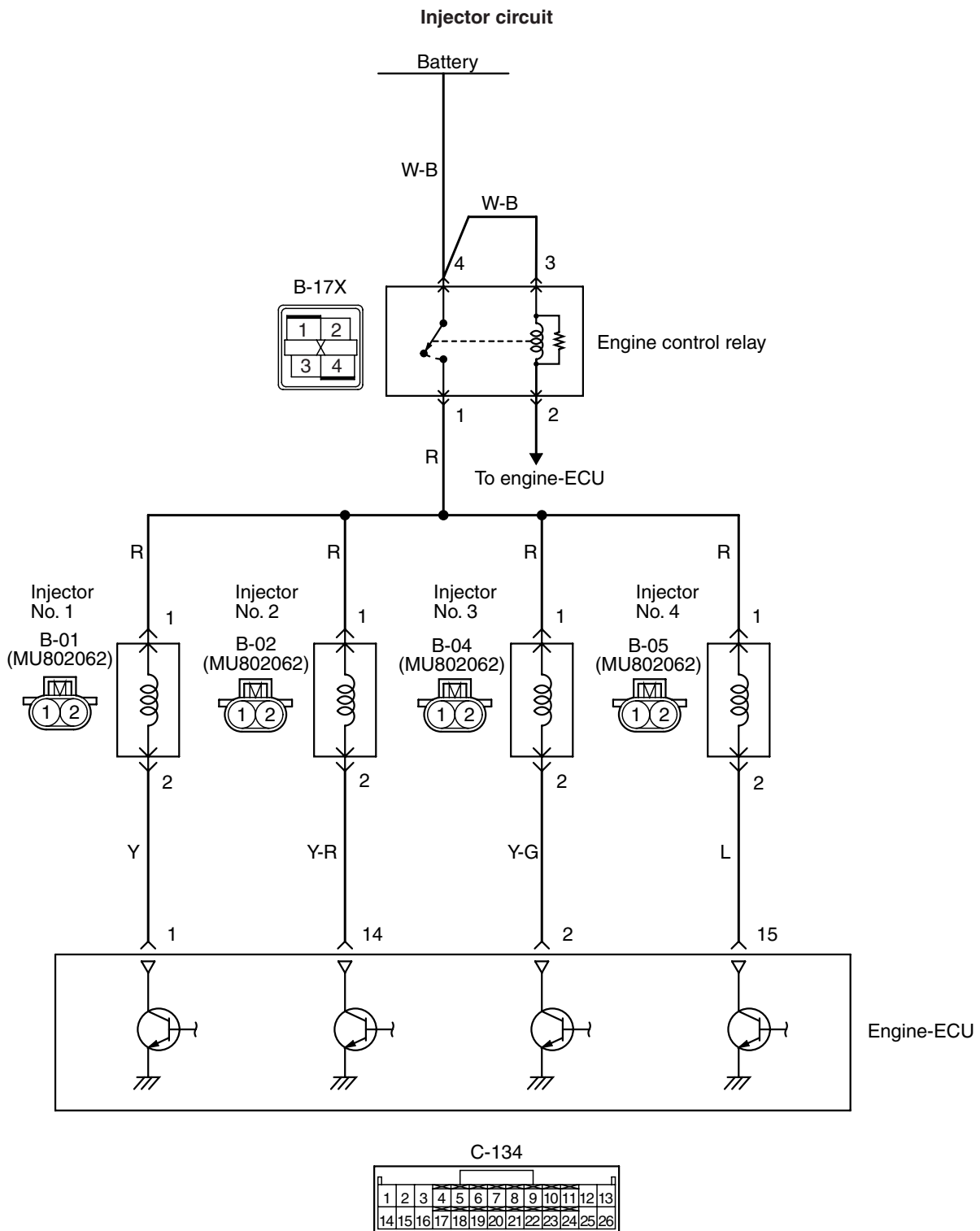
**OK: Waveforms should be display on Inspection procedure using an oscilloscope (Refer to [P.13A-305](#)).**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

## Code No. P0202: No. 2 Injector System



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

## OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-ECU (terminal No. 14) 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-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

- The engine speed is 50 – 8,000 r/min.
- The throttle position sensor output voltage 5 V or less.
- Injector not in forced drive (actuator test) mode

### Judgment Criterion

- No surge voltage of the injector coil is detected for 2 seconds.

## PROBABLE CAUSE

- Failed No. 2 injector
- Open/short circuit in No. 2 injector circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

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

- Refer to Actuator test reference table list

[P.13A-299](#).

- Item 02: No. 2 injector

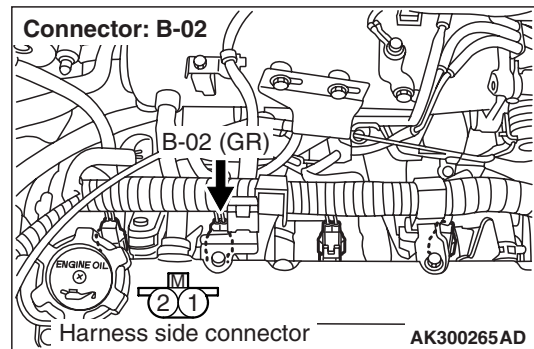
**OK: Idling state varies.**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Go to Step 2 .

### STEP 2. Connector check: B-02 No. 2 injector connector

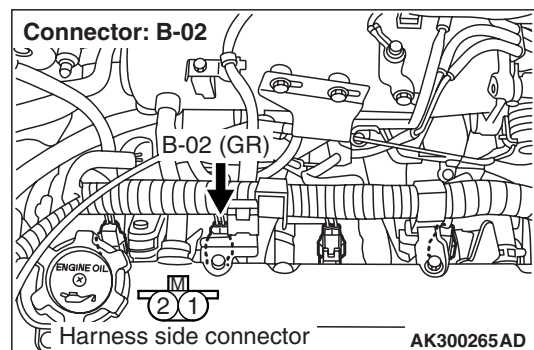


#### Q: Is the check result normal?

**YES :** Go to Step 3 .

**NO :** Repair.

### STEP 3. Perform resistance measurement at resistance B-02 No. 2 injector connector.



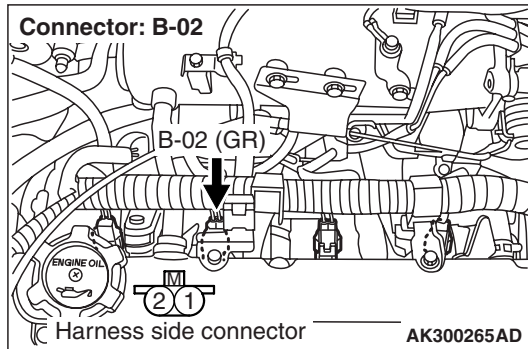
- Disconnect connector, and measure at injector side.
- Resistance between terminal No. 1 and No. 2.

**OK: 10.5 – 13.5  $\Omega$**

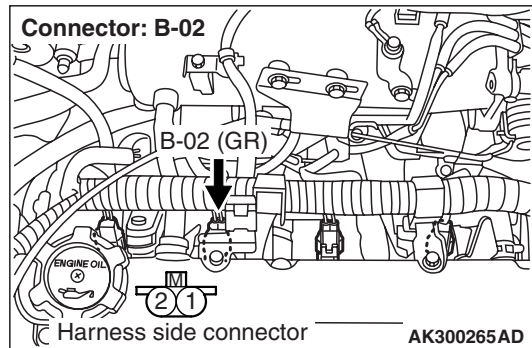
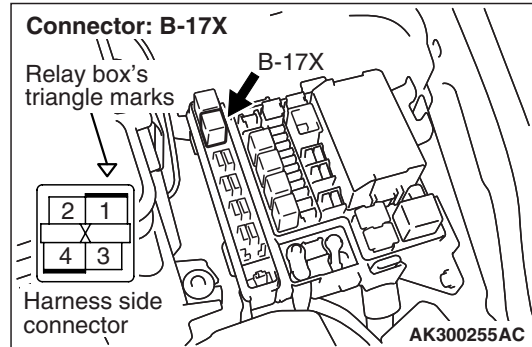
#### Q: Is the check result normal?

**YES :** Go to Step 4 .

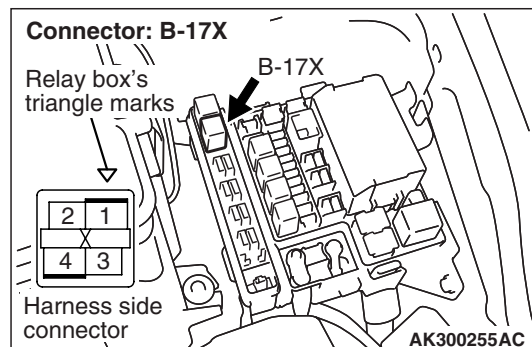
**NO :** Replace No. 2 injector.

**STEP 4. Perform voltage measurement at B-02 No. 2 injector connector.**

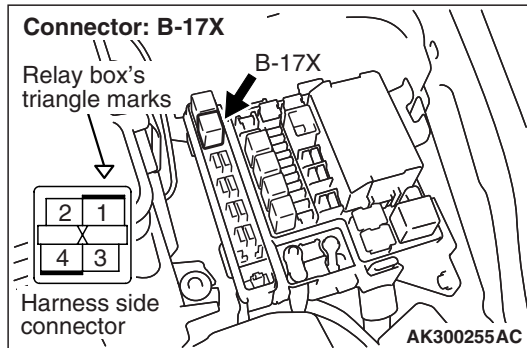
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**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-17X (terminal No. 1) engine control relay connector and B-02 (terminal No. 1) No. 2 injector connector.

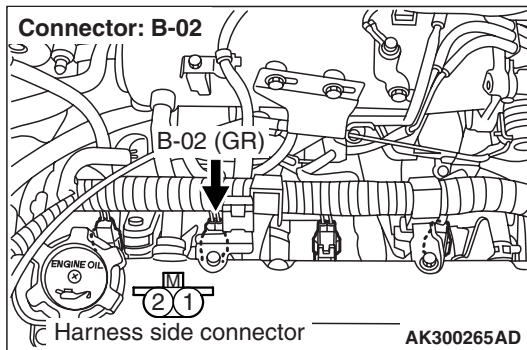
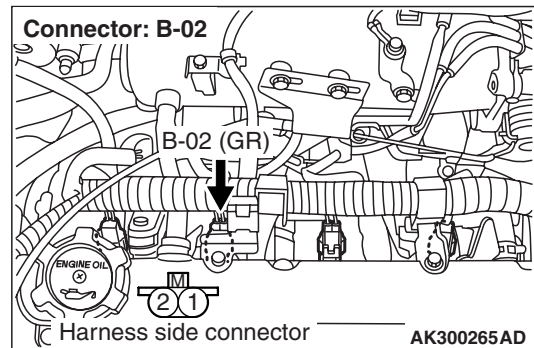
- Check power supply line for open/short circuit and damage.

**NO :** Repair.**STEP 6. Connector check: 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 (terminal No. 1) engine control relay connector and B-02 (terminal No. 1) No. 2 injector connector.**



**STEP 9. Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-134 (terminal No. 14) engine-ECU connector.**



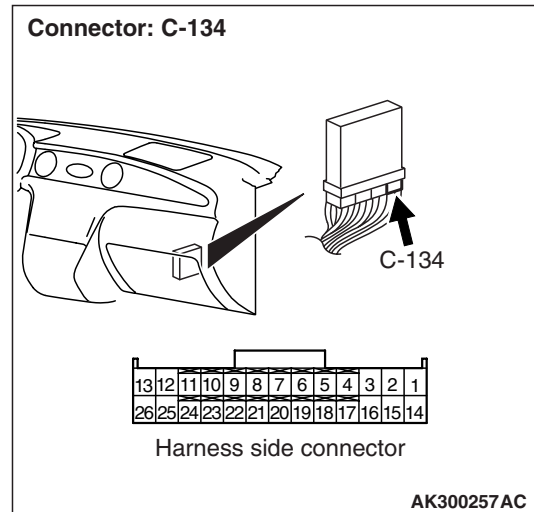
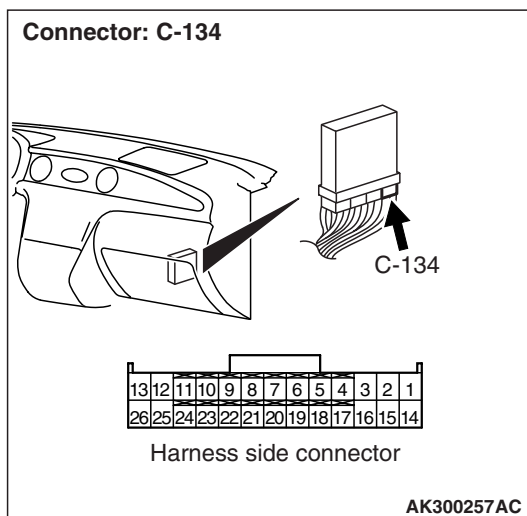
- Check power supply line for damage.

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

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8. Connector check: C-134 engine-ECU connector**



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

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

**YES :** Go to Step 10 .

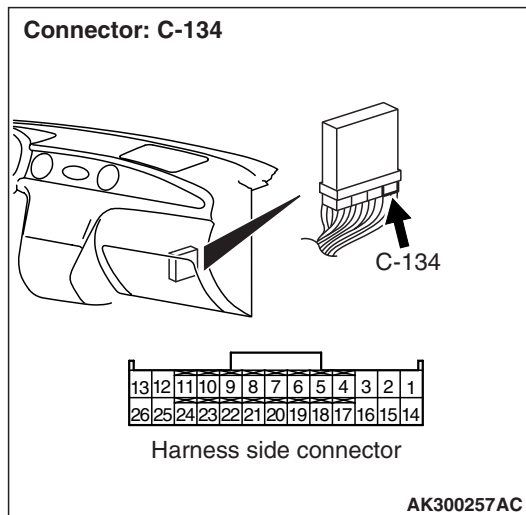
**NO :** Repair.

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

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 10. Perform signal wave pattern measurement at C-134 engine-ECU connector (Using an oscilloscope).**



- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 9 and earth.

**OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to [P.13A-305](#)).**

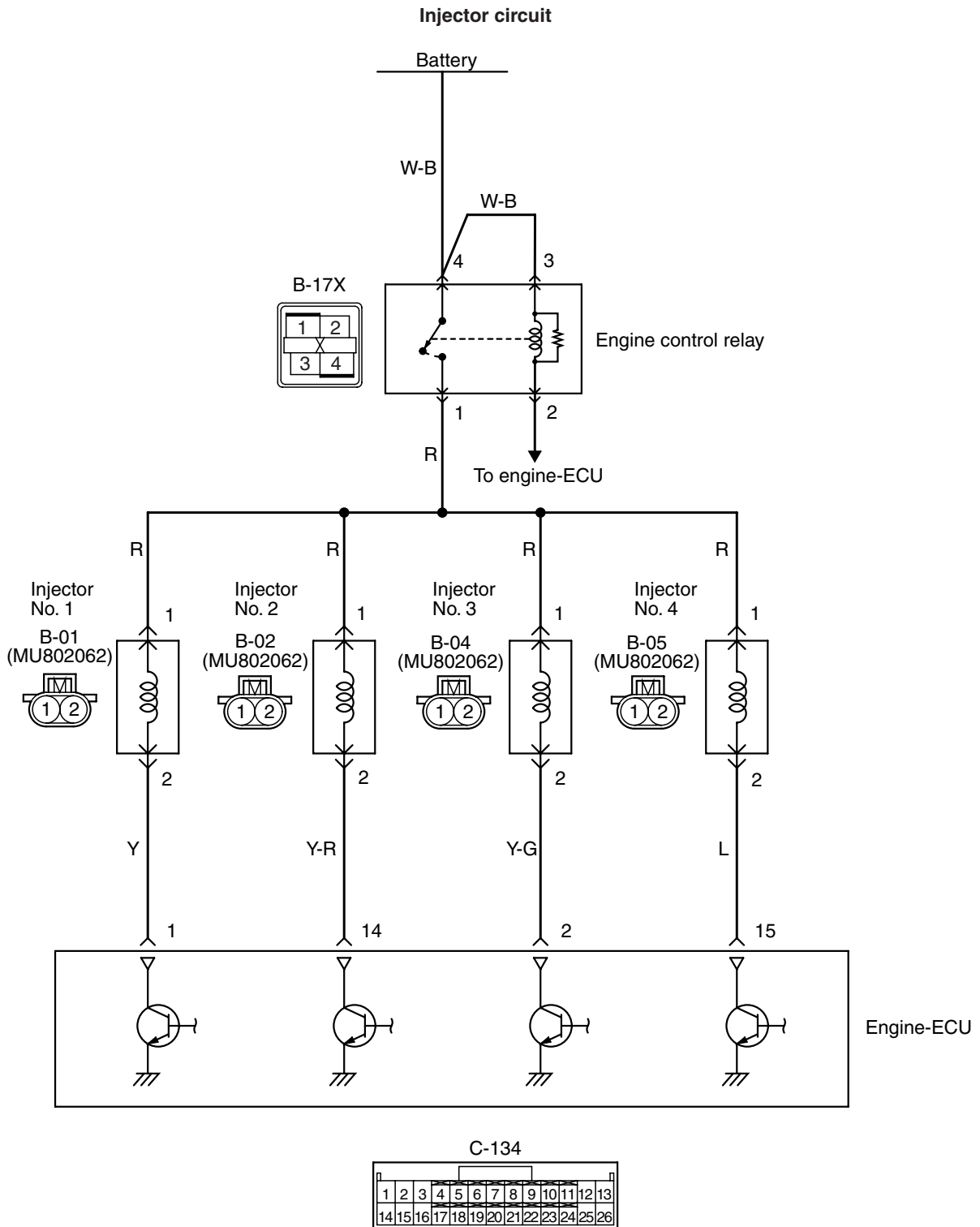
**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.



**Code No. P0203: No. 3 Injector System**



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

**OPERATION**

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-ECU (terminal No. 2) 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-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**

- The engine speed is 50 – 8,000 r/min.
- The throttle position sensor output voltage is 5 V or less.
- Injector not in forced drive (actuator test) mode

**Judgment Criterion**

- No surge voltage of the injector coil is detected for 2 seconds.

**PROBABLE CAUSE**

- Failed No. 3 injector
- Open/short circuit in No. 3 injector circuit or loose connector contact
- Failed engine-ECU

**DIAGNOSIS PROCEDURE****STEP 1. M.U.T.-II/III actuator test**

- Refer to Actuator test reference table list

[P.13A-299](#).

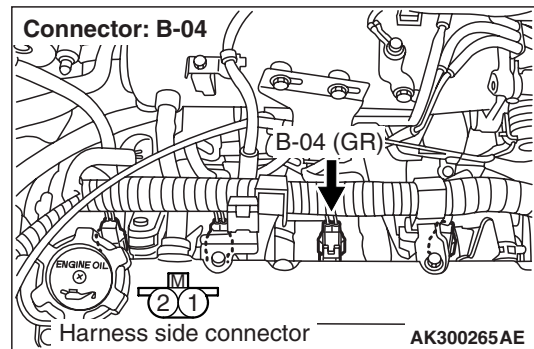
- Item 03: No. 3 injector

**OK: Idling state varies.**

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

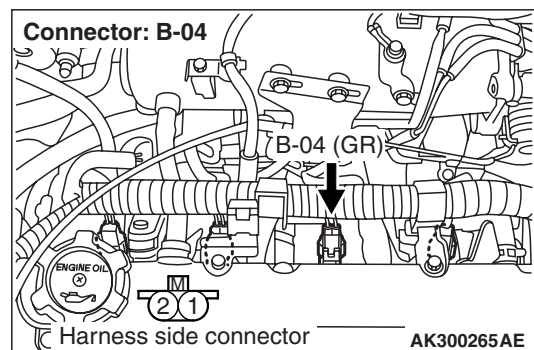
**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Go to Step 2 .

**STEP 2. Connector check: B-04 No. 3 injector connector****Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Repair.

**STEP 3. Perform resistance measurement at B-04 No. 3 injector connector.**

- Disconnect connector, and measure at injector side.
- Resistance between terminal No. 1 and No. 2.

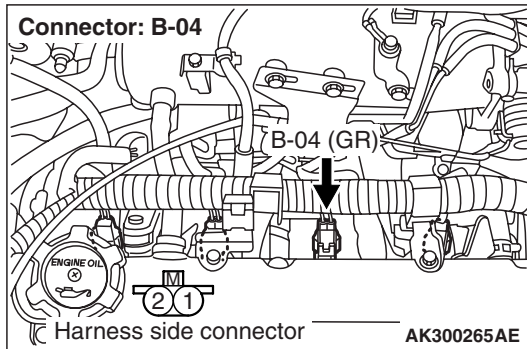
**OK: 10.5 – 13.5  $\Omega$**

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

**YES :** Go to Step 4 .

**NO :** Replace No. 3 injector.

**STEP 4. Perform voltage measurement at B-04  
No. 3 injector connector.**



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

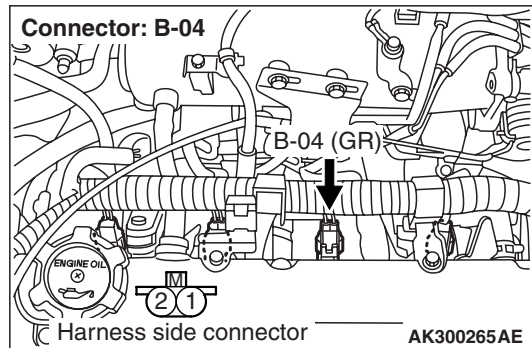
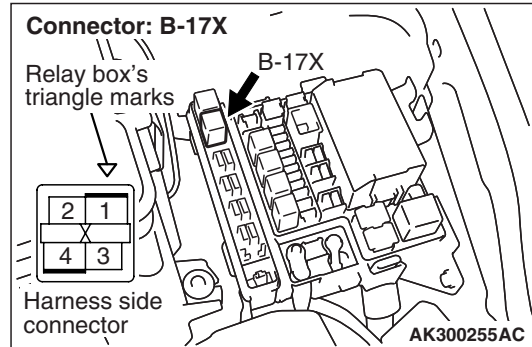
**OK: System voltage**

**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**



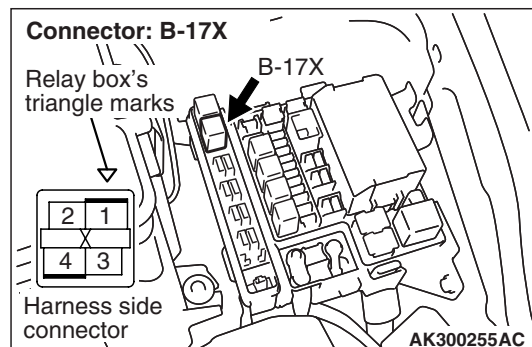
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-17X (terminal No. 1) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

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

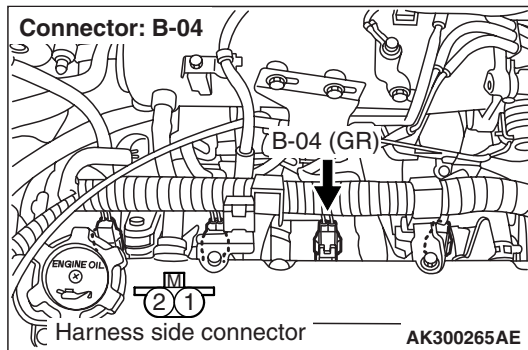
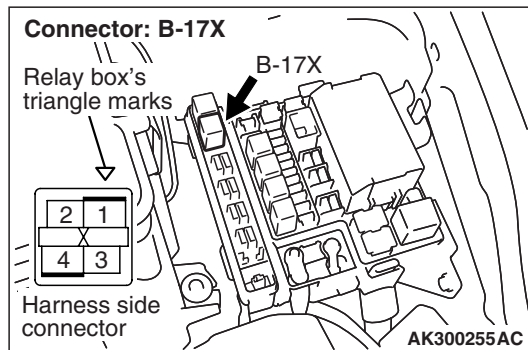


**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Check harness between B-17X (terminal No. 1) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.**



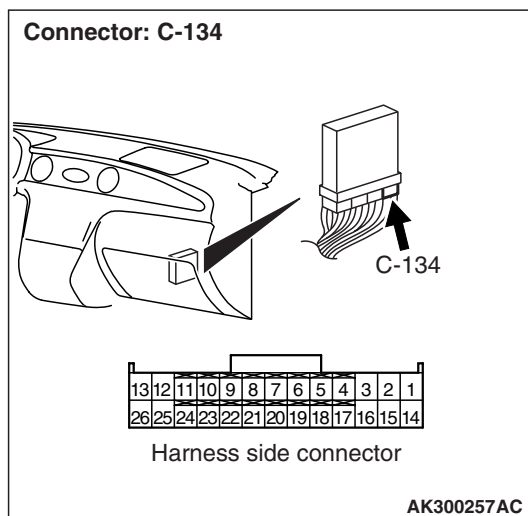
- Check power supply line for damage.

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

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8. Connector check: C-134 engine-ECU connector**

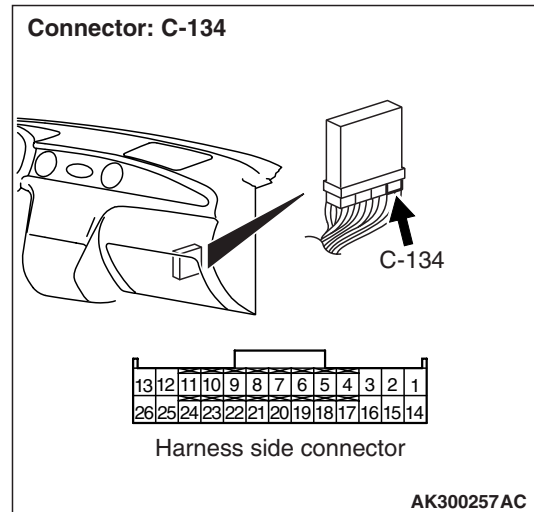
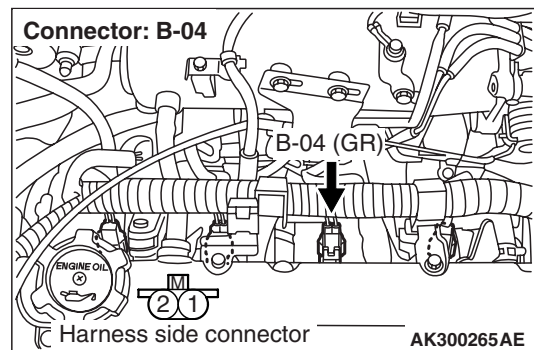


**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-134 (terminal No. 2) engine-ECU connector.**



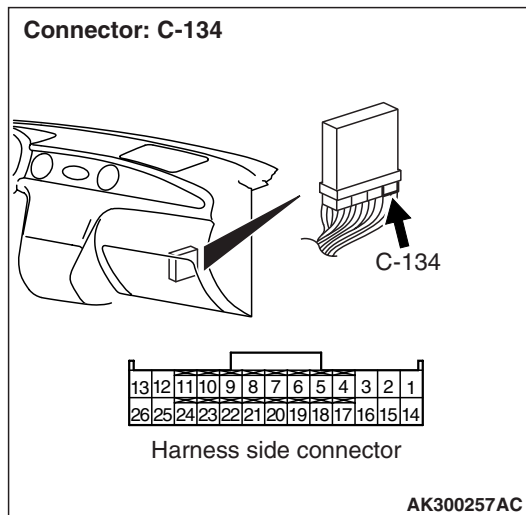
- Check output line for open/short circuit and damage.

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

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Perform signal wave pattern measurement at C-134 engine-ECU connector (Using an oscilloscope).**



- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 24 and earth.

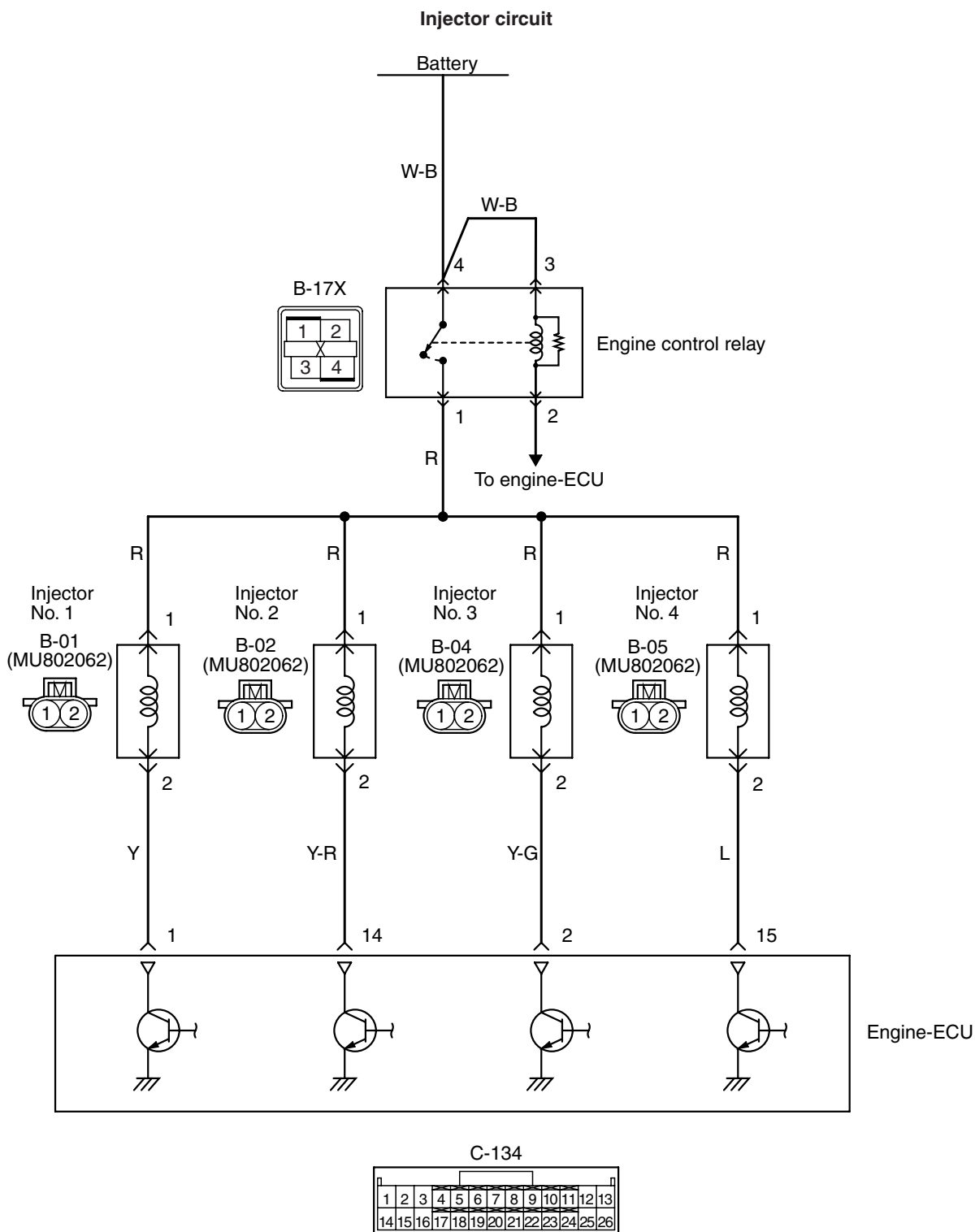
**OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to [P.13A-305](#)).**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

## Code No. P0204: No. 4 Injector System



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

## OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-ECU (terminal No. 15) 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-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

- The engine speed is 50 – 8,000 r/min.
- The throttle position sensor output voltage is 5 V or less.
- Injector not in forced drive (actuator test) mode

### Judgment Criterion

- No surge voltage of the injector coil is detected for 2 seconds

## PROBABLE CAUSE

- Failed No. 4 injector
- Open/short circuit in No. 4 injector circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

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

- Refer to Actuator test reference table list

[P.13A-299](#).

- Item 04: No. 4 injector

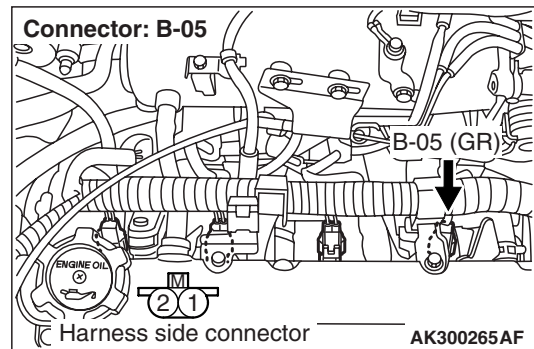
**OK: Idling state varies.**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Go to Step 2 .

### STEP 2. Connector check: B-05 No. 4 injector connector

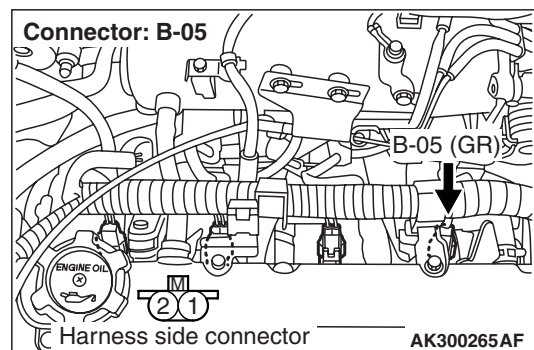


#### Q: Is the check result normal?

**YES :** Go to Step 3 .

**NO :** Repair.

### STEP 3. Perform resistance measurement at B-05 No. 4 injector connector.



- Disconnect connector, and measure at injector side.
- Resistance between terminal No. 1 and No. 2.

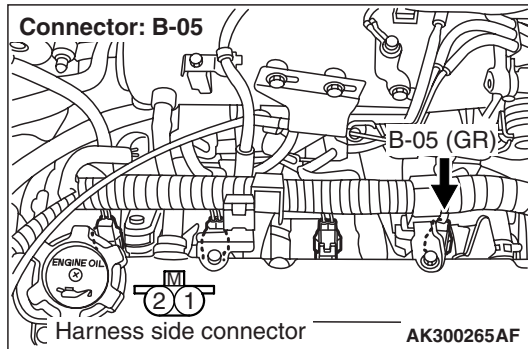
**OK: 10.5 – 13.5 Ω**

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

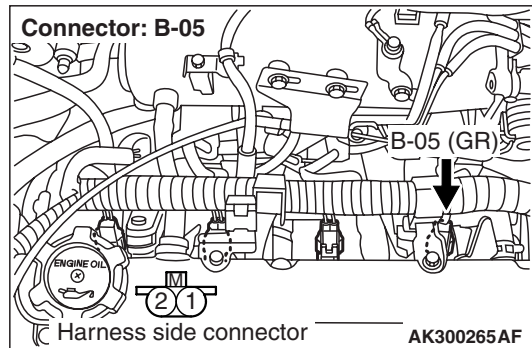
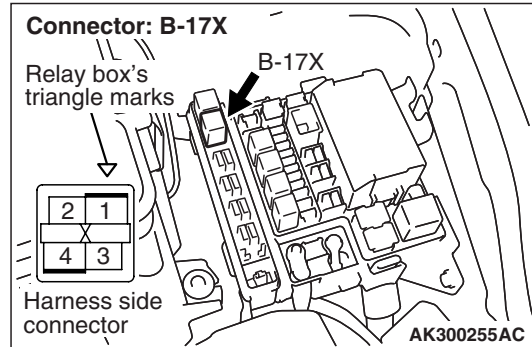
**YES :** Go to Step 4 .

**NO :** Replace No. 4 injector.

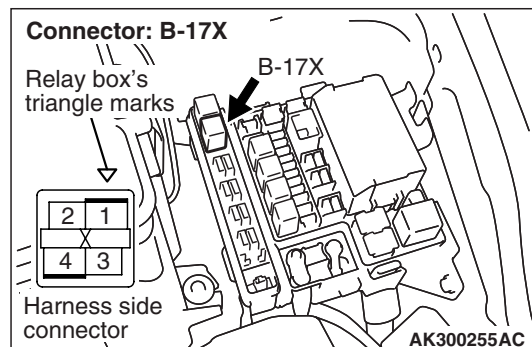


**STEP 4. Perform voltage measurement at B-05 No. 4 injector connector.**

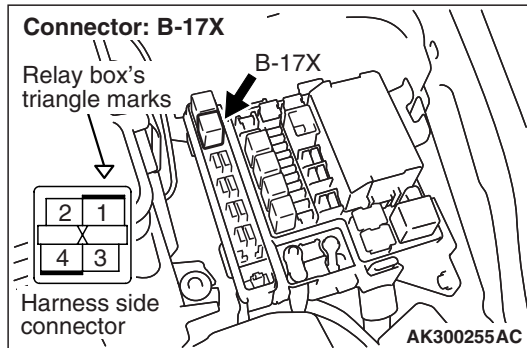
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: System voltage****Q: 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-17X (terminal No. 1) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.

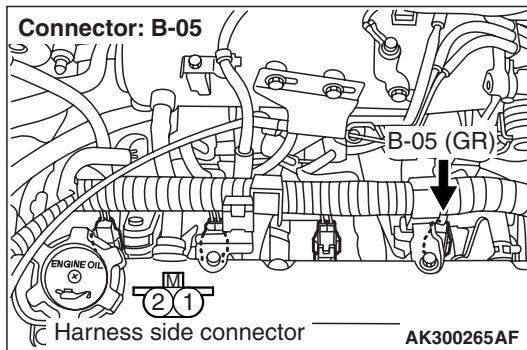
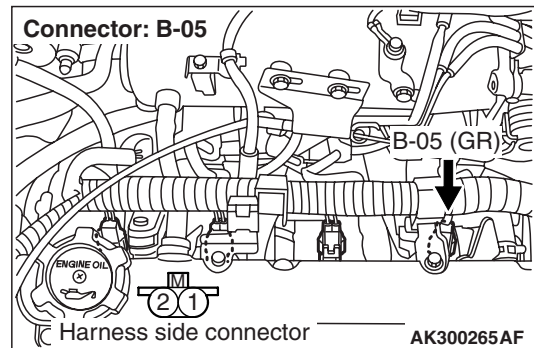
- Check power supply line for open/short circuit and damage.

**NO :** Repair.**STEP 6. Connector check: 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 (terminal No. 1) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.**



**STEP 9. Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-134 (terminal No. 15) engine-ECU connector.**

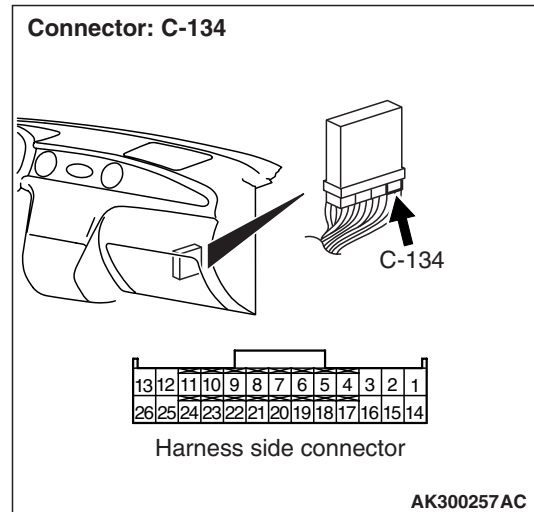


- Check power supply line for damage.

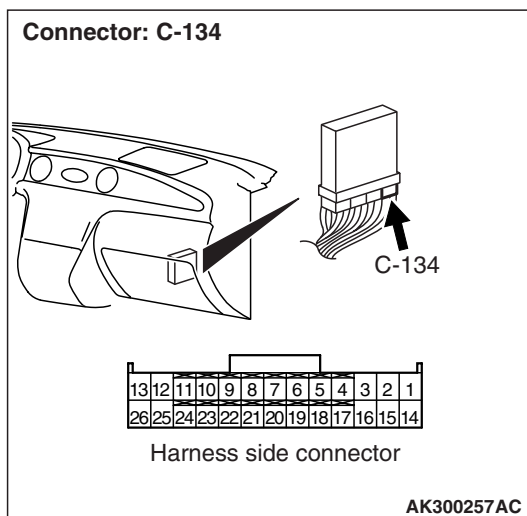
**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.



**STEP 8. Connector check: C-134 engine-ECU connector**



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

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

**YES :** Go to Step 10 .

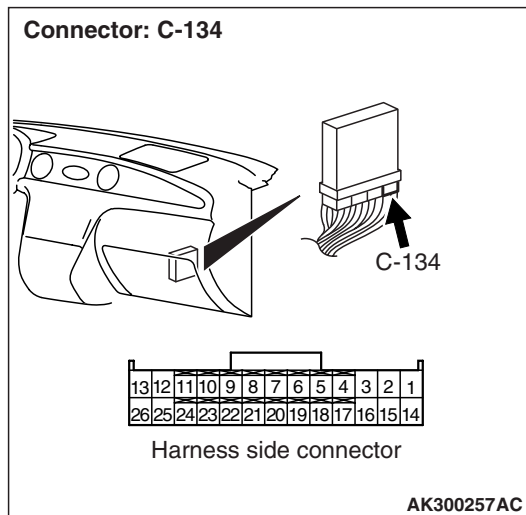
**NO :** Repair.

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

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 10. Perform signal wave pattern measurement at C-134 engine-ECU connector (Using an oscilloscope).**



- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 2 and earth.

**OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13A-305).**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

**NO :** Replace engine-ECU.

**Code No. P0300: Random cylinder mis-fire detected**

**OPERATION**

- Refer to P0201 injector circuit P.13A-87.
- Refer to P0202 injector circuit P.13A-92.
- Refer to P0203 injector circuit P.13A-97.
- Refer to P0204 injector circuit P.13A-102.

**FUNCTION**

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU checks for such changes in engine speed.

**TROUBLE JUDGMENT**

**Check Conditions**

- 5 seconds later after the engine has started up.
- The engine speed is 500 – 4,500 r/min.

- The engine coolant temperature is  $-10^{\circ}\text{C}$  or higher.
- The intake air temperature is  $-10^{\circ}\text{C}$  or higher.
- The barometric pressure is 72 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of  $-0.059 \text{ V}/10\text{ms}$  to  $0.059 \text{ V}/10\text{ms}$ .

### Judgment Criteria

- The number of misfiring (in the catalyst temperature of above 950°C) is beyond the specified number (of 4.5% on more than the two cylinders) with the engine speed of 200 r/min.

Or

- The number of misfiring (that is 1.5 times the emission standard limit) is beyond the specified number (of 2% on more than the two cylinders) with the engine speed of 1000 r/min.

### PROBABLE CAUSE

- Ignition system related part(s) failed
- Failed crank angle sensor
- Incorrect air-fuel ratio
- Low compression pressure
- Failed coolant temperature sensor
- Skipping of timing belt teeth.
- EGR system and EGR valve failed
- Failed engine-ECU

### DIAGNOSIS PROCEDURE

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

- Item 22: Crank angle sensor

**OK:** Keep the engine speed constant to make the pulse width of output waveform constant.

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

**YES :** Go to Step 2 .

**NO :** Check crank angle sensor system (Refer to Code No. P0335 [P.13A-124](#)).

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

- Refer to Data list reference table [P.13A-293](#).
- a. Item 21: Engine coolant temperature sensor
- b. Item 81: Long-term fuel compensation
- c. Item 82: Short-term fuel compensation

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

**YES :** Go to Step 3 .

**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-15](#)).

#### STEP 3.Check ignition secondary voltage waveform using an oscilloscope.

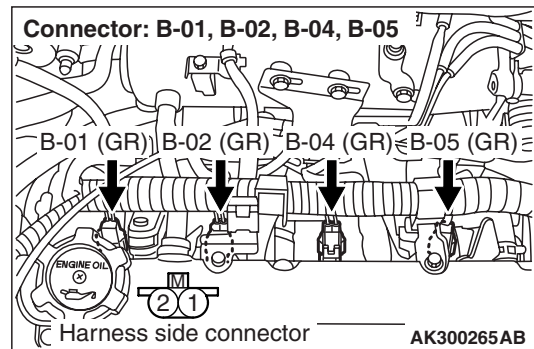
- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Go to Step 4 .

**NO :** Check ignition circuit system (Refer to Inspection procedure 30 [P.13A-286](#)).

#### STEP 4.Connector check: 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 5 .

**NO :** Repair.

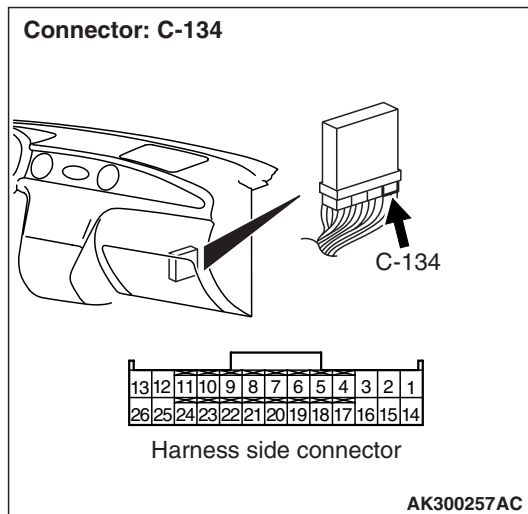
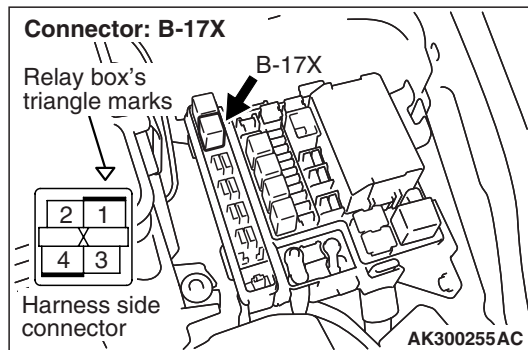
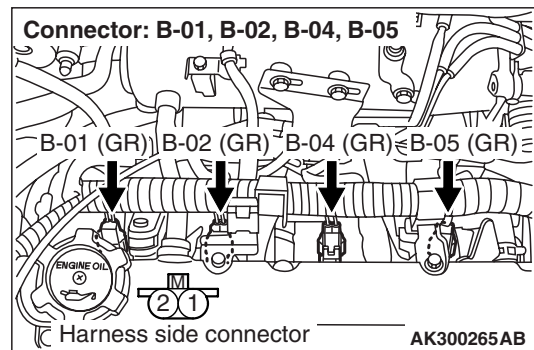
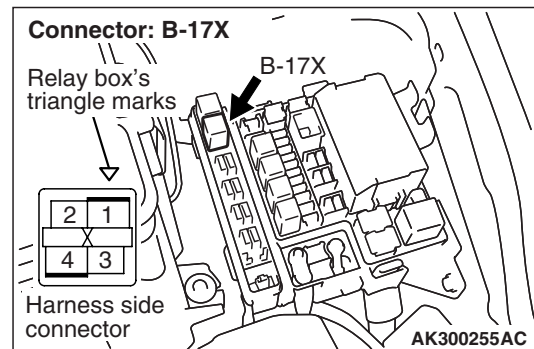
#### STEP 5.Check injector itself.

- Check Injector itself (Refer to [P.13A-325](#)).

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

**YES :** Go to Step 6 .

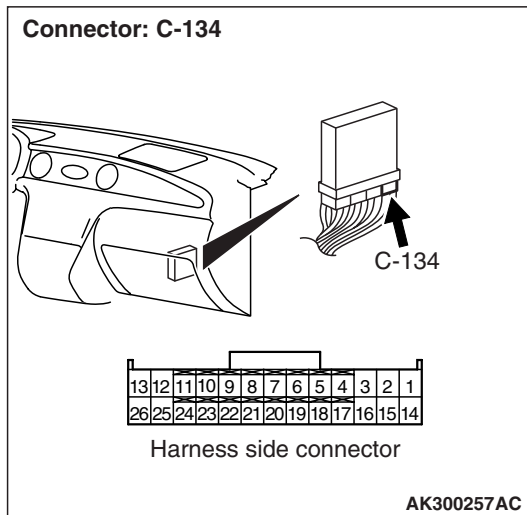
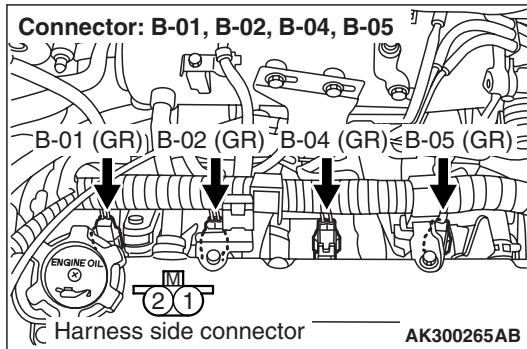
**NO :** Replace injector.

**STEP 6. Connector check: B-17X engine control relay connector and C-134 engine-ECU 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 harness between injector connector and C-134 engine-ECU connector.**



- Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-134 (terminal No. 1) engine-ECU connector.
- Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-134 (terminal No. 14) engine-ECU connector.
- Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-134 (terminal No. 2) engine-ECU connector.
- Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-134 (terminal No. 15) engine-ECU connector.
  - Check output line for damage.

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

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to fuel pressure test [P.13A-316](#))

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

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Check for intake of air from intake hose and inlet manifold.**

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

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. Check for skipped timing belt teeth.**

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

**YES :** Go to Step 12 .

**NO :** Repair.

**STEP 12. Exhaust gas recirculation system check.**

- Exhaust gas recirculation system check [Refer to GROUP 17 – Exhaust gas recirculation (EGR) system [P.17-70](#)].

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

**YES :** Replace engine-ECU

**NO :** Repair.



**Code No. P0301: No. 1 cylinder mis-fire detection system****OPERATION**

- Refer to P0201 injector circuit [P.13A-87](#).

**FUNCTION**

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU checks for such changes in engine speed.

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

- 5 seconds later after the engine has started up.
- The engine speed is 500 – 4,500 r/min.
- The engine coolant temperature is –10°C or higher.
- The intake air temperature is –10°C or higher.
- The barometric pressure is 72 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of –0.059 V/10ms to 0.059 V/10ms.

**Judgment Criteria**

- The number of misfiring (in the catalyst temperature of above 950°C) is beyond the specified number (of 4.5% on more than the two cylinders) with the engine speed of 200 r/min.

Or

- The number of misfiring (that is 1.5 times the emission standard limit) is beyond the specified number (of 2% on more than the two cylinders) with the engine speed of 1,000 r/min.

**PROBABLE CAUSE**

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU

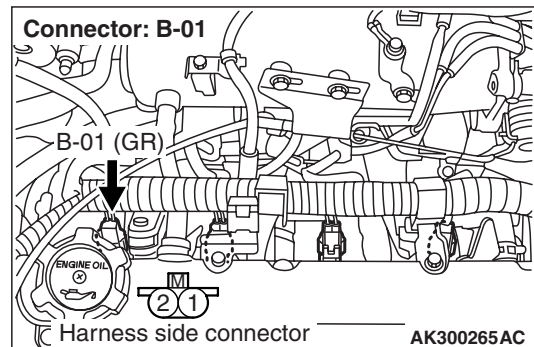
**DIAGNOSIS PROCEDURE****STEP 1. Check ignition secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Go to Step 2 .

**NO :** Check ignition Circuit System (Refer to Inspection procedure 30 [P.13A-286](#))

**STEP 2. Connector check: B-01 No.1 injector connector****Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Repair.

**STEP 3. Check No.1 injector itself.**

- Check Injector itself (Refer to [P.13A-325](#)).

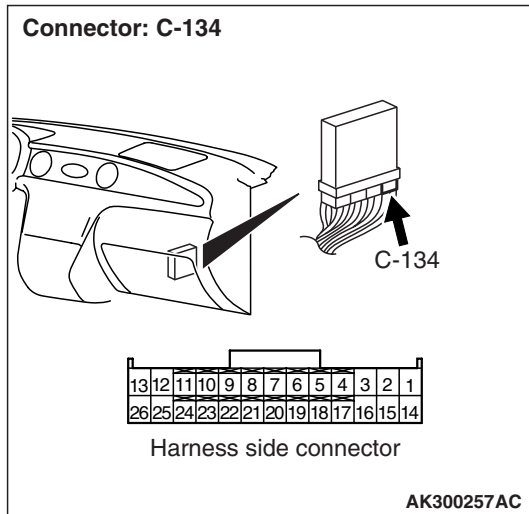
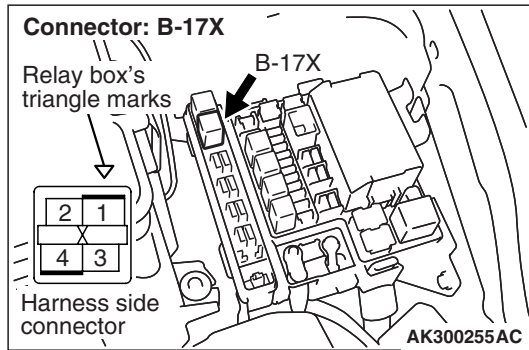
**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Replace No.1 injector.



**STEP 4. Connector check: B-17X engine control relay connector and B-134 engine-ECU connector**

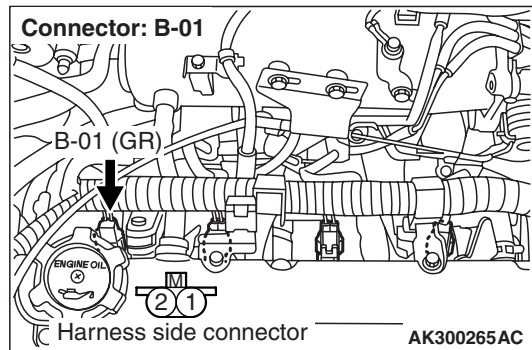
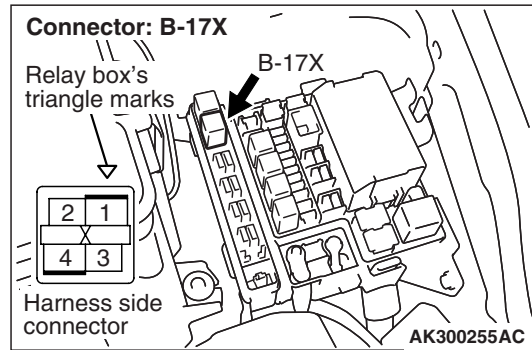


**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Repair.

**STEP 5. Check harness between B-17X (terminal No. 1) engine control relay connector and B-01 (terminal No. 1) No.1 injector connector.**

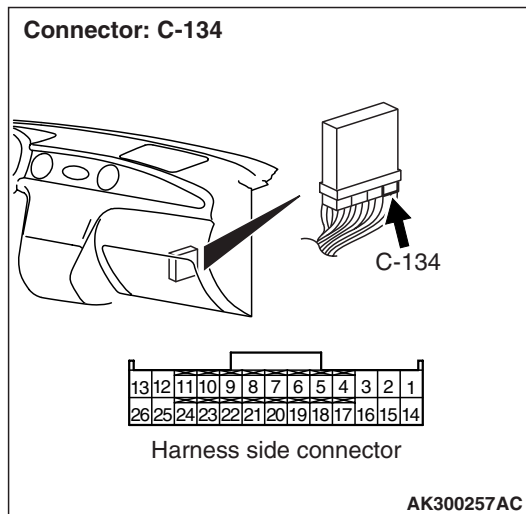
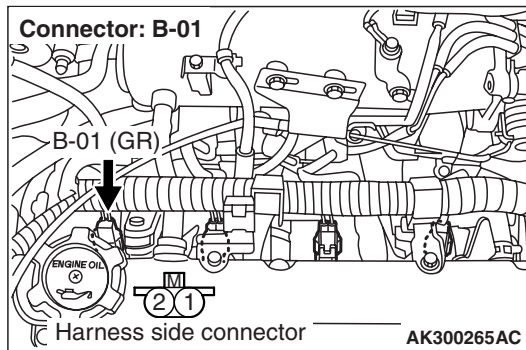


- Check power supply line for damage.

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

**YES :** Go to Step 6 .

**NO :** Repair.

**STEP 6. Check harness between B-01 (terminal No. 2) No.1 injector connector and C-134 (terminal No. 1) engine-ECU connector**

- Check output line for damage.

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

YES : Go to Step 7 .

NO : Repair.

**STEP 7. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to fuel pressure test [P.13A-316](#)).

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

YES : Replace engine-ECU.

NO : Repair.

**Code No. P0302: No. 2 cylinder mis-fire detection system****OPERATION**

- Refer to P0202 injector circuit [P.13A-92](#).

**FUNCTION**

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU checks for such changes in engine speed.

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

- 5 seconds later after the engine has started up.
- The engine speed is 500 – 4,500 r/min.

- The engine coolant temperature is  $-10^{\circ}\text{C}$  or higher.
- The intake air temperature is  $-10^{\circ}\text{C}$  or higher.
- The barometric pressure is 72 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of  $-0.059\text{ V}/10\text{ms}$  to  $0.059\text{ V}/10\text{ms}$ .

### Judgment Criteria

- The number of misfiring (in the catalyst temperature of above 950°C) is beyond the specified number (of 4.5% on more than the two cylinders) with the engine speed of 200 r/min.

or

- The number of misfiring (that is 1.5 times the emission standard limit) is beyond the specified number (of 2% on more than the two cylinders) with the engine speed of 1,000 r/min.

### PROBABLE CAUSE

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU

### DIAGNOSIS PROCEDURE

#### STEP 1. Check ignition secondary voltage waveform using an oscilloscope.

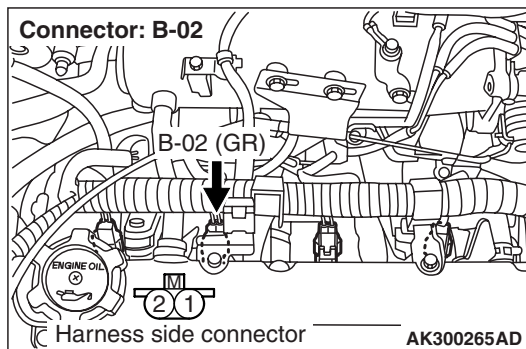
- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Go to Step 2 .

**NO :** Check ignition circuit system (Refer to Inspection procedure 30 [P.13A-286](#)).

#### STEP 2. Check connector: B-02 No.2 injector connector



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

**YES :** Go to Step 3 .

**NO :** Repair.

#### STEP 3. Check No.2 injector itself.

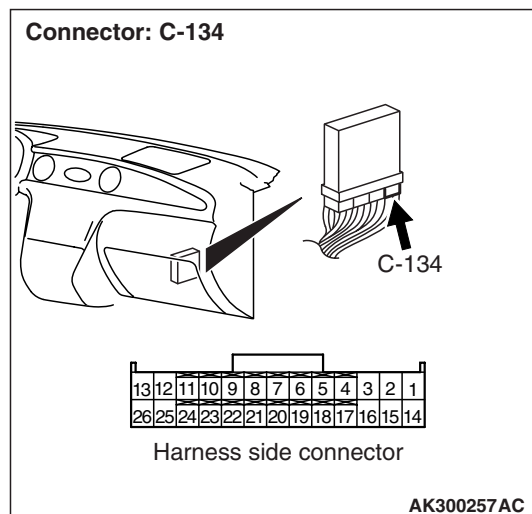
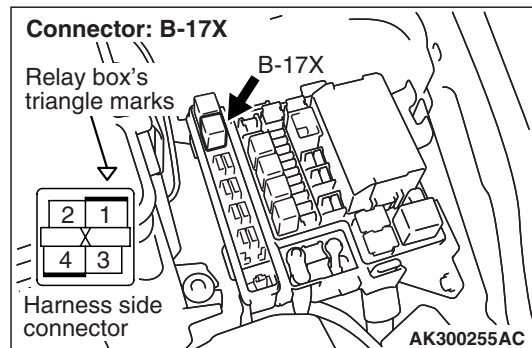
- Check Injector itself (Refer to [P.13A-325](#)).

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

**YES :** Go to Step 4 .

**NO :** Replace No.2 injector.

#### STEP 4. Connector check: B-17X engine control relay connector and B-134 engine-ECU connector

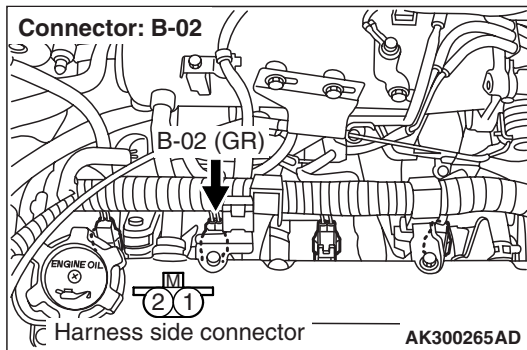
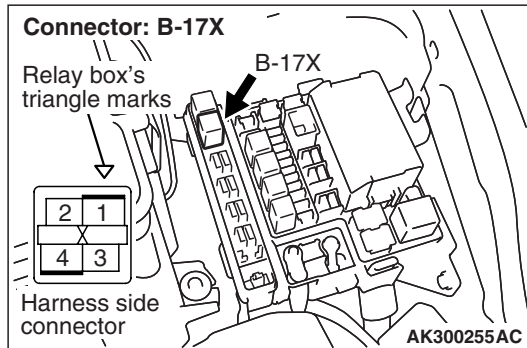


**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Repair.

**STEP 5. Check harness between B-17X (terminal No. 1) engine control relay connector and B-02 (terminal No. 1) No.2 injector connector.**



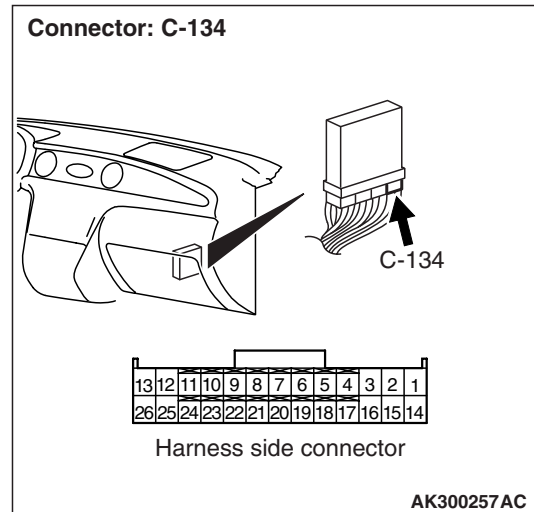
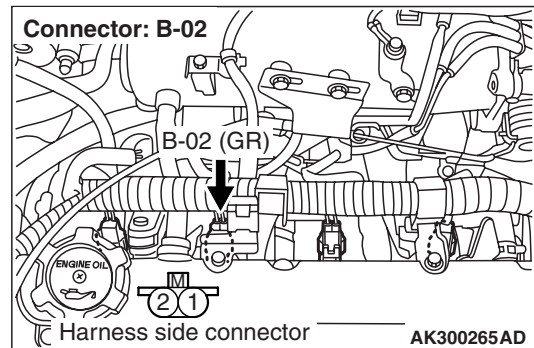
- Check power supply line for damage.

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

**YES :** Go to Step 6 .

**NO :** Repair.

**STEP 6. Check harness between B-02 (terminal No. 2) No.2 injector connector and C-134 (terminal No. 14) engine-ECU connector**



- Check output line for damage.

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

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to fuel pressure test [P.13A-316](#))

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

**YES :** Replace engine-ECU.

**NO :** Repair.

**Code No. P0303: No. 3 cylinder mis-fire detection system**

**OPERATION**

- Refer to P0203 injector circuit [P.13A-97](#).

**FUNCTION**

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU checks for such changes in engine speed.

**TROUBLE JUDGMENT**

**Check Conditions**

- 5 seconds later after the engine has started up.
- The engine speed is 500 – 4,500 r/min.
- The engine coolant temperature is –10°C or higher.
- The intake air temperature is –10°C or higher.
- The barometric pressure is 72 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of – 0.059 V/10ms to 0.059 V/10ms.

**Judgment Criteria**

- The number of misfiring (in the catalyst temperature of above 950°C) is beyond the specified number (of 4.5% on more than the two cylinders) with the engine speed of 200 r/min.

or

- The number of misfiring (that is 1.5 times the emission standard limit) is beyond the specified number (of 2% on more than the two cylinders) with the engine speed of 1,000 r/min.

**PROBABLE CAUSE**

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU

**DIAGNOSIS PROCEDURE**

**STEP 1. Check ignition secondary voltage waveform using an oscilloscope.**

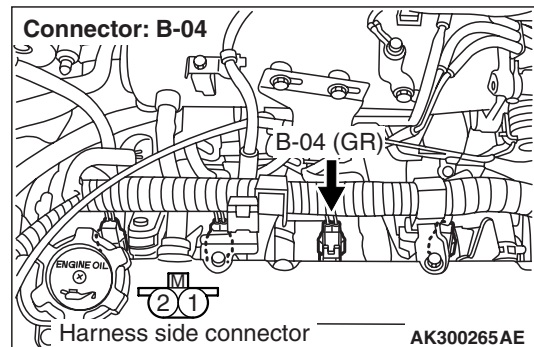
- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Go to Step 2 .

**NO :** Check ignition circuit system (Refer to Inspection procedure 30 [P.13A-286](#)).

**STEP 2. Connector check: B-04 No.3 injector connector**



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

**YES :** Go to Step 3 .

**NO :** Repair.

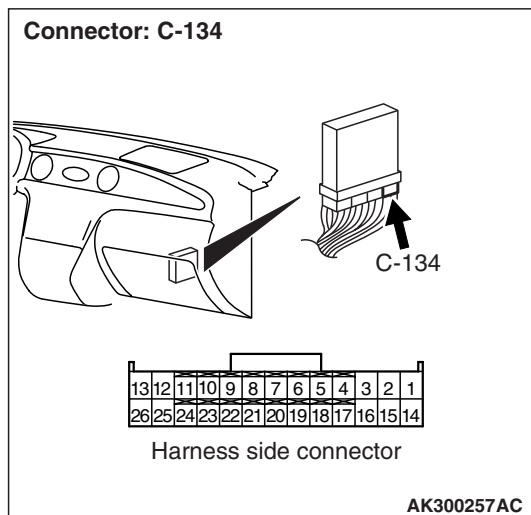
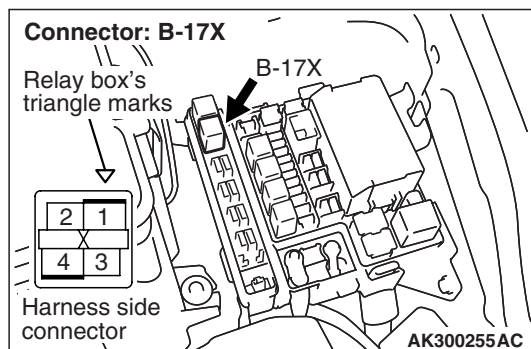
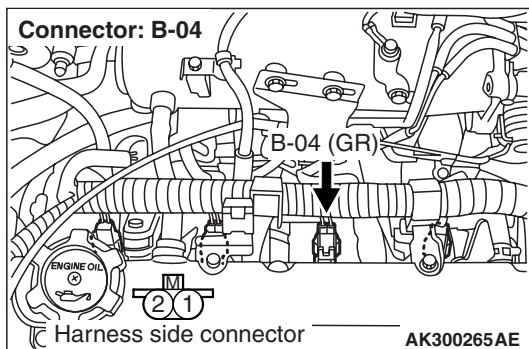
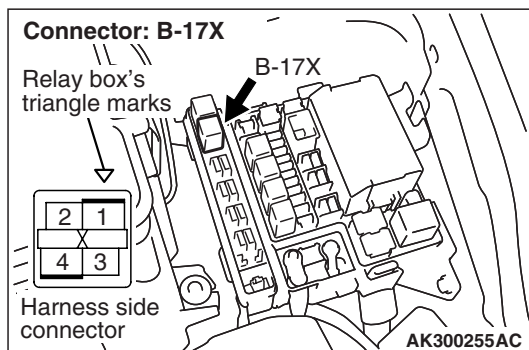
**STEP 3. Check No.3 injector itself.**

- Check Injector itself (Refer to [P.13A-325](#)).

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

**YES :** Go to Step 4 .

**NO :** Replace No.3 injector.

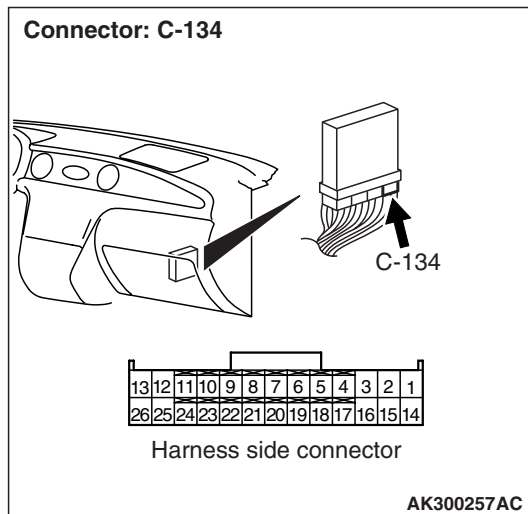
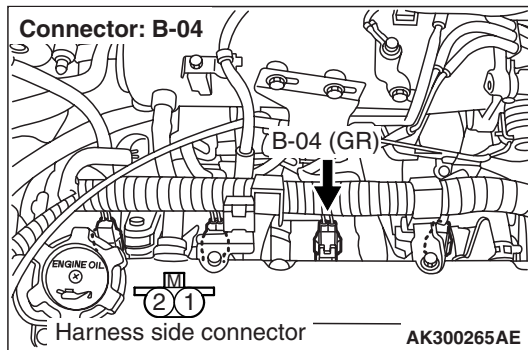
**STEP 4. Connector check: B-17X engine control relay connector, B-134 engine-ECU connector****Q: Is the check result normal?****YES :** Go to Step 5 .**NO :** Repair.**STEP 5. Check harness between B-17X (terminal No. 1) engine control relay connector and B-04 (terminal No. 1) No.3 injector connector.**

- Check power supply line for damage.

**Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Repair.



**STEP 6. Check harness between B-04 (terminal No. 2) No.3 injector connector and C-134 (terminal No. 2) engine-ECU connector**



- Check output line for damage.

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

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to fuel pressure test [P.13A-316](#))

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

**YES :** Replace engine-ECU.

**NO :** Repair.



**Code No. P0304: No. 4 cylinder mis-fire detection system****OPERATION**

- Refer to P0204 injector circuit [P.13A-102](#).

**FUNCTION**

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU checks for such changes in engine speed.

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

- 5 seconds later after the engine has started up.
- The engine speed is 500 – 4,500 r/min.
- The engine coolant temperature is –10°C or higher.
- The intake air temperature is –10°C or higher.
- The barometric pressure is 72 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of – 0.059 V/10ms to 0.059 V/10ms.

**Judgment Criteria**

- The number of misfiring (in the catalyst temperature of above 950°C) is beyond the specified number (of 4.5% on more than the two cylinders) with the engine speed of 200 r/min.

or

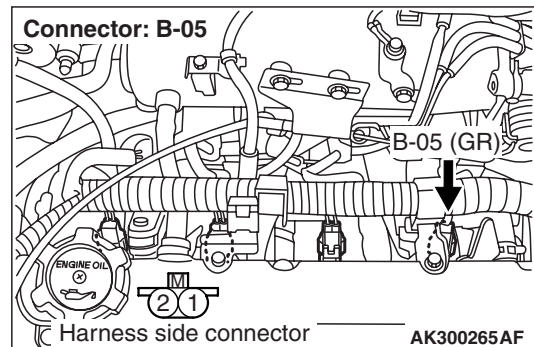
- The number of misfiring (that is 1.5 times the emission standard limit) is beyond the specified number (of 2% on more than the two cylinders) with the engine speed of 1,000 r/min.

**PROBABLE CAUSE**

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU

**DIAGNOSIS PROCEDURE****STEP 1. Check ignition secondary voltage waveform using an oscilloscope.**

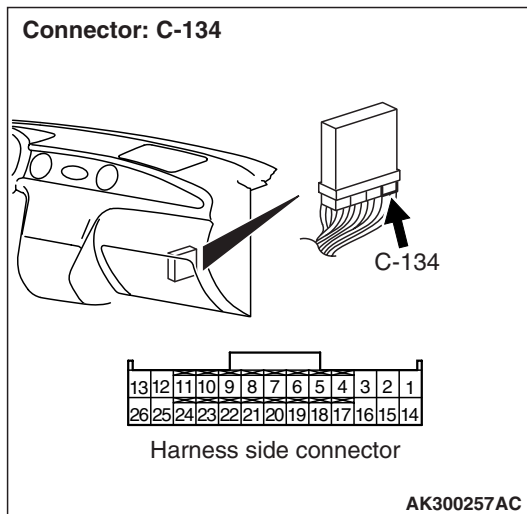
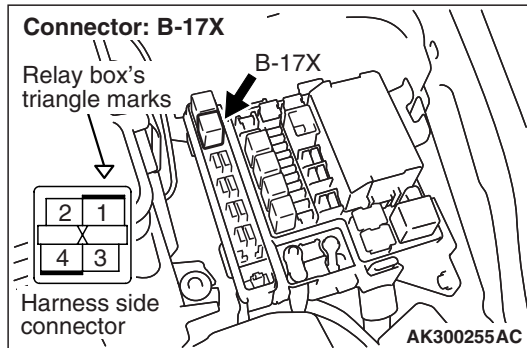
- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

**Q: Is the check result normal?****YES :** Go to Step 2 .**NO :** Check ignition Circuit System (Refer to Inspection procedure 30 [P.13A-286](#)).**STEP 2. Connector check: B-05 No.4 injector connector****Q: Is the check result normal?****YES :** Go to Step 3 .**NO :** Repair.**STEP 3. Check No.4 injector itself.**

- Check Injector itself (Refer to [P.13A-325](#)).

**Q: Is the check result normal?****YES :** Go to Step 4 .**NO :** Replace No.4 injector.

**STEP 4. Connector check: B-17X engine control relay connector and B-134 engine-ECU connector**

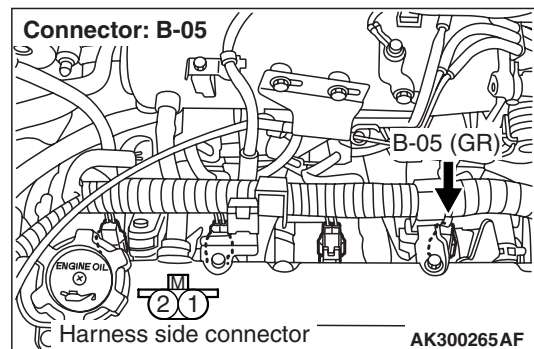
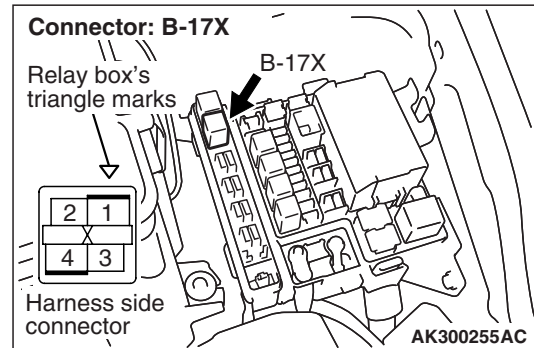


**Q: Is the check result normal?**

**YES :** Go to Step 5 .

**NO :** Repair.

**STEP 5. Check harness between B-17X (terminal No. 1) engine control relay connector and B-05 (terminal No. 1) No.4 injector connector.**



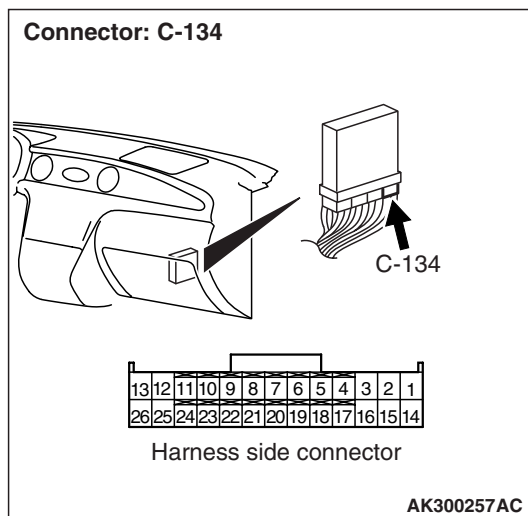
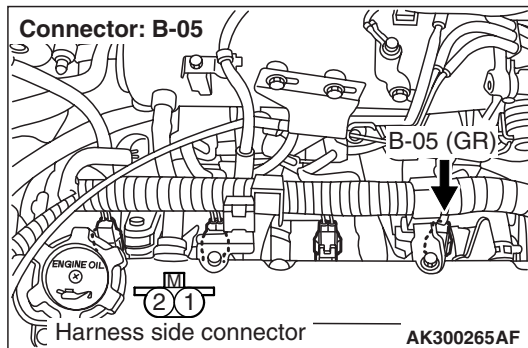
- Check power supply line for damage.

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

**YES :** Go to Step 6 .

**NO :** Repair.

**STEP 6. Check harness between B-05 (terminal No. 2) No.4 injector connector and C-134 (terminal No. 15) engine-ECU connector.**



- Check output line for damage.

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

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to fuel pressure test [P.13A-316](#))

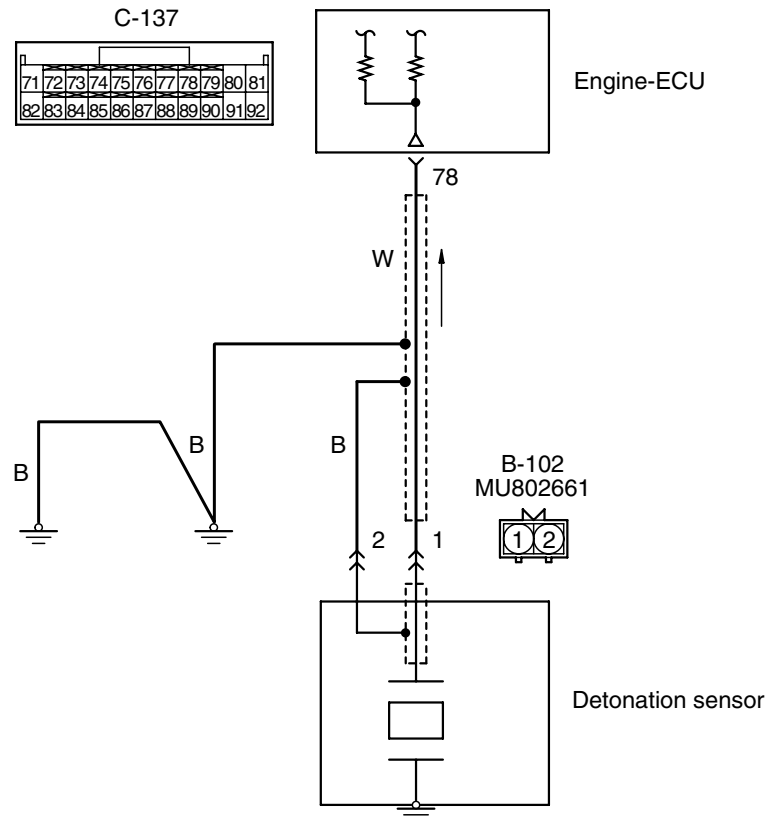
**Q: Is the check result normal?**

**YES :** Replace engine-ECU.

**NO :** Repair.

Code No. P0325: Detonation Sensor System

Detonation sensor circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401196 AB

OPERATION

- The sensor signal is inputted to the engine-ECU (terminal No. 78) 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-ECU.
- In response to the signal, the engine-ECU provides controls to retard the ignition timing when the detonation occurs.

TROUBLE JUDGMENT

Check Condition

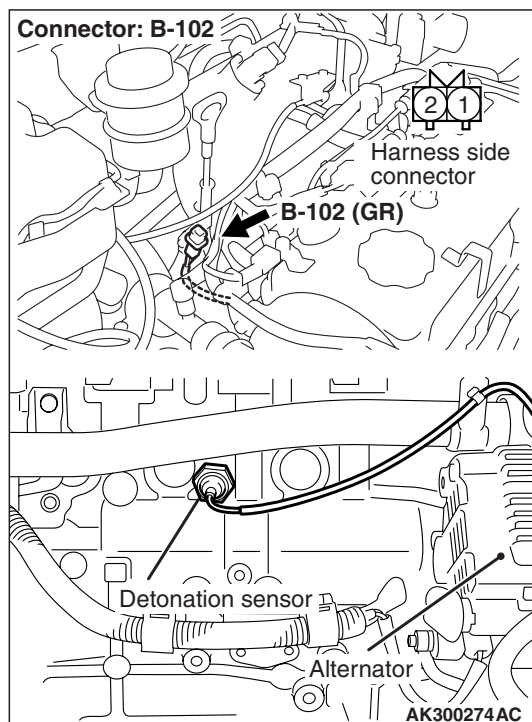
- 2 seconds later after the engine has started up.

Judgment Criteria

- The change amount of the detonation sensor output voltage (the detonation sensor peak voltage in every one third a turn of the crankshaft) is below 0.08 V in 200 consecutive times.

**PROBABLE CAUSE**

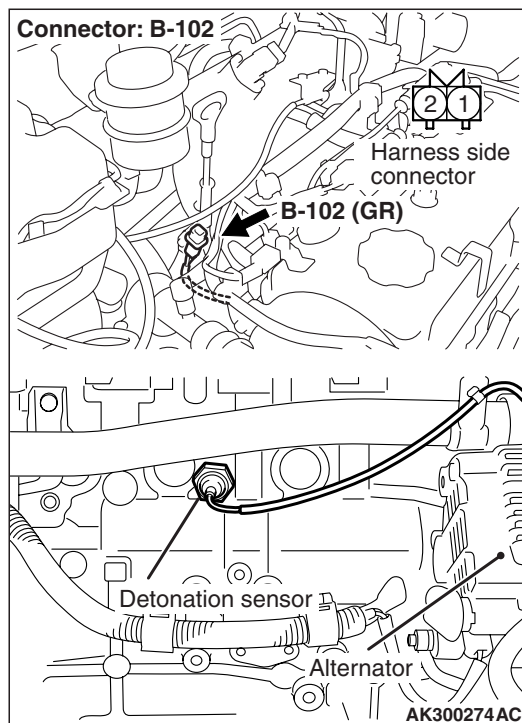
- Failed detonation sensor
- Open/short circuit in detonation sensor circuit or loose connector contact
- Failed engine-ECU

**DIAGNOSIS PROCEDURE****STEP 1. Connector check: B-102 detonation sensor connector**

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

**YES :** Go to Step 2 .

**NO :** Repair.

**STEP 2. Perform resistance measurement at B-102 detonation sensor connector.**

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

**OK: Continuity ( $2\ \Omega$  or less)**

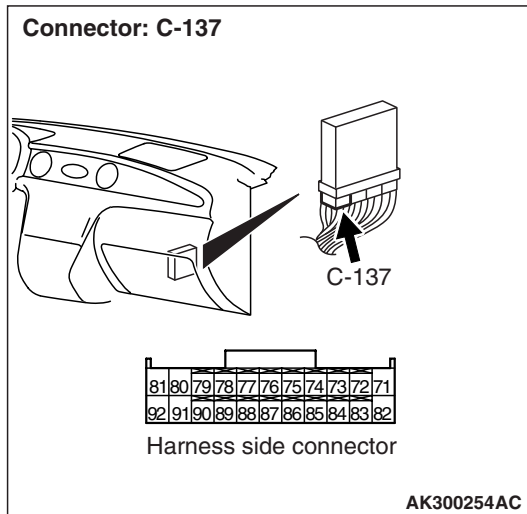
**Q: Is the check result normal?**

**YES :** Go to Step 3 .

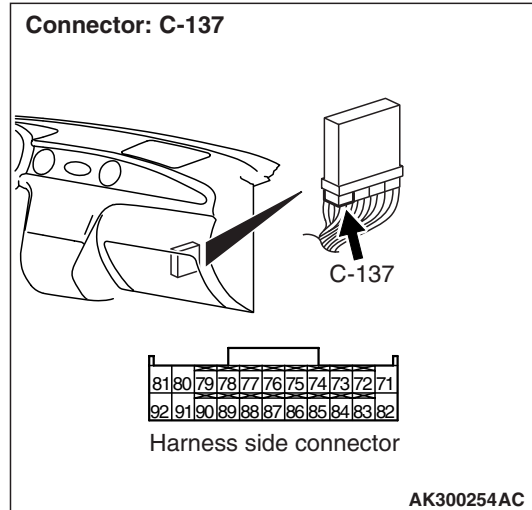
**NO :** Check and repair harness between B-102 (terminal No. 2) detonation sensor connector and body earth.

- Check earthing line for open circuit and damage.

**STEP 3. Connector check: C-137 engine-ECU connector**



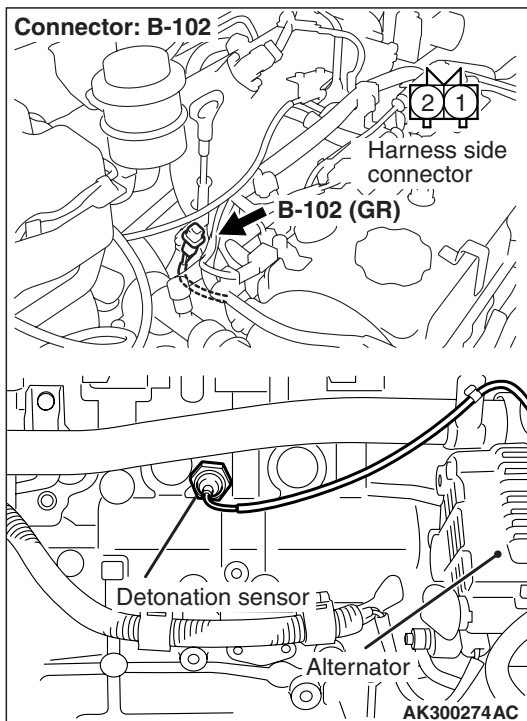
**Q: Is the check result normal?**  
**YES :** Go to Step 4 .  
**NO :** Repair.



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

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

**STEP 4. Check harness between B-102 (terminal No. 1) detonation sensor connector and C-137 (terminal No.78) engine-ECU connector.**



**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.00-6).

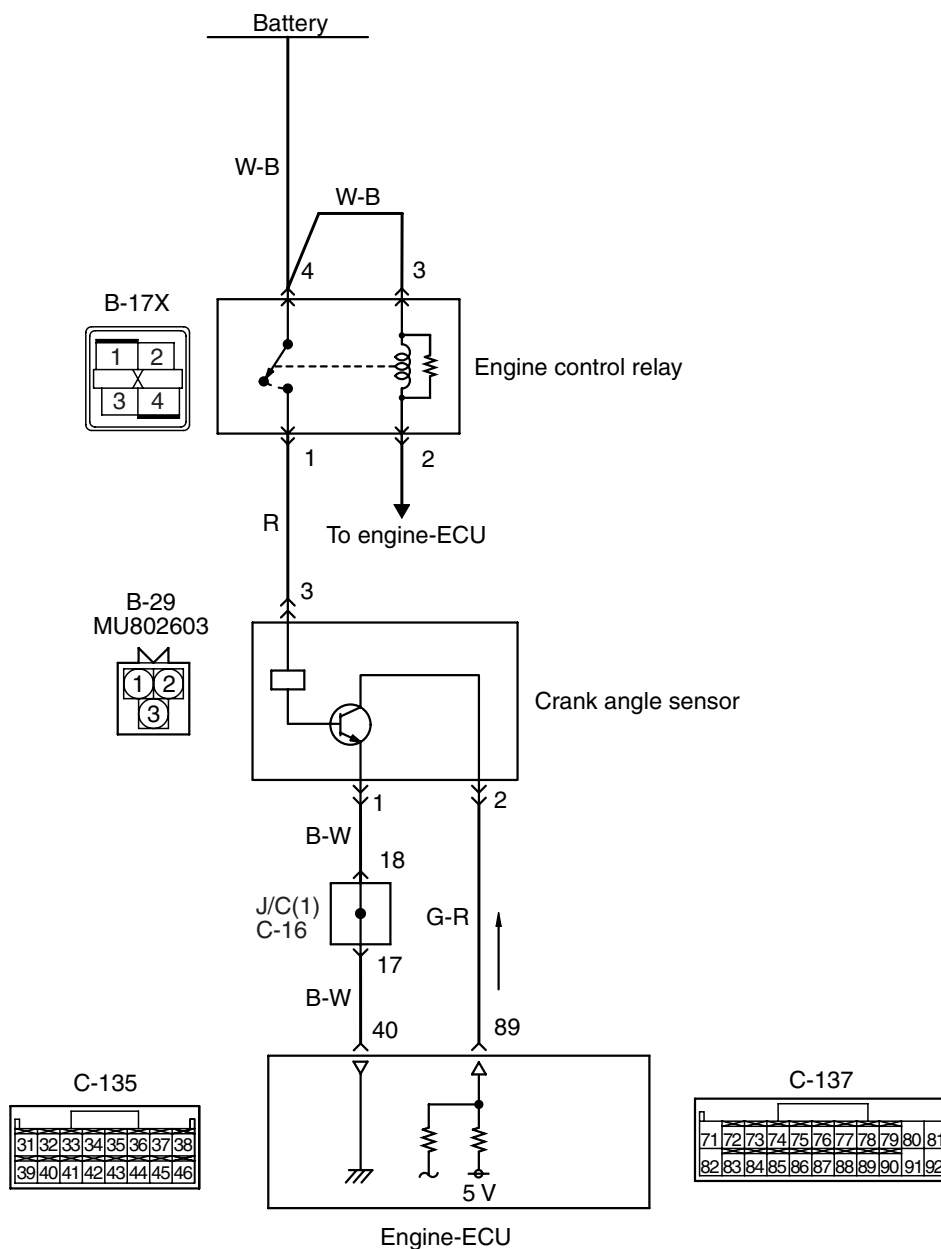
**STEP 6. Replace detonation sensor.**

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

**Q: Does trouble symptom persist?**  
**YES :** Replace engine-ECU.  
**NO :** Check end.

## Code No. P0335: Crank Angle Sensor System

Crank angle sensor circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
 R: Red P: Pink V: Violet



## OPERATION

- Power is supplied to the crank angle sensor (terminal No. 3) from the engine control relay (terminal No. 1) and is earthed to the engine-ECU (terminal No. 40) 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-ECU (terminal No. 89).

## FUNCTION

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

## TROUBLE JUDGMENT

### Check Condition

- Engine in cranking state.

### Judgment Criterion

- The sensor output voltage remains unchanged (no pulse signal is inputted) for 2 seconds.

## PROBABLE CAUSE

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

## DIAGNOSIS PROCEDURE

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

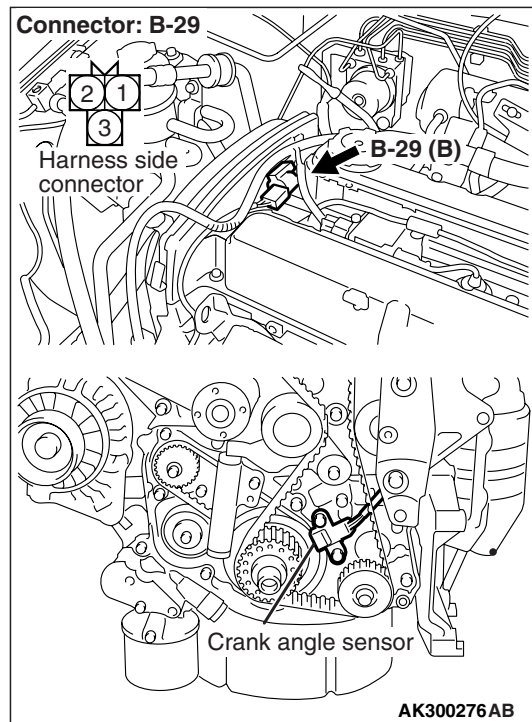
- Refer to Data list reference table [P.13A-293](#).
  - Item 22: Crank angle sensor

### Q: Is the check result normal?

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Go to Step 2 .

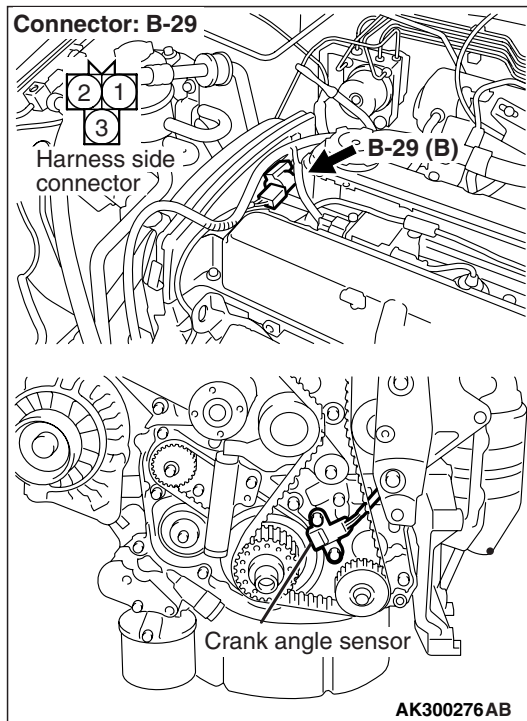
### STEP 2. Connector check: B-29 crank angle sensor connector



### 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.**

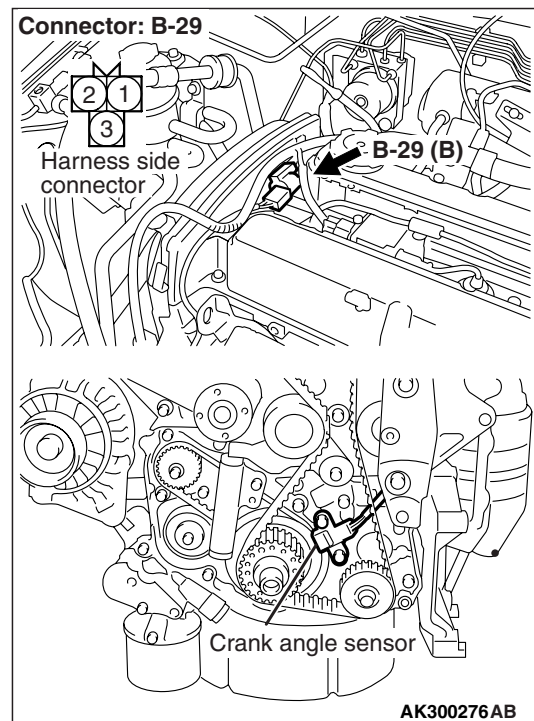
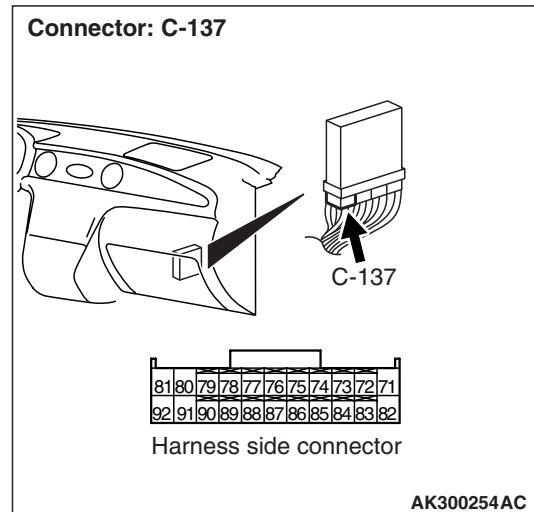
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

**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-137 engine-ECU connector.**

- Measure engine-ECU terminal voltage.
- Disconnect B-29 crank angle sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 89 and earth.

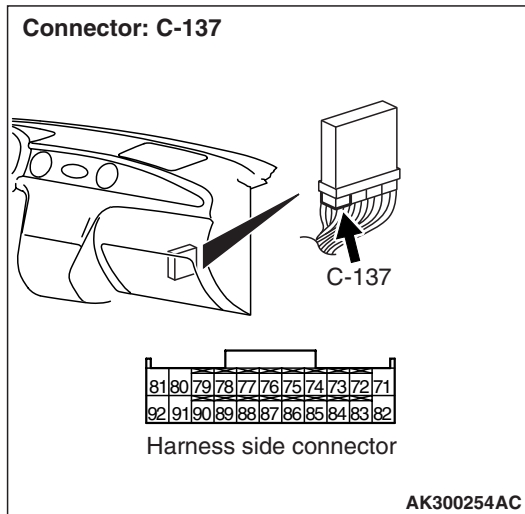
**OK: 4.9 – 5.1 V**

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

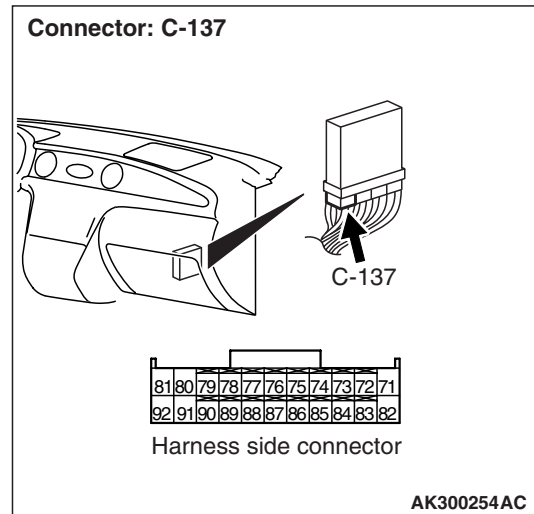
**YES :** Go to Step 5 .

**NO :** Go to Step 6 .

**STEP 5. Connector check: C-137 engine-ECU connector**



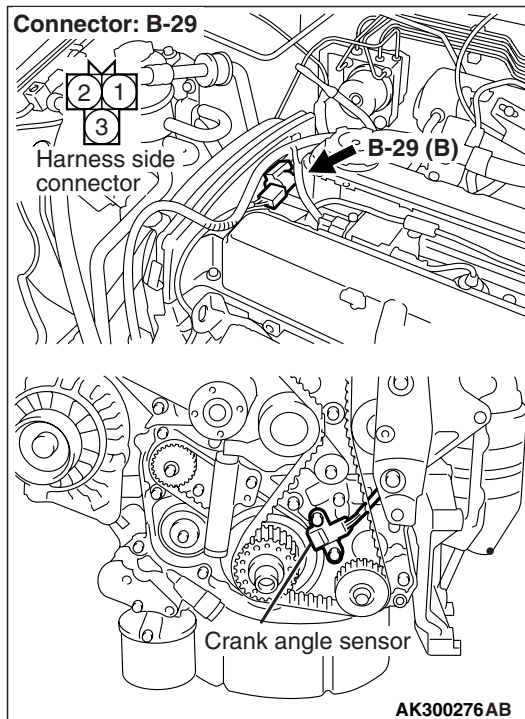
**STEP 6. Connector check: C-137 engine-ECU connector**



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

**YES :** Go to Step 7 .

**NO :** Repair.



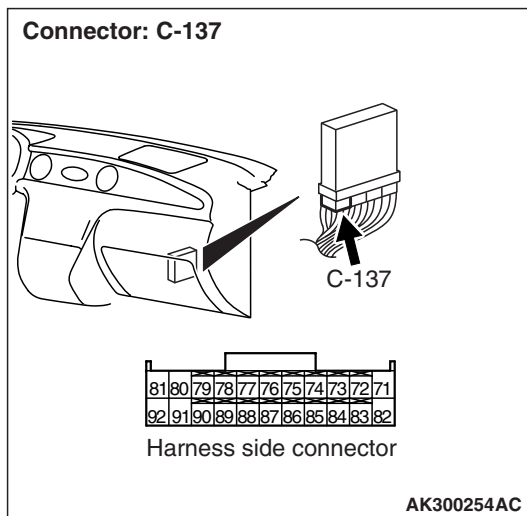
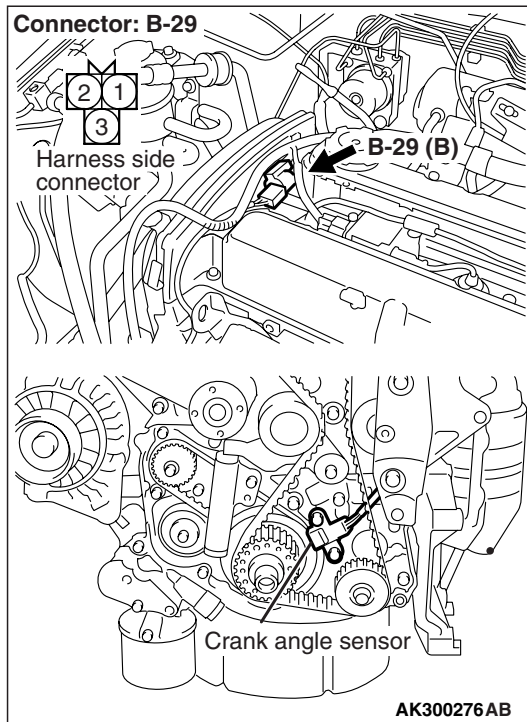
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-29 (terminal No. 2) crank angle sensor connector and C-137 (terminal No. 89) engine-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 7. Check harness between B-29 (terminal No. 2) crank angle sensor connector and C-137 (terminal No. 89) engine-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**

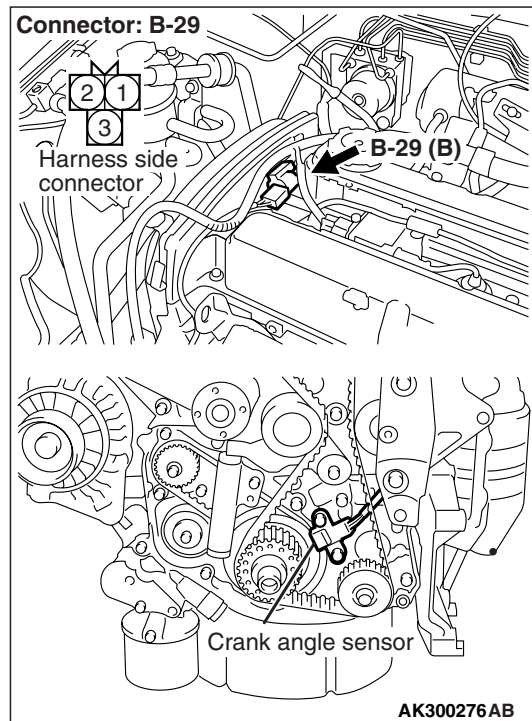
- Refer to Data list reference table [P.13A-293](#).
  - a. Item 22: Crank angle sensor

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-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.

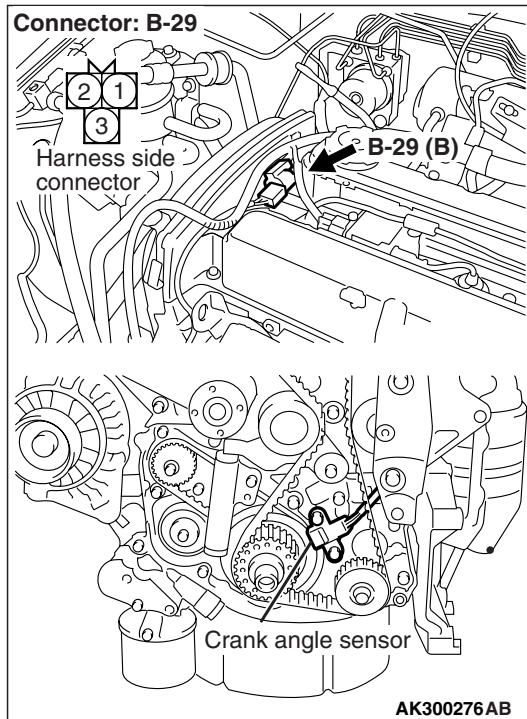
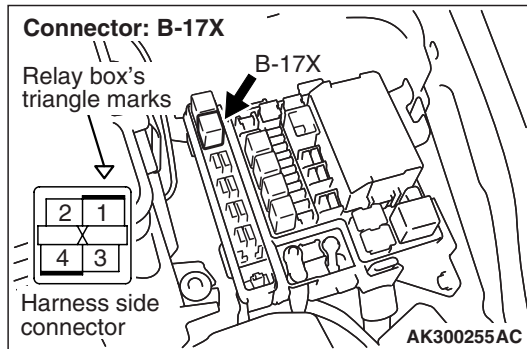
**OK: System voltage**

**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**



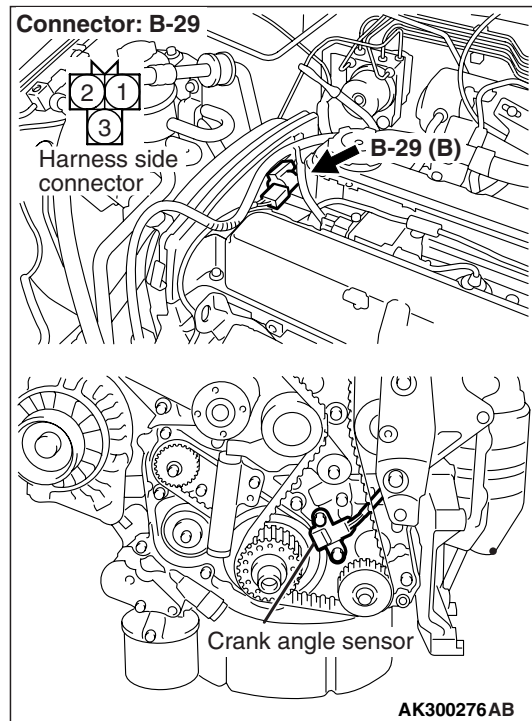
**Q: Is the check result normal?**

**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. Perform resistance measurement at B-29 crank angle sensor connector.**



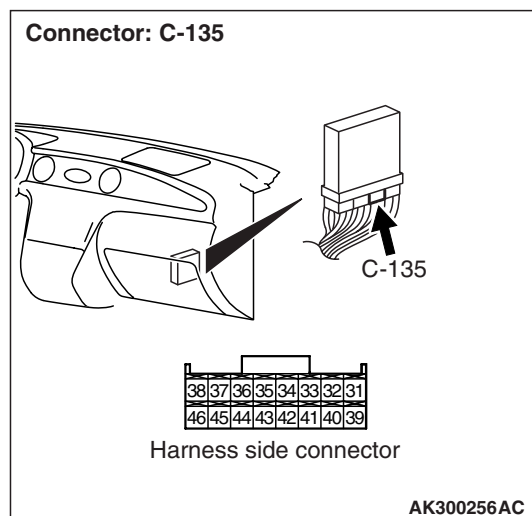
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.  
**OK: Continuity ( $2\ \Omega$  or less)**

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

**YES :** Go to Step 14 .

**NO :** Go to Step 12 .

**STEP 12. Connector check: C-135 engine-ECU connector**



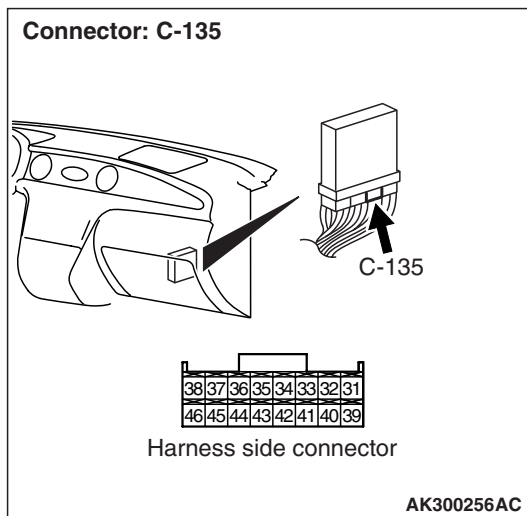
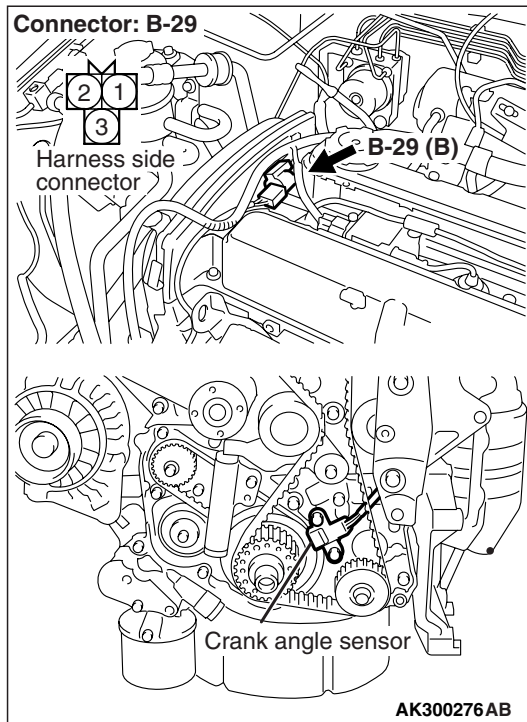
**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Repair.



**STEP 13. Check harness between B-29 (terminal No. 1) crank angle sensor connector and C-135 (terminal No. 40) engine-ECU connector.**



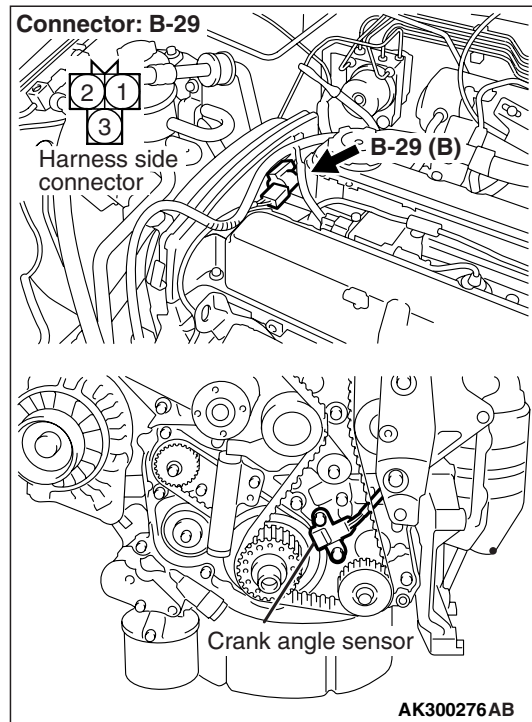
**NOTE:** Before checking harness, check intermediate connector C-16, and repair if necessary.

- Check earthing line for open circuit and damage.

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

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

**STEP 14. Perform output wave pattern measurement at B-29 crank angle sensor connector (Using an oscilloscope).**



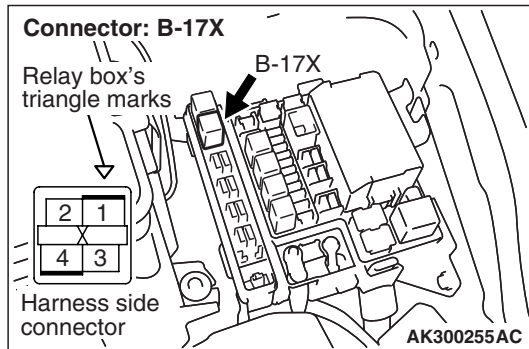
- Use special tool test harness (MB998478) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 2 and earth.

**OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-305), 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**

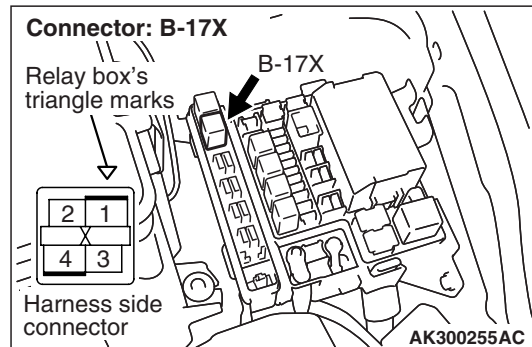
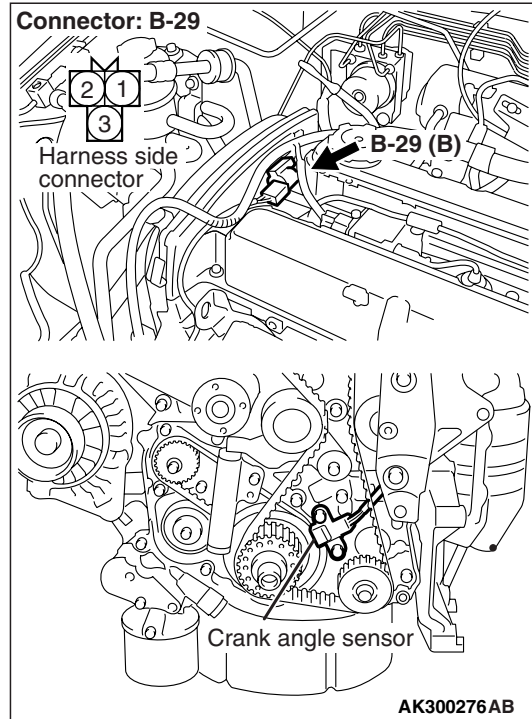


**Q: Is the check result normal?**

**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.**



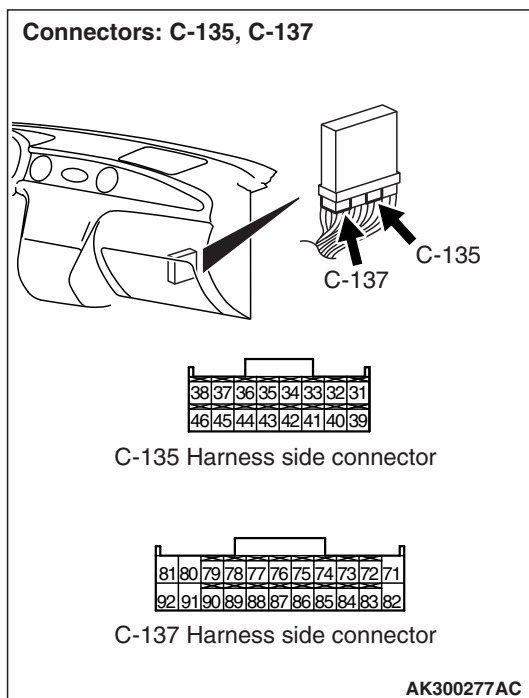
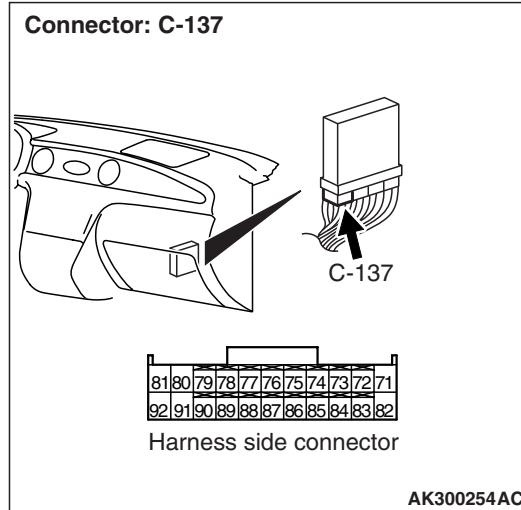
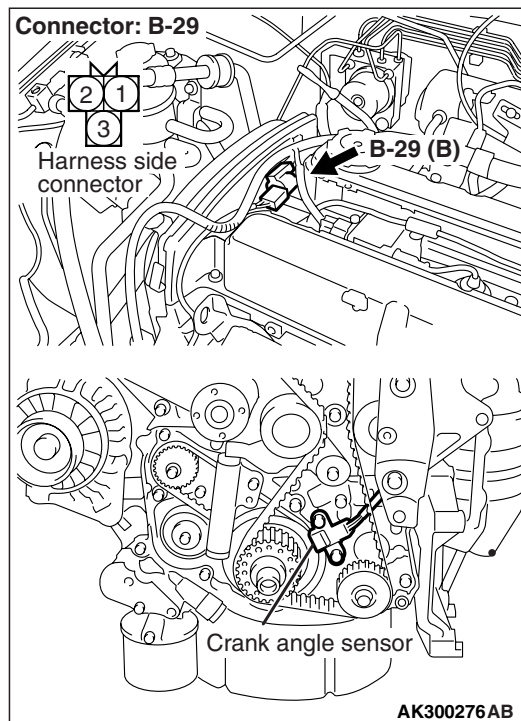
- Check power supply line for damage.

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

**YES :** Go to Step 17 .

**NO :** Repair.

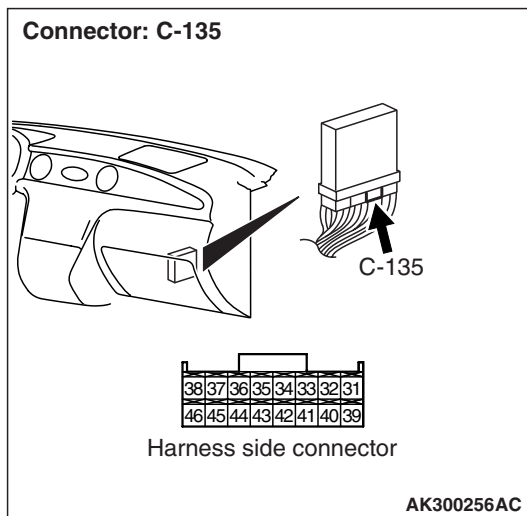
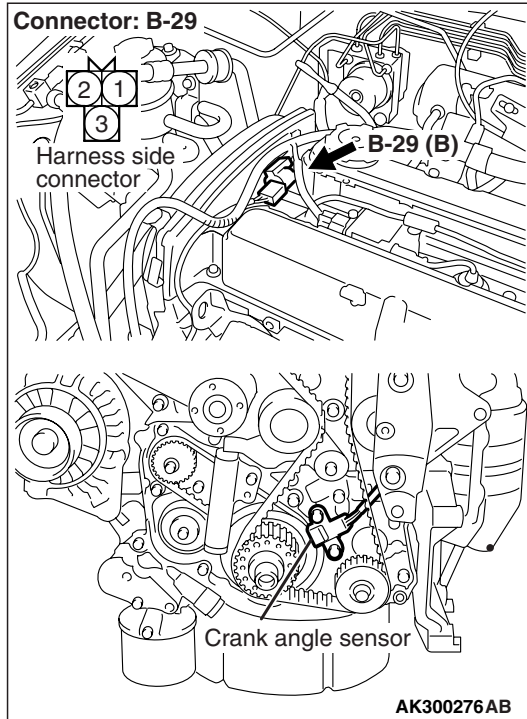


**STEP 17. Connector check: C-135 and C-137 engine-ECU connectors****Q: Is the check result normal?****YES :** Go to Step 18 .**NO :** Repair.**STEP 18. Check harness between B-29 (terminal No. 2) crank angle sensor connector and C-137 (terminal No. 89) engine-ECU connector.**

- Check output line for damage.

**Q: Is the check result normal?****YES :** Go to Step 19 .**NO :** Repair.

**STEP 19. Check harness between B-29 (terminal No. 1) crank angle sensor connector and C-135 (terminal No. 40) engine-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-293](#).
  - a. Item 22: Crank angle sensor

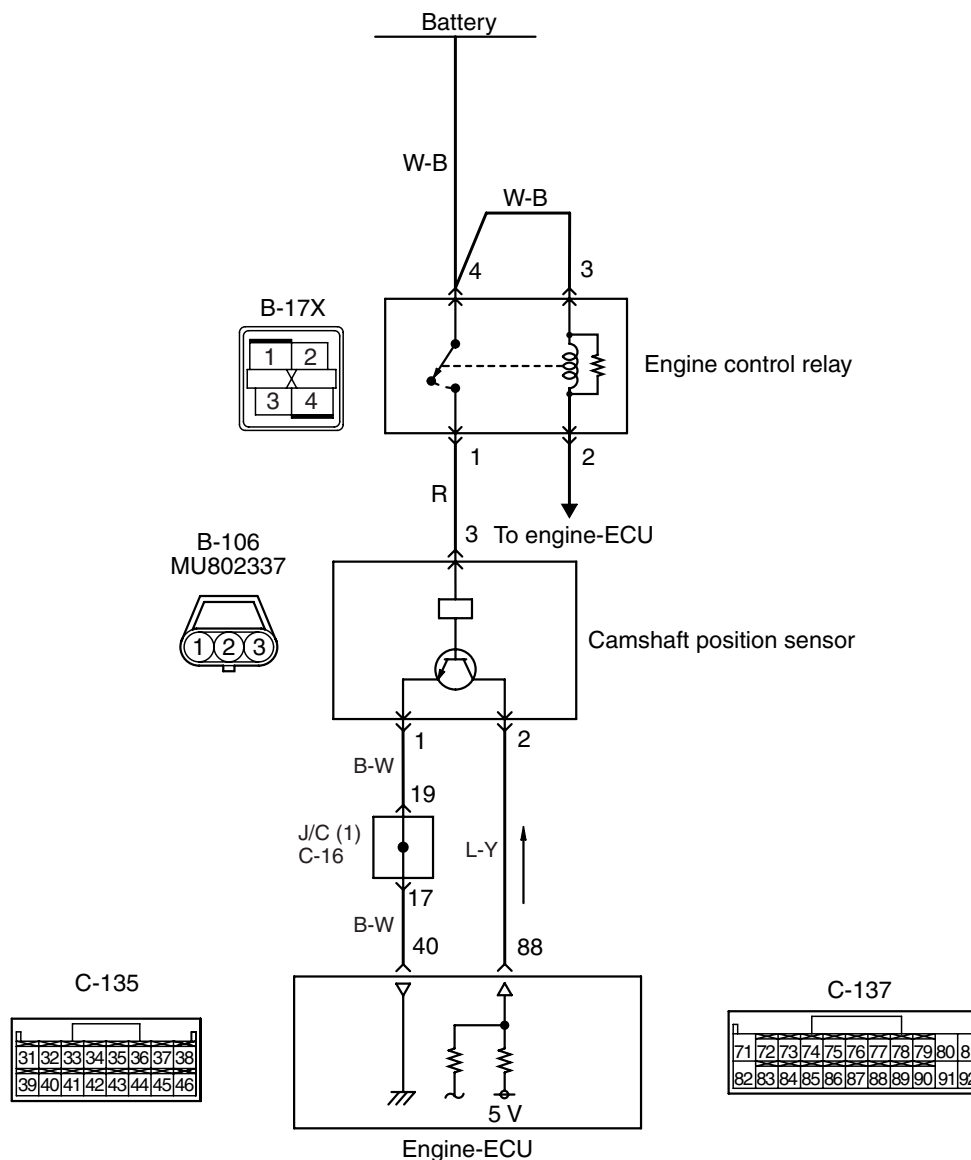
**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace crank angle sensor.

## Code No. P0340: Camshaft Position Sensor System

### Camshaft position sensor circuit



### Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

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## 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-ECU (terminal No. 40) 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-ECU (terminal No. 88).

## 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-ECU.

## TROUBLE JUDGMENT

### Check Condition

- After the engine has started up.

**Judgment Criterion**

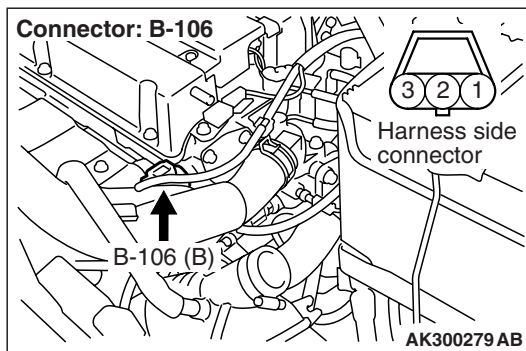
- The sensor output voltage remains unchanged (no pulse signal is inputted) for 2 seconds.

**PROBABLE CAUSE**

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

**DIAGNOSIS PROCEDURE**

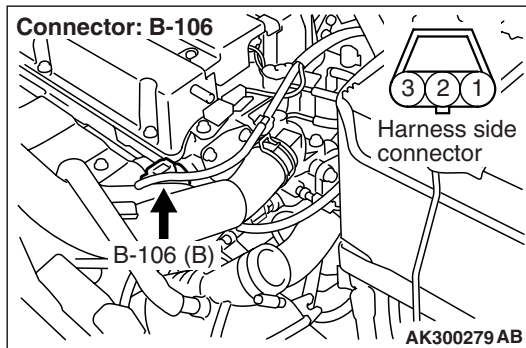
**STEP 1. Connector check: B-106 camshaft position sensor connector**



**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.**



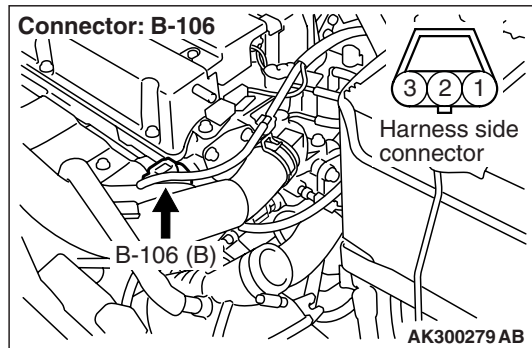
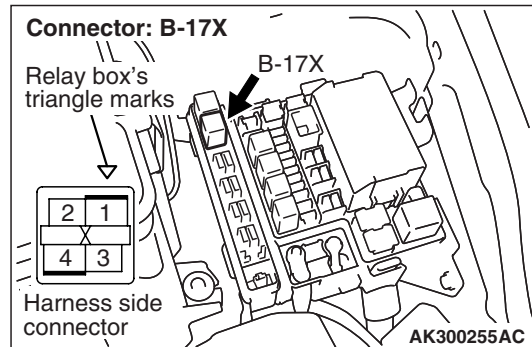
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

**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**

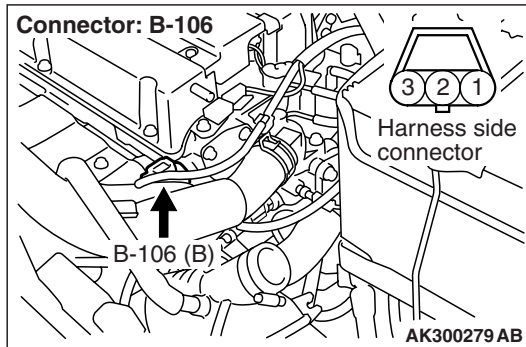


**Q: Is the check result normal?**

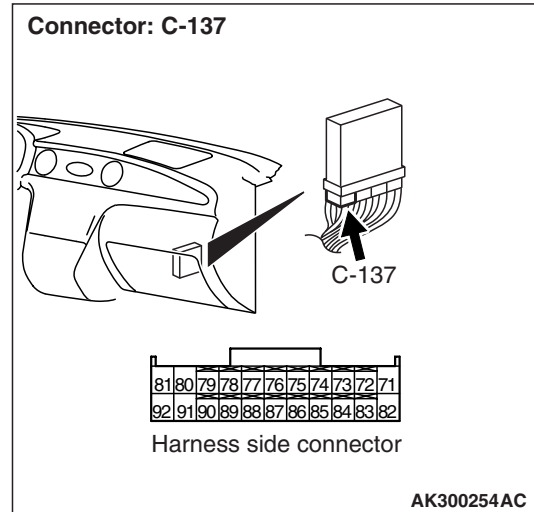
**YES :** Check and repair harness between B-106 (terminal No. 3) camshaft position sensor connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

**NO :** Repair.

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

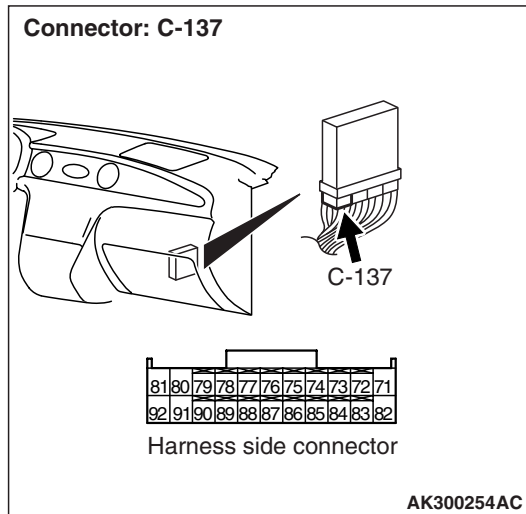
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

**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-137 engine-ECU connector.**

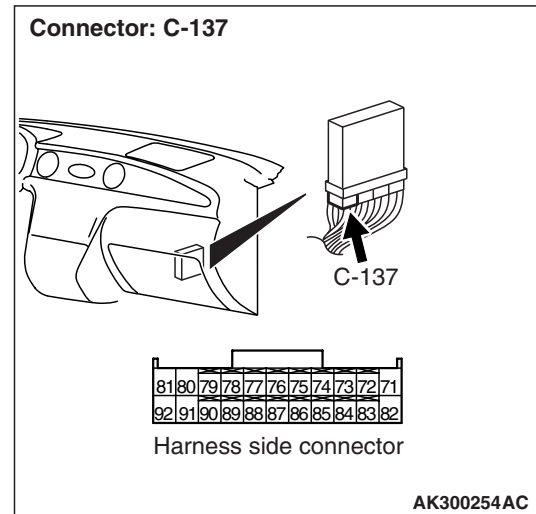
- Measure engine-ECU terminal voltage.
- Disconnect B-106 camshaft position sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 88 and earth.

**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-137 engine-ECU connector**



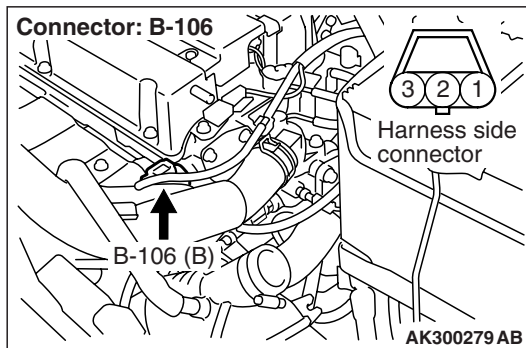
**STEP 7. Connector check: C-137 engine-ECU connector**



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

**YES :** Go to Step 8 .

**NO :** Repair.



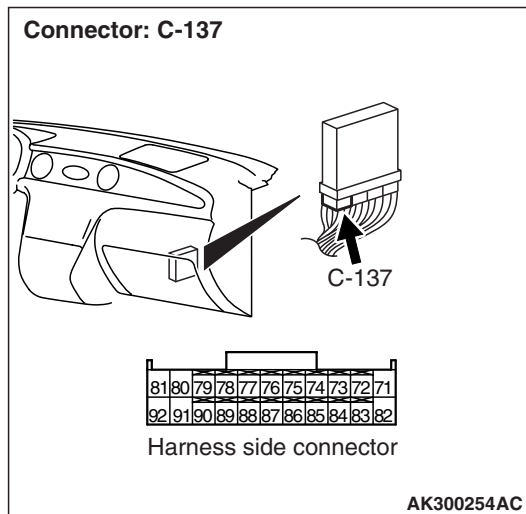
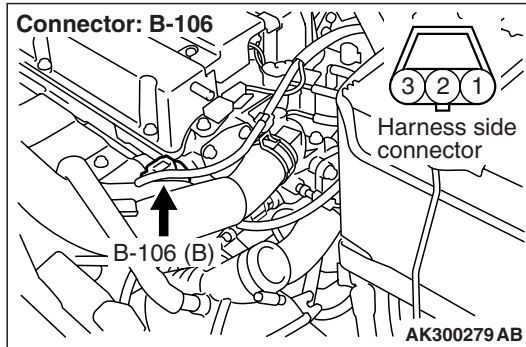
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-106 (terminal No. 2) camshaft position sensor connector and C-137 (terminal No. 88) engine-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 8. Check harness between B-106 (terminal No. 2) camshaft position sensor connector and C-135 (terminal No. 88) engine-ECU connector.**



- Check output line for short circuit.

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

**YES :** Go to Step 9 .

**NO :** Repair.

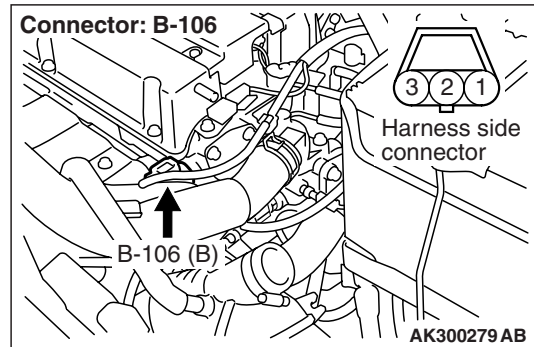
**STEP 9. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

**STEP 10. Perform resistance measurement at B-106 camshaft position sensor connector.**



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

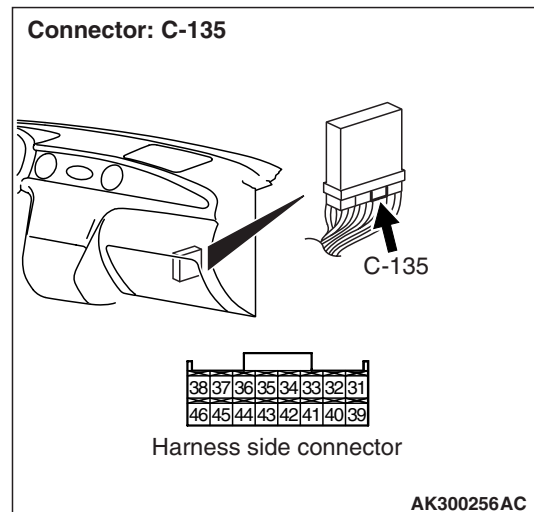
**OK: Continuity ( $2 \Omega$  or less)**

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

**YES :** Go to Step 13 .

**NO :** Go to Step 11 .

**STEP 11. Connector check: C-135 engine-ECU connector**



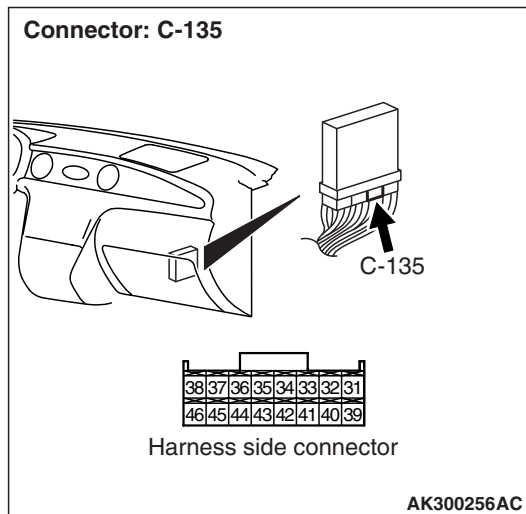
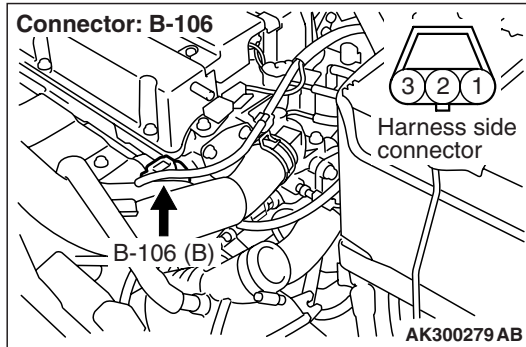
**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Repair.



**STEP 12. Check harness between B-106 (terminal No. 1) camshaft position sensor connector and C-135 (terminal No. 40) engine-ECU connector.**



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

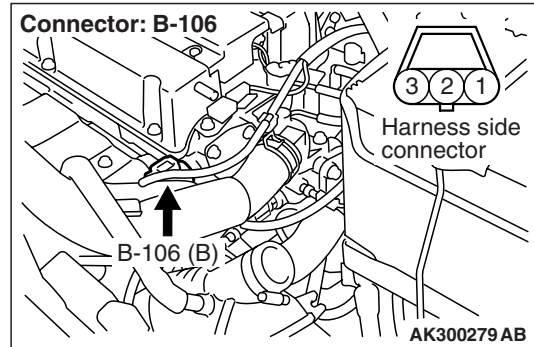
- Check earthing line for open circuit and damage.

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

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 13. Perform output wave pattern measurement at B-106 camshaft position sensor connector (Using an oscilloscope).**



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

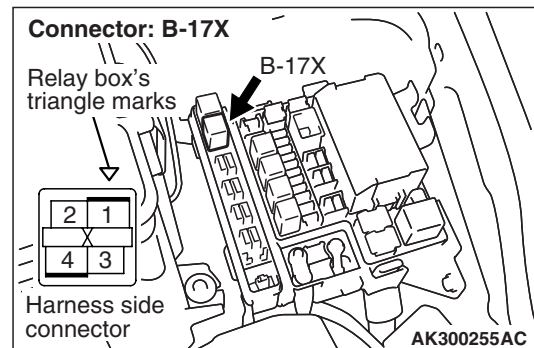
**OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-305), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.**

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

**YES :** Go to Step 9 .

**NO :** Go to Step 14 .

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

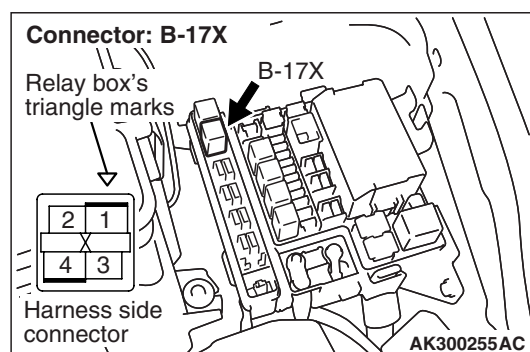
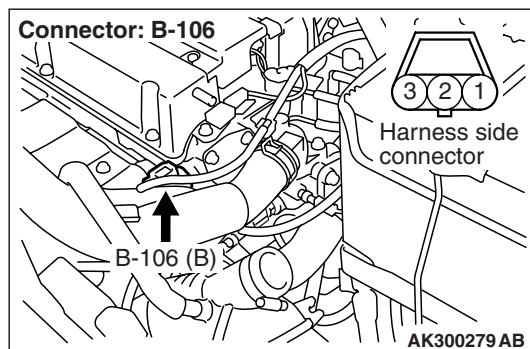


**Q: Is the check result normal?**

**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.**



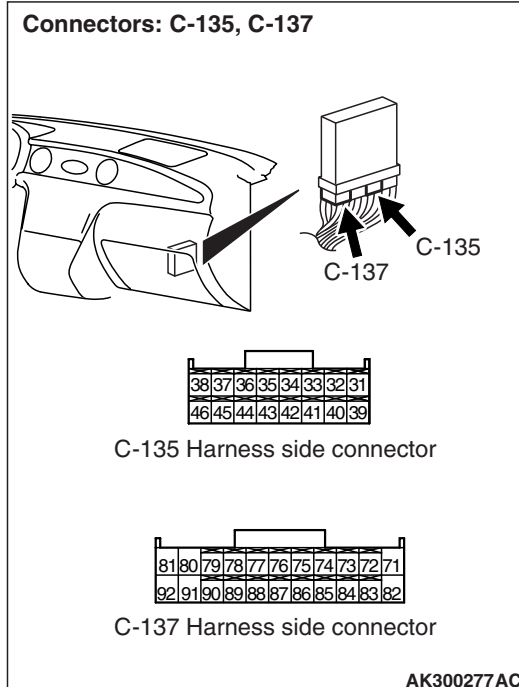
- Check power supply line for damage.

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

**YES :** Go to Step 16 .

**NO :** Repair.

**STEP 16. Connector check: C-135 and C-137 engine-ECU connectors**

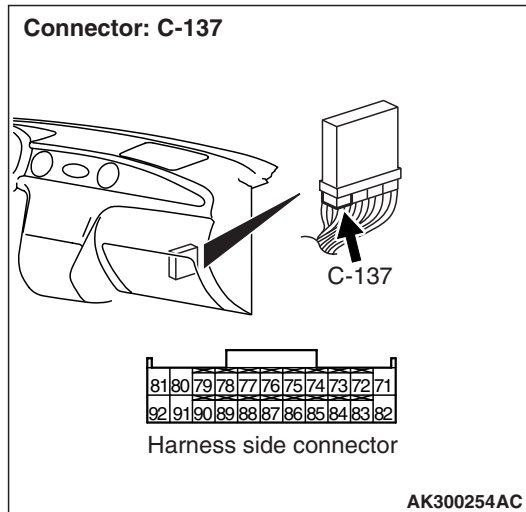
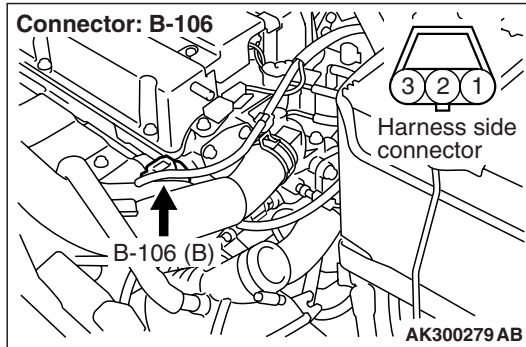


**Q: Is the check result normal?**

**YES :** Go to Step 17 .

**NO :** Repair.

**STEP 17. Check harness between B-106 (terminal No. 2) camshaft position sensor connector and C-137 (terminal No. 88) engine-ECU connector.**



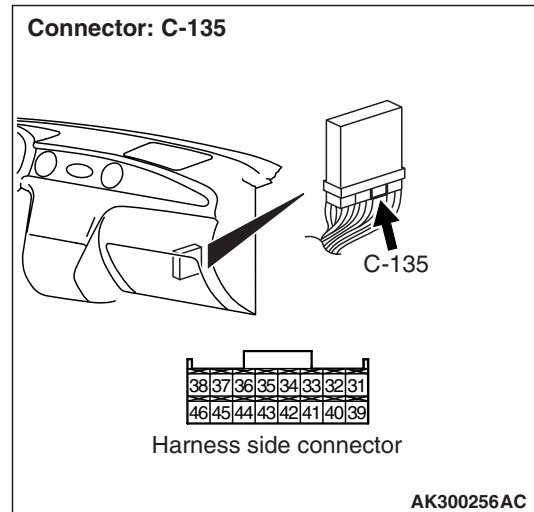
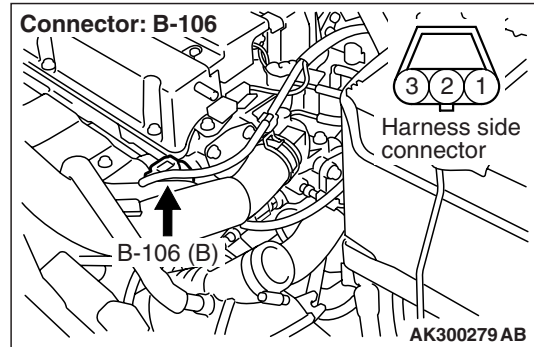
- Check output line for damage.

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

**YES :** Go to Step 18 .

**NO :** Repair.

**STEP 18. Check harness between B-106 (terminal No. 1) camshaft position sensor connector and C-135 (terminal No. 40) engine-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 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.**

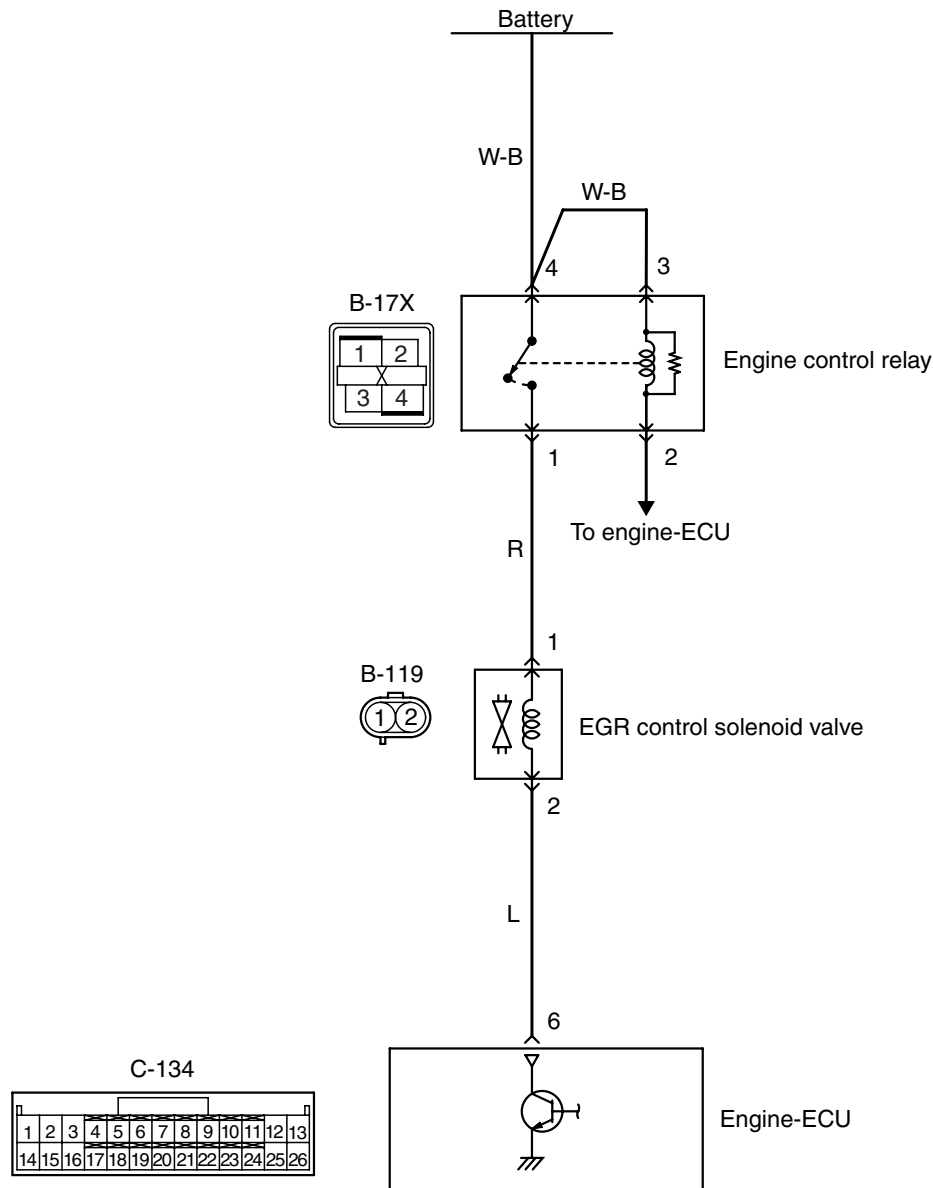
**Q: Does trouble symptom persist?**

**YES :** Replace camshaft position sensor.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

## Code No. P0403: EGR Control Solenoid Valve System

EGR control solenoid valve circuit



## Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401034 AB

## OPERATION

- Power is supplied to the EGR control solenoid valve (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-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-ECU, the EGR control solenoid valve controls the operation of the EGR valve.

## TROUBLE JUDGMENT

### Check Conditions

- Except the engine stalling
- The battery voltage is 10 – 16 V.

### Judgment Criteria

- If the off surge voltage from the motor coil is not generated when the EGR valve control motor is driven.

## PROBABLE CAUSE

- Failed EGR control solenoid valve
- Open/short circuit in EGR control solenoid valve circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

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

- Refer to Actuator test reference table [P.13A-299](#).  
a. Item 10: EGR control solenoid valve

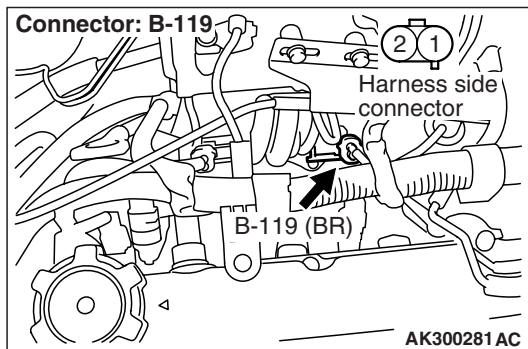
**OK: Operating sound can be heard and the valve vibrates.**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Go to Step 2 .

### STEP 2. Connector check: B-119 EGR control solenoid valve connector

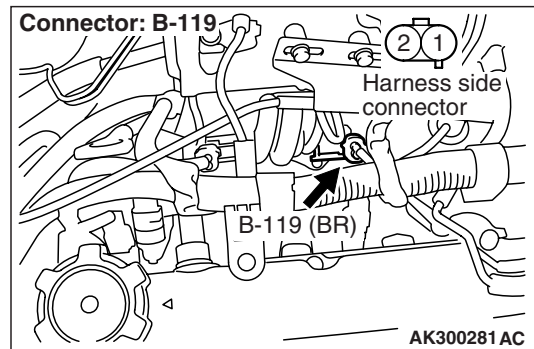


#### Q: Is the check result normal?

**YES :** Go to Step 3 .

**NO :** Repair.

### STEP 3. Perform resistance measurement at B-119 EGR control solenoid valve connector.



- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.

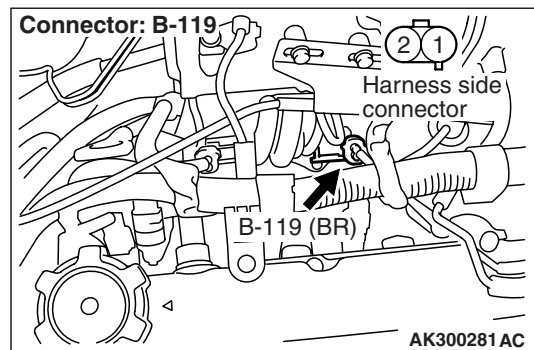
**OK: 29 – 35  $\Omega$  (at 20°C)**

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

**YES :** Go to Step 4 .

**NO :** Replace EGR control solenoid valve.

### STEP 4. Perform voltage measurement at B-119 EGR control solenoid valve connector.



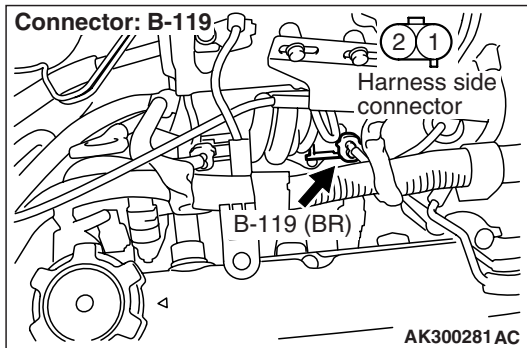
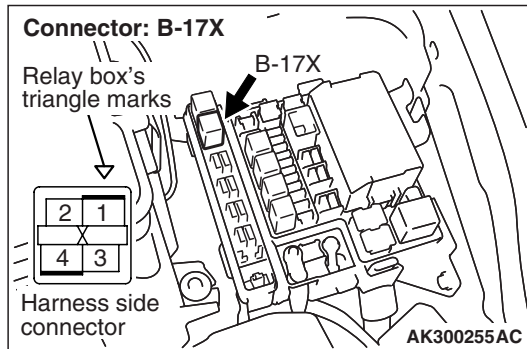
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: System voltage**

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

**YES :** Go to Step 6 .

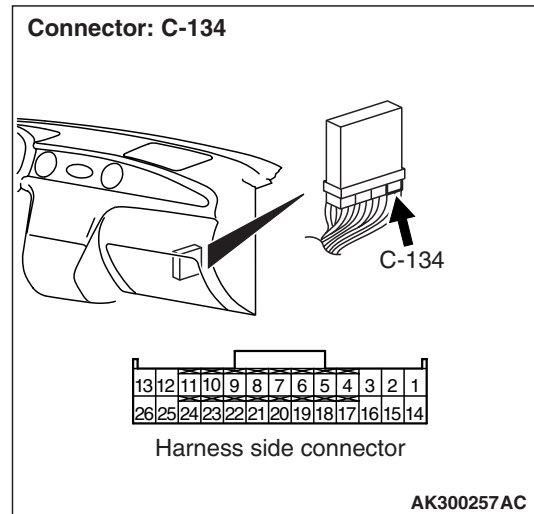
**NO :** Go to Step 5 .

**STEP 5. Connector check: B-17X engine control relay connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-119 (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-134 engine-ECU connector.**

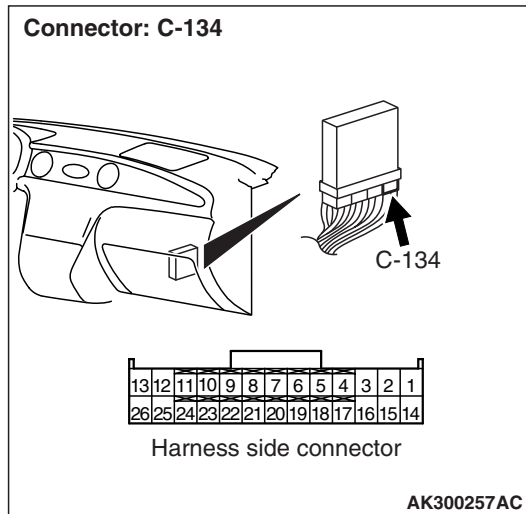
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 6 and earth.

**OK: System voltage****Q: Is the check result normal?**

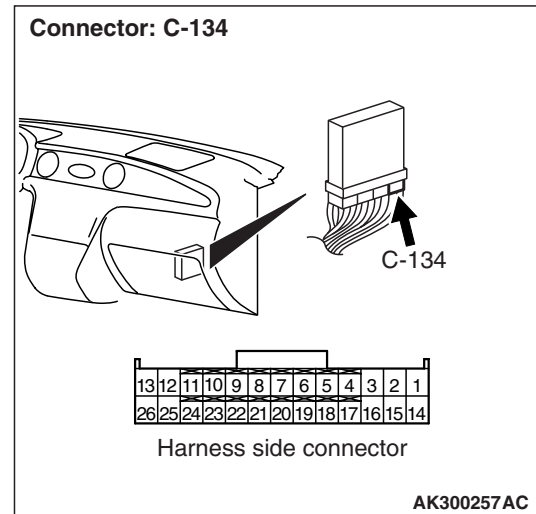
**YES :** Go to Step 8 .

**NO :** Go to Step 7 .

**STEP 7. Connector check: C-134 engine-ECU connector**



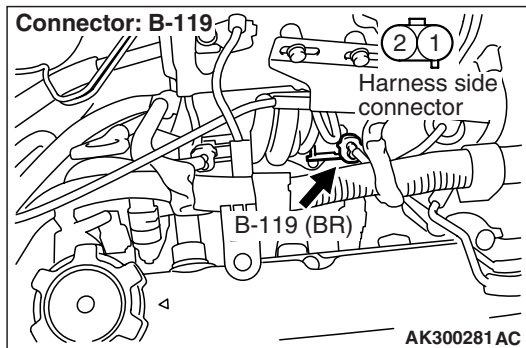
**STEP 8. Connector check: C-134 engine-ECU connector**



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

**YES :** Go to Step 9 .

**NO :** Repair.



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

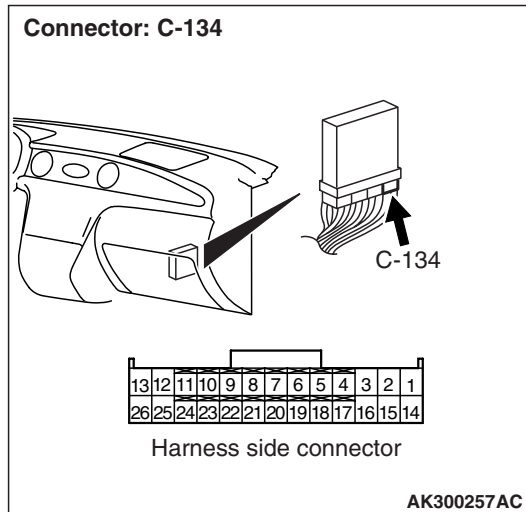
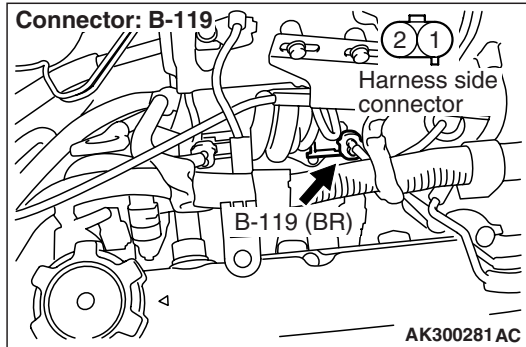
**YES :** Check and repair harness between B-119 (terminal No. 2) EGR control solenoid valve connector and C-134 (terminal No. 6) engine-ECU connector.

- Check output line for open/short circuit.

**NO :** Repair.



**STEP 9. Check harness between B-119 (terminal No. 2) EGR control solenoid valve connector and C-134 (terminal No. 6) engine-ECU connector.**



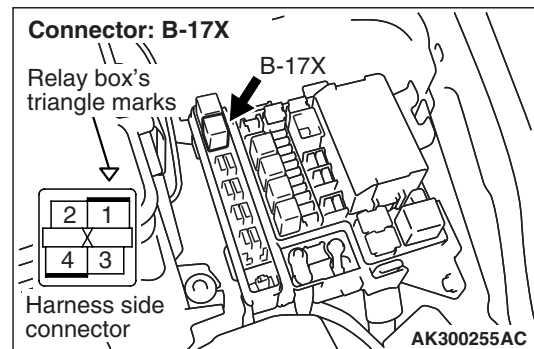
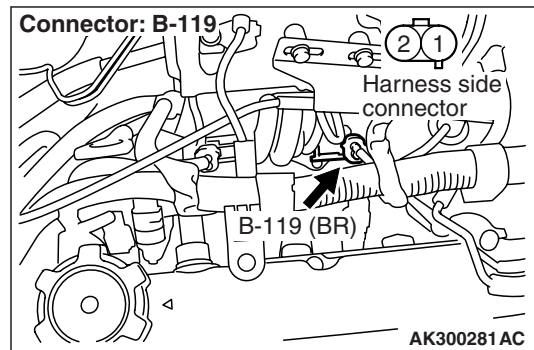
- Check output line for damage.

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

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Check harness between B-119 (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

- Refer to actuator test reference table list

[P.13A-299.](#)

- 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.00-6\).](#)

**NO :** Replace engine-ECU.

---

**Code No. P0420: Catalyst malfunction**

---

**FUNCTION**

- The signal from the heated oxygen sensor (rear) differs from the heated oxygen sensor (front). That is because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the heated oxygen sensor (front) becomes similar to the heated oxygen sensor (rear).
- The engine-ECU compares the output of the front and rear heated oxygen sensor signals.

**TROUBLE JUDGMENT**

**Check Conditions**

- Engine speed: 3,000 r/min or less.
- During the driving.
- During the air-fuel ratio feedback control.

**Judgment Criterion**

- When the output frequency ratio of the oxygen sensor (rear) vs. The oxygen sensor (front) is 0.8 or more on the average for 10 seconds.

**PROBABLE CAUSE**

- Catalytic converter deteriorated
- Failed oxygen sensor (front)
- Failed oxygen sensor (rear)
- Failed engine-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. Check for leakage of exhaust emission from exhaust manifold.**

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

- YES :** Go to Step 2 .  
**NO :** Repair.

---

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

- Refer to Data list reference table [P.13A-293](#).
  - a. Item 11: Oxygen sensor (front)
  - b. Item 59: Oxygen sensor (rear)

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

**YES :** Go to Step 3 .

**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-15](#)).

---

**STEP 3. M.U.T.-II/III data list**

- a. Item 11: Oxygen sensor (front)

**OK: 0 – 0.4 and 0.6 – 1.0 volt should alternate 15 times or more within 10 seconds (engine speed at 2,000 r/min).**

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

**YES :** Go to Step 4 .

**NO :** Replace the oxygen sensor (front).

---

**STEP 4. Replace the oxygen sensor (rear).**

- After replacing the oxygen sensor (rear), re-check the trouble symptoms.

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

**YES :** Check end.

**NO :** Go to Step 5 .

---

**STEP 5. Replace the catalytic converter.**

- After replacing the catalytic converter, re-check the trouble symptoms.

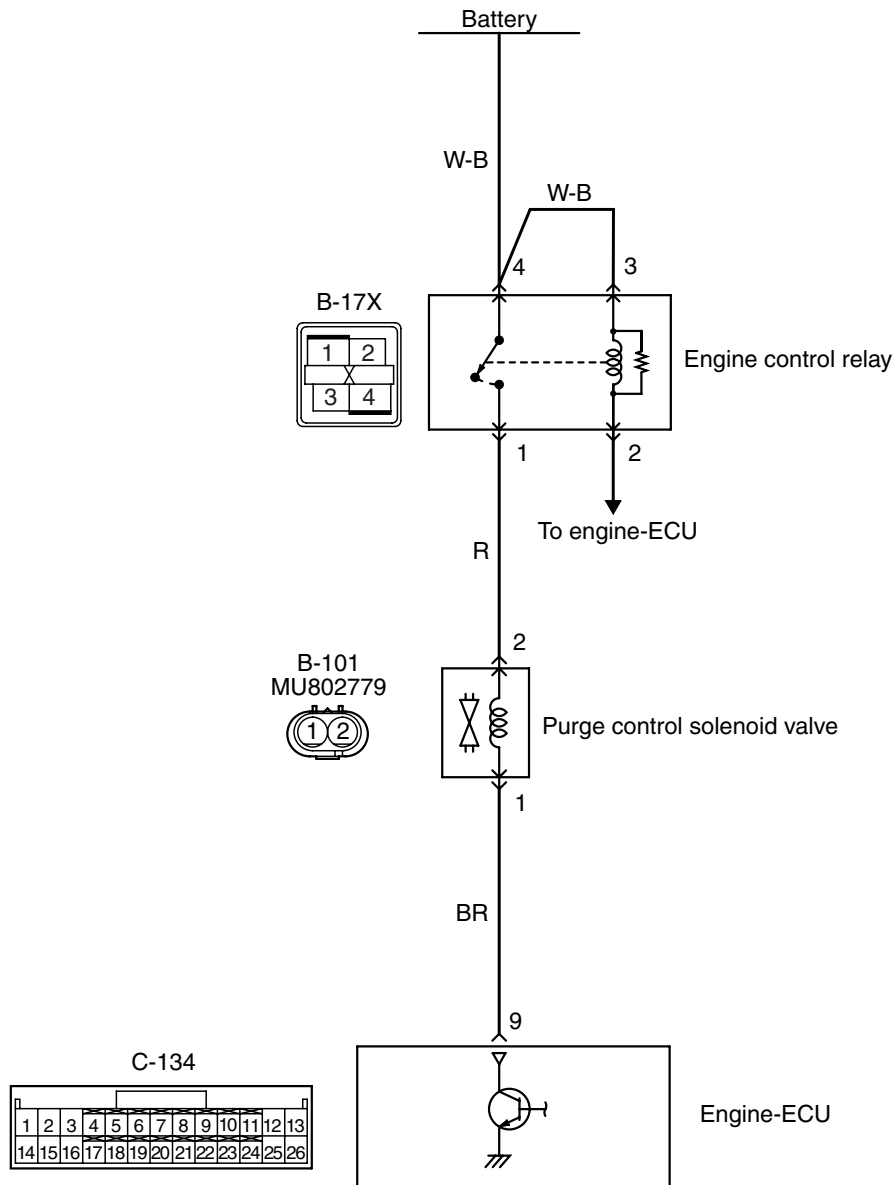
**Q: Is the check result normal?**

**YES :** Replacing engine-ECU.

**NO :** Check end.

## Code No. P0443: Purge Control Solenoid Valve System

Purge control solenoid valve circuit



## Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401035AB

## OPERATION

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

## FUNCTION

- In response to a signal from the engine-ECU, the purge control solenoid valve controls the flow rate of the purge air to be introduced into the surge tank.

## TROUBLE JUDGMENT

### Check Conditions

- Ignition switch: ON
- The battery voltage is 10 V or more.

### Judgment Criteria

- The surge voltage (system voltage + 2 V) of solenoid coil is not detected when the purge control solenoid valve is turned in OFF position from ON.
- The battery voltage is 10 V or more.

## PROBABLE CAUSE

- Failed purge control solenoid valve
- Open/short circuit in purge control solenoid value circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

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

- Item 08: Purge control solenoid valve

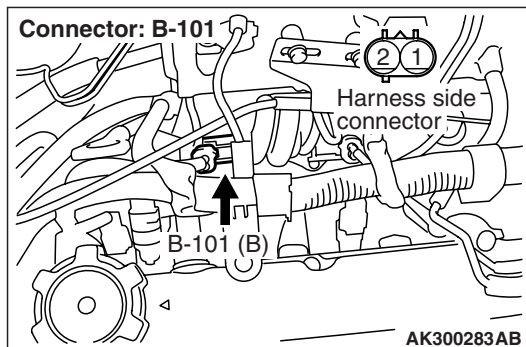
**OK: Operating sound can be heard and the valve vibrates**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

**NO :** Go to Step 2 .

### STEP 2. Connector check: B-101 purge control solenoid valve connector

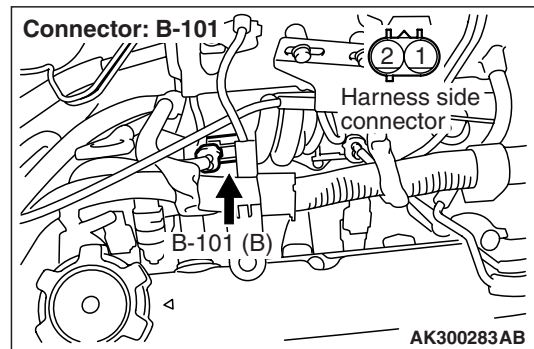


#### Q: Is the check result normal?

**YES :** Go to Step 3 .

**NO :** Repair.

### STEP 3: Perform resistance measurement at B-101 purge control solenoid valve connector.



- Disconnect connector, and measure at solenoid valve side.

- Resistance between terminal No. 1 and No. 2.

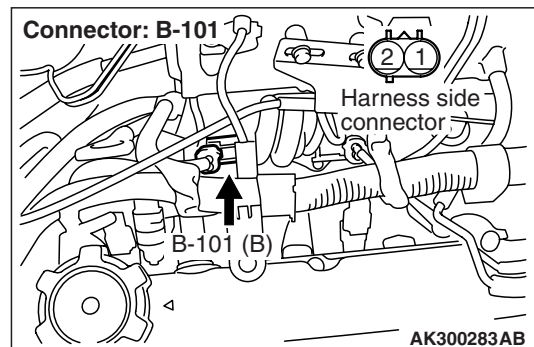
**OK: 30 – 34  $\Omega$  (at 20°C)**

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

**YES :** Go to Step 4 .

**NO :** Replace purge control solenoid valve.

### STEP 4. Perform voltage measurement at B-101 purge control solenoid valve connector.



- Disconnect connector, and measure at harness side.

- Ignition switch: ON

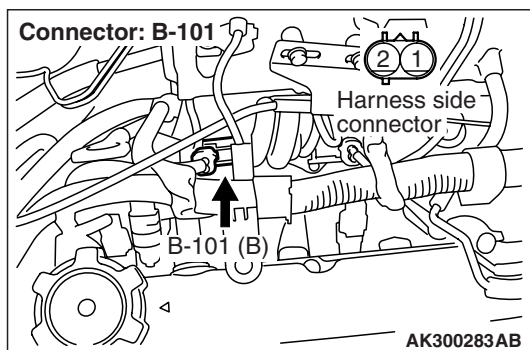
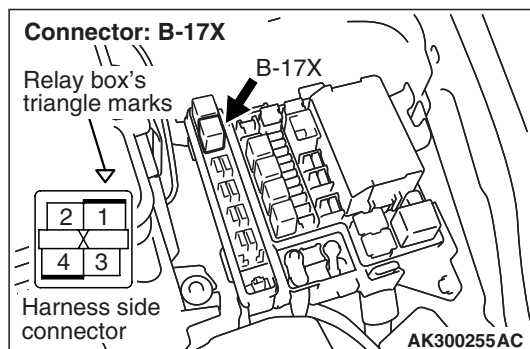
- Voltage between terminal No. 2 and earth.

**OK: System voltage**

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

**YES :** Go to Step 6 .

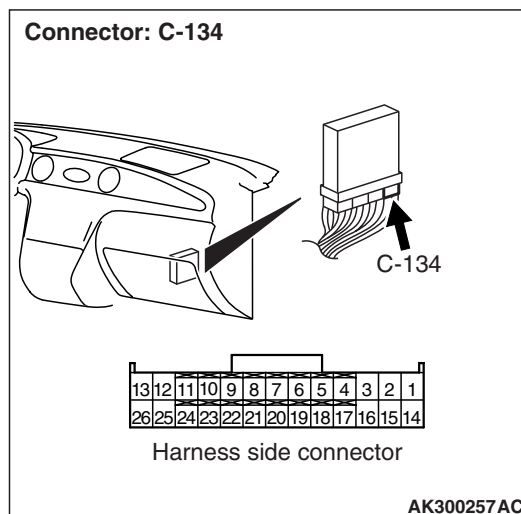
**NO :** Go to Step 5 .

**STEP 5. Connector check: B-17X engine control relay connector****Q: Is the check result normal?**

**YES :** Check and repair harness between B-101 (terminal No. 2) purge 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-134 engine-ECU connector.**

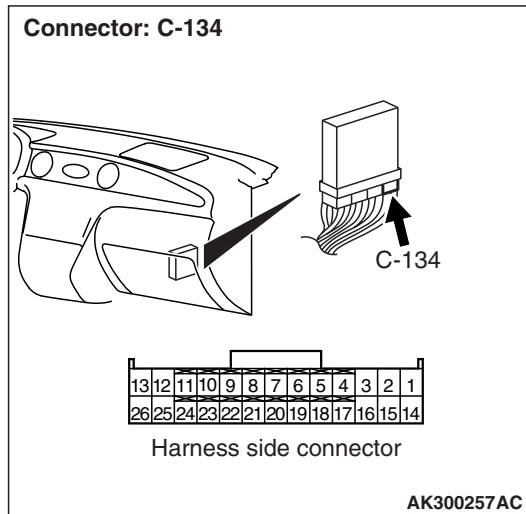
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 9 and earth.

**OK: System voltage****Q: Is the check result normal?**

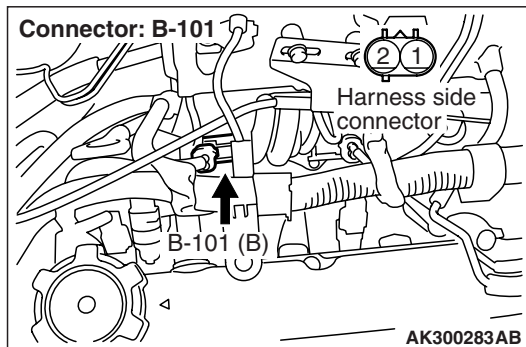
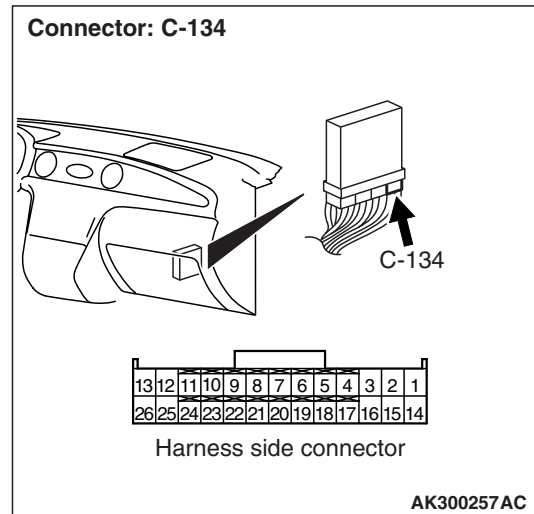
**YES :** Go to Step 8 .

**NO :** Go to Step 7 .

**STEP 7. Connector check: C-134 engine-ECU connector**



**STEP 8. Connector check: C-134 engine-ECU connector**



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

**YES :** Go to Step 9 .

**NO :** Repair.

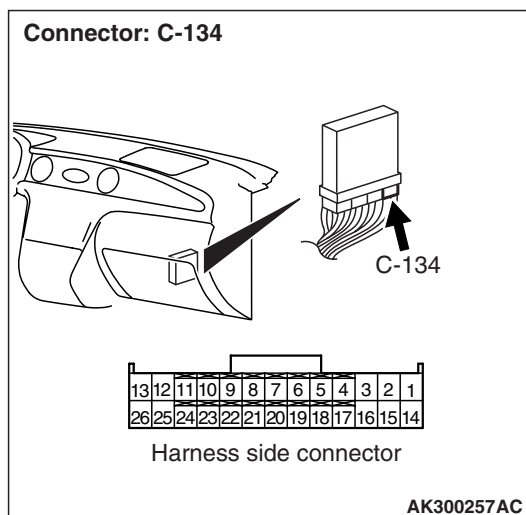
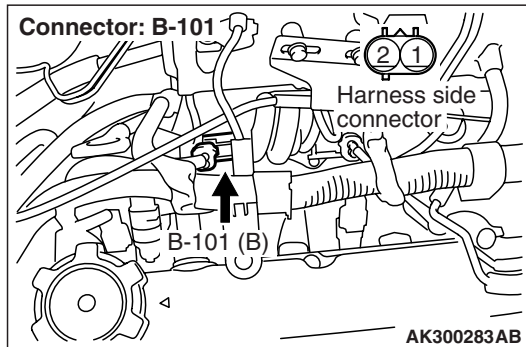
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-101 (terminal No. 1) purge control solenoid valve connector and C-134 (terminal No. 9) engine-ECU connector.

- Check output line for open and short circuit.

**NO :** Repair.

**STEP 9. Check harness between B-101 (terminal No. 1) purge control solenoid valve connector and C-134 (terminal No. 9) engine-ECU connector.**



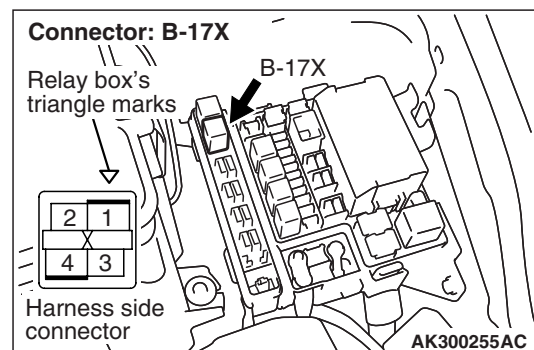
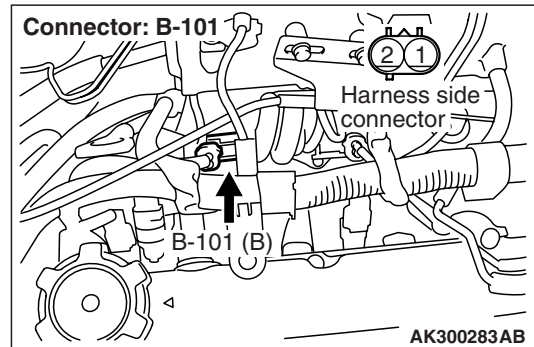
- Check output line for damage.

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

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Check harness between B-101 (terminal No. 2) purge 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 08: purge control solenoid valve

**OK: Operating sound can be heard and the valve vibrates**

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

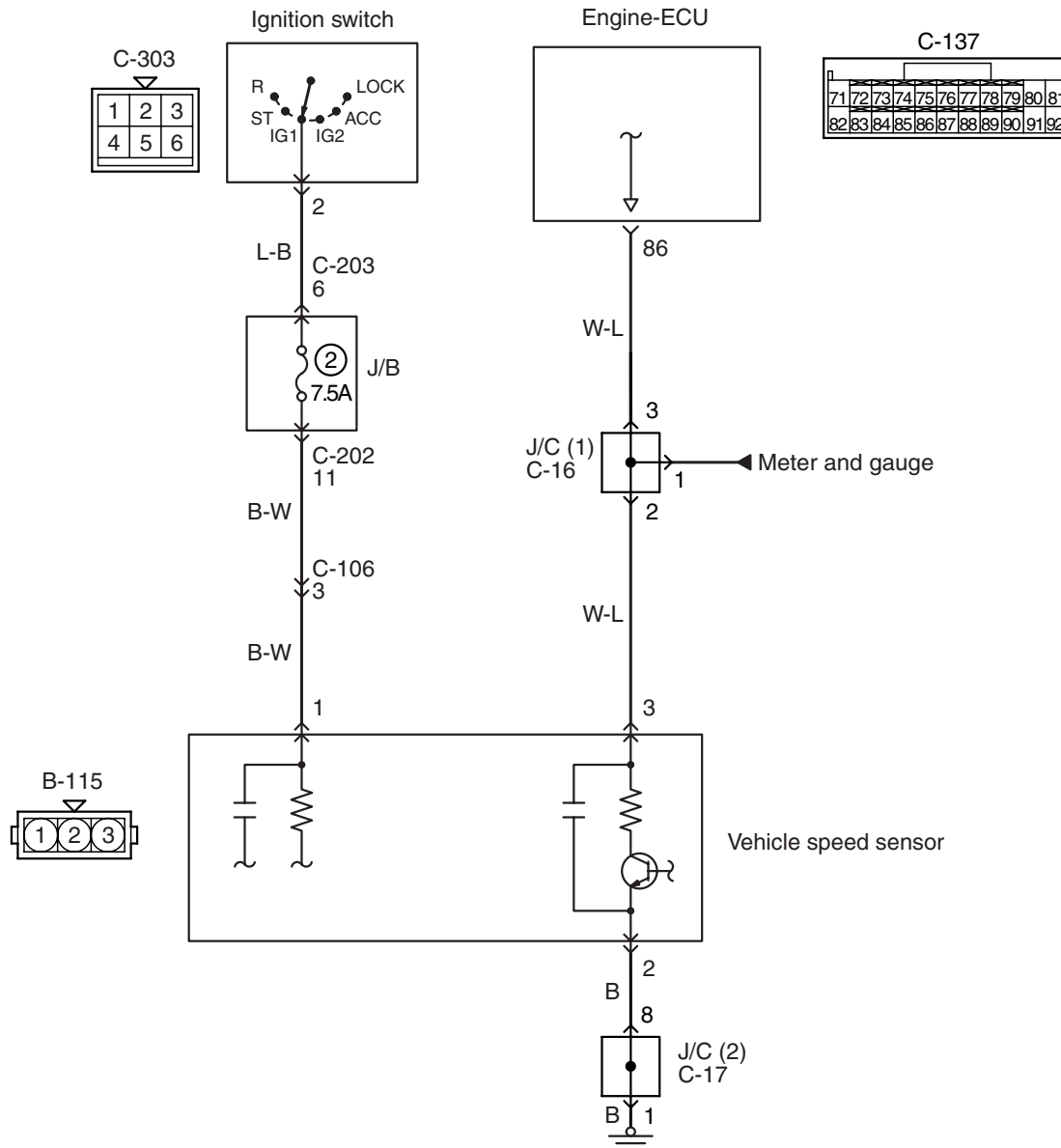
**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.



**Code No. P0500: Vehicle speed sensor system**

**Vehicle speed sensor circuit**



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401036 AB

**OPERATION**

- A power voltage of 5 V is applied to the vehicle speed sensor (terminal No. 3) from the engine-ECU (terminal No. 86).

**FUNCTION**

- The vehicle speed sensor converts the vehicle speed to the voltage, and then input it into the engine-ECU

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

- 2 seconds later after the engine has started up.
- Engine speed: 2,000 r/min or more.
- Under the high load operation (The volumetric efficiency is 50 – 60%).

**Judgment Criterion**

- The sensor output voltage remains unchanged (no pulse signal is inputted) for 2 seconds.

**PROBABLE CAUSE**

- Failed Vehicle speed sensor
- Open/short circuit in vehicle speed sensor circuit or loose connector contact
- Failed engine-ECU

**DIAGNOSIS PROCEDURE****STEP 1. Check the speedometer****Q: Is the check result normal?**

**YES** : Go to Step 2 .

**NO** : Check the speedometer (Refer to GROUP 54A –Combination Meter Assembly and Vehicle speed sensor – On-vehicle Service P.54A-57).

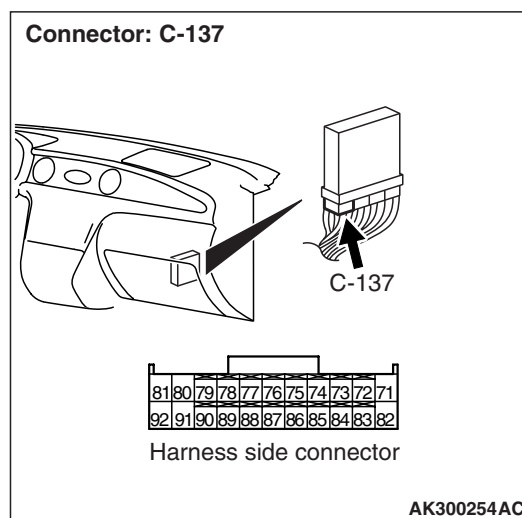
**STEP 2.M.U.T.-II/III data list**

- Refer to Data list reference table P.13A-293.
  - a. Item 24: Vehicle speed sensor

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

**YES** : Go to Step 3 .

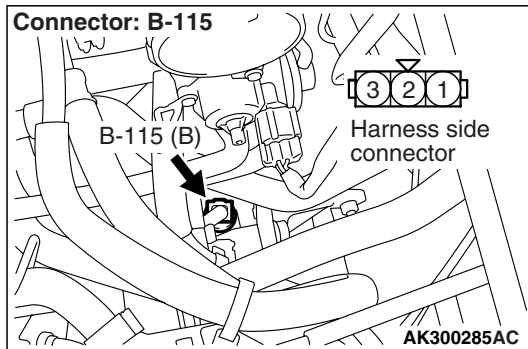
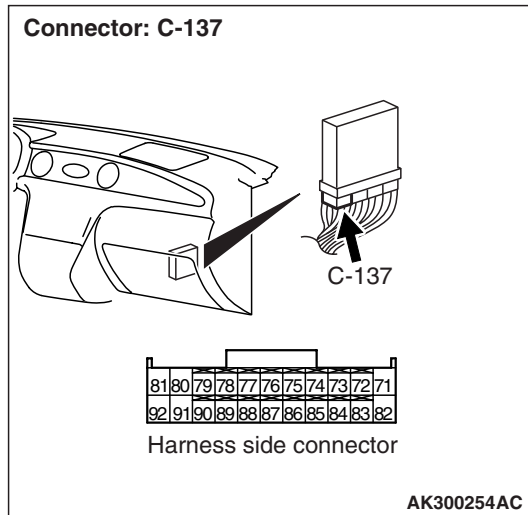
**NO** : Intermittent malfunction (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points P.00-6).

**STEP 3. Check connector: C-137 engine-ECU connector****Q: Is the check result normal?**

**YES** : Go to Step 4 .

**NO** : Repair.

**STEP 4.** Check harness between C-137 (terminal No. 86) engine-ECU connector and B-115 (terminal No. 3) Vehicle speed sensor connector.



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

- Check output line for open circuit and damage.

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

**YES :** Go to Step 5 .

**NO :** Repair.

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

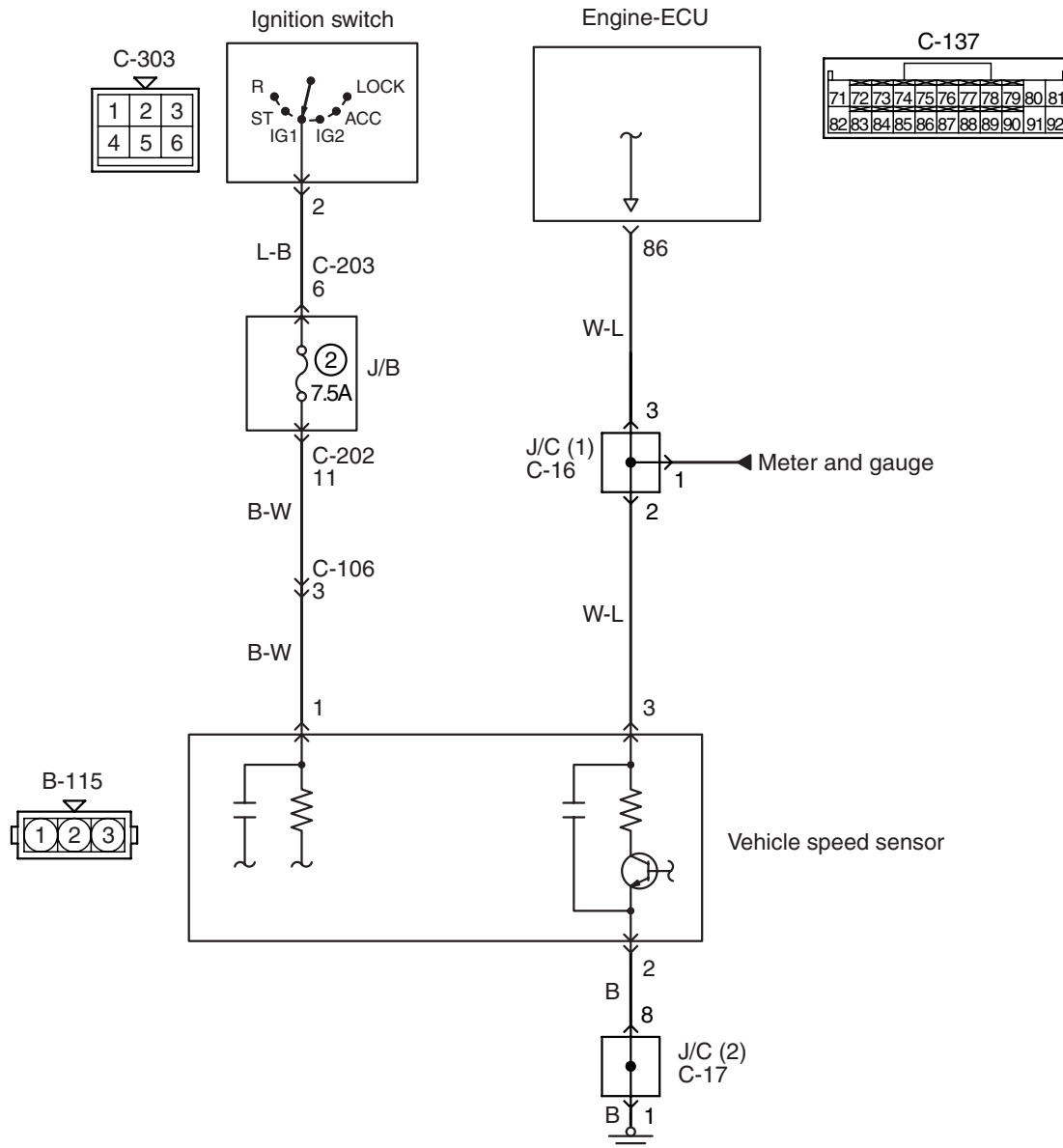
**Q: Does trouble symptom persist?**

**YES :** Replacing engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

## Code No. P0500: Vehicle speed sensor system

Vehicle speed sensor circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401036 AB

**OPERATION**

- A power voltage of 5 V is applied to the vehicle speed sensor (terminal No. 3) from the engine-ECU (terminal No. 86).

**FUNCTION**

- The vehicle speed sensor converts the vehicle speed to the voltage, and then input it into the engine-ECU

## **TROUBLE JUDGMENT**

### **Check Conditions**

- 2 seconds later after the engine has started up.
- Engine speed: 2,000 r/min or more.
- Under the high load operation (The volumetric efficiency is 40 – 75%).

### **Judgment Criterion**

- The sensor output voltage remains unchanged (no pulse signal is inputted) for 2 seconds.

## **PROBABLE CAUSE**

- Failed Vehicle speed sensor
- Open/short circuit in vehicle speed sensor circuit or loose connector contact
- Failed engine-ECU

## **DIAGNOSIS PROCEDURE**

### **STEP 1. Check the speedometer**

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

**YES** : Go to Step 2 .

**NO** : Check the speedometer (Refer to GROUP 54A –Combination Meter Assembly and Vehicle speed sensor – On-vehicle Service [P.54A-57](#)).

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

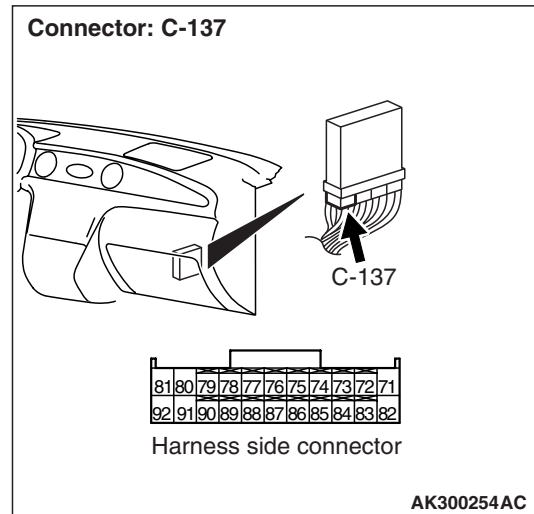
- Refer to Data list reference table [P.13A-293](#).
  - a. Item 24: Vehicle speed sensor

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

**YES** : Go to Step 3 .

**NO** : Intermittent malfunction (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

### **STEP 3. Check connector: C-137 engine-ECU connector**

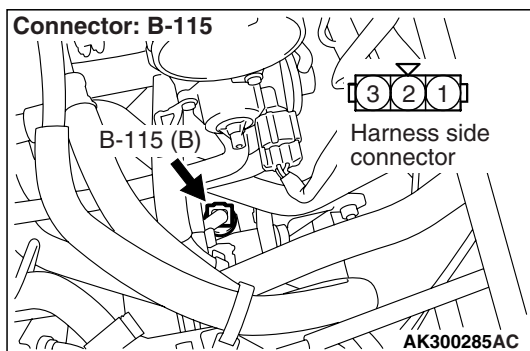
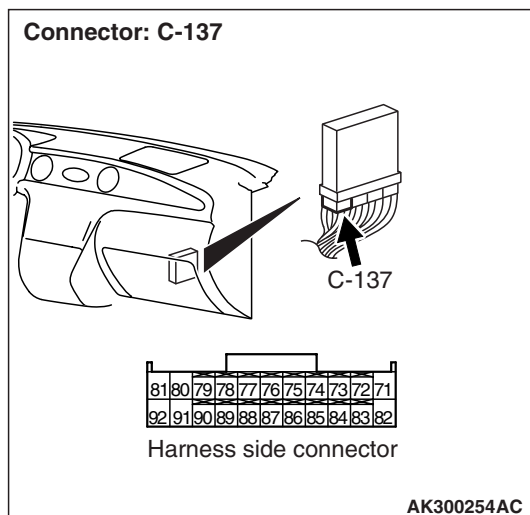


#### **Q: Is the check result normal?**

**YES** : Go to Step 4 .

**NO** : Repair.

**STEP 4.** Check harness between C-137 (terminal No. 86) engine-ECU connector and B-115 (terminal No. 3) Vehicle speed sensor connector.



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

- Check output line for open circuit and damage.

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

**YES :** Go to Step 5 .

**NO :** Repair.

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

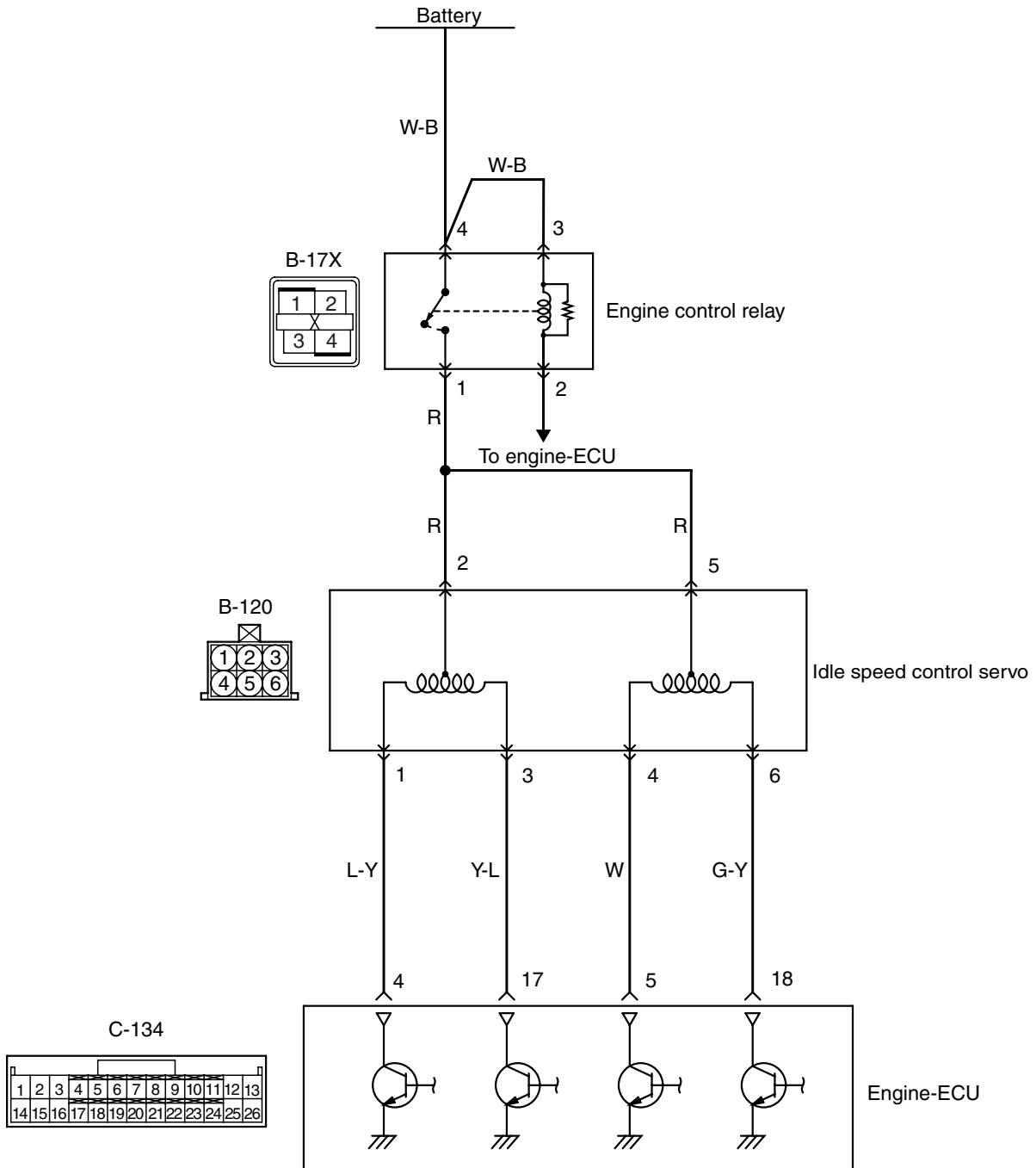
**Q: Does trouble symptom persist?**

**YES :** Replacing engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**Code No. P0505: Idle Speed Control Servo System**

Idle speed control servo circuit





**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-ECU (terminal No. 4, No. 5, No. 17 and No. 18) 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-ECU to control the intake air flow rate during idling.

**TROUBLE JUDGMENT****Check conditions**

- The vehicle speed has reached 1.5 km/h or more at least once.
- During the closed-loop idle speed control.

**Judgment Criteria**

- The actual idle speed is higher than the target idle speed by 300 r/min or more for 10 seconds.

**Check conditions**

- The vehicle speed has reached 1.5 km/h or more at least once.
- During the closed-loop idle speed control.
- The highest ambient temperature at the last drive is 45 °C or less.
- The engine coolant temperature is approximately 82°C or higher.
- The battery voltage is 10 V or more.
- The intake air temperature is -10°C or higher.

**Judgment Criteria**

- The actual idle speed is higher than the target idle speed by 200 r/min or more for 10 seconds.

**Check conditions**

- During the closed-loop idle speed control.
- The engine coolant temperature is approximately 82°C or higher.
- The battery voltage is 10 V or more.
- The power steering switch is in OFF position.
- The charging efficiency is 40 % or less.
- The intake air temperature is -10°C or higher.

**Judgment Criteria**

- The actual idle speed is higher than the target idle speed by 100 r/min or more for 10 seconds.

**PROBABLE CAUSE**

- Failed idle speed control servo
- Open/short circuit in idle speed control servo circuit or loose connector contact
- Failed engine-ECU

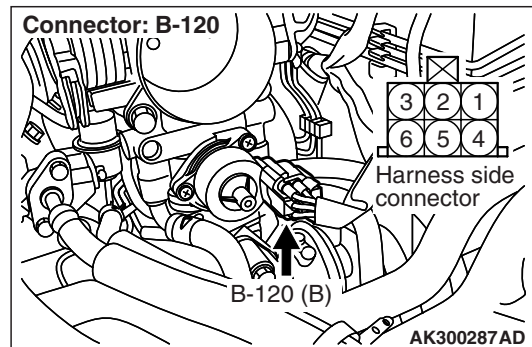
**DIAGNOSIS PROCEDURE****STEP 1. M.U.T.-II/III Data List**

- Refer to Data list reference table [P.13A-293](#).
  - Item 45: Idle speed control position

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

**YES** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO** : Go to Step 2 .

**STEP 2. Connector check: B-120 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.**

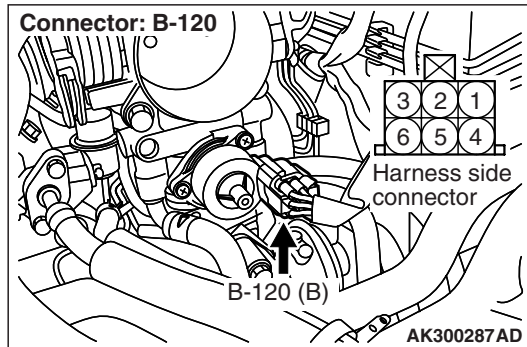
- Check idle speed control servo itself (Refer to [P.13A-326](#)).

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

**YES** : Go to Step 4 .

**NO** : Replace idle speed control servo.

**STEP 4. Perform voltage measurement at B-120 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.

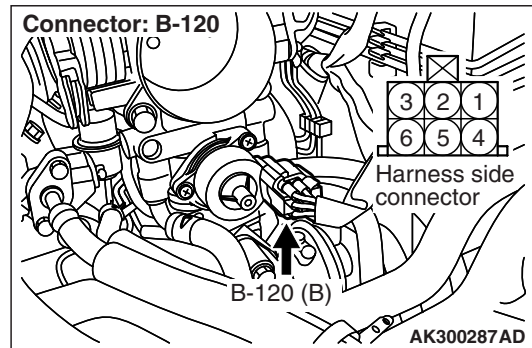
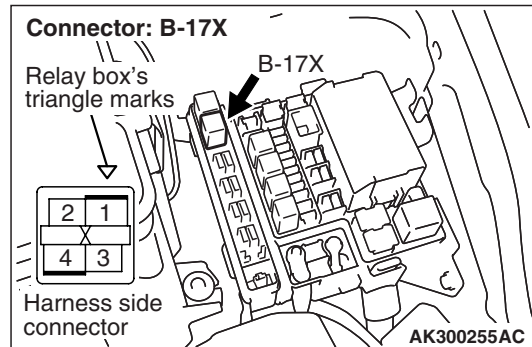
**OK: System voltage**

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

**YES :** Go to Step 6 .

**NO :** Go to Step 5 .

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

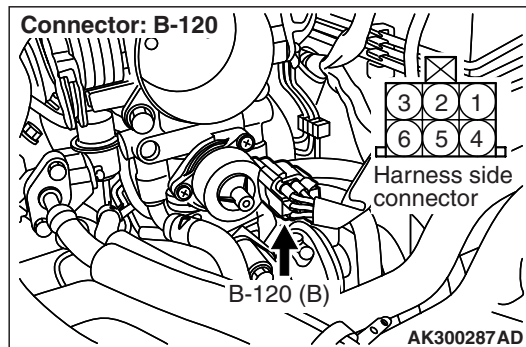
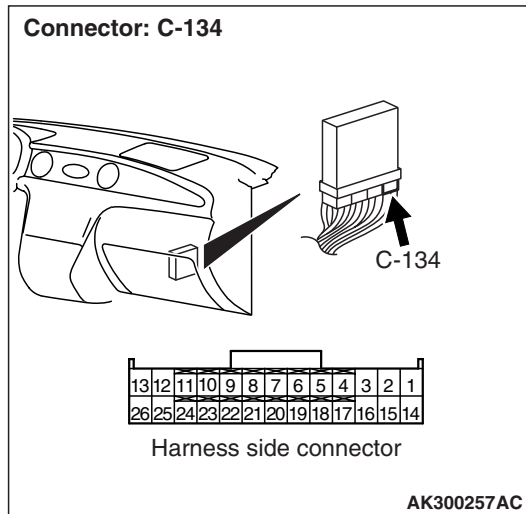


**Q: Is the check result normal?**

**YES :** Check and repair harness between B-120 (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-134 engine-ECU connector.**

- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth, between terminal No. 5 and earth, between terminal No. 17 and earth, also voltage between terminal No. 18 and earth.

**OK: System voltage**

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

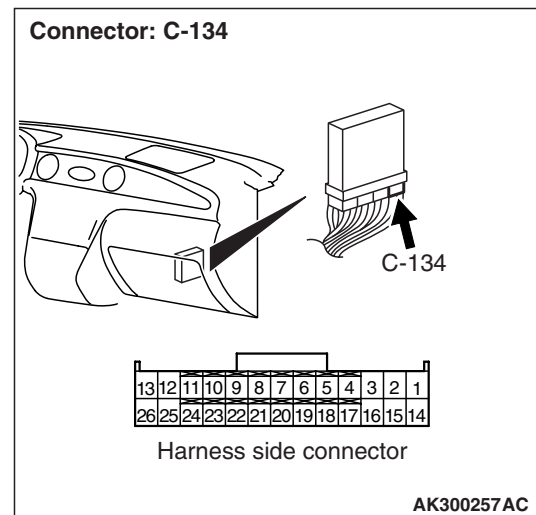
**YES :** Go to Step 7 .

**NO :** Check and repair harness between B-120 idle speed control servo and C-134 engine-ECU.

1. Harness between idle speed control servo terminal No. 1 and engine-ECU connector terminal No. 4
2. Harness between idle speed control servo terminal No. 3 and engine-ECU connector terminal No. 17
3. Harness between idle speed control servo terminal No. 4 and engine-ECU connector terminal No. 5

4. Harness between idle speed control servo terminal No. 6 and engine-ECU connector terminal No. 18

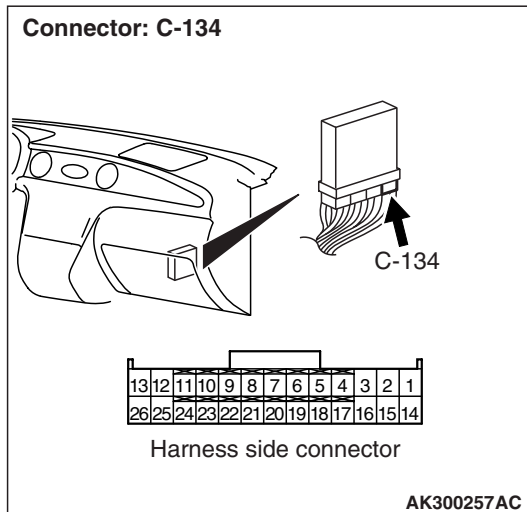
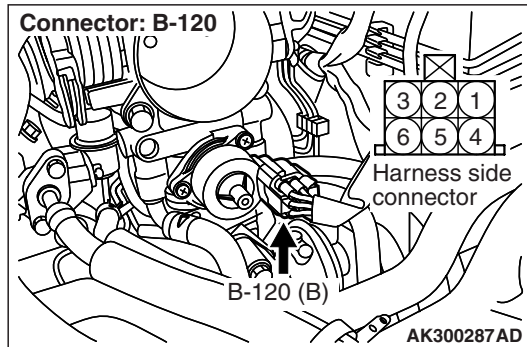
- Check power supply line for open/short circuit.

**STEP 7. Connector check: C-134 engine-ECU connector****Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

**STEP 8. Check harness between B-120 idle speed control servo and C-134 engine-ECU.**



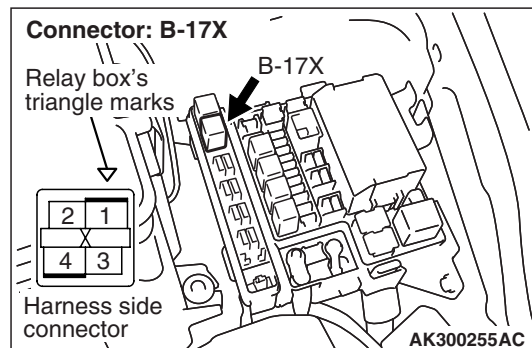
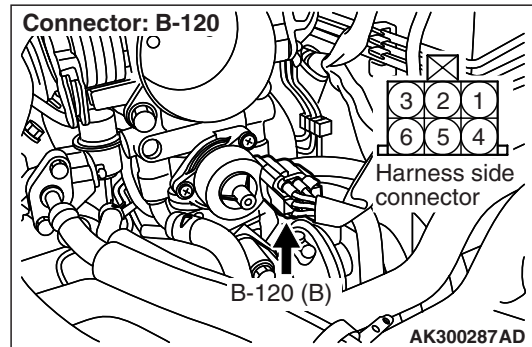
1. Harness between idle speed control servo terminal No. 1 and engine-ECU connector terminal No. 4
  2. Harness between idle speed control servo terminal No. 3 and engine-ECU connector terminal No. 17
  3. Harness between idle speed control servo terminal No. 4 and engine-ECU connector terminal No. 5
  4. Harness between idle speed control servo terminal No. 6 and engine-ECU connector terminal No. 18
- Check output line for damage.

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

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. Check harness between B-120 (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.

**STEP 10. M.U.T.-II/III Data List**

- Refer to Data list reference table [P.13A-293](#).
  - a. Item 45: Idle speed control position

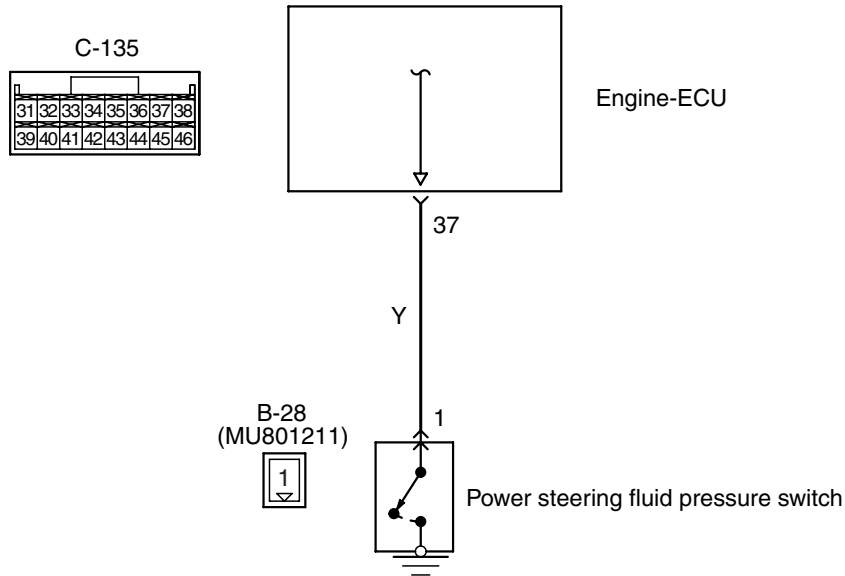
**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

## Code No. P0551: Power Steering Fluid Pressure Switch System

Power steering fluid pressure switch circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401204 AC

**CONDITION**

- The battery voltage is applied to the power steering fluid pressure switch (terminal No. 1) from the engine-ECU (terminal No. 37).

**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-ECU. When the power steering fluid pressure switch "ON" signal (a large load on the power steering fluid pump) is inputted, the engine-ECU provides the idle-up control.

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

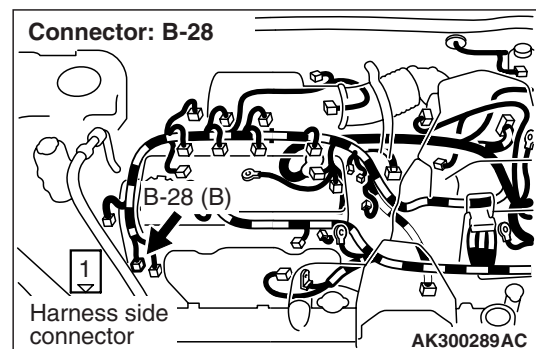
- The intake air temperature is  $-10^{\circ}\text{C}$  or higher.
- The engine coolant temperature is approximately  $20^{\circ}\text{C}$  or higher.

**Judgment Criterion**

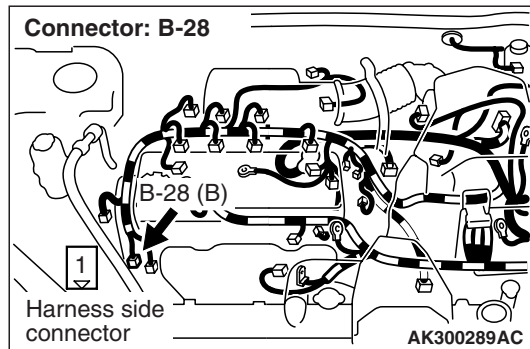
- A power steering pressure switch in the ON position is detected 10 times for 4 seconds at a vehicle speed of 50 km/h or more.

**PROBABLE CAUSE**

- Failed power steering fluid pressure switch
- Open/short circuit in power steering fluid pressure switch circuit or loose connector contact
- Failed engine-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.

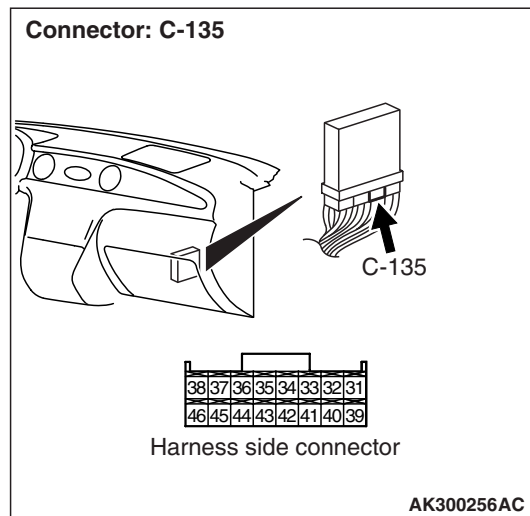
**OK: System voltage**

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

**YES :** Go to Step 8 .

**NO :** Go to Step 3 .

**STEP 3. Perform voltage measurement at C-135 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 37 and earth.

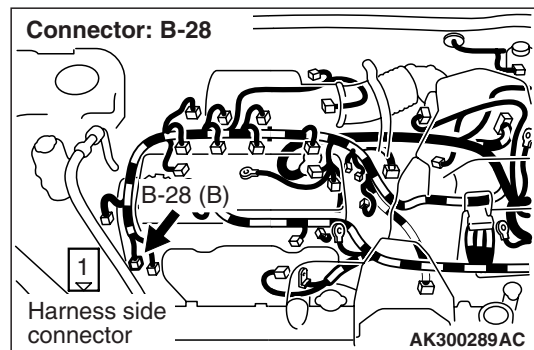
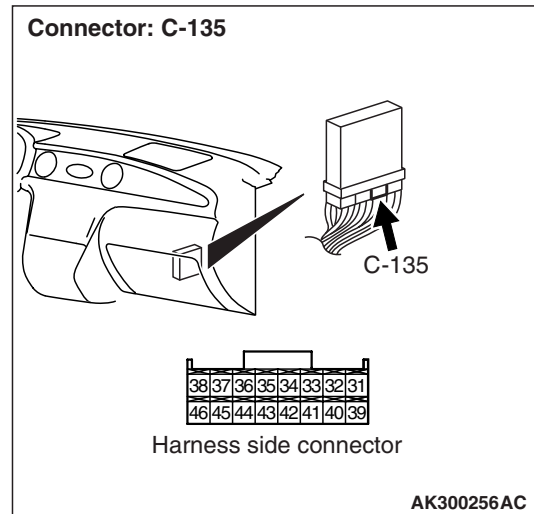
**OK: System voltage**

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

**YES :** Go to Step 4 .

**NO :** Go to Step 5 .

**STEP 4. Connector check: C-135 engine-ECU connector**



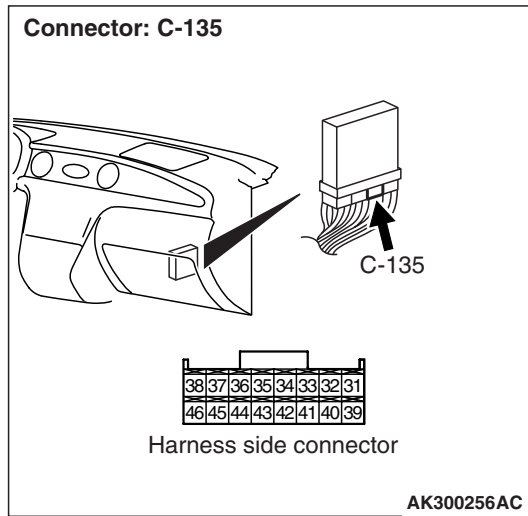
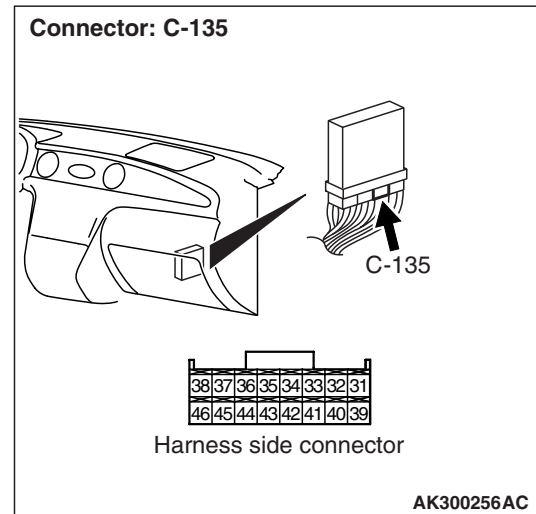
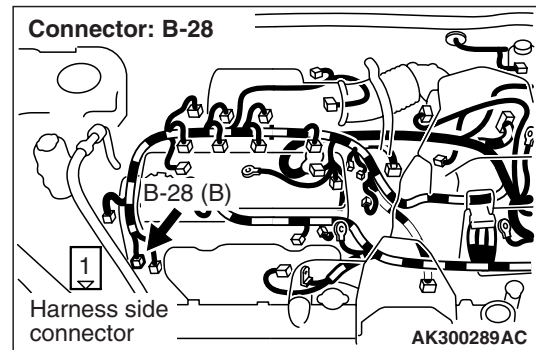
**Q: Is the check result normal?**

**YES :** Check and repair harness between B-28 (terminal No. 1) power steering fluid pressure switch connector and C-135 (terminal No. 37) engine-ECU connector.

- Check output line for open circuit.

**NO :** Repair.



**STEP 5. Connector check: C-135 engine-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-135 (terminal No. 37) engine-ECU connector.**

- Check output line for short circuit.

**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-293](#).
  - Item 27: Power steering fluid pressure switch

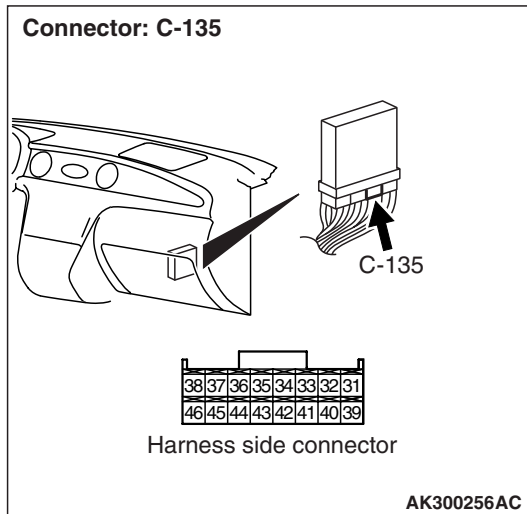
**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.



**STEP 8. Perform voltage measurement at C-135 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Engine: Idling
- Voltage between terminal No. 37 and earth.

**OK:**

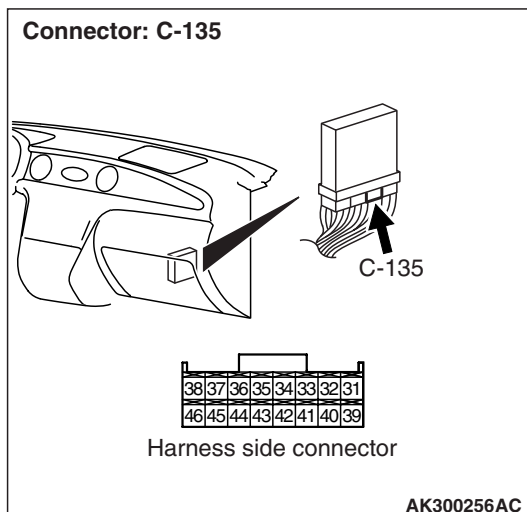
**System voltage (Steering wheel: Stationary)  
1 V or less (Steering wheel: Turned)**

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

**YES :** Go to Step 11 .

**NO :** Go to Step 9 .

**STEP 9. Connector check: C-135 engine-ECU connector**

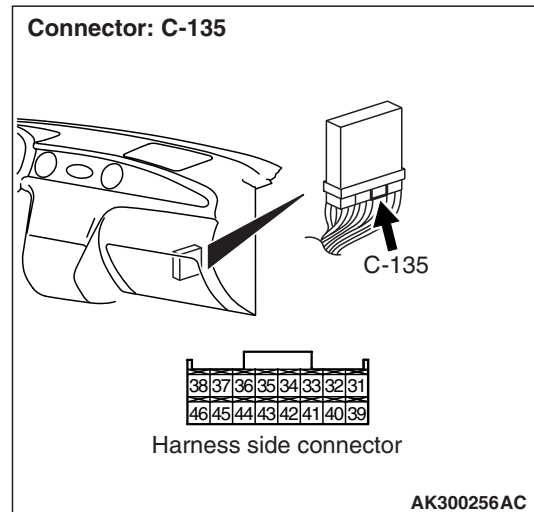
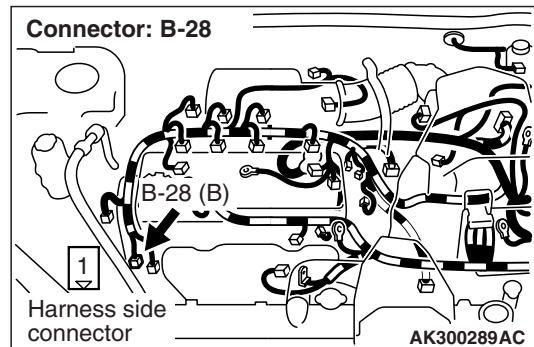


**Q: Is the check result normal?**

**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-135 (terminal No. 37) engine-ECU connector.**

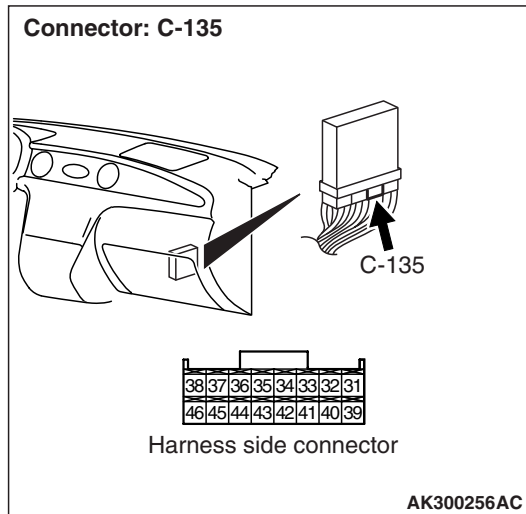


- Check output line for damage.

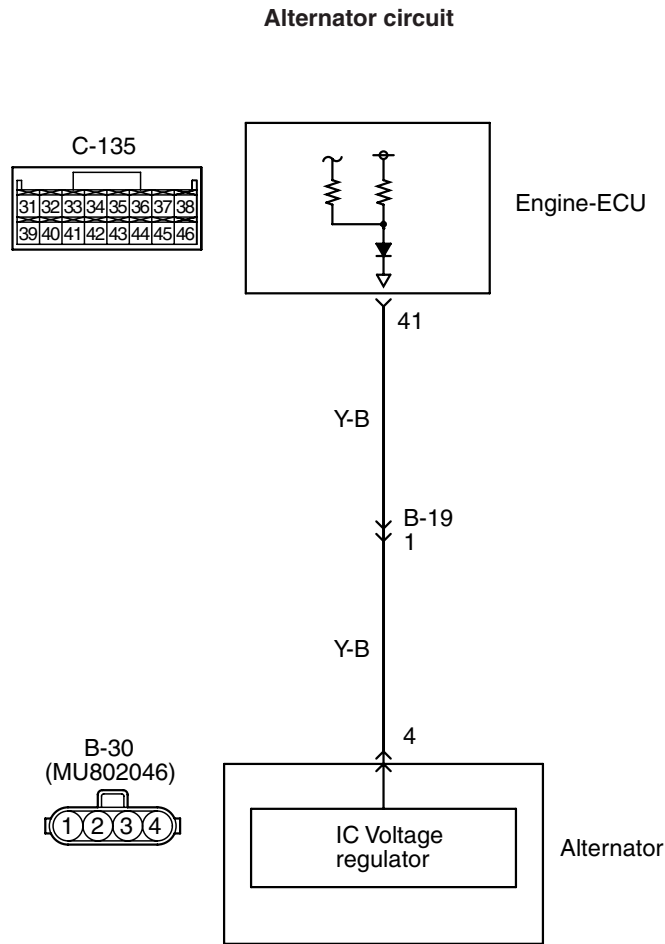
**Q: Is the check result normal?**

**YES :** Replace power steering fluid pressure switch.

**NO :** Repair.

**STEP 11. Connector check: C-135 engine-ECU  
connector****Q: Is the check result normal?****YES :** Go to Step 7 .**NO :** Repair.

Code No. P0622: Alternator FR Terminal System



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK300290 AB

## OPERATION

- The energized state of the alternator field coil is inputted from the alternator (terminal No. 4) to the engine-ECU (terminal No. 41).

## FUNCTION

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

## TROUBLE JUDGMENT

### Check Condition

- Engine speed is 50 r/min or more.

### Judgment Criterion

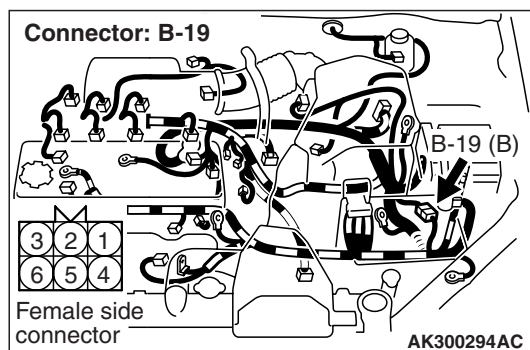
- Input voltage from alternator FR terminal is the system voltage or more for 20 seconds.

## PROBABLE CAUSE

- Alternator FR terminal circuit open circuited
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

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

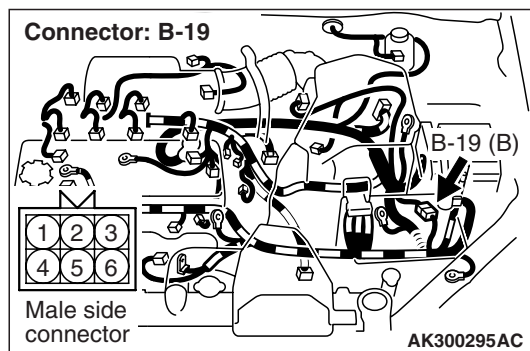


Q: Is the check result normal?

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.

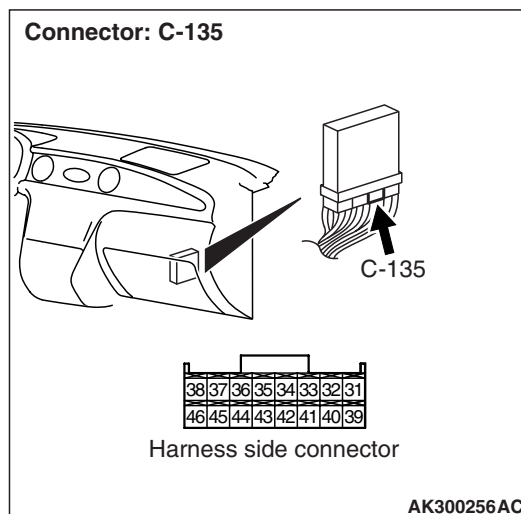
**OK: System voltage**

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 3 .

## STEP 3. Connector check: C-135 engine-ECU connector

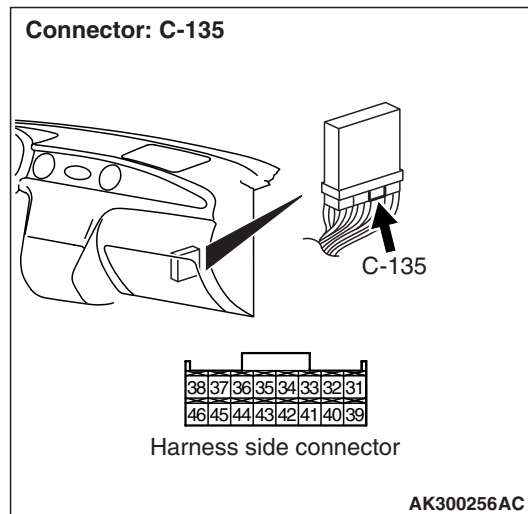
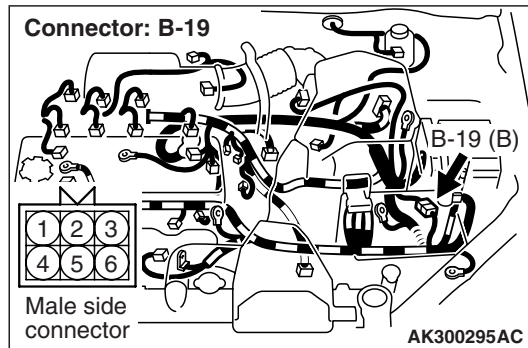


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

**STEP 4. Check harness between B-19 (terminal No. 1) intermediate connector and C-135 (terminal No. 41) engine-ECU connector.**



- Check output line for short circuit.

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

**YES :** Go to Step 5 .

**NO :** Repair.

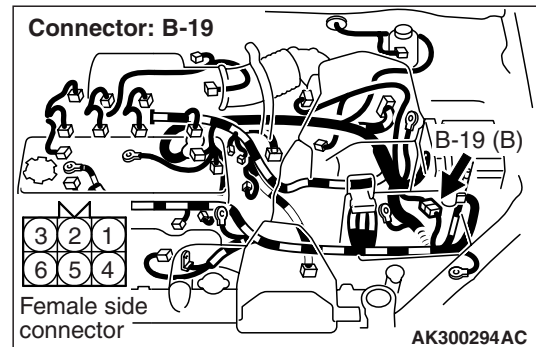
**STEP 5. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

**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.

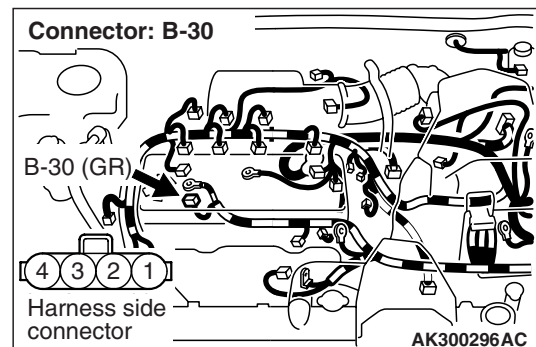
**OK: System voltage**

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

**YES :** Go to Step 9 .

**NO :** Go to Step 7 .

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

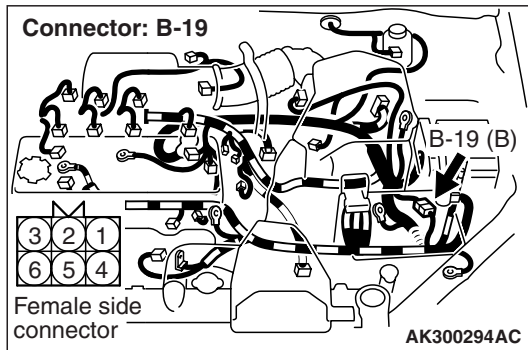
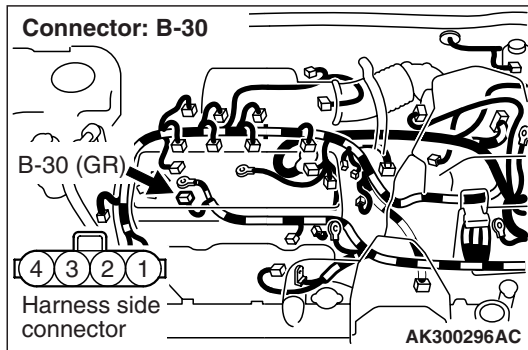


**Q: Is the check result normal?**

**YES :** Go to Step 8 .

**NO :** Repair.

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

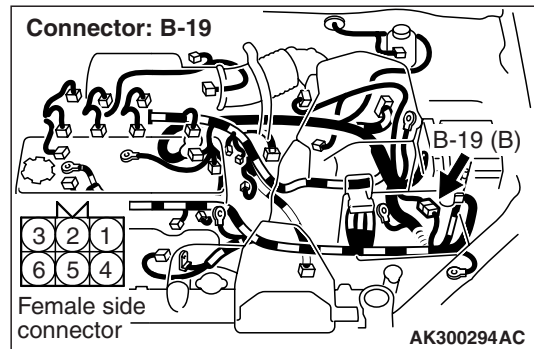


- Check output line for short circuit.

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

**YES :** Replace alternator.  
**NO :** Repair.

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



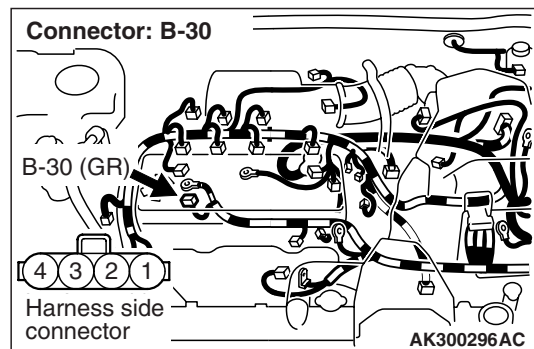
- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: Idle after warm-up
- Transmission: Neutral
- Radiator fan: Inactive
- Voltage between terminal No. 1 and earth.

**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 .

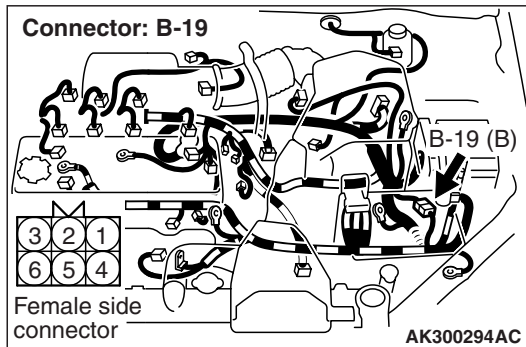
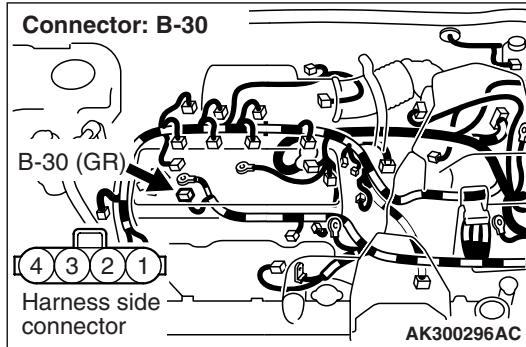
**STEP 10. Connector check: B-30 alternator connector**



**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 pin No. 1.**



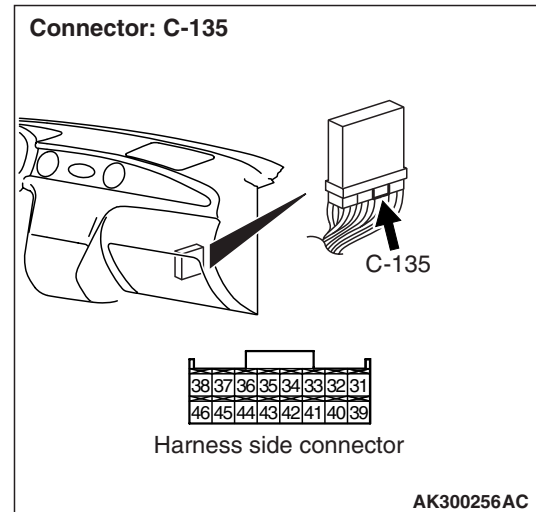
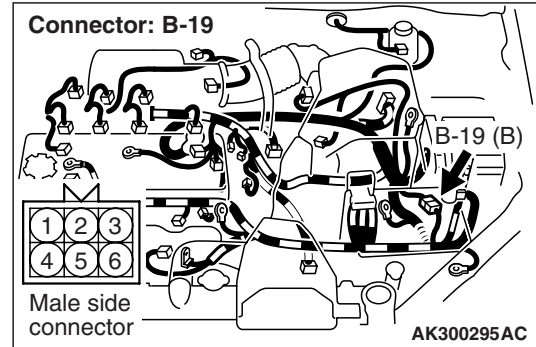
- Check output line for damage.

**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-135 (terminal No. 41) engine-ECU connector.**



- Check output line for damage.

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

**YES :** Go to Step 13 .

**NO :** Repair.

**STEP 13. Check trouble symptom.**

**Q: Same symptoms regenerated?**

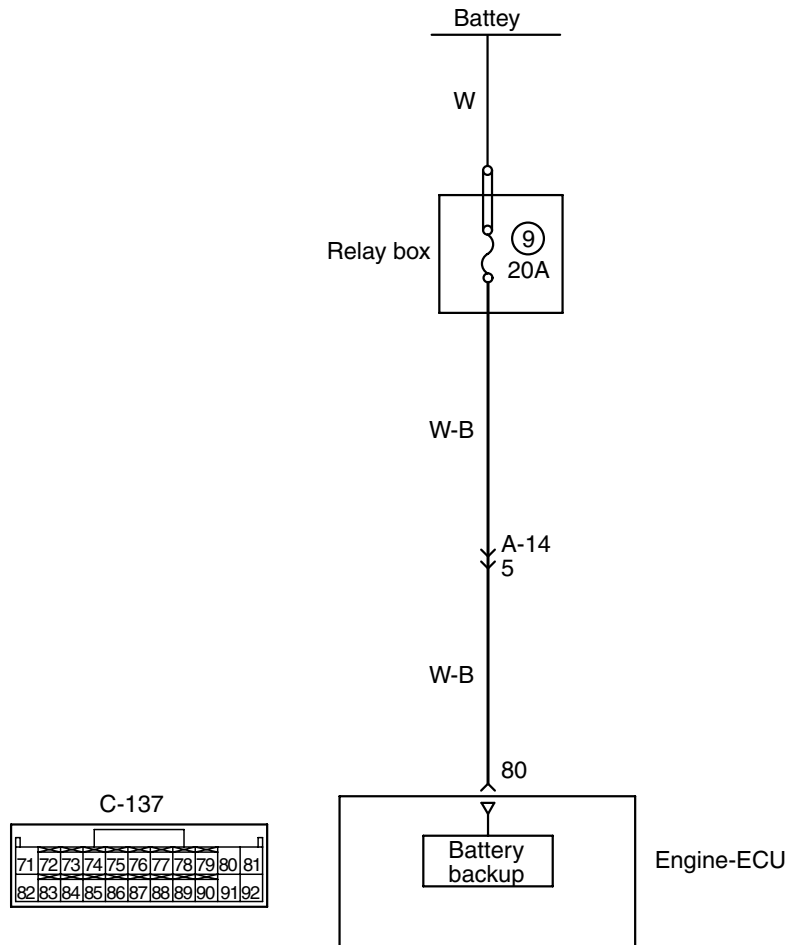
**YES :** Replace alternator.

**NO :** Intermittent malfunction (Refer to Group 00  
– How to Use troubleshooting/Inspection  
Service Points [P.00-6](#)).



## Code No. P1603: Battery Backup Line System

Battery backup circuit



## Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK300297 AB

**OPERATION**

- Power is directly supplied to the engine-ECU (terminal No. 80) from the battery.

**FUNCTION**

- The engine-ECU is check the open circuit of battery backup line.

**TROUBLE JUDGMENT****Check Condition**

- Ignition switch: ON

**Judgment Criterion**

- The battery backup line voltage 6 V or less.

**PROBABLE CAUSE**

- Open/short circuit in battery backup line circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

### STEP 1 M.U.T.-II/III diagnosis code

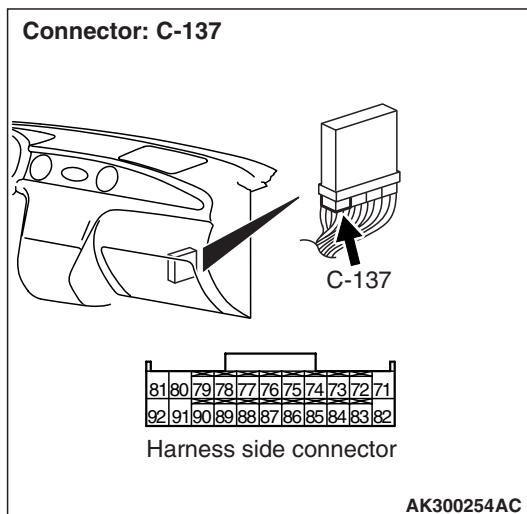
- Temporarily place the ignition switch in "LOCK" (OFF) position, and 10 seconds after that, place it in "ON" position again.

**Q: Is the diagnosis code P1603 set?**

**YES :** Go to Step 2 .

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to use Troubleshooting/Inspection Service Points [P.00-6](#)).

### STEP 2. Perform voltage measurement at C-137 engine-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 80 and earth.

**OK: System voltage**

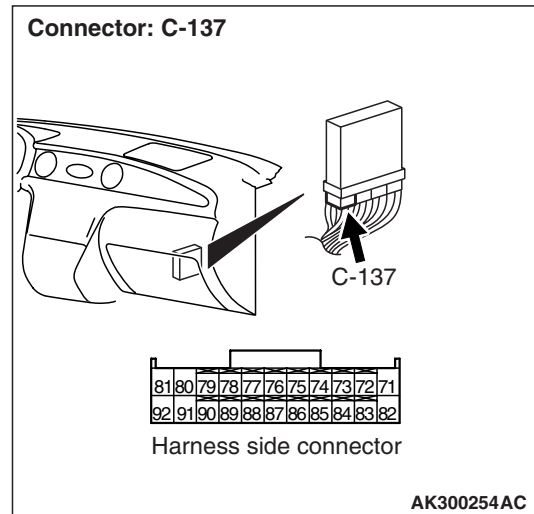
**Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between battery and C-137 (terminal No. 80) engine-ECU connector.

- Check power supply line for open/short circuit.

### STEP 3. Connector check: C-137 engine-ECU connector



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

**YES :** Go to Step 4 .

**NO :** Repair.

### STEP 4. Check the trouble symptoms.

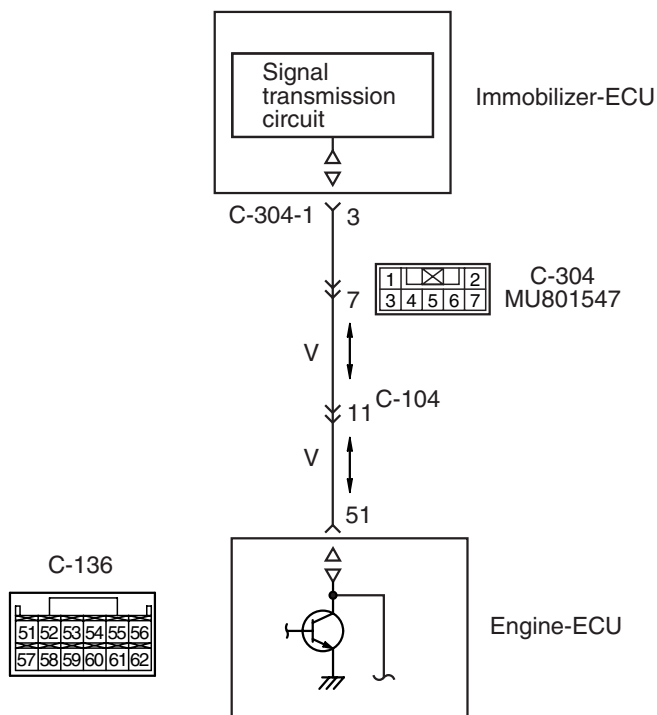
**Q: Does trouble symptom persist?**

**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

## Code No. P1610: Immobilizer System

## Immobilizer-ECU circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK300298 AD

## OPERATION

- The signals are sent and received between engine-ECU (terminal No. 51) and immobilizer-ECU (terminal No. 7).

## FUNCTION

- Engine-ECU sends or receives the control signals to or from immobilizer-ECU to certify the ignition key.

## NOTE:

- If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
- This code may be displayed when registering the key encrypted code.

## TROUBLE JUDGMENT

## Check Condition

- Ignition switch: ON

## Judgment Criterion

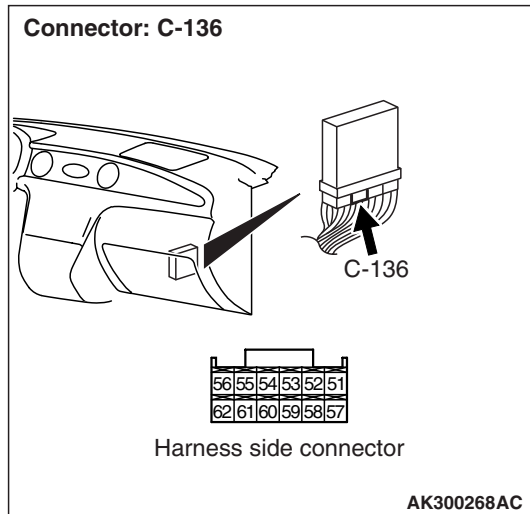
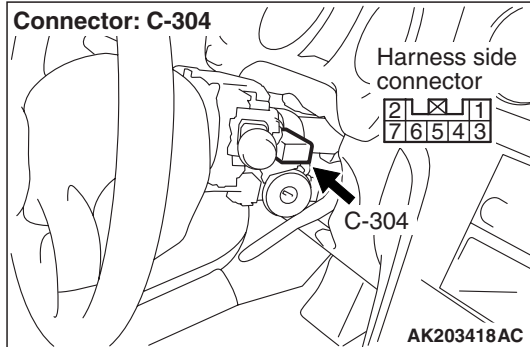
- Improper communication problems between the engine-ECU and the immobilizer-ECU are detected.

## PROBABLE CAUSE

- Open/short circuit in immobilizer system circuit or loose connector contact
- Failed immobilizer-ECU
- Failed engine-ECU

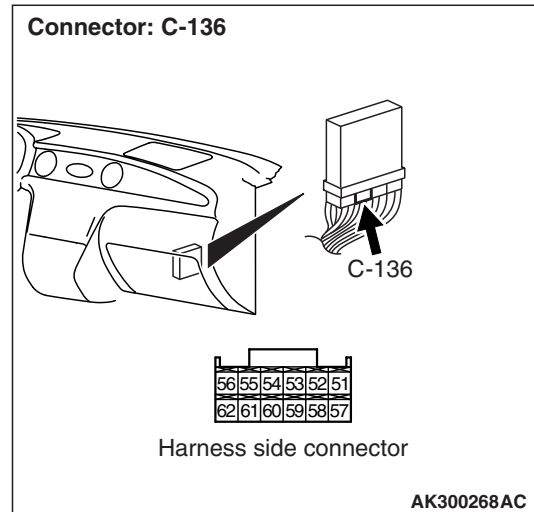
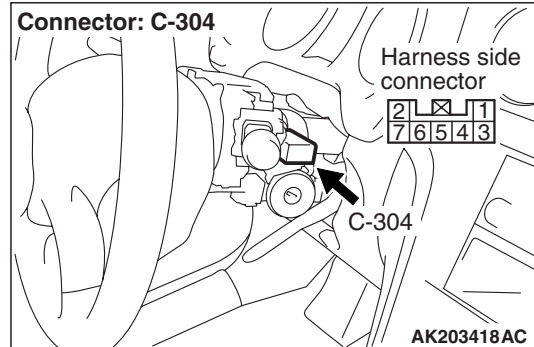
## DIAGNOSIS PROCEDURE

### STEP 1. Connector check: C-304 immobilizer-ECU connector and C-136 engine-ECU connector



**Q: Is the check result normal?**  
**YES :** Go to Step 2 .  
**NO :** Repair.

### STEP 2. Check harness between C-304 (terminal No. 7) immobilizer-ECU connector and C-136 (terminal No. 51) engine-ECU connector.



**NOTE:** Before checking harness, check intermediate connector C-104, and repair if necessary.

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

**Q: Is the check result normal?**  
**YES :** Go to Step 3 .  
**NO :** Repair.

### STEP 3. Check the trouble symptoms.

**Q: Is the check result normal?**  
**YES :** Go to Step 4 .  
**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

### STEP 4. After replacing the immobilizer-ECU, re-check the trouble symptoms.

**Q: Is the check result normal?**  
**YES :** Replace engine-ECU.  
**NO :** Check end.

## INSPECTION CHART FOR TROUBLE SYMPTOMS

M1131151500823

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-ECU only is not possible		2
Engine warning lamp	The engine warning lamp does not illuminate right after the ignition switch is turned the "ON" position		3
	The engine warning lamp remains illuminating and never goes out		4
Starting	Starting impossible (No initial combustion)	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	Engine does not revolve up	The engine speed is not higher when the accelerator pedal is depressed.	11
	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.	12
	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



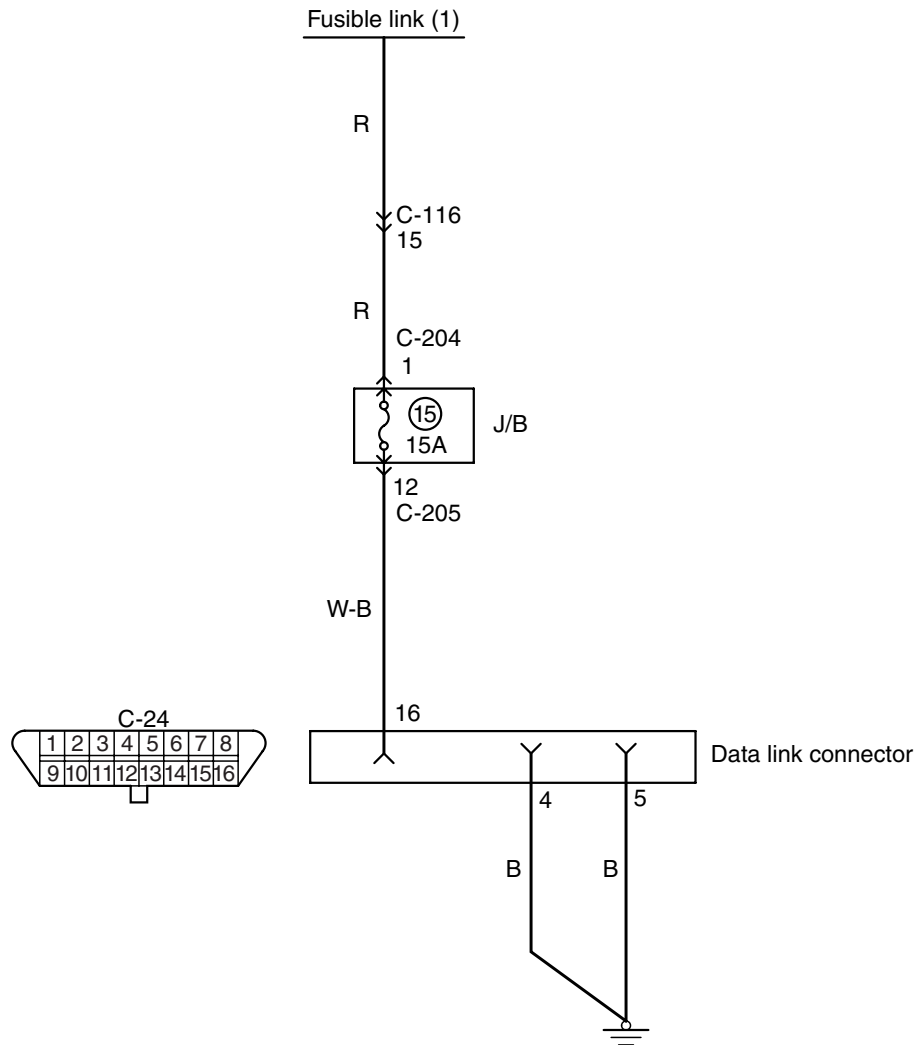
**PROBLEM SYMPTOMS TABLE**

<b>Inspection procedure No.</b>	<b>Trouble symptom</b>	<b>Reference page</b>
1	Communication with all system is not possible	<a href="#">P.13A-182</a>
2	Communication with engine-ECU only is not possible	<a href="#">P.13A-185</a>
3	The engine warning lamp does not illuminate right after the ignition switch is turned the "ON" position	<a href="#">P.13A-187</a>
4	The engine warning lamp remains illuminating and never goes out	<a href="#">P.13A-193</a>
5	Starting impossible (No initial combustion)	<a href="#">P.13A-195</a>
6	Starting impossible (Starter operative but no initial combustion)	<a href="#">P.13A-200</a>
7	Starting impossible (Initial combustion but no complete combustion)	<a href="#">P.13A-204</a>
	Starting impossible (Long time to start)	
8	Unstable idling (Rough idling, hunting)	<a href="#">P.13A-207</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-214</a>
10	The engine stalls when decelerating	<a href="#">P.13A-216</a>
11	Engine does not revolve up	<a href="#">P.13A-218</a>
12	Hesitation, sag	<a href="#">P.13A-220</a>
	Poor acceleration	
	Stumble	
	Surge	
13	The feeling of impact or vibration when accelerating	<a href="#">P.13A-222</a>
14	The feeling of impact or vibration when decelerating	<a href="#">P.13A-224</a>
15	Knocking	<a href="#">P.13A-224</a>
16	Ignition timing offset	<a href="#">P.13A-225</a>
17	Run on (Dieseling)	<a href="#">P.13A-227</a>
18	Odor, white smoke, black smoke, high-concentration CO/HC during idling	<a href="#">P.13A-227</a>
19	Battery rundown	<a href="#">P.13A-229</a>
20	Overheating	<a href="#">P.13A-234</a>
21	Abnormal rotation of fan motor	<a href="#">P.13A-235</a>
22	Poor A/C performance	<a href="#">P.13A-237</a>
23	Engine-ECU power supply, engine control relay, ignition switch-IG1 system	<a href="#">P.13A-239</a>
24	Fuel pump system	<a href="#">P.13A-247</a>
25	Fan control relay system	<a href="#">P.13A-256</a>
26	A/C switch system	<a href="#">P.13A-262</a>
27	A/C compressor relay system	<a href="#">P.13A-266</a>
28	A/C load signal system	<a href="#">P.13A-273</a>
29	A/C pressure sensor system	<a href="#">P.13A-277</a>
30	Ignition circuit system	<a href="#">P.13A-286</a>

## SYMPTOM PROCEDURES

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

Data link connector circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK300300 AD

## 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

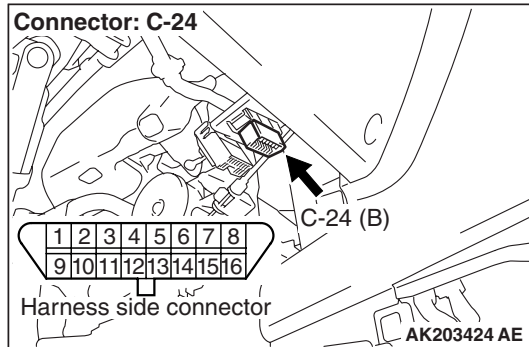
- Failure is possibly caused by failed power supply circuit or failed earthing circuit of diagnosis connector.

## PROBABLE CAUSE

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

## DIAGNOSIS PROCEDURE

### STEP 1: Check connector: C-24 diagnosis connector

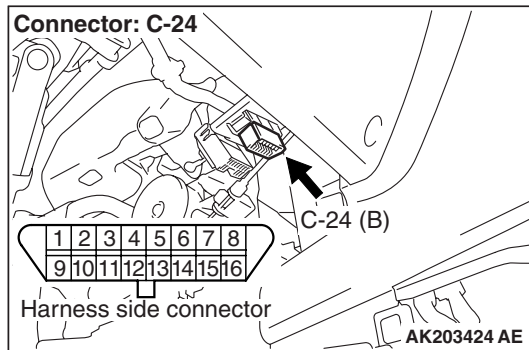


**Q: Is the check result normal?**

**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: Continuity (2  $\Omega$  or less)**

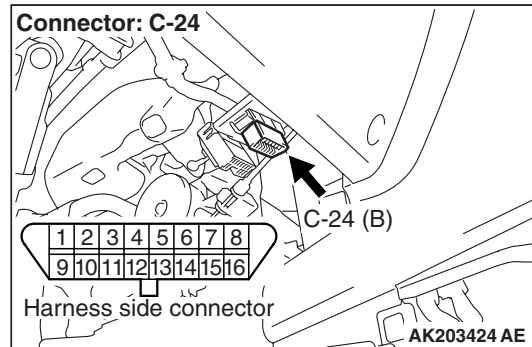
**Q: Is the check result normal?**

**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 C-116, 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

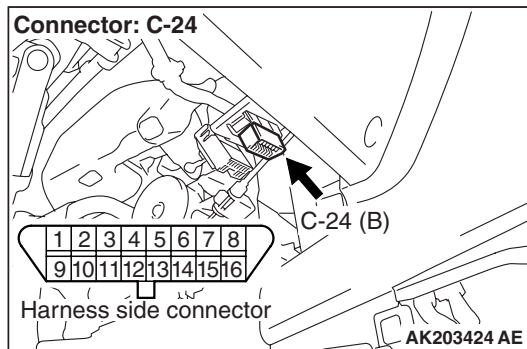
- After replacing the M.U.T.-II/III, re-check the trouble symptoms.

**Q: Does trouble symptom persist?**

**YES :** Go to Step 5 .

**NO :** Check end

**STEP 5: Check harness between C-24 (terminal No. 16) diagnosis connector and battery.**



**NOTE:** Before checking harness, check intermediate connectors C116, C-204 and C-205, and repair if necessary.

- Check power supply line for damage.

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

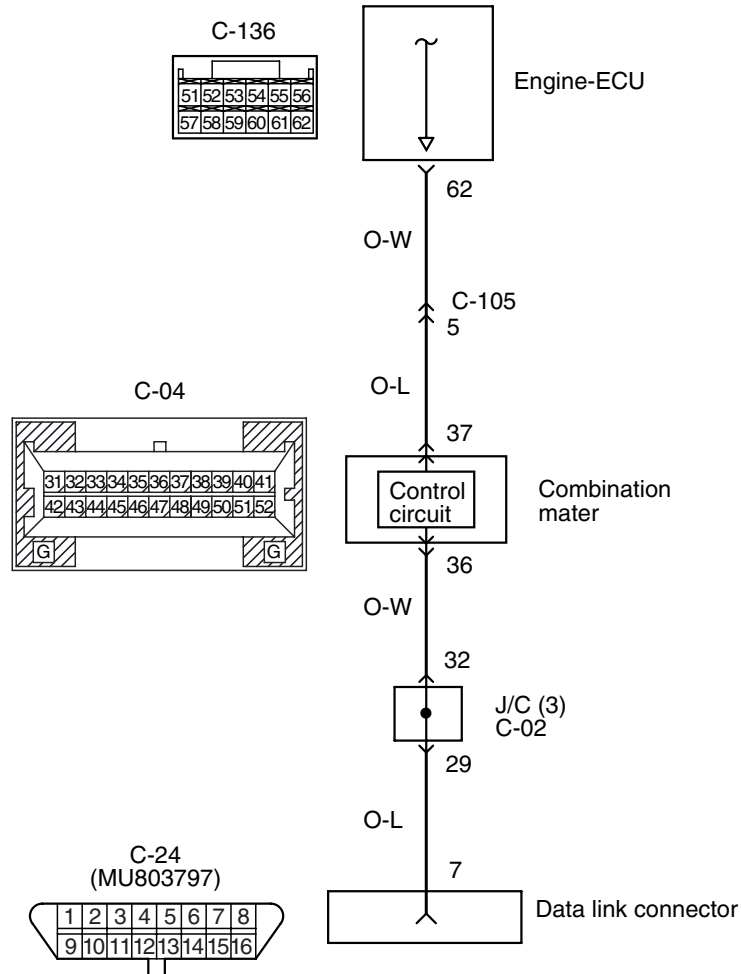
**YES :** Check and repair harness between C-24 (terminal No. 4 and No. 5) diagnosis connector and body earth.

- Check earthing line for damage.

**NO :** Repair.

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

**Data link connector circuit**



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401207 AB

**OPERATION**

- There is data communication between diagnosis connector output terminal (terminal No. 7) and engine-ECU (terminal No. 62).

**COMMENT ON TROUBLE SYMPTOM**

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

**PROBABLE CAUSE**

- Open/short circuit in engine-ECU power circuit
- Between engine-ECU and diagnosis connector for short circuit
- Failed engine-ECU

**DIAGNOSIS PROCEDURE**

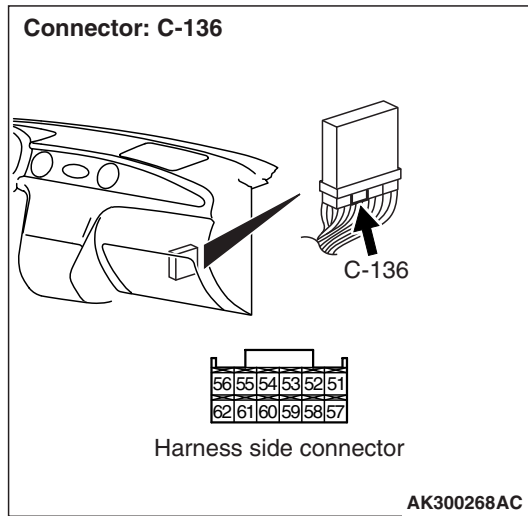
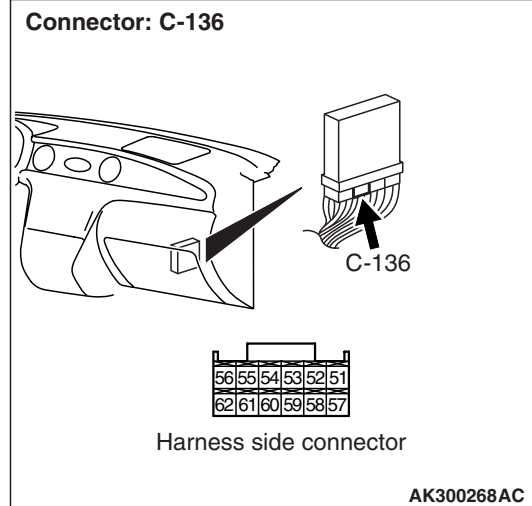
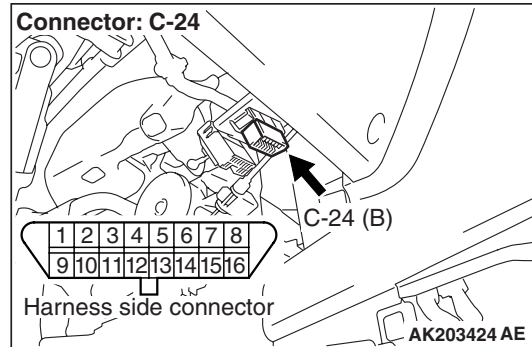
**STEP 1: Check engine warning lamp.**

- Ignition switch: OFF → ON

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

**YES :** Go to Step 2 .

**NO :** Check engine-ECU power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 [P.13A-239](#)).

**STEP 2: Connector check: C-136 engine-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-136 (terminal No. 62) engine-ECU connector.**

**NOTE:** Before Checking harness, check intermediate connectors C-105, C-02 and C-04 and repair if necessary.

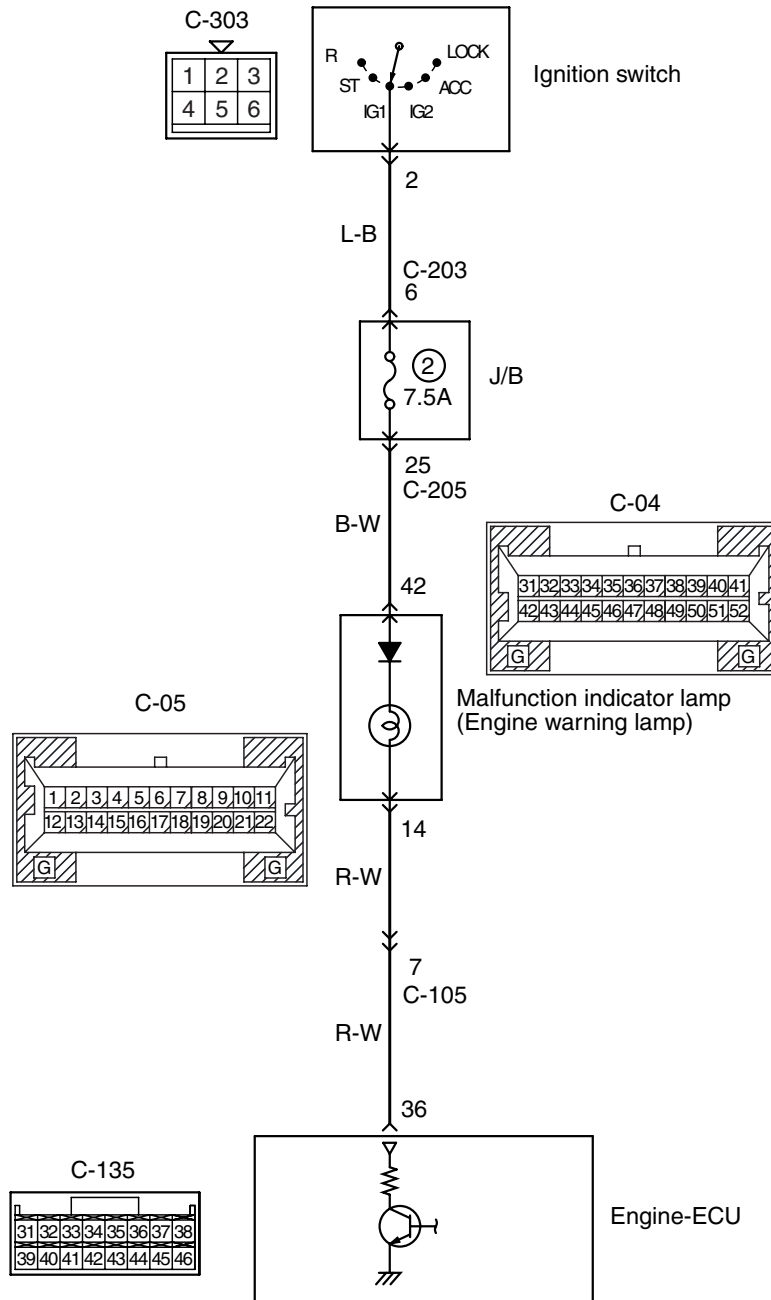
- Check communication line for open/short circuit and damage.

**Q: Is the check result normal?****YES :** Go to Step 4 .**NO :** Repair.**STEP 4: Check the trouble symptom.****Q: Does trouble symptom persist?****YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

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

Malfunction indicator lamp (Engine warning lamp) circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401039 AB

**OPERATION**

- Battery voltage is applied to engine warning lamp of combination meter connector (terminal No. 42) from ignition switch.
- Engine-ECU (terminal No. 36) 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-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 for or loose connector contact
- Failed engine-ECU

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

**Q: Is engine started?**

**YES :** Go to Step 2 .

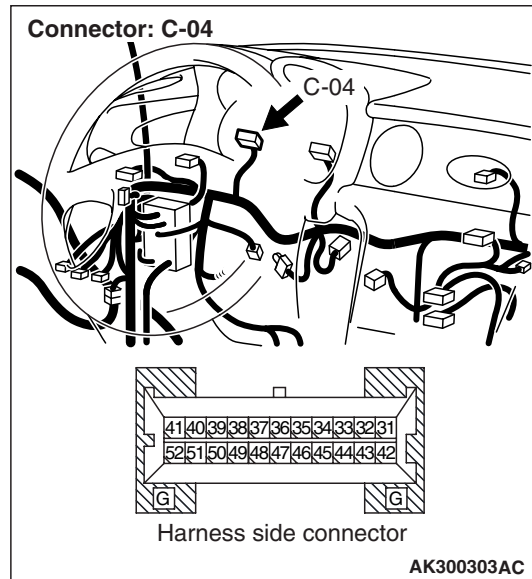
**NO :** Check engine-ECU power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 P.13A-239).

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

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

**YES :** Go to Step 3 .

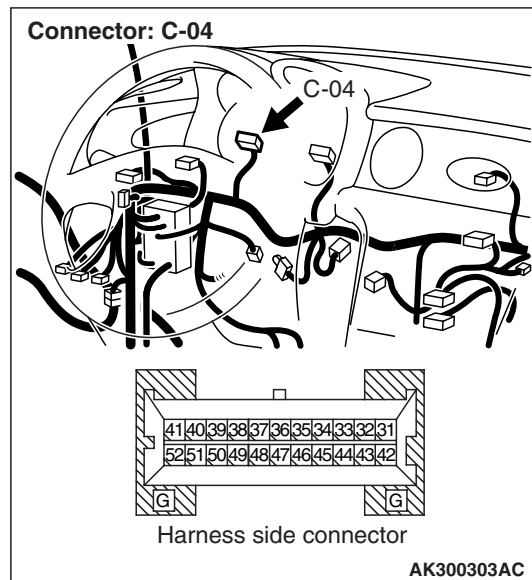
**NO :** Replace engine warning lamp.

**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.

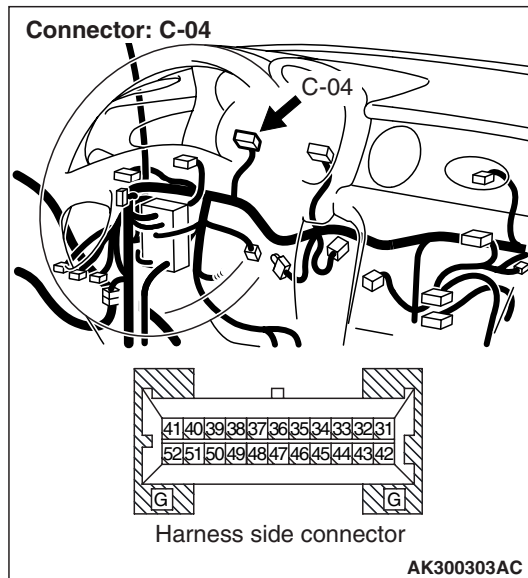
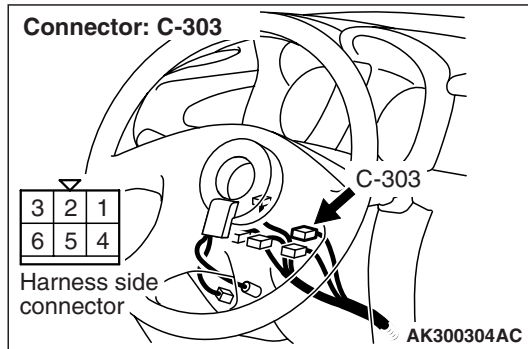
**OK: System voltage**

**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**



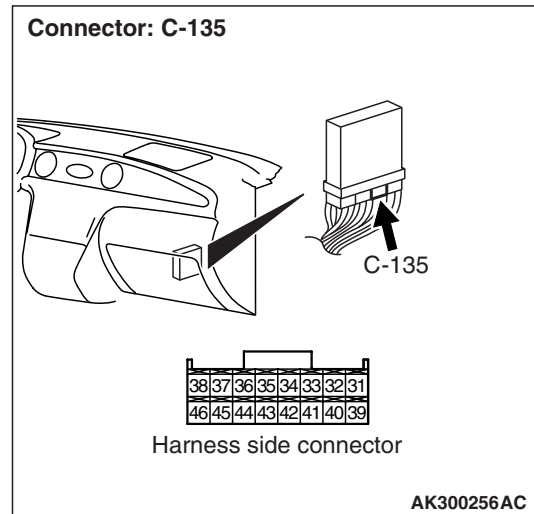
**Q: Is the check result normal?**

**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-135 engine-ECU connector**

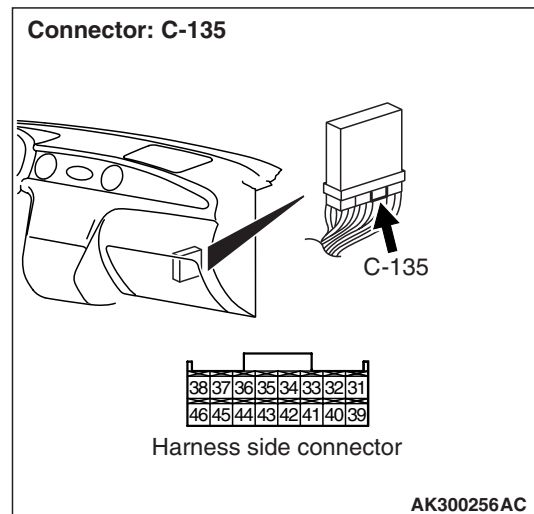


**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7: Perform voltage measurement at C-135 engine-ECU connector.**



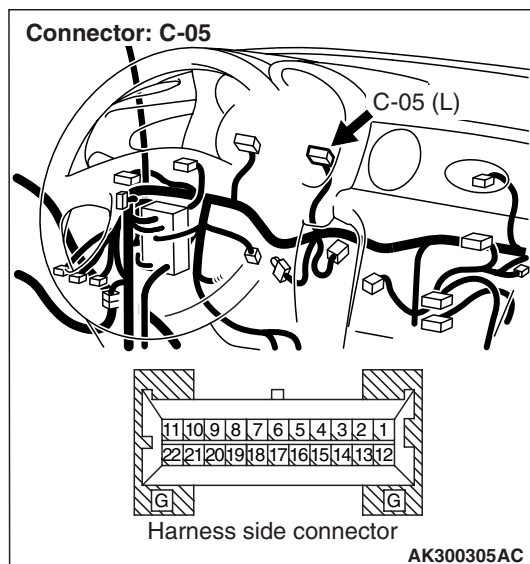
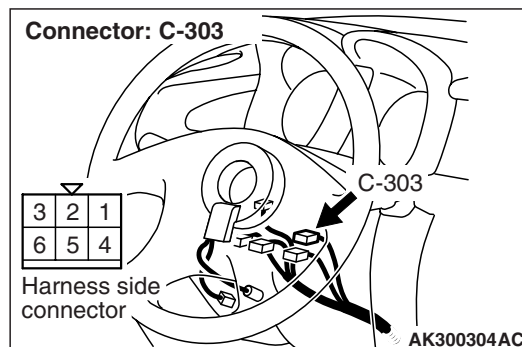
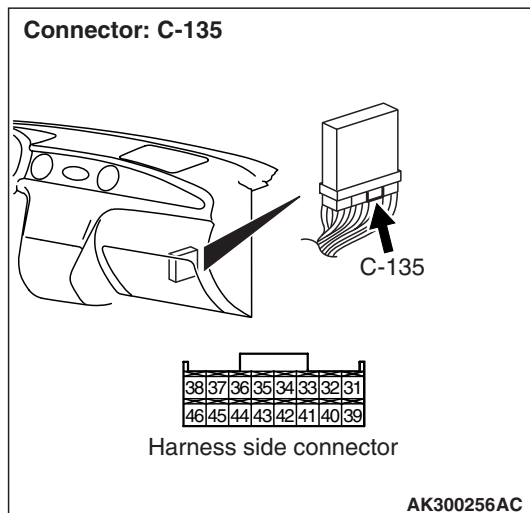
- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 36 and earth.

**OK: System voltage**

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

**YES :** Go to Step 9 .

**NO :** Go to Step 8 .

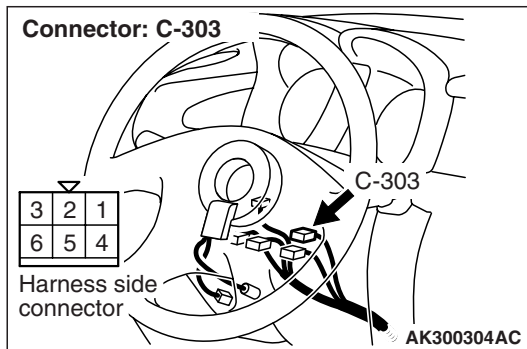
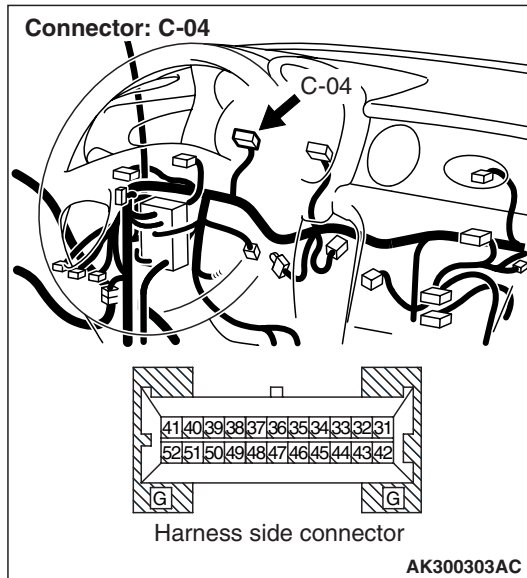
**STEP 8: Check connector: C-05 combination meter connector****STEP 9: Connector check: C-303 ignition switch connector****Q: Is the check result normal?****YES :** Go to Step 10 .**NO :** Repair.**Q: Is the check result normal?**

**YES :** Check intermediate connector C-105, and repair if necessary. If intermediate connector is normal, check and repair harness between C-05 (terminal No. 14) combination meter connector and C-135 (terminal No. 36) engine-ECU connector.

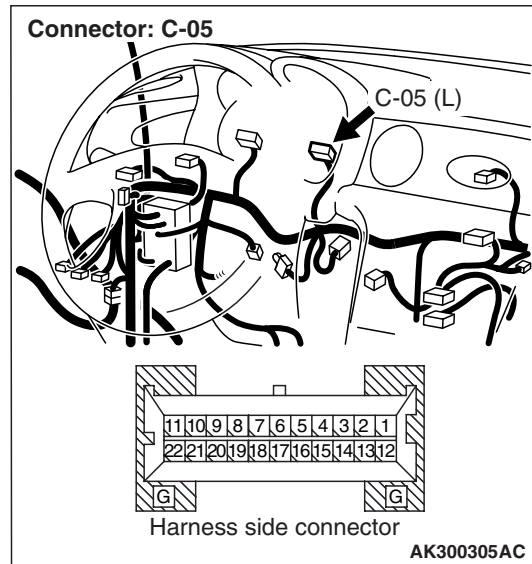
- Check output line for open/short circuit.

**NO :** Repair.

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



**STEP 11: Connector check: C-05 ignition switch connector**



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

**YES :** Go to Step 12 .

**NO :** Repair.

**NOTE:** Before checking harness, check intermediate connectors C-203 and C-205, and repair if necessary.

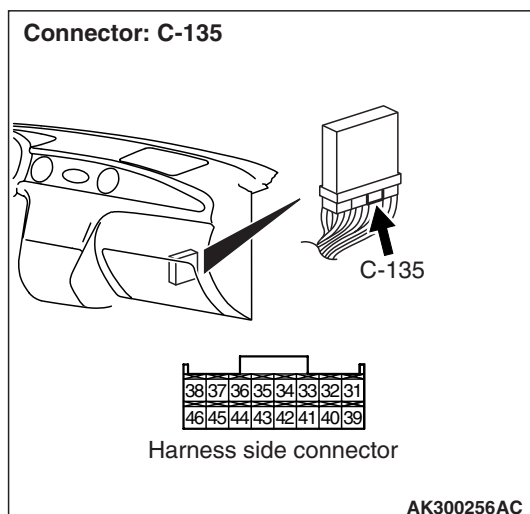
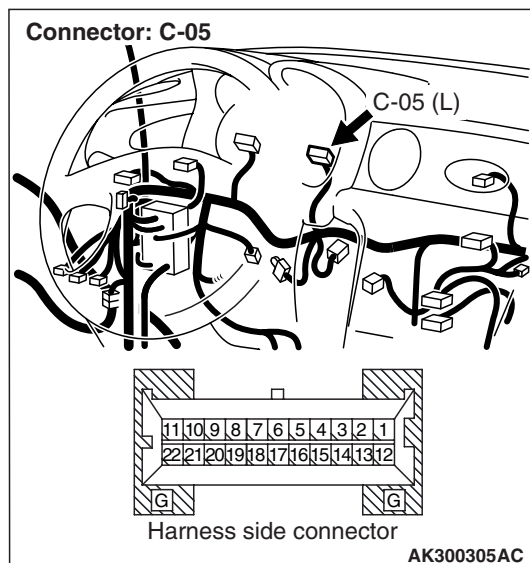
- Check power supply line for damage.

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

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 12: Check harness between C-05 (terminal No. 14) combination meter connector and C-135 (terminal No. 36) engine-ECU connector.**



**NOTE:** Before checking harness, check intermediate connector C-105, and repair if necessary.

- Check output line for damage.

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

**YES :** Go to Step 13 .

**NO :** Repair.

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

**Q: Does trouble symptom persist?**

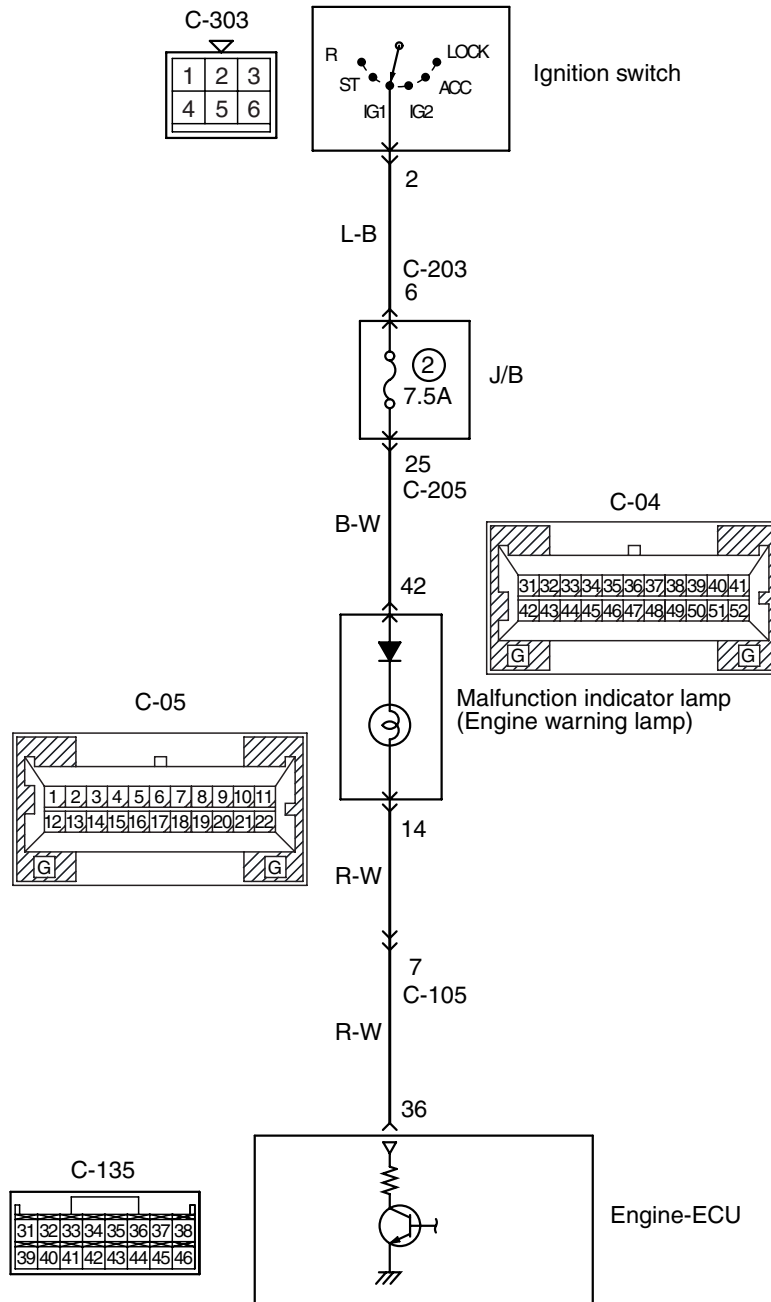
**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use

Troubleshooting/Inspection Service Points P.00-6).

**Inspection Procedure 4: The Engine Warning Lamp Remains Illuminating and never goes out**

**Malfunction indicator lamp (Engine warning lamp) circuit**



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401039 AB

**OPERATION**

- Battery voltage is applied to engine warning lamp (terminal No. 42) from ignition switch.
- Engine-ECU (terminal No. 36) 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-ECU has detected failed sensor or failed actuator. Or failure is possibly caused by short circuit or other faults.

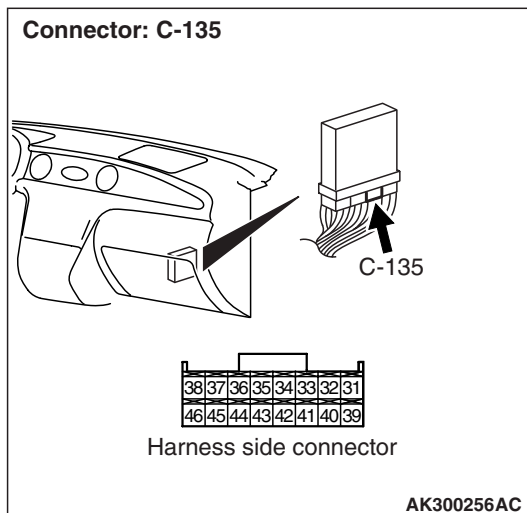
**PROBABLE CAUSE**

- Short circuit in between engine warning lamp and engine-ECU circuit.
- Failed engine-ECU

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

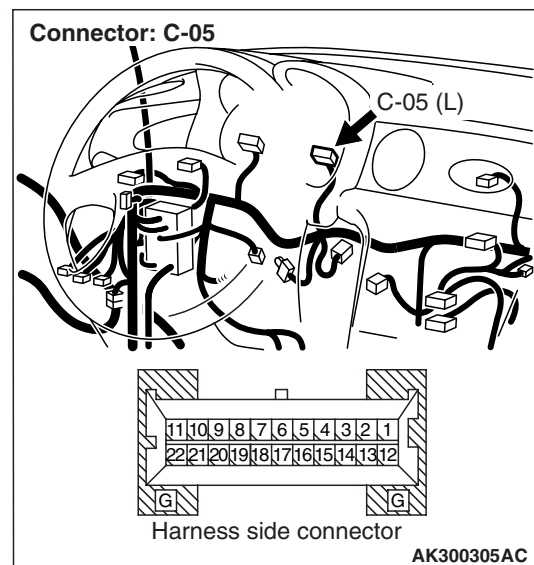
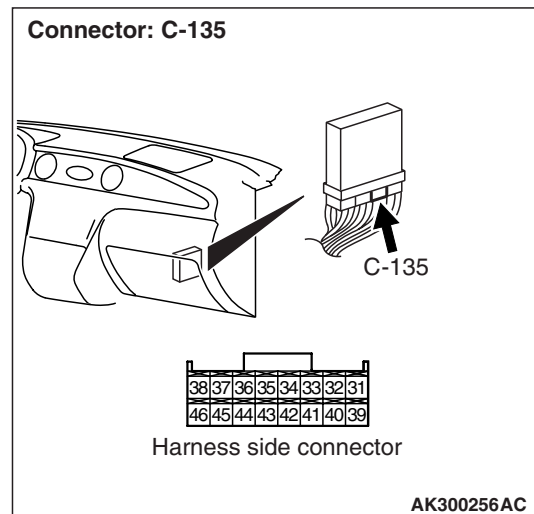
**YES** : Inspection chart for diagnosis code (Refer to P.13A-15.)

**NO** : Go to Step 2 .

**STEP 2: Connector check: C-135 engine-ECU connector****Q: Is the check result normal?**

**YES** : Go to Step 3 .

**NO** : Repair.

**STEP 3: Perform voltage measurement at C-135 engine-ECU connector.**

- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 36 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-135 (terminal No. 36) engine-ECU connector.

- Check output line for short circuit.



---

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

**Q: Does trouble symptom persist?**

**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP  
00 – How to Use  
Troubleshooting/Inspection Service Points  
[P.00-6](#)).

---

**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

**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-7](#)).

---

**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?**

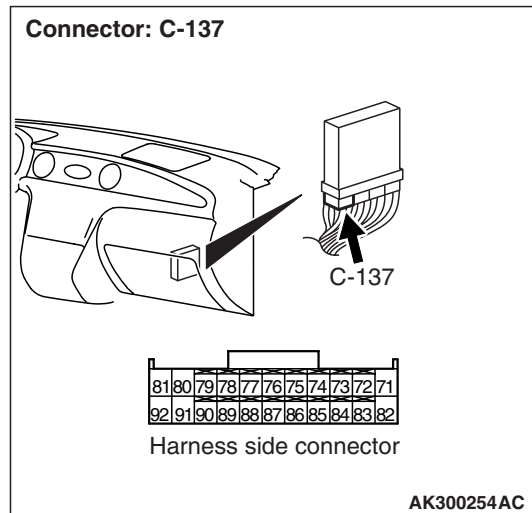
**YES :** Go to Step 8 .

**NO :** Go to Step 3 .

---

**STEP 3: Connector check: C-137 engine-ECU connector**

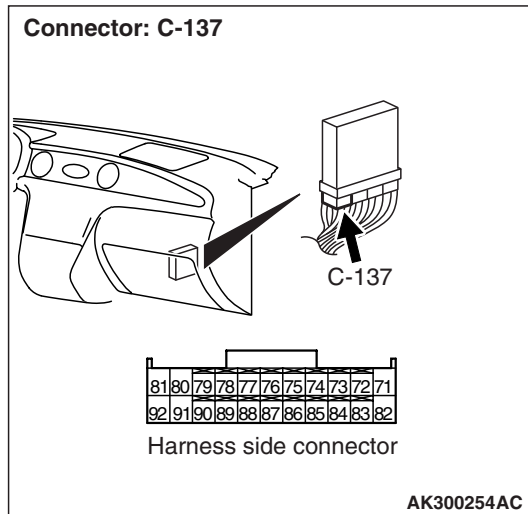
---



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

**YES :** Go to Step 4 .

**NO :** Repair.

**STEP 4: Perform voltage measurement at C-137 engine-ECU connector.**

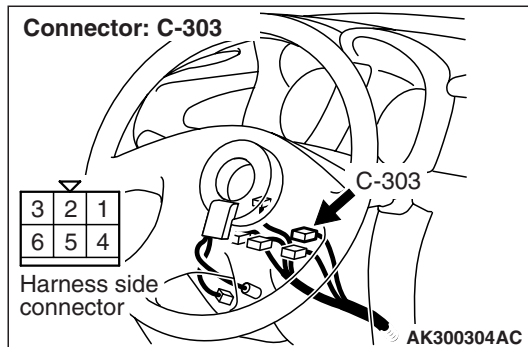
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 71 and earth.

**OK: System voltage**

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

**YES :** Go to Step 7 .

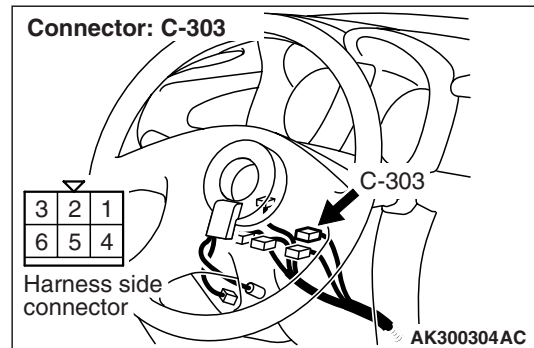
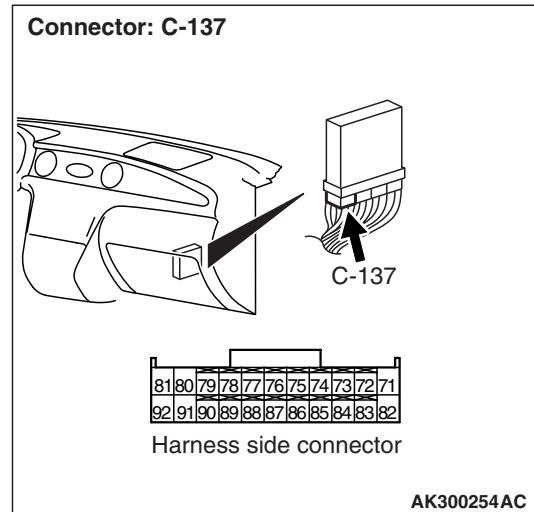
**NO :** Go to Step 5 .

**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-30](#)).

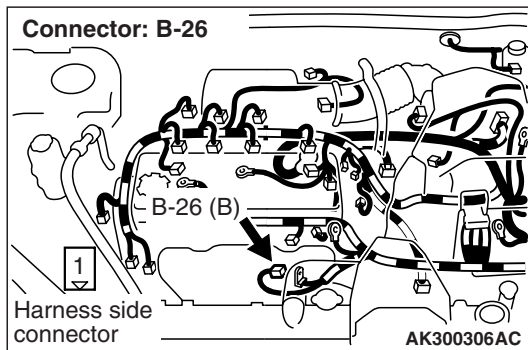
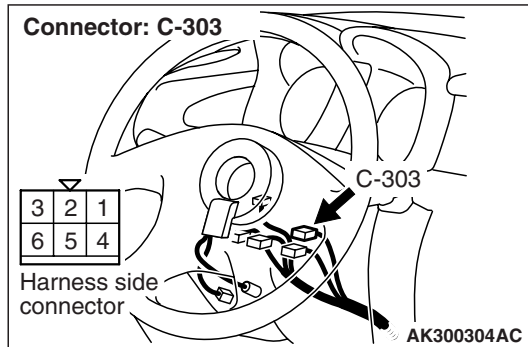
**Q: Is the check result normal?**

**YES :** Check intermediate connectors C-106 and B-19, and repair if necessary. If intermediate connector are normal, check and repair harness between C-137 (terminal No. 71) 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: Connector check: C-303 ignition switch connector and B-26 starter connector**



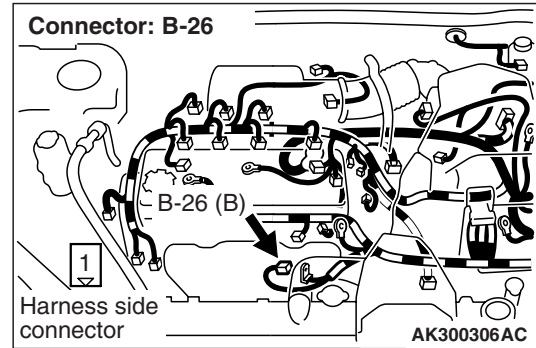
**Q: Is the check result normal?**

**YES :** Check intermediate connectors C-106 and B-19, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-303 (terminal No. 5) ignition switch connector and B-26 (terminal No. 1) starter connector.

- Check output line for short circuit.

**NO :** Repair.

**STEP 8: Check connector: B-26 starter connector**

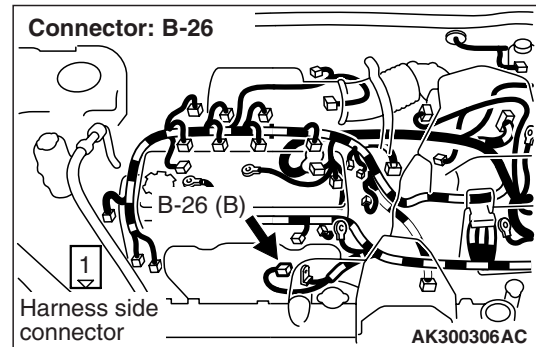


**Q: Is the check result normal?**

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9: Perform voltage measurement at B-26 starter connector.**



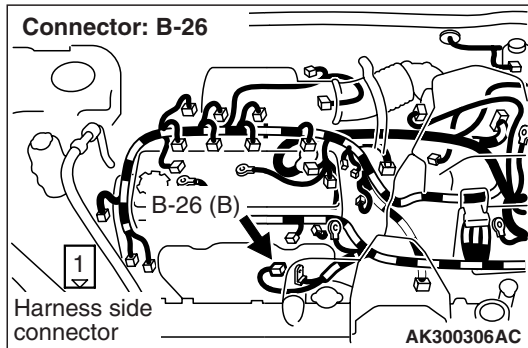
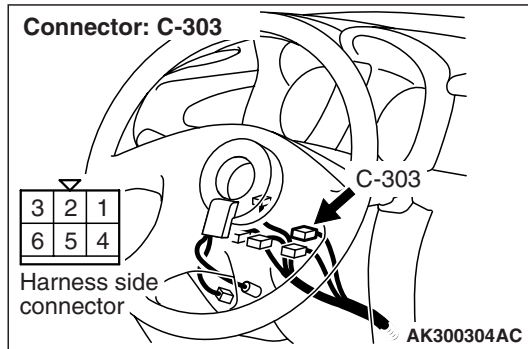
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 1 and earth.

**OK: System voltage**

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

**YES :** Go to Step 11 .

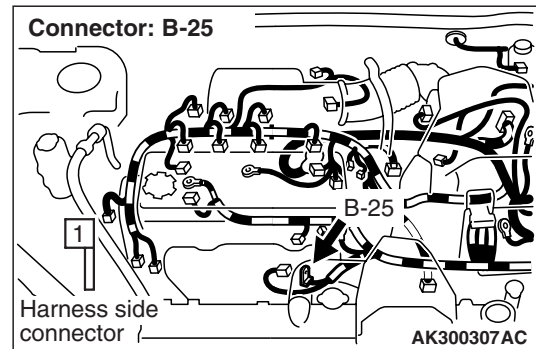
**NO :** Go to Step 10 .

**STEP 10: Connector check: C-303 ignition switch connector****Q: Is the check result normal?**

**YES :** Check intermediate connectors B-19 and C-106, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-303 (terminal No. 5) ignition switch connector and B-26 (terminal No. 1) starter connector.

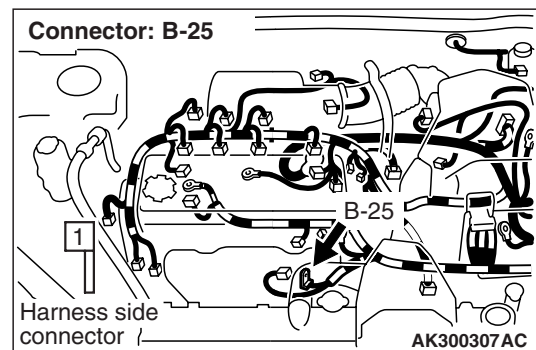
- Check output line for open circuit and damage.

**NO :** Repair.

**STEP 11: Connector check: B-25 starter connector****Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Repair.

**STEP 12: 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**

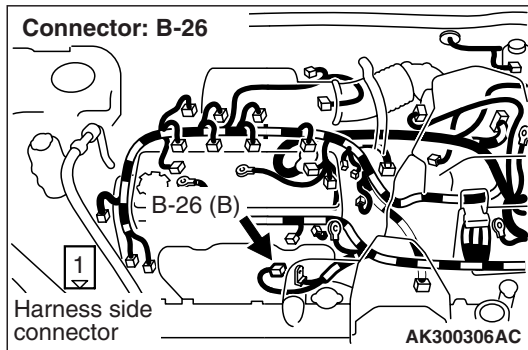
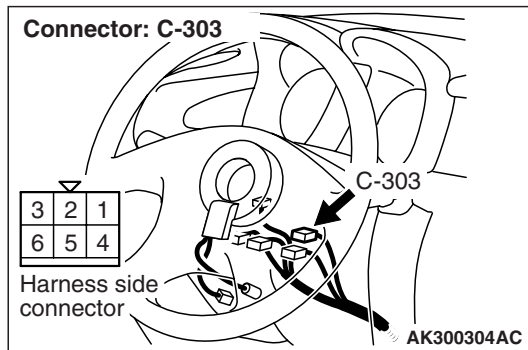
**Q: Is the check result normal?**

**YES :** Go to Step 13 .

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

- Check power supply line for open/short circuit.

**STEP 13: Check harness between C-303 (terminal No. 5) ignition switch connector and B-26 (terminal No. 1) starter connector.**



**NOTE:** Before checking harness, check intermediate connectors B-19 and C-106, and repair if necessary.

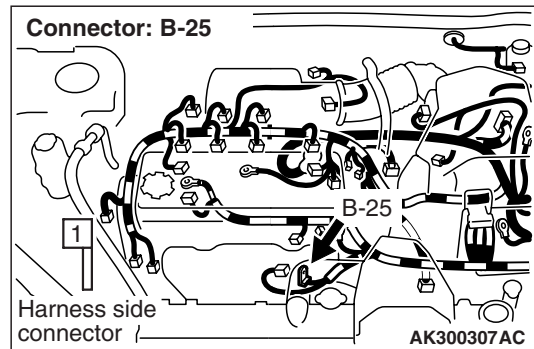
- Check output line for damage.

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

**YES :** Go to Step 14 .

**NO :** Repair.

**STEP 14: 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
- Throttle valve fouled around
- Failed ignition system
- Failed fuel system
- Failed immobilizer system
- Failed engine-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 54 – Battery – On-vehicle Service – Battery test [P.54A-7](#)).

---

**STEP 2: Check engine warning lamp for burnt out bulb.****Q: Is the check result normal?**

**YES :** Go to Step 3 .

**NO :** Check engine-ECU power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 [P.13A-239](#)).

---

**STEP 3: M.U.T.-II/III diagnosis code****Q: Diagnosis code set?**

**YES :** Inspection chart for diagnosis codes (Refer to [P.13A-15](#))

**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-247](#))

---

**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 start ability.**

- 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-326](#)).

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

**YES :** Clean throttle body (throttle valve portion) (Refer to [P.13A-315](#)).

**NO :** Check idle speed control servo system (Refer to code No. P0505 [P.13A-159](#)).

---

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

- Item 18: Cranking signal

**OK:**

**ON (Ignition switch: ST)**

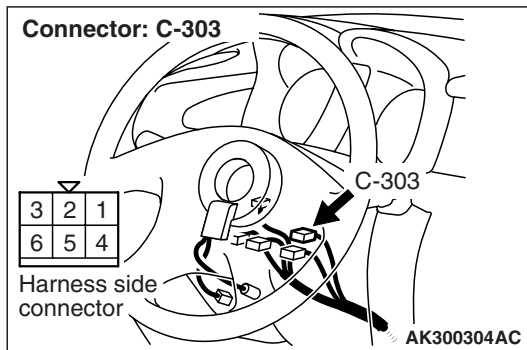
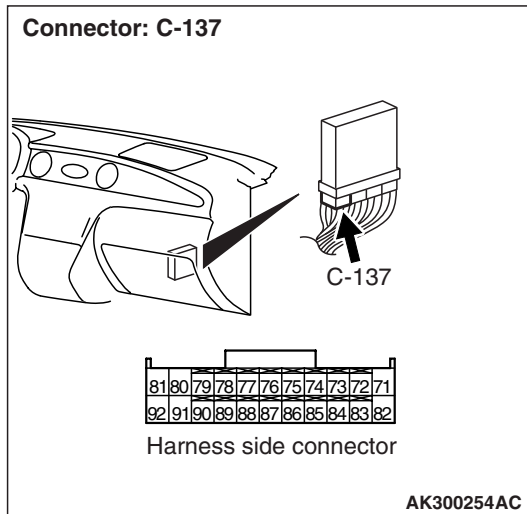
**OFF (Ignition switch: ON)**

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

**YES :** Go to Step 10 .

**NO :** Go to Step 9 .

**STEP 9: Connector check: C-137 engine-ECU connector**



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

**YES :** Check intermediate connectors B-19 and C-106, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-303 (terminal No. 5) ignition switch connector and C-137 (terminal No. 71) engine-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-293](#).
  - 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. P0335 [P.13A-124](#)).

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

- Check injector for operating sound (Refer to [P.13A-325](#)).

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

**YES :** Go to Step 12 .

**NO :** Check the injector system of the defective cylinder.

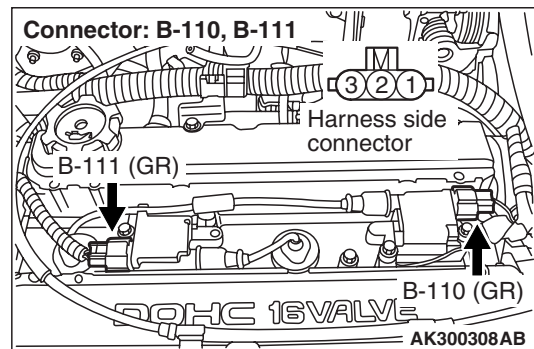
(Refer to Code No. P0201: No. 1 injector system [P.13A-87](#).)

(Refer to Code No. P0202: No. 2 injector system [P.13A-92](#).)

(Refer to Code No. P0203: No. 3 injector system [P.13A-97](#).)

(Refer to Code No. P0204: No. 4 injector system [P.13A-102](#).)

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



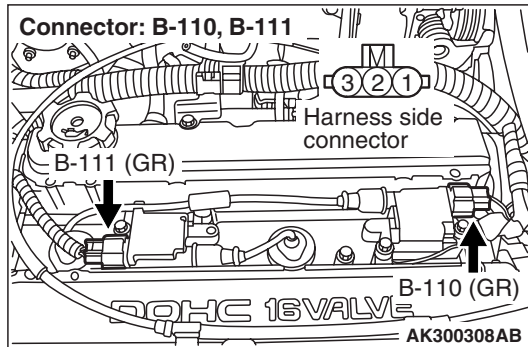
**Q: Is the check result normal?**

**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.

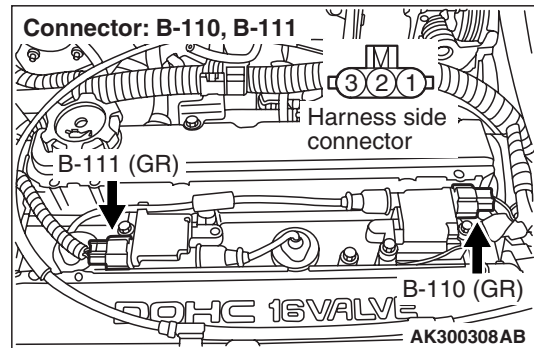
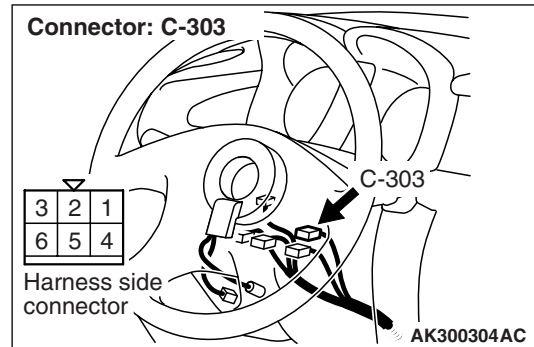
**OK: System voltage**

**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, C-116, 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) affected cylinders ignition coil connector.

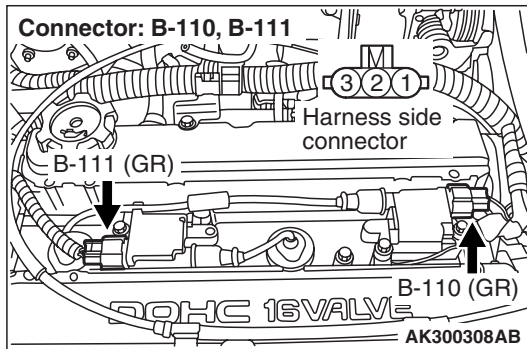
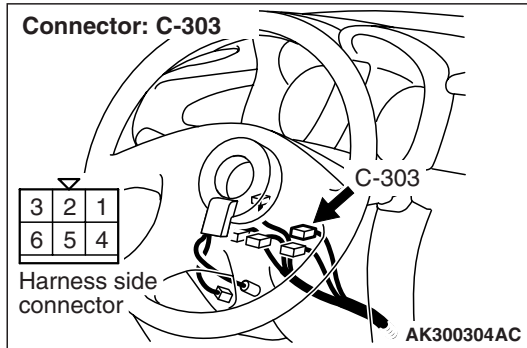
- Check power supply line for open/short circuit.

**NO :** Repair.

**STEP 15: Check harness between C-303 (terminal No. 2) ignition switch connector and (terminal No. 1) affected cylinders ignition coil connector.**

*NOTE: Before checking harness, check intermediate connectors A-14, C-116, 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 16 .

**NO :** Repair.

**STEP 16: Check ignition secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Go to Step 18 .

**NO :** Go to Step 17 .

**STEP 17: Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

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

**YES :** Go to Step 18 .

**NO :** Replace spark plug.

**STEP 18: Replace engine-ECU**

- After replacing the engine-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 7: Starting Impossible (Initial Combustion But no Complete Combustion), Improper Starting (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-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 54 – Battery – On-vehicle Service – Battery Test [P.54A-7](#)).

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

**Q: Diagnosis code set?**

**YES :** Inspection chart for diagnosis codes (Refer to [P.13A-15](#))

**NO :** Go to Step 4 .

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

- Refer to Data list reference table [P.13A-293](#).
  - 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-15](#)).

**STEP 5: Check start ability.**

- 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-326](#)).

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

**YES :** Clean throttle body (throttle valve portion) (Refer to [P.13A-315](#)).

**NO :** Check idle speed control servo system (Refer to Code No. P0505 [P.13A-159](#)).

**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-247](#)).

**STEP 8: Check air intake from intake hose and inlet 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-325](#)).

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

**YES :** Go to Step 10 .

**NO :** Check the injector system of the defective cylinder.

(Refer to Code No. P0201: No.1 injector system [P.13A-87.](#))

(Refer to Code No. P0202: No.2 injector system [P.13A-92.](#))

(Refer to Code No. P0203: No.3 injector system [P.13A-97.](#))

(Refer to Code No. P0204: No.4 injector system [P.13A-102.](#))

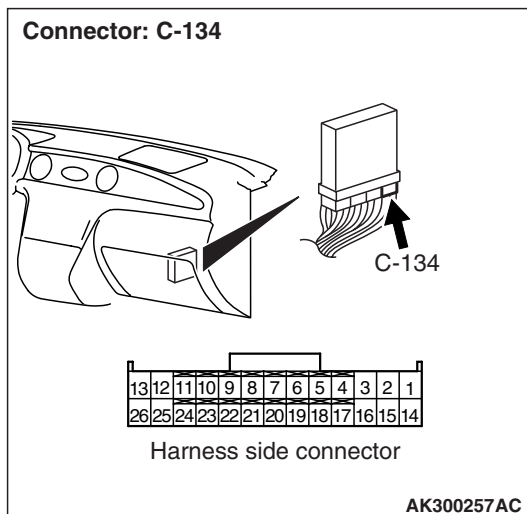
**STEP 10. Check timing marks of timing belt.**

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

**YES :** Go to Step 11 .

**NO :** Align timing marks.

**STEP 11: Perform voltage measurement at C-134 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 13 and earth, also between terminal No. 26 and earth.

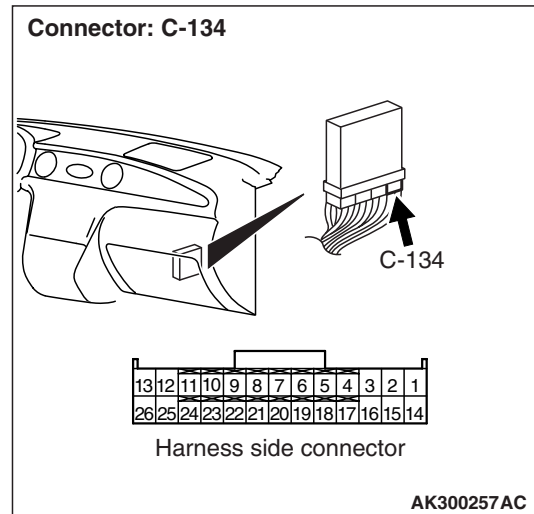
**OK: 0.5 V or less**

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

**YES :** Go to Step 13 .

**NO :** Go to Step 12 .

**STEP 12: Connector check: C-134 engine-ECU connector**



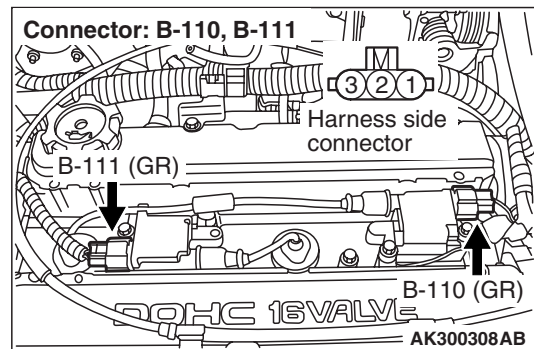
**Q: Is the check result normal?**

**YES :** Check and repair harness between C-134 (terminal No. 13 and No. 26) engine-ECU connector and body earth.

- Check earthing line for open circuit and damage.

**NO :** Repair.

**STEP 13: Connector check: B110 and B-111 ignition coil connectors**



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

**YES :** Go to Step 14 .

**NO :** Repair.

**STEP 14: Check ignition secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Go to Step 19 .

**NO :** Go to Step 15 .

**STEP 15: Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

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

**YES :** Go to Step 16 .

**NO :** Replace spark plug.

**STEP 16: Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

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

**YES :** Go to Step 17 .

**NO :** Replace spark plug cable.

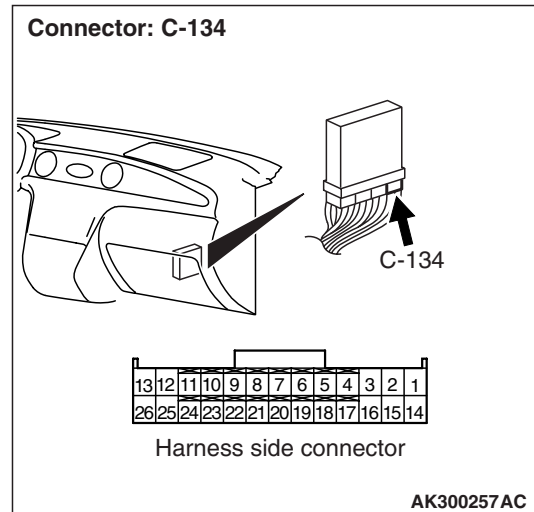
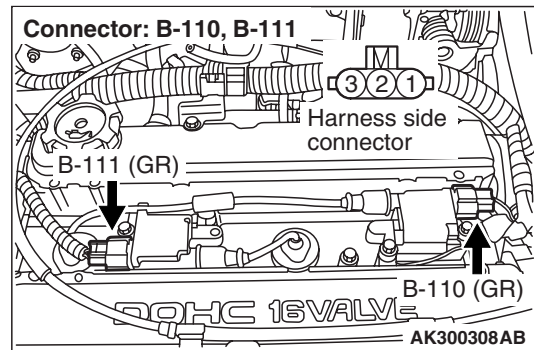
**STEP 17: Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

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

**YES :** Go to Step 18 .

**NO :** Replace ignition coil.

**STEP 18: 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-134 engine-ECU connector.

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

**NO :** Repair.

**STEP 19: Check spray condition of injector.**

- Check each injector for spray condition (Refer to [P.13A-325](#)).

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

**YES :** Go to Step 20 .

**NO :** Replace injector.

**STEP 20: Check compression pressure.**

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service [P.11A-13](#)).

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

**YES :** Go to Step 21 .

**NO :** Repair.

---

**STEP 21: 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.17-72](#)].

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

**YES :** Go to Step 22 .

**NO :** Replace EGR control solenoid valve.

---

**STEP 22: Check EGR valve itself.**

- Check EGR valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-71](#)].

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

**YES :** Go to Step 23 .

**NO :** Replace EGR valve.

---

**STEP 23: Replace engine-ECU.**

- After replacing the engine-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-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-15](#)).

**NO :** Go to Step 3 .

---

**STEP 3: M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).
  - 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-15](#)).

---

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

- Refer to Data list reference table [P.13A-293](#).
  - a. Item 27: Power steering fluid pressure switch

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

**YES :** Go to Step 5 .

**NO :** Check power steering fluid pressure switch system (Refer to Code No. P0551 [P.13A-164](#)).



**STEP 5: Check idle speed control servo for operating sound.**

- Check idle speed control servo for operating sound (Refer to P.13A-326).

**Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Check idle speed control servo system (Refer to Code No. P505 P.13A-159).**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-315).**STEP 7: Check air intake from intake hose and inlet 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-325).

**Q: Can operating sound be heard?****YES :** Go to Step 9 .**NO :** Check the injector system of the defective cylinder.

(Refer to Code No. P0201: No. 1 injector system P.13A-87.)

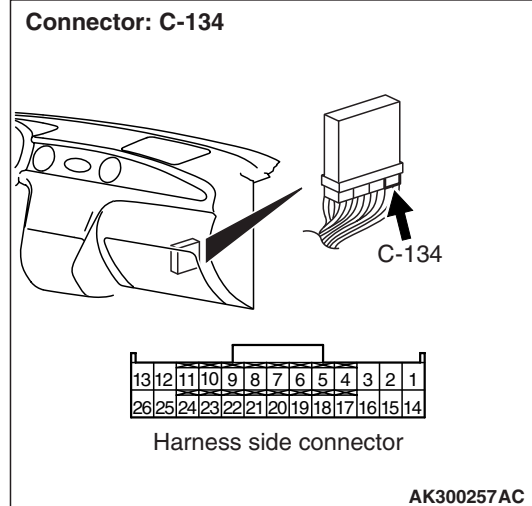
(Refer to Code No. P0202: No. 2 injector system P.13A-92.)

(Refer to Code No. P0203: No. 3 injector system P.13A-97.)

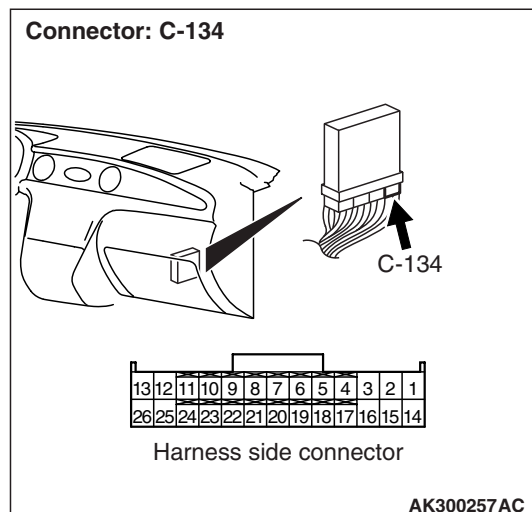
(Refer to Code No. P0204: No. 4 injector system P.13A-102.)

**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-293.
  - Item 11: Oxygen sensor (front)

**Q: Is the check result normal?****YES :** Go to Step 11 .**NO :** Check oxygen sensor (front) system (Refer to Code No. P0130 P.13A-61).**STEP 11: Perform voltage measurement at C-134 engine-ECU connector.**

- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 13 and earth, also between terminal No. 26 and earth.

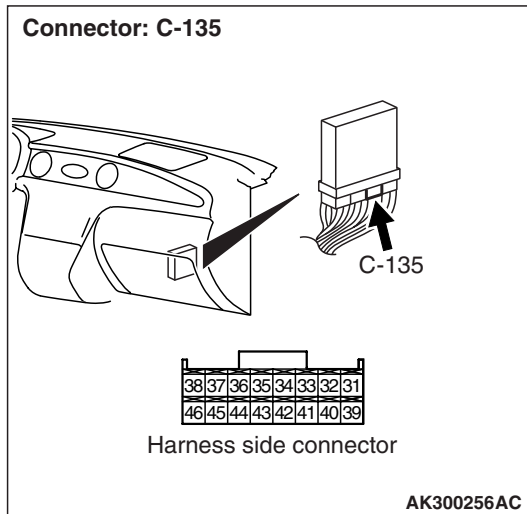
**OK: 0.5 V or less****Q: Is the check result normal?****YES :** Go to Step 13 .**NO :** Go to Step 12 .**STEP 12: Connector check: C-134 engine-ECU connector****Q: Is the check result normal?****YES :** Check and repair harness between C-134 (terminal No. 13 and No. 26) engine-ECU connector and body earth.

- Check earthing line for open circuit and damage.

**NO :** Repair.



**STEP 13. Perform voltage measurement at C-135 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral
- Radiator fan: Not operating
- Voltage between terminal No. 33 and earth.

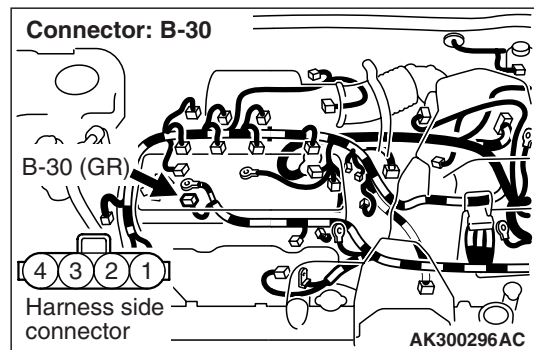
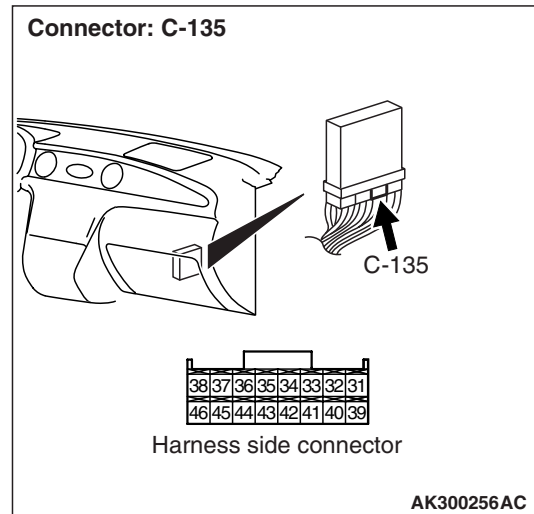
**OK: Switching the headlamps to ON from OFF causes the voltage to increase by 0.2 – 3.5 V.**

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

**YES :** Go to Step 16 .

**NO :** Go to Step 14 .

**STEP 14. Connector check: C-135 engine-ECU connector and B-30 alternator connector**

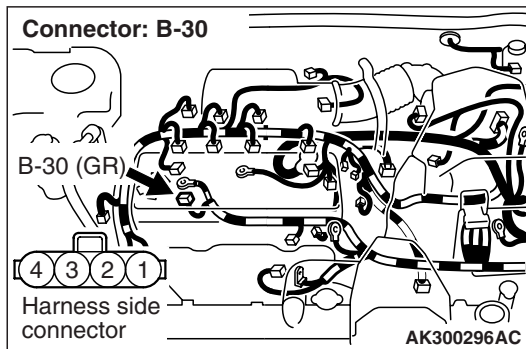
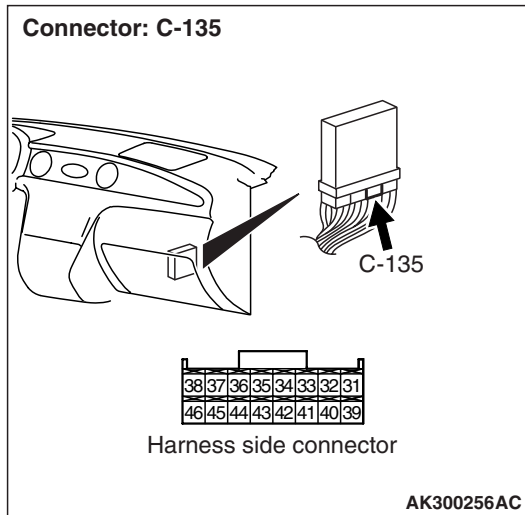


**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Repair.

**STEP 15. Check harness between C-135 (terminal No. 33) engine-ECU connector and B-30 (terminal No. 1) alternator connector.**



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

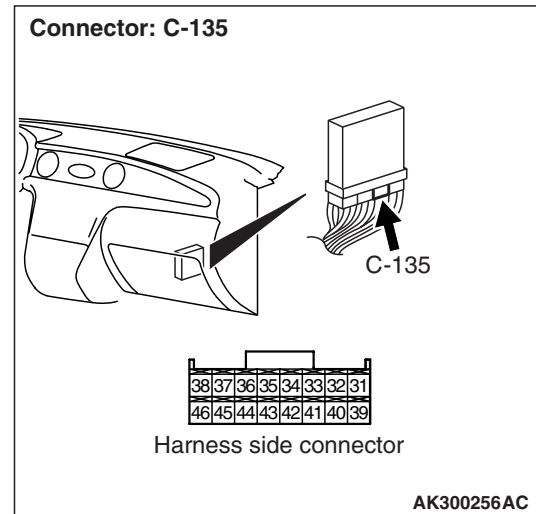
- Check output line for open/short circuit and damage.

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

**YES :** Go to Step 16 .

**NO :** Repair.

**STEP 16. Perform voltage measurement at C-135 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral
- Radiator fan: Not operating
- Voltage between terminal No. 33 and earth.

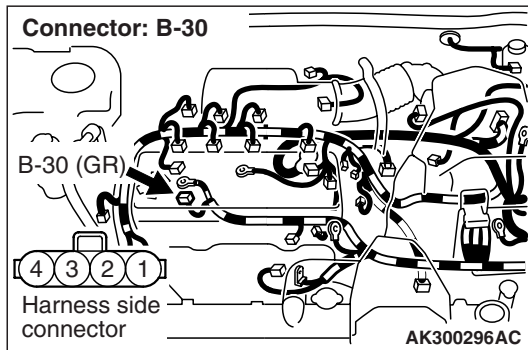
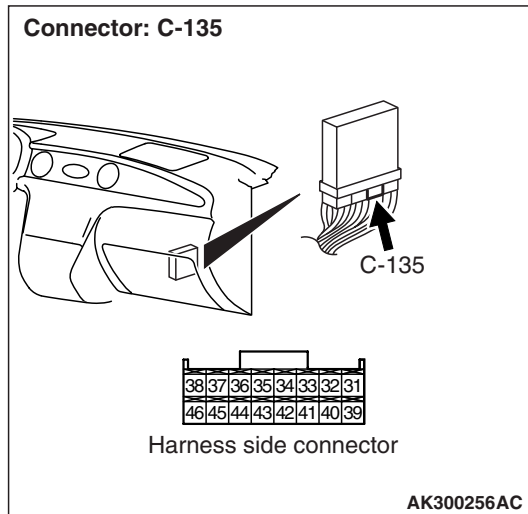
**OK: Switching the headlamps to ON from OFF causes the voltage to fall.**

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

**YES :** Go to Step 20 .

**NO :** Go to Step 17 .

**STEP 17. Connector check: C-135 engine-ECU connector and B-30 alternator connector**

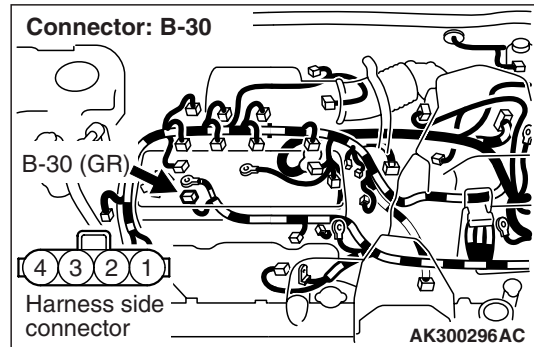
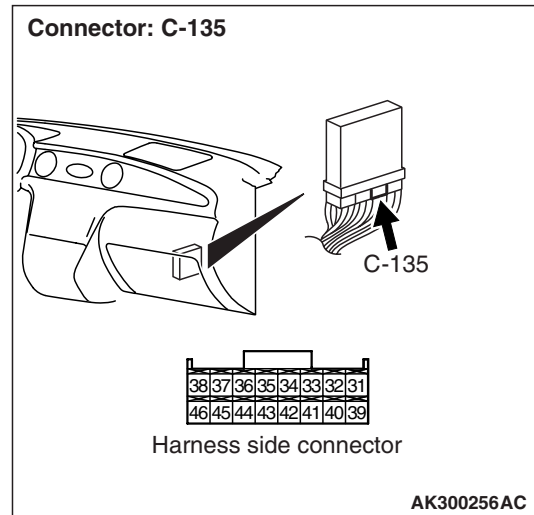


**Q: Is the check result normal?**

**YES :** Go to Step 18 .

**NO :** Repair.

**STEP 18. Check harness between C-135 (terminal No. 41) engine-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 19 .

**NO :** Repair.

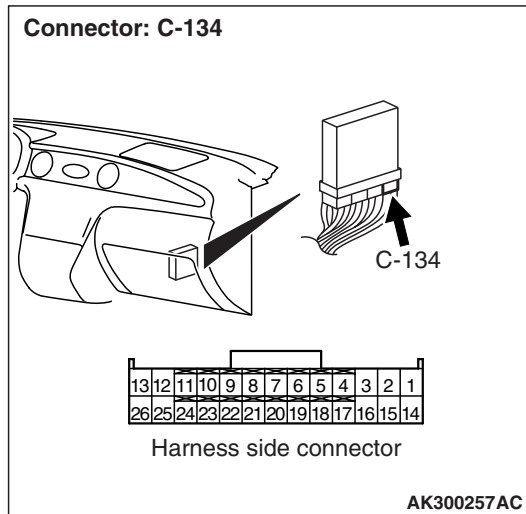
**STEP 19. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace alternator.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**STEP 20. Perform voltage measurement at C-134 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Engine: Idling
- A/C switch: ON (A/C compressor ON)
- Voltage between terminal No. 24 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)**

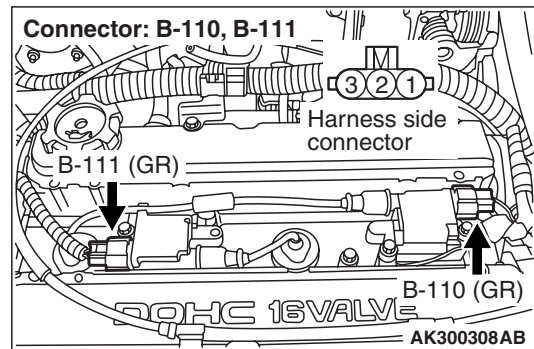
**System voltage (with A/C set for minimum air flow at room temperature)**

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

**YES :** Go to Step 21 .

**NO :** Check A/C load signal system (Refer to Inspection Procedure 28 [P.13A-273](#)).

**STEP 21. Connector check: B-110 and B-111 ignition coil connectors**



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

**YES :** Go to Step 22 .

**NO :** Repair.

**STEP 22. Check ignition secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Go to Step 27 .

**NO :** Go to Step 23 .

**STEP 23. Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

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

**YES :** Go to Step 24 .

**NO :** Replace spark plug.

**STEP 24. Check individual spark plug cable**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

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

**YES :** Go to Step 25 .

**NO :** Replace spark plug cable.

**STEP 25. Check ignition coil itself.**

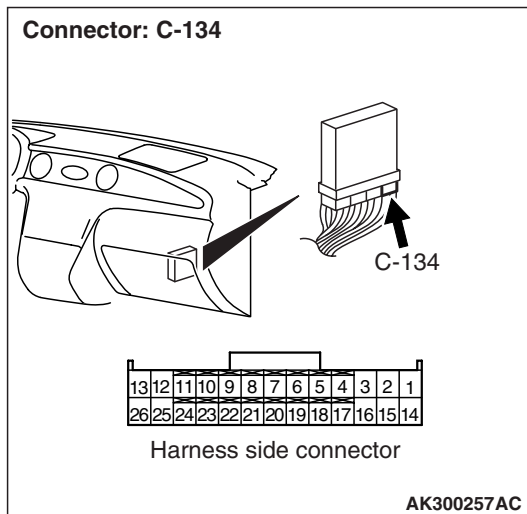
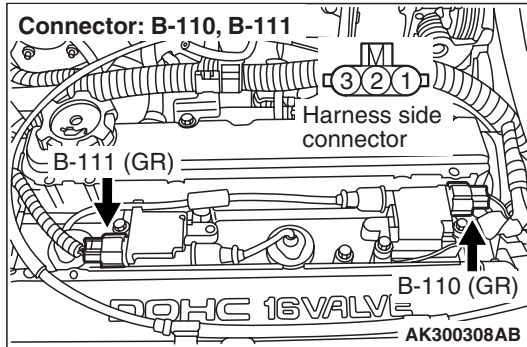
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

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

**YES :** Go to Step 26 .

**NO :** Replace ignition coil.

**STEP 26. 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-134 engine-ECU

- Check signal line for open/short and damage.

**NO :** Repair.

**STEP 27. Check injector for spray condition.**

- Check each injector for spray condition (Refer to [P.13A-325](#)).

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

**YES :** Go to Step 28 .

**NO :** Replace injector.

**STEP 28. Check compression pressure.**

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service [P.11A-13](#)).

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

**YES :** Go to Step 29 .

**NO :** Repair.

**STEP 29. Check purge control solenoid valve itself.**

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System [P.17-65](#))

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

**YES :** Go to Step 30 .

**NO :** Replace purge control solenoid valve.

**STEP 30. 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.17-72](#)].

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

**YES :** Go to Step 31 .

**NO :** Replace EGR control solenoid valve.

**STEP 31. 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.17-71](#)].

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

**YES :** Go to Step 32 .

**NO :** Replace EGR valve.

**STEP 32. 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 33 .

**NO :** Check fuel pump system (Refer to inspection Procedure 24 [P.13A-247](#)).

**STEP 33. Replace engine-ECU.**

- After engine-ECU is replaced, re-check for trouble symptom.

**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 mis-fire 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-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-15](#)).

**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.17-72](#)].

**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.17-71](#)].

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

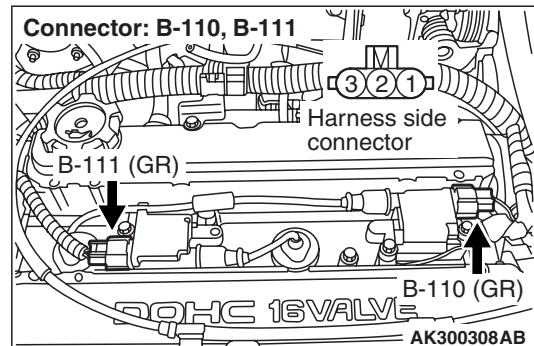
**YES** : Go to Step 4 .

**NO** : Replace EGR valve.

**STEP 4. Check air intake from intake hose and inlet 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 secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES** : Replace engine-ECU.

**NO** : Go to Step 7 .

**STEP 7. Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

**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.16-40](#)).

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

**YES** : Go to Step 9 .

**NO** : Replace spark plug cable.

**STEP 9. Check ignition coil itself.**

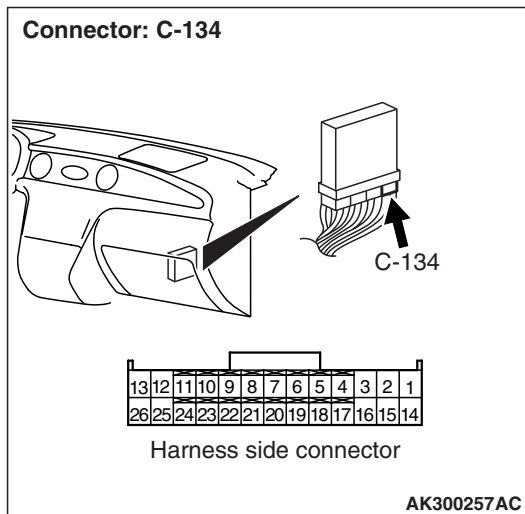
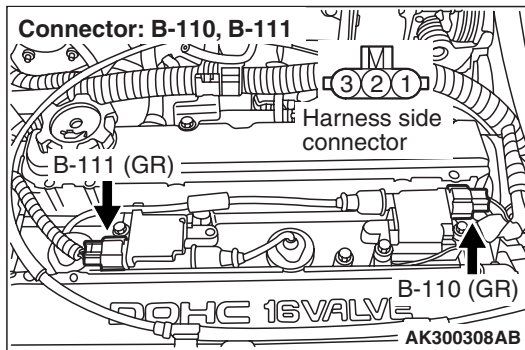
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

**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-134 engine-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-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-15](#)).
- NO** : Go to Step 2 .

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

- Refer to Data list reference table [P.13A-293](#).
  - 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. P0120 [P.13A-49](#)).

**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 idle speed control servo system (Refer to Code No. P0505 [P.13A-159](#)).

**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.17-72](#)].

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

- YES** : Go to Step 5 .
- NO** : Replace EGR control solenoid valve.

**STEP 5. Check EGR valve itself.**

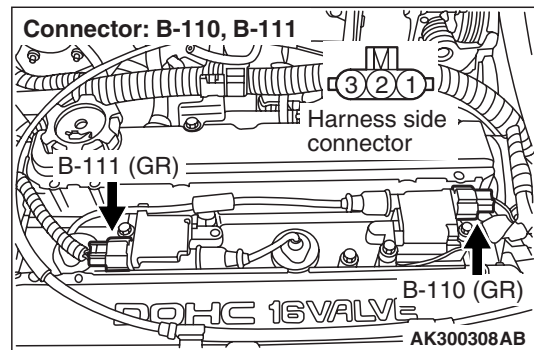
- Check EGR valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-71](#)].

**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-315](#)).

**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 secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

- YES** : Replace engine-ECU.
- NO** : Go to Step 9 .

**STEP 9. Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

**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.16-40).

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

**YES :** Go to Step 11 .

**NO :** Replace spark plug cable.

**STEP 11. Check ignition coil itself.**

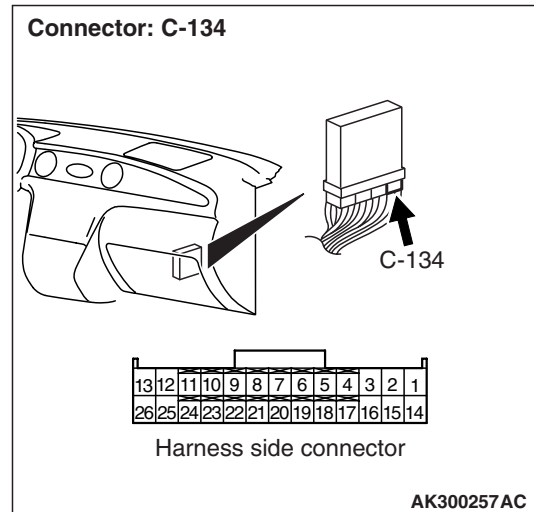
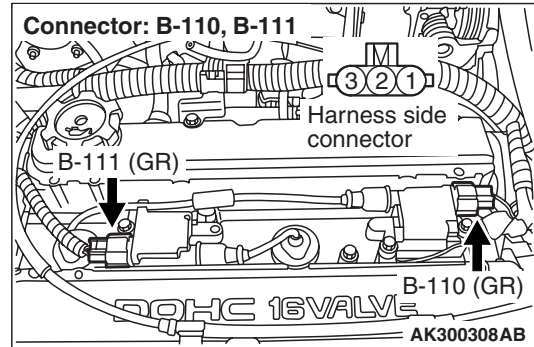
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-38).

**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-134 engine-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-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-15](#)).

**NO** : Go to Step 2 .

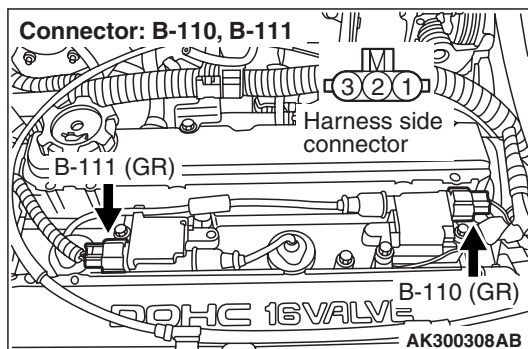
---

**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 secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES** : Go to Step 9 .

**NO** : Go to Step 5 .

---

**STEP 5. Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

**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.16-40](#)).

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

**YES** : Go to Step 7 .

**NO** : Replace spark plug cable.

---

**STEP 7. Check ignition coil itself.**

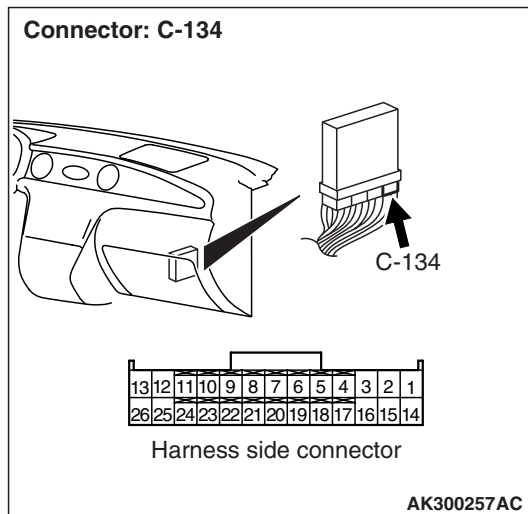
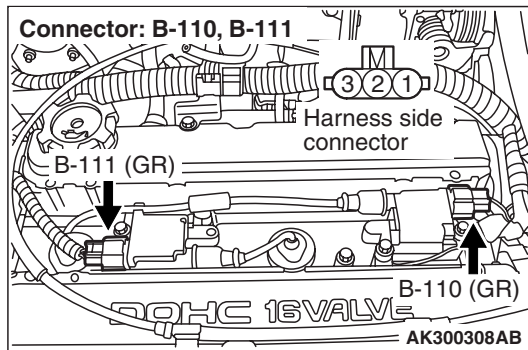
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

**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.**



- 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-134 engine-ECU.

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

**NO :** Repair.

**STEP 9. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to [P.13A-316](#)).

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

**YES :** Replace engine-ECU.

**NO :** Repair.

---

Inspection Procedure 12: Hesitation, sag, poor acceleration, stumble, 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-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-15](#)).

**NO** : Go to Step 2 .

---

**STEP 2. Check injector for operating sound.**

- Check injector for operating sound (Refer to [P.13A-325](#)).

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

**YES** : Go to Step 3 .

**NO** : Check the injector system of the defective cylinder.

(Refer to code No. P0201: No. 1 injector system [P.13A-87](#)).

(Refer to code No. P0202: No. 2 injector system [P.13A-92](#)).

(Refer to code No. P0203: No. 3 injector system [P.13A-97](#)).

(Refer to code No. P0204: No. 4 injector system [P.13A-102](#)).

---

**STEP 3. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).
  - 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-15](#)).

---

**STEP 4. Check purge control solenoid valve itself.**

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System [P.17-65](#)).

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

**YES** : Go to Step 5 .

**NO** : Replace purge control solenoid valve.

---

**STEP 5. 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.17-72](#)].

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

**YES** : Go to Step 6 .

**NO** : Replace EGR control solenoid valve.

---

**STEP 6. Check EGR valve itself.**

- Check EGR itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-71](#)].

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

**YES** : Go to Step 7 .

**NO** : Replace EGR valve.

---

**STEP 7. M.U.T.-II/III data list**

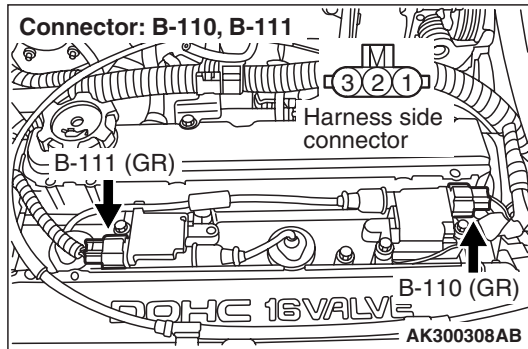
- Refer to Data list reference table [P.13A-293](#).
  - a. Item 11: Oxygen sensor (front)

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

**YES** : Go to Step 8 .

**NO** : Check oxygen sensor system (Refer to Code No. P0130 [P.13A-61](#)).

**STEP 8. Connector check: B-110 and B-111  
ignition coil connectors**



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

**YES :** Go to Step 9 .

**NO :** Repair.

**STEP 9. Check ignition secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Go to Step 14 .

**NO :** Go to Step 10 .

**STEP 10. Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

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

**YES :** Go to Step 11 .

**NO :** Replace spark plug.

**STEP 11. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

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

**YES :** Go to Step 12 .

**NO :** Replace spark plug cable.

**STEP 12. Check ignition coil itself.**

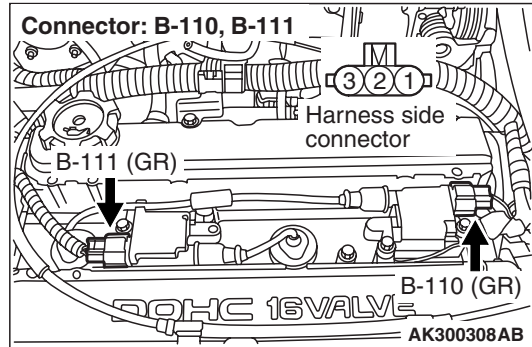
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

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

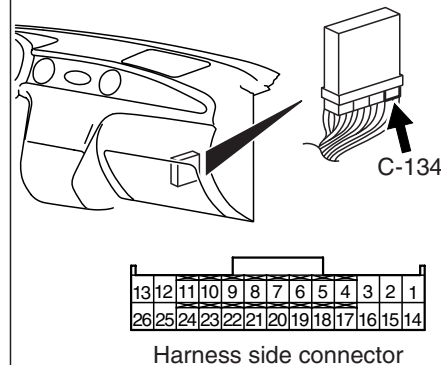
**YES :** Go to Step 13 .

**NO :** Replace ignition coil.

**STEP 13. Check harness between terminal No. 2 of ignition coil connector of each cylinder and body earth.**



**Connector: C-134**



AK300257AC

- 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-134 engine-ECU

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

**NO :** Repair.

**STEP 14. Check throttle body (throttle valve portion) for contamination.**

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

**YES :** Go to Step 15 .

**NO :** Clean throttle body (throttle valve portion) (Refer to [P.13A-315](#)).

**STEP 15. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to [P.13A-316](#)).

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

**YES :** Go to Step 16 .

**NO :** Repair.



**STEP 16. Check compression pressure.**

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service [P.11A-13](#)).

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

**YES :** Replace engine-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**

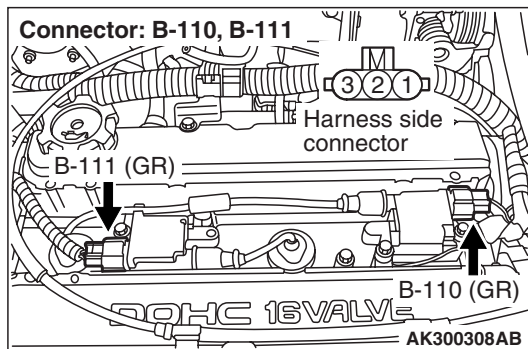
- Failed ignition system
- Failed engine-ECU

**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-15](#)).

**NO :** Go to Step 2 .

**STEP 2. Check connector: 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 secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Replace engine-ECU.

**NO :** Go to Step 4 .

**STEP 4. Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

**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.16-40](#)).

**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.16-38](#)).

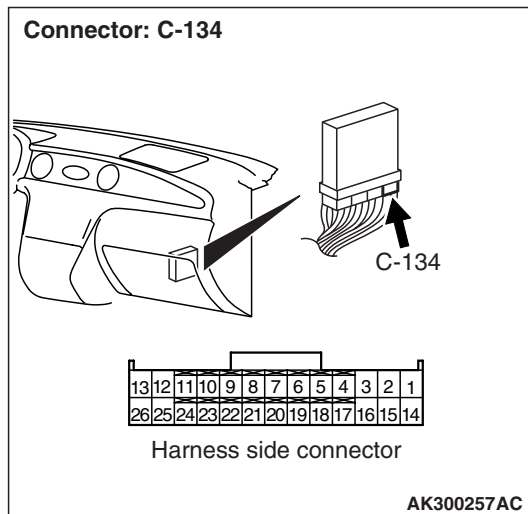
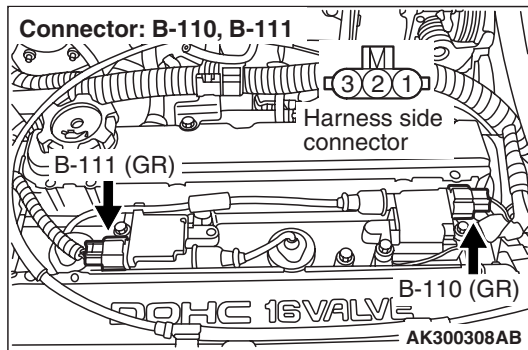
**Q: Is the check result normal?**

**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.**



- Check earthing line for open circuit and damage.

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

**YES :** Check and repair harness between terminal 3 of ignition coil connector of each cylinder and C-134 engine-ECU

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

**NO :** Repair.

**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-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-15](#)).

**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-326](#)).

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

**YES** : Go to Step 3 .

**NO** : Check idle speed control servo system (Refer to Code No. P0505 [P.13A-159](#)).

**STEP 3. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).  
a. Item 14: Throttle position sensor

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

**YES** : Go to Step 4 .

**NO** : Check throttle position sensor system (Refer to Code No. P0120 [P.13A-49](#)).

**STEP 4. Check throttle body (throttle valve portion) for contamination.****Q: Is the check result normal?**

**YES** : Replace engine-ECU.

**NO** : Clean throttle body (throttle valve portion) (Refer to [P.13A-315](#)).

**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.

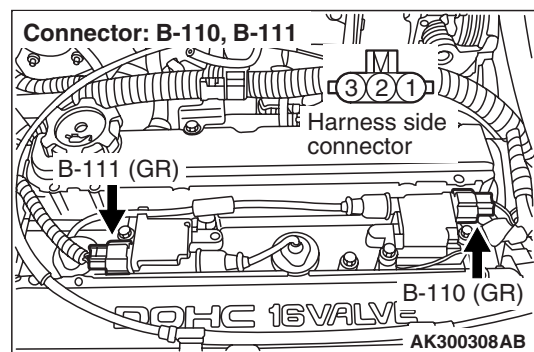
**PROBABLE CAUSE**

- Defective detonation sensor
- Failed detonation control system
- Failed ignition system
- Defective spark plug
- Failed engine-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-15](#)).

**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 secondary voltage waveform using an oscilloscope.**

- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

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

**YES :** Check detonation sensor (Refer to Code No. P0325 [P.13A-121](#)).

**NO :** Go to Step 4 .

**STEP 4. Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

**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.16-40](#)).

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

**YES :** Go to Step 6 .

**NO :** Replace spark plug cable.

**STEP 6. Check ignition coil itself.**

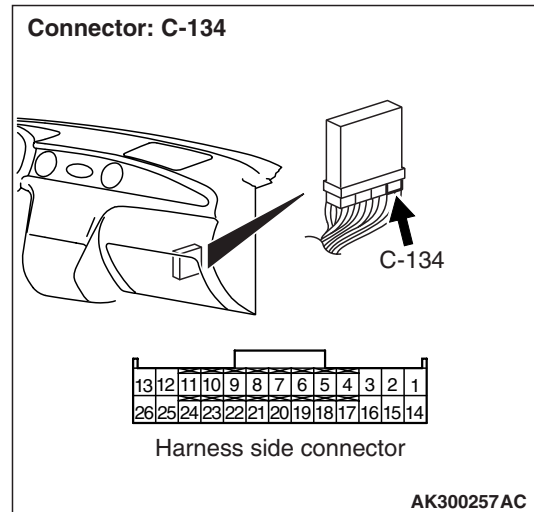
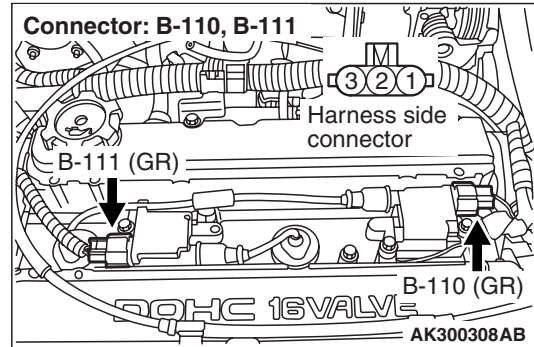
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

**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.**



- Check earthing line for open circuit and damage.

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

**YES :** Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-134 engine-ECU connector.

- Check signal line for open circuit, short circuit and damage.

**NO :** Repair.

**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-ECU

**DIAGNOSIS PROCEDURE**

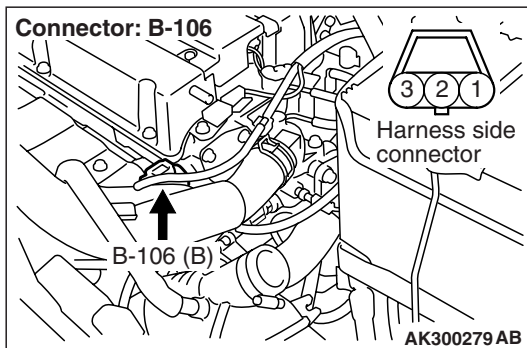
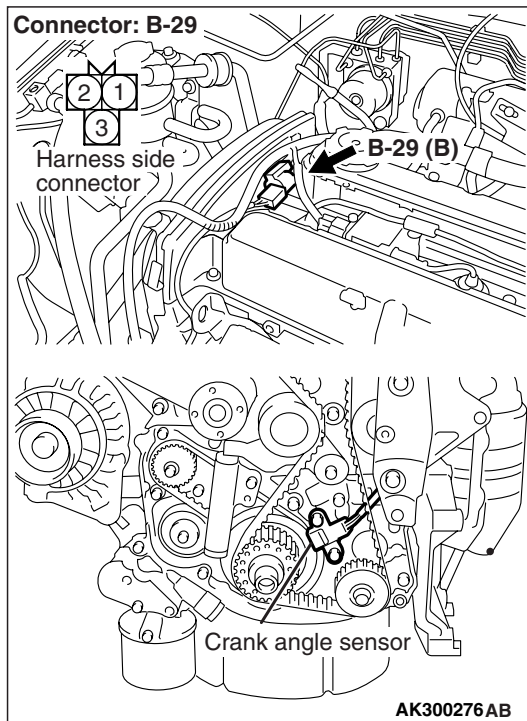
**STEP 1. M.U.T.-II/III diagnosis code**

**Q: Diagnosis code set?**

**YES :** Inspection chart for diagnosis code (Refer to [P.13A-15](#)).

**NO :** Go to Step 2 .

**STEP 2. Perform output wave pattern measurement of crank angle sensor and camshaft position sensor (Using an oscilloscope).**



#### Crank Angle Sensor

- Use special tool test harness (MB998478) to connect B-29 crank angle sensor connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 2 and earth.

#### Camshaft Position Sensor

- Use special tool test harness (MD991709) to connect B-106 camshaft position sensor connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral

- Voltage between terminal No. 2 and earth.

**OK:** Output waveform timings of both sensors are the same as the check procedure (Refer to [P.13A-305](#)) 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-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

#### 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-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**Inspection Procedure 17: Run on (Dieseling)**

**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by leakage from injector.

**PROBABLE CAUSE**

- Failed injector
- Failed engine-ECU

**DIAGNOSIS PROCEDURE**

**STEP 1. Check injector for spray condition.**

- Check each injector for spray condition (Refer to [P.13A-325](#)).

**Q: Does trouble symptom persist?**

**YES :** Replace engine-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**

- Incorrect air/fuel ratio
- Failed ignition system
- Failed fuel system
- Failed intake and exhaust system
- Failed emission control system
- Failed compression pressure
- Failed catalytic converter
- Failed engine-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-15](#)).

**NO :** Go to Step 2 .

**STEP 2. Check injector for operating sound.**

- Check injector for operating sound (Refer to [P.13A-325](#)).

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

**YES :** Go to Step 3 .

**NO :** Check the injector system of the defective cylinder.

(Refer to [P.13A-87](#), Code P0201: No. 1 injector System)

(Refer to [P.13A-92](#), Code P0202: No. 2 injector System)

(Refer to [P.13A-97](#), Code P0203: No. 3 injector System)

(Refer to [P.13A-102](#), Code P0204: No. 4 injector System)

**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-225](#)).

**STEP 4. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13A-293](#).
  - 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-15](#)).

**STEP 5. Check air intake from intake hose and inlet 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-315](#)).

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

- Refer to Data list reference table [P.13A-293](#).
  - a. Item 11: Oxygen sensor (front)

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

**YES** : Go to Step 9 .

**NO** : Check oxygen sensor (front) system (Refer to Code No. P0130 [P.13A-61](#)).

**STEP 9. Check Purge control solenoid valve itself.**

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System [P.17-65](#)).

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

**YES** : Go to Step 10 .

**NO** : Replace purge control solenoid valve.

**STEP 10. 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.17-72](#)].

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

**YES** : Go to Step 11 .

**NO** : Replace EGR control solenoid valve.

**STEP 11. Check EGR valve itself.**

- Check EGR valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-71](#)].

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

**YES** : Go to Step 12 .

**NO** : Replace EGR valve.

**STEP 12. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to [P.13A-316](#)).

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

**YES** : Go to Step 13 .

**NO** : Repair.

**STEP 13. Check positive crankcase ventilation valve itself.**

- Check positive crankcase ventilation valve itself (Refer to GROUP 17 – Emission Control System – crankcase Emission Control System [P.17-60](#)).

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

**YES** : Go to Step 14 .

**NO** : Replace positive crankcase ventilation valve.

**STEP 14. Check spark plug.**

- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

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

**YES** : Go to Step 15 .

**NO** : Replace spark plug.

**STEP 15. Check spark plug cable itself.**

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

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

**YES** : Go to Step 16 .

**NO** : Replace spark plug cable.



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**STEP 16. Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

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

**YES :** Go to Step 17 .

**NO :** Replace ignition coil.

---

**STEP 17. Check compression pressure.**

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service [P.11A-13](#)).

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

**YES :** Go to Step 18 .

**NO :** Repair.

---

**STEP 18. Check injector for spray condition.**

- Check each injector for spray condition (Refer to [P.13A-325](#)).

**Q: Does trouble symptom persist?**

**YES :** Go to Step 19 .

**NO :** Replace injector.

---

**STEP 19. Replace catalytic converter.**

- After replacing the catalytic converter, re-check the trouble symptoms.

**Q: Does trouble symptom persist?**

**YES :** Replace engine-ECU.

**NO :** Check end

---

**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-ECU

**DIAGNOSIS PROCEDURE**

---

**STEP 1. Check battery voltage.**

- Measure battery voltage during cranking.

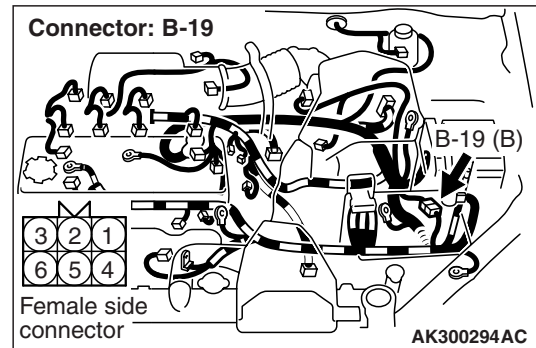
**OK: 8 V or more**

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

**YES :** Go to Step 2 .

**NO :** Check battery (Refer to GROUP 54 – Battery – On-vehicle Service – Battery test [P.54A-7](#)).

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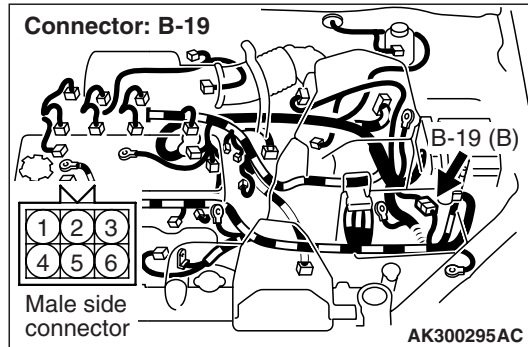
**STEP 2. Connector check: B-19 intermediate connector**

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

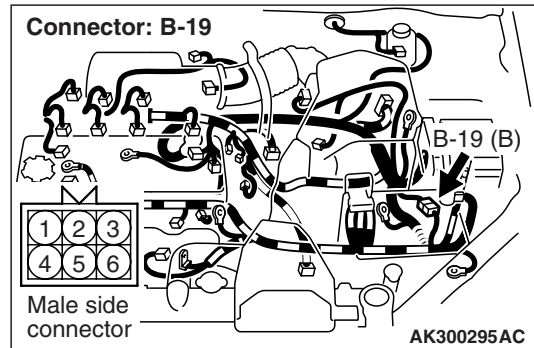
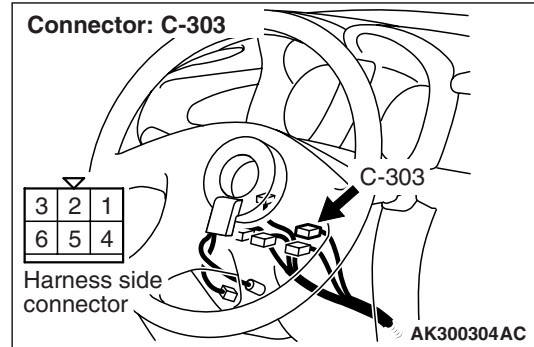
**YES :** Go to Step 3 .

**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.

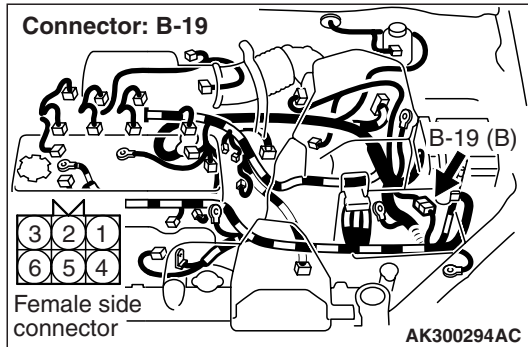
**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 5 .**NO :** Go to Step 4 .**STEP 4. Connector check: C-303 ignition switch connector****Q: Is the check result normal?**

**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.

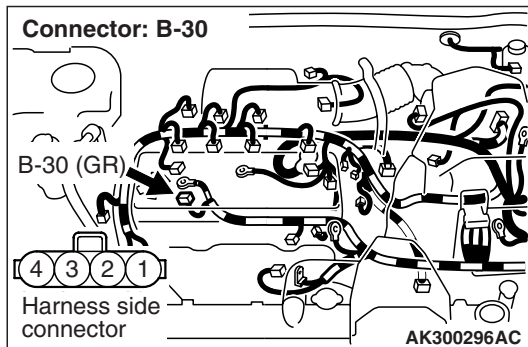
**OK: System voltage**

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

**YES :** Go to Step 10 .

**NO :** Go to Step 6 .

**STEP 6. Connector check: B-30 alternator connector**

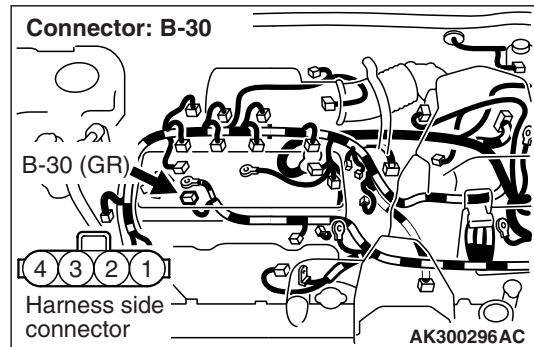
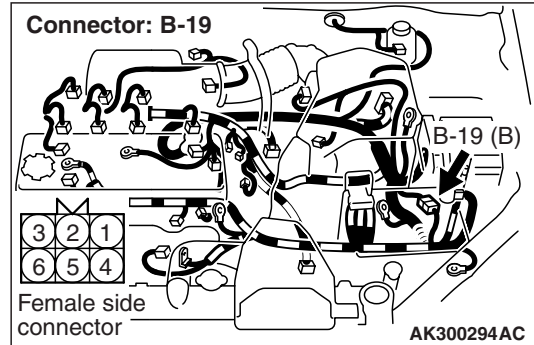


**Q: Is the check result normal?**

**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.**



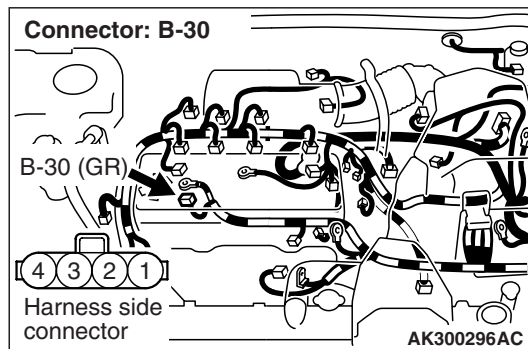
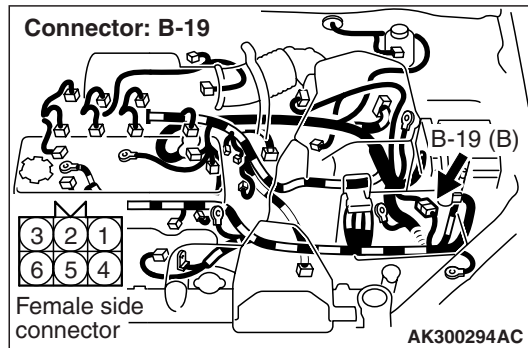
- Check output line for short circuit.

**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.**



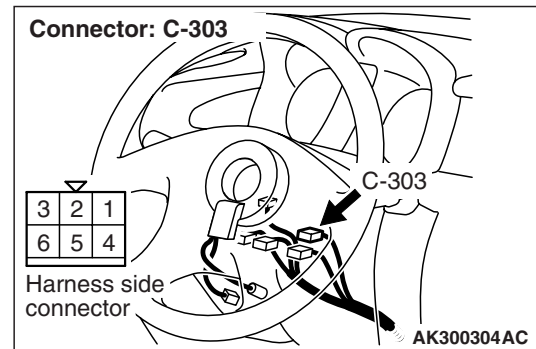
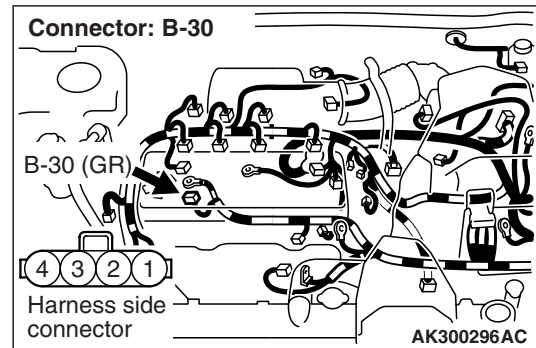
- Check power supply line for open/short circuit.

**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.

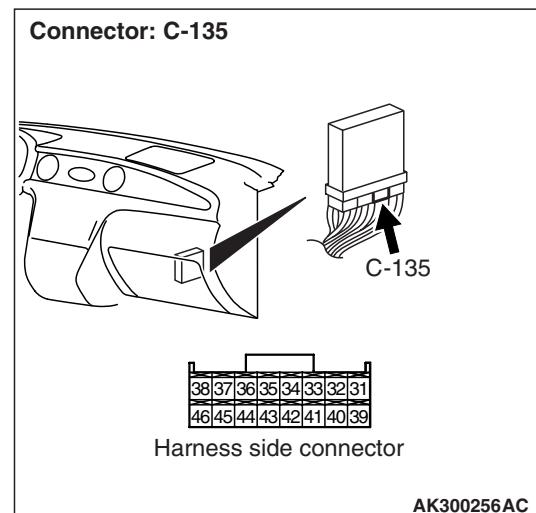
- Check power supply line for damage.

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

**YES :** Replace alternator.

**NO :** Repair.

**STEP 10. Connector check: C-135 engine-ECU connector**

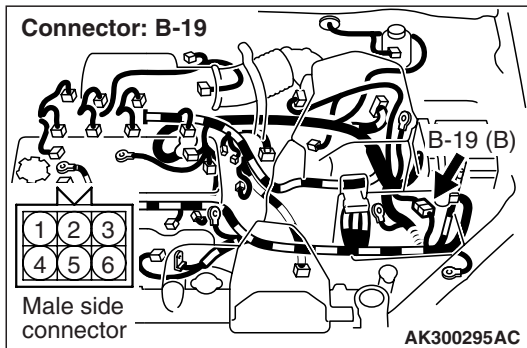
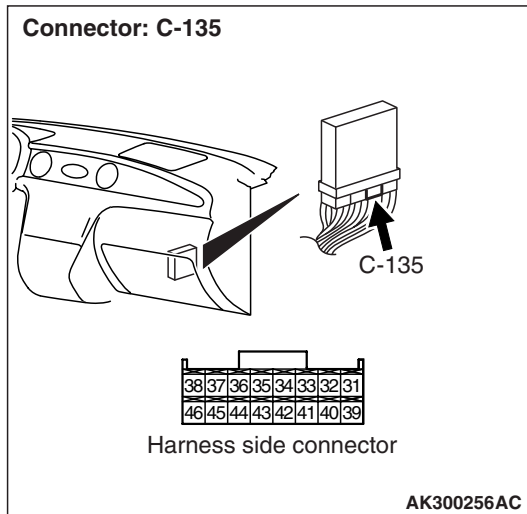


**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. Perform voltage measurement at C-135 engine-ECU connector.**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 33 and earth.

**OK: System voltage**

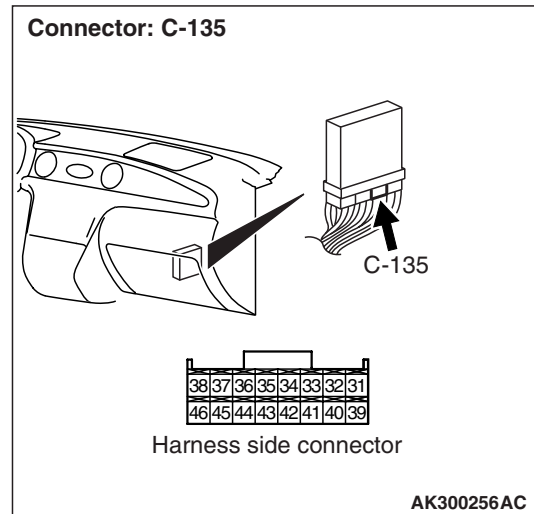
**Q: Is the check result normal?**

**YES :** Go to Step 12 .

**NO :** Check and repair harness between B-19 (terminal No. 4) intermediate connector and C-135 (terminal No. 33) engine-ECU connector.

- Check output line for short circuit.

**STEP 12. Perform voltage measurement at C-135 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral
- Radiator fan: Inactive
- Voltage between terminal No. 33 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.

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

**Q: Does trouble symptom persist?**

**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

---

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-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-15](#)).

**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.14-17](#)).

**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-256](#)).

---

**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. P0115 [P.13A-42](#)).

---

**STEP 5. Check thermostat.**

- Check thermostat (Refer to GROUP 14 – Thermostat [P.14-24](#)).

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

**YES** : Go to Step 6 .

**NO** : Replace thermostat.

---

**STEP 6. Check water pump.**

- Check water pump.

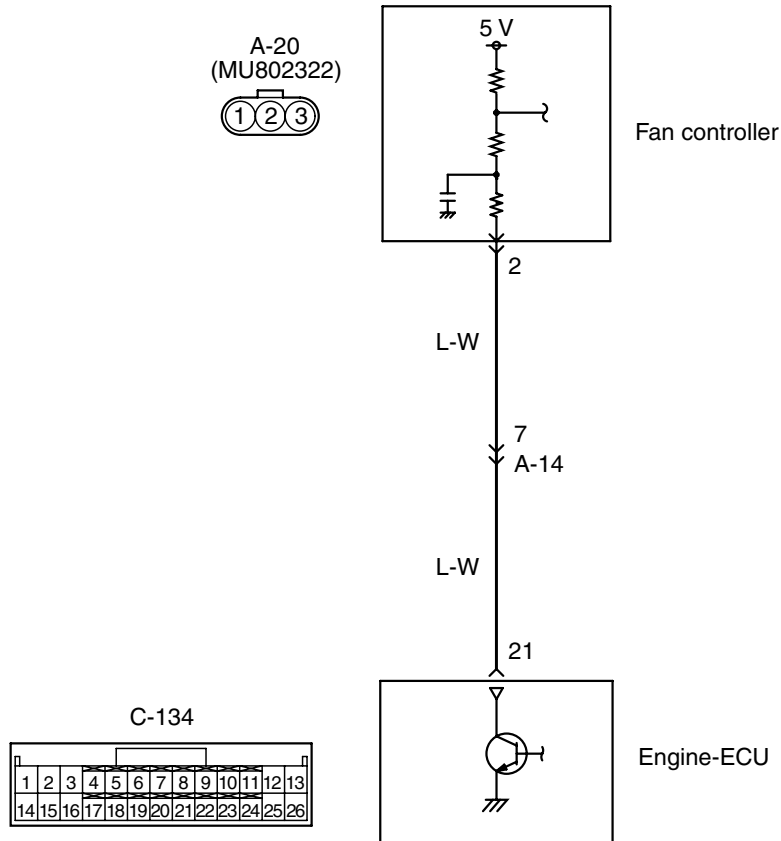
**Q: Is the check result normal?**

**YES** : Replace radiator.

**NO** : Replace water pump.

**Inspection Procedure 21: Abnormal Rotation of Fan Motor**

**Fan controller (Radiator fan, A/C condensor fan) Circuit**



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V:Violet

AK300309 AB

**OPERATION**

- The control (duty) signal is inputted to the fan controller (terminal No. 2) from the engine-ECU (terminal No. 21).

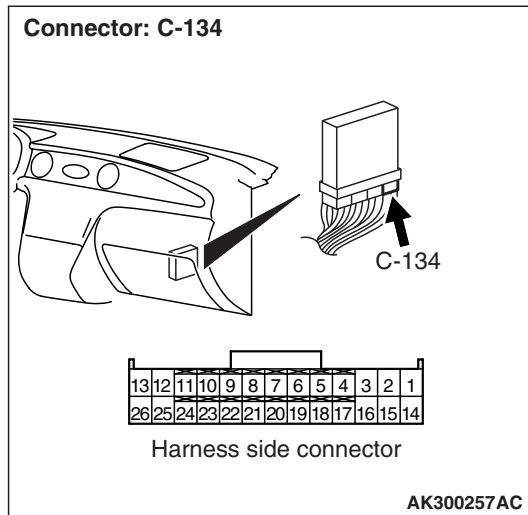
**FUNCTION**

- The engine-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 5V).

**PROBABLE CAUSE**

- Failed fan controller
- Open/short circuit in fan controller circuit or loose connector contact
- Failed engine-ECU

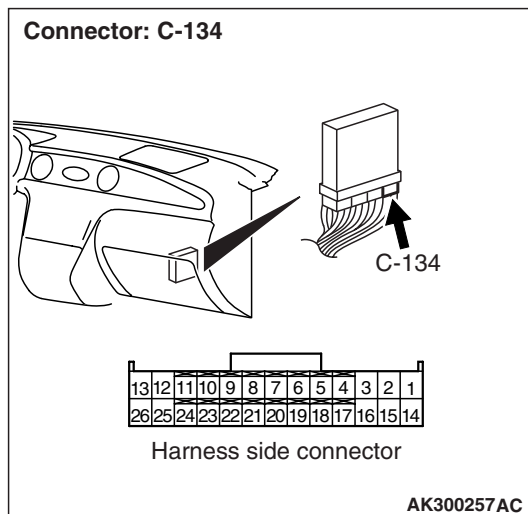
## DIAGNOSIS PROCEDURE

**STEP 1. Connector check: C-134 engine-ECU connector**

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

**YES :** Go to Step 2 .

**NO :** Repair.

**STEP 2. Check at C-134 engine-ECU connector.**

- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Short-circuit terminal No. 21 to earth.

**OK: Fan motor stops rotating.**

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

**YES :** Go to Step 3 .

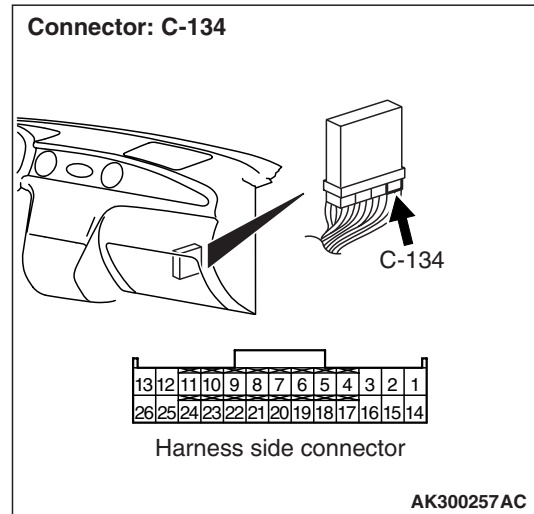
**NO :** Go to Step 4 .

**STEP 3. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

**STEP 4. Perform voltage measurement at C-134 engine-ECU connector.**

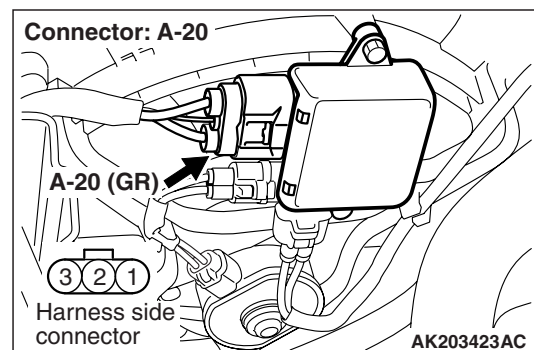
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 21 and earth.

**OK: 4.9 – 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**

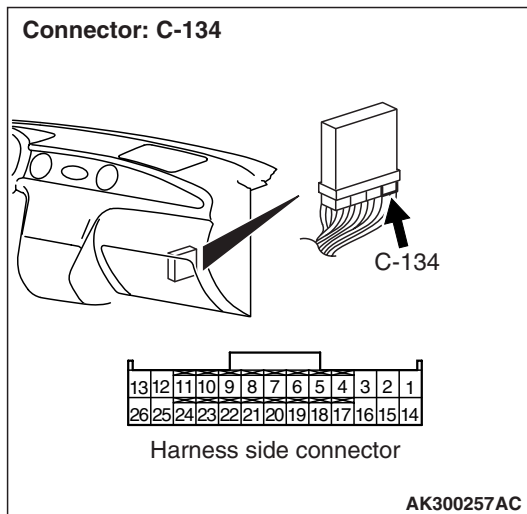
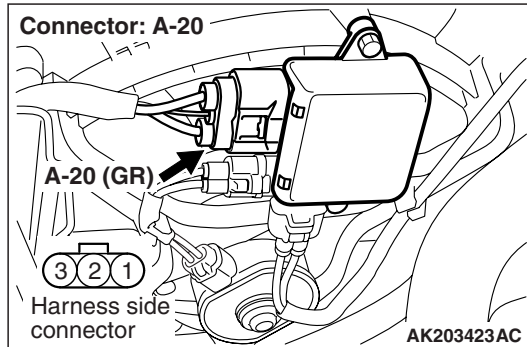
**Q: Is the check result normal?**

**YES :** Go to Step 6 .

**NO :** Repair.



**STEP 6. Check harness between A-20 (terminal No. 2) fan controller connector and C-134 (terminal No. 21) engine-ECU connector.**



**NOTE:** Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check output line for open circuit.

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

**YES :** Replace fan controller.

**NO :** Repair.

## 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 relay
- Failed fan controller
- Failed A/C-ECU
- Failed engine-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-15](#)).

**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-262](#)).

---

**STEP 4. M.U.T.-II/III data list**

- Item 49: A/C relay
  - a. Engine: Running at idle
  - 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 :** 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-266](#)).

---

**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-49](#)).

**Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Adjust charged amount of A/C refrigerant.

---

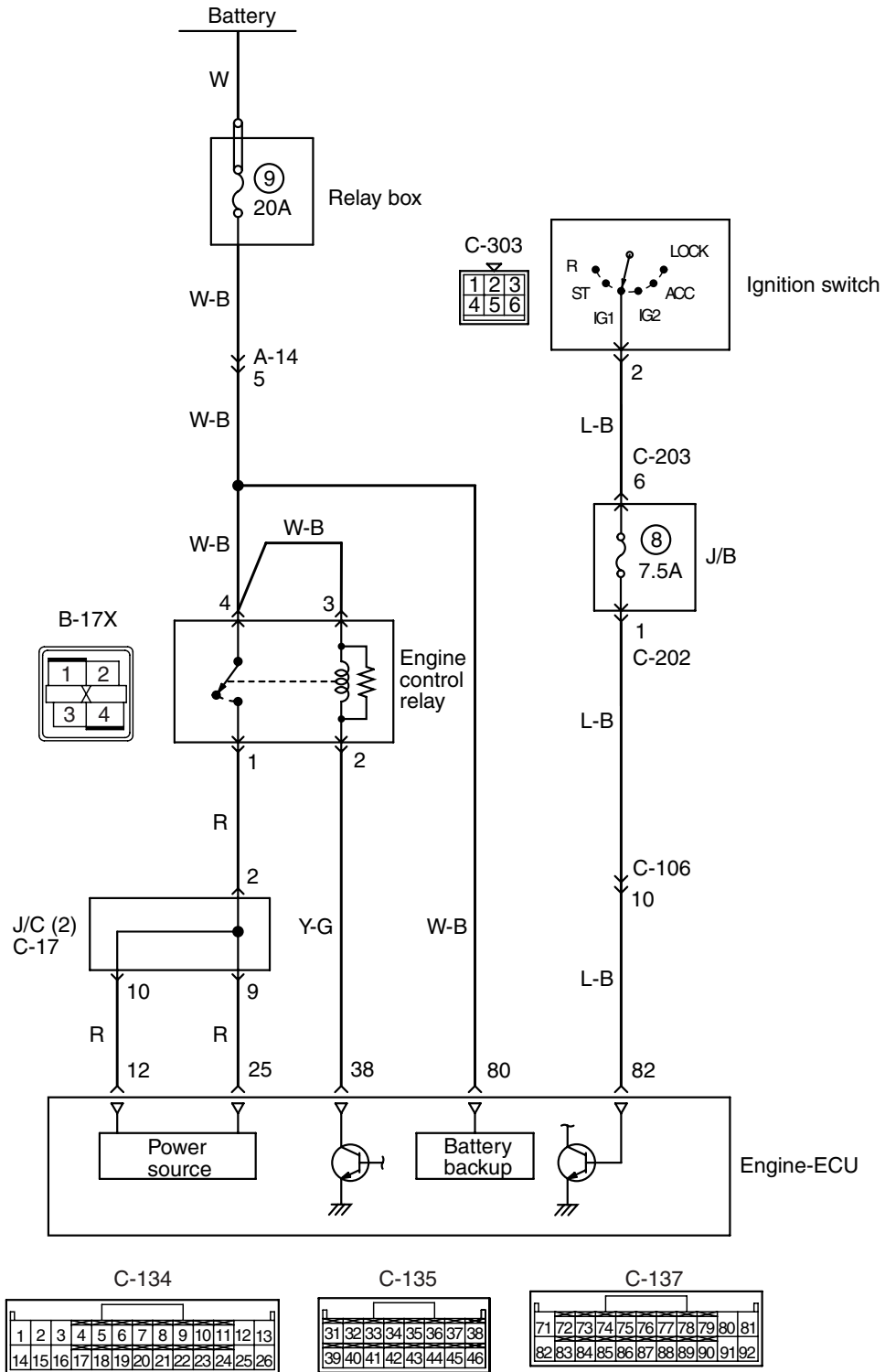
**STEP 6. M.U.T.-II/III actuator test**

- 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-273](#)).**NO :** Check fan control relay system (Refer to Inspection Procedure 25 [P.13A-256](#)).

**Inspection Procedure 23: Engine-ECU Power Supply, Engine Control Relay, Ignition Switch-IG1 System**

**Power supply and ignition switch-IG circuit**



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

**OPERATION**

- The battery voltage is applied to the engine control relay (terminal No. 3 and 4).
- The engine-ECU (terminal No. 38) 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-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-ECU, the engine-ECU places the engine control relay in the ON position. Accordingly, the battery voltage is supplied to the engine-ECU, sensor and actuator.

**PROBABLE CAUSE**

- Failed engine control relay
- Open/short circuit in engine control relay circuit or loose connector contact
- Failed engine-ECU

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

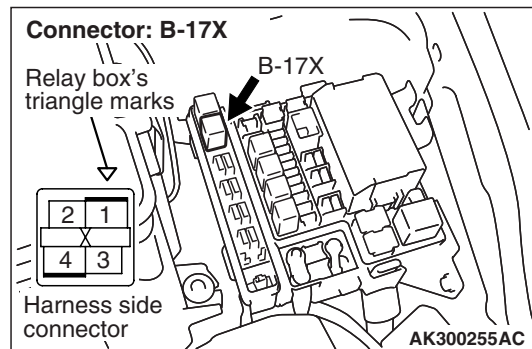
- Measure battery voltage during cranking.

**OK: 8 V or more**

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

**YES :** Go to Step 2 .

**NO :** Check battery (Refer to GROUP 54 – Battery – On-vehicle Service – Battery test P.54A-7).

**STEP 2. Connector check: B-17X engine control relay connector**

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

**YES :** Go to Step 3 .

**NO :** Repair.

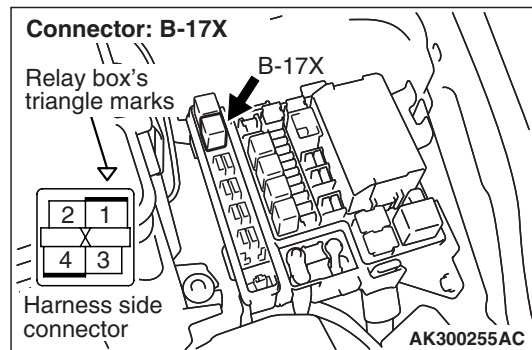
**STEP 3. Check engine control relay.**

- Check engine control relay (Refer to P.13A-321).

**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**

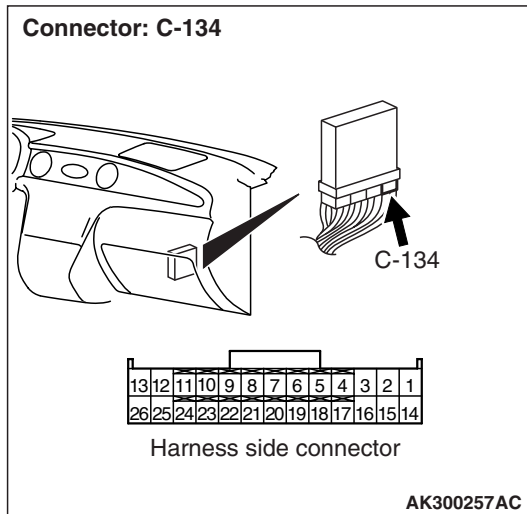
**Q: Is the check result normal?**

**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.

- Check power supply line for open/short circuit.

**STEP 5. Perform voltage measurement at C-134 engine-ECU connector.**



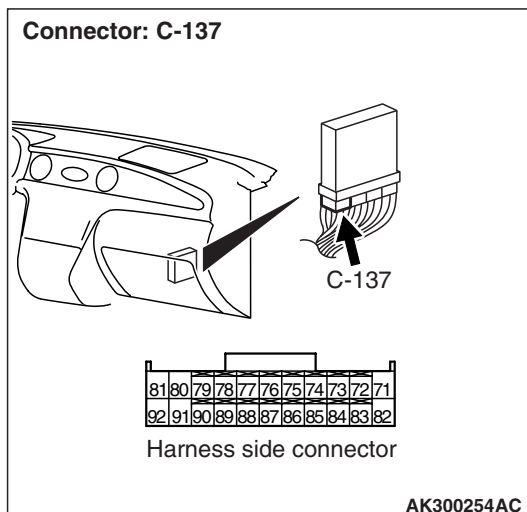
- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 12 and earth, also between terminal No. 25 and earth.

**OK: System voltage**

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

- YES :** Check and repair C-134 engine-ECU connector.
- NO :** Go to Step 6 .

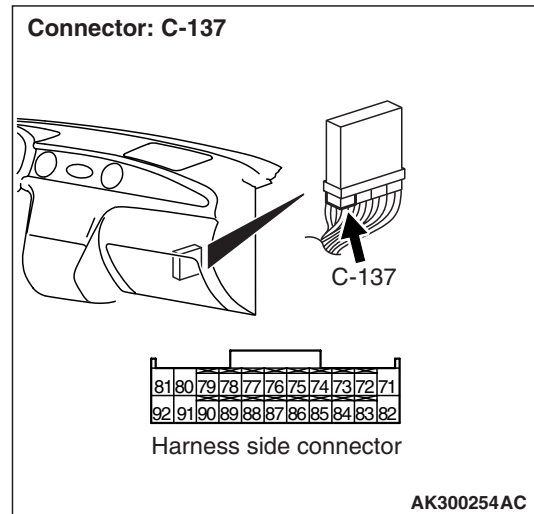
**STEP 6. Connector check: C-137 engine-ECU connector**



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

- YES :** Go to Step 7 .
- NO :** Repair.

**STEP 7. Perform voltage measurement at C-137 engine-ECU connector.**



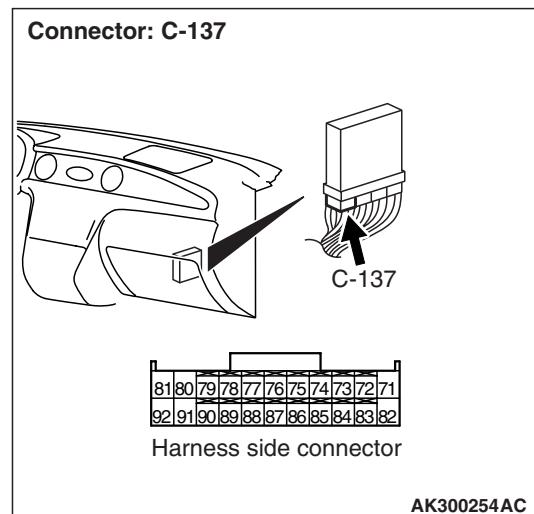
- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 82 and earth.

**OK: System voltage**

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

- YES :** Go to Step 12 .
- NO :** Go to Step 8 .

**STEP 8. Connector check: C-137 engine-ECU connector**



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

- YES :** Go to Step 9 .
- NO :** Repair.

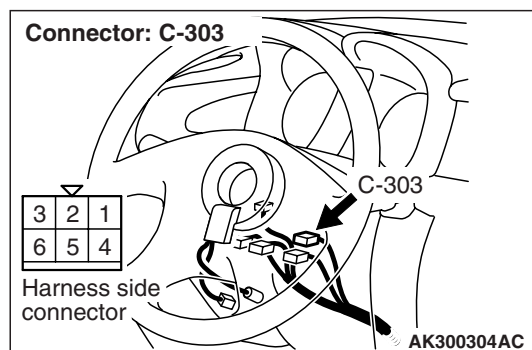
**STEP 9. Check ignition switch.**

- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Ignition Switch P.54A-96).

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

**YES :** Go to Step 10 .

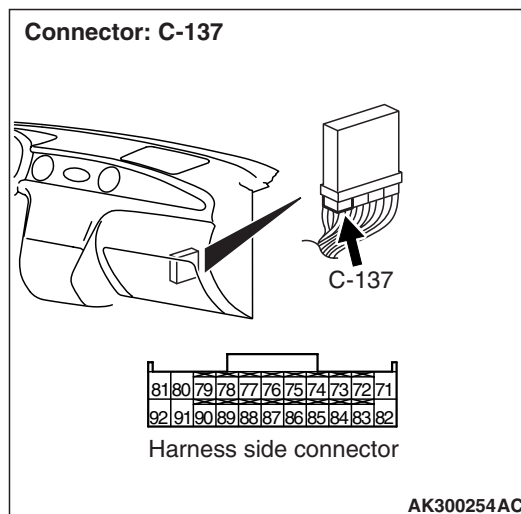
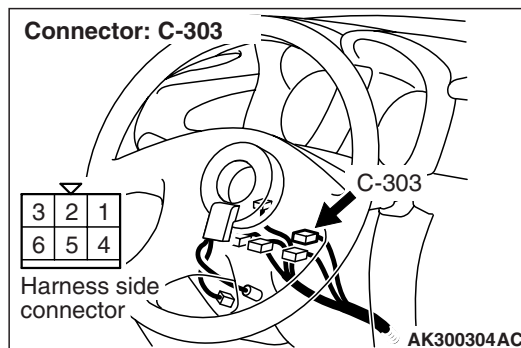
**NO :** Replace ignition switch.

**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-137 (terminal No. 82) engine-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.

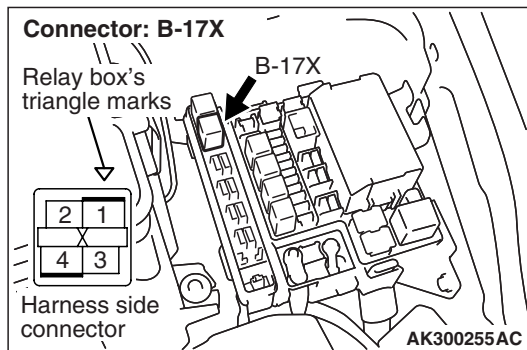
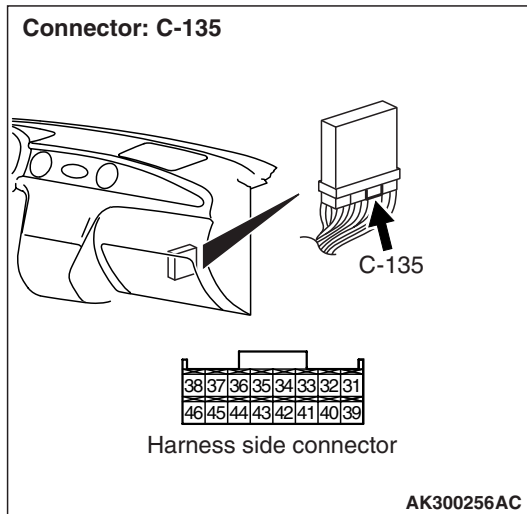
**Q: Is the check result normal?**

**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-135 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Ignition switch: OFF
- Voltage between terminal No. 38 and earth.

**OK: System voltage**

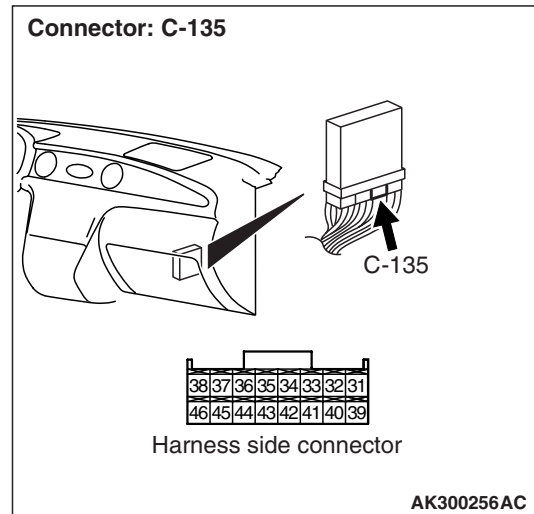
**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Check and repair harness between B-17X (terminal No. 2) engine control relay connector and C-135 (terminal No. 38) engine-ECU connector.

- Check earthing line for open/short circuit.

**STEP 13. Perform voltage measurement at C-135 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 38 and earth.

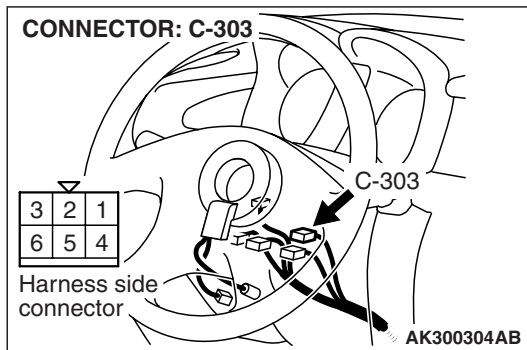
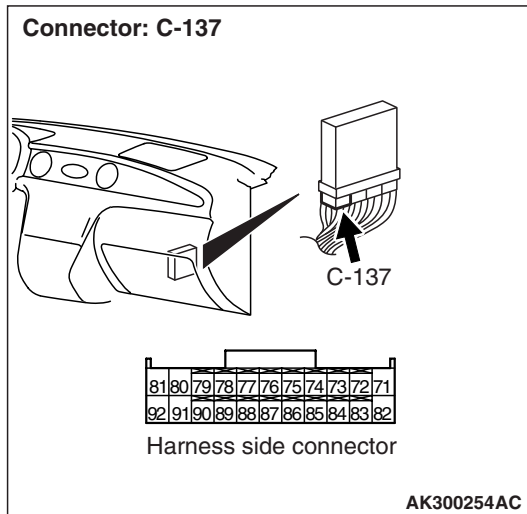
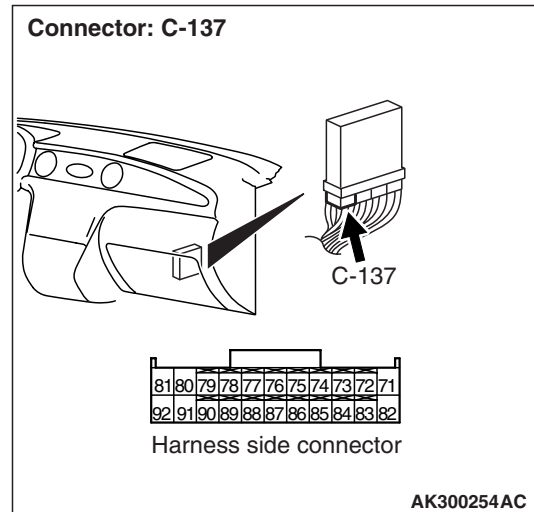
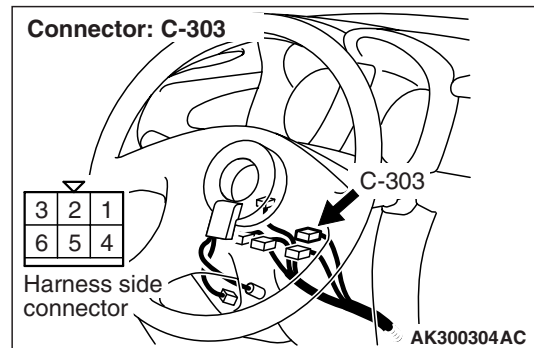
**OK: 1 V or less**

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

**YES :** Go to Step 17 .

**NO :** Go to Step 14 .



**STEP 14. Connector check: C-137 engine-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-137 (terminal No. 82) engine-ECU connector.**

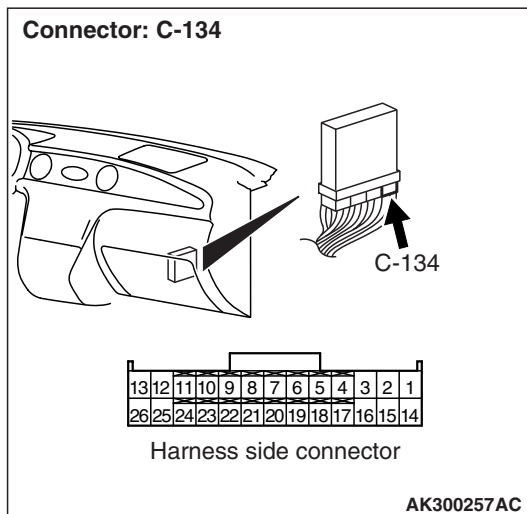
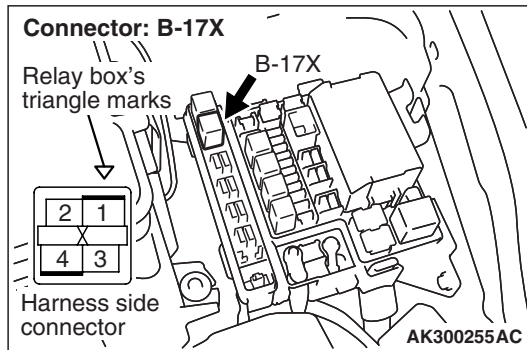
**NOTE:** Before checking harness, check intermediate connectors C-106, C-202 and C-203 and repair if necessary.

- 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-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**STEP 17. Check harness between B-17X (terminal No. 1) engine control relay connector and C-134 (terminal No. 12 and No. 25) engine-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.

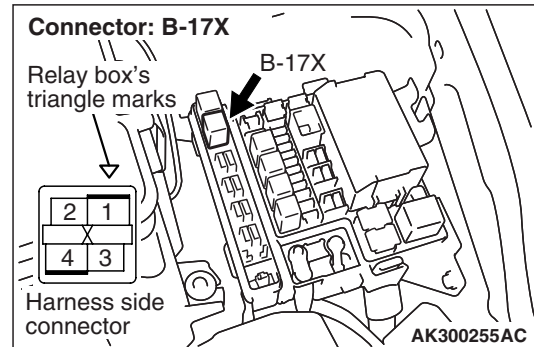
**STEP 18. Check engine control relay output power supply harness and connector for short circuit.**

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

**YES :** Go to Step 19 .

**NO :** Repair.

**STEP 19. Check harness between B-17X (terminal No. 3 and No. 4) engine control relay connector and battery.**



**NOTE:** Before checking harness, check intermediate connector A-14, and repair if necessary.

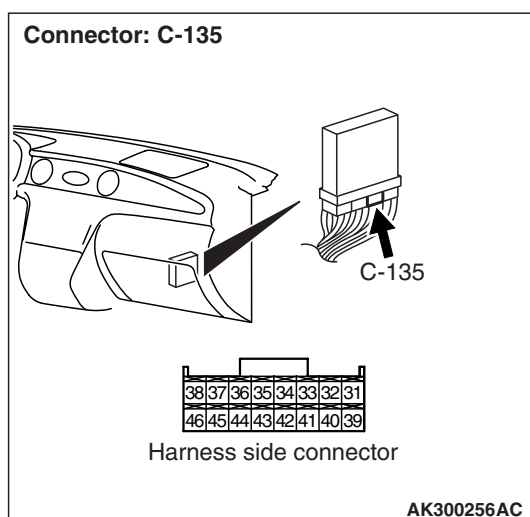
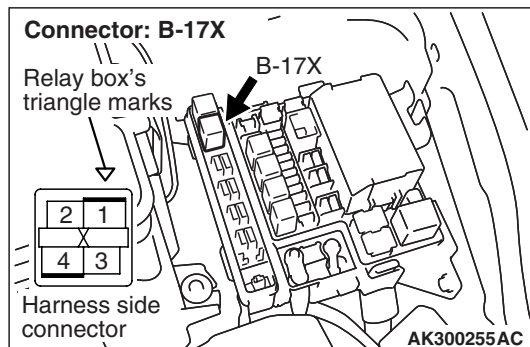
- Check power supply line for damage.

**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-135 (terminal No. 38) engine-ECU connector.**



- Check earthing line for damage.

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

**YES :** Go to Step 16 .

**NO :** Repair.



**OPERATION**

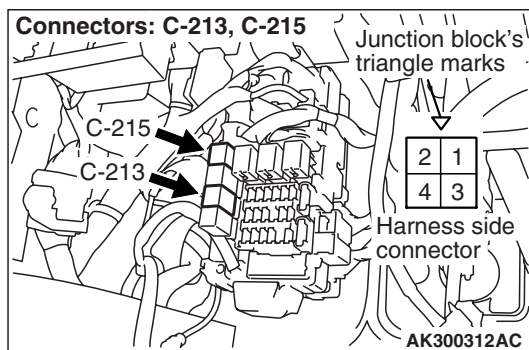
- The battery voltage is applied to the fuel pump relay (1) (terminal No. 3) from the ignition switch and is earthed to the vehicle body from the fuel pump relay (1) (terminal No. 2).
- The battery voltage is applied to the fuel pump relay (1) (terminal No. 4) and to the fuel pump relay (2) (terminal 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-ECU (terminal No. 22) 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. 4).

**FUNCTION**

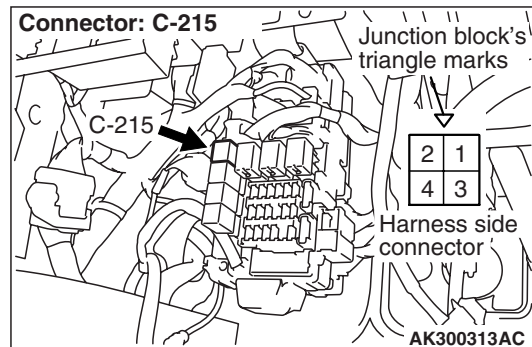
- When the ignition switch ON signal is input to the engine-ECU, the engine-ECU places the fuel pump relay in the "ON" position. Accordingly, the battery voltage is supplied to the fuel pump.

**PROBABLE CAUSE**

- Failed fuel pump relay
- Failed fuel pump
- Open/short circuit in fuel pump drive circuit or loose connector contact
- Failed engine-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-321).

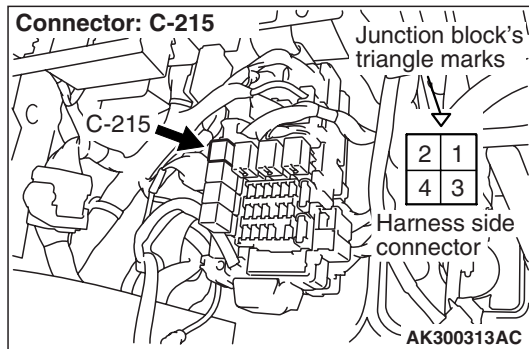
**Q: Is the check result normal?****YES :** Go to Step 3 .**NO :** Replace fuel pump relay.**STEP 3. Perform resistance measurement at C-215 fuel pump relay (1) connector.**

- Remove relay, and measure at junction block side.
- Resistance between terminal No. 2 and earth.

**OK: Continuity (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.

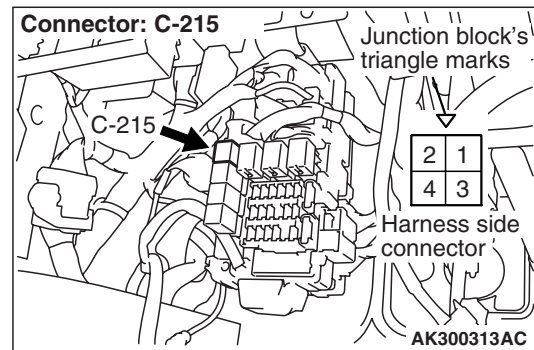
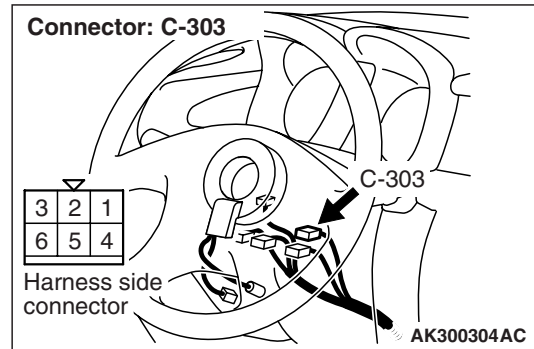
**OK: System voltage**

**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**

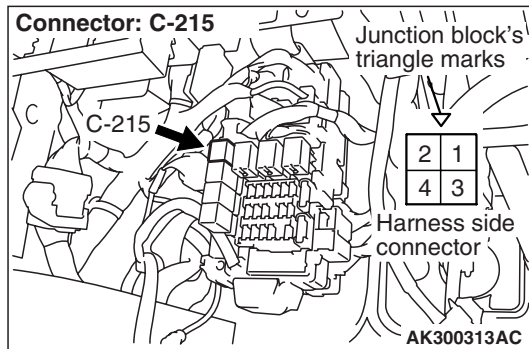


**Q: Is the check result normal?**

**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.

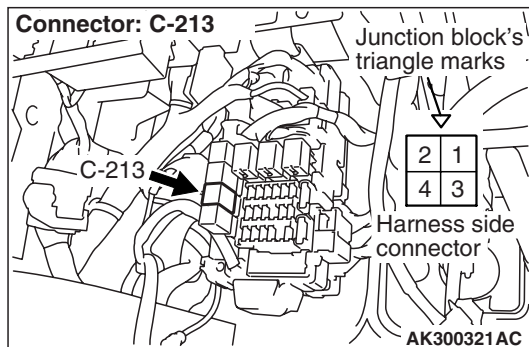
**STEP 6. Perform voltage measurement at C-215 fuel pump relay (1) connector.**

- Remove relay, and measure at junction block side.
- Voltage between terminal No. 4 and earth.

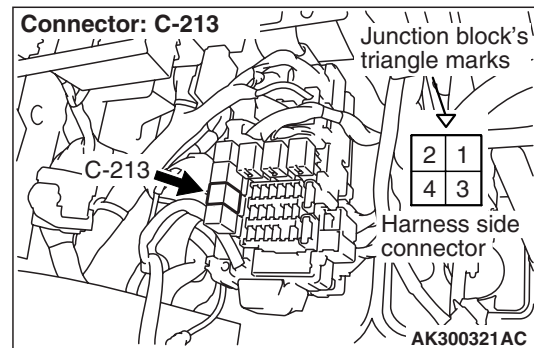
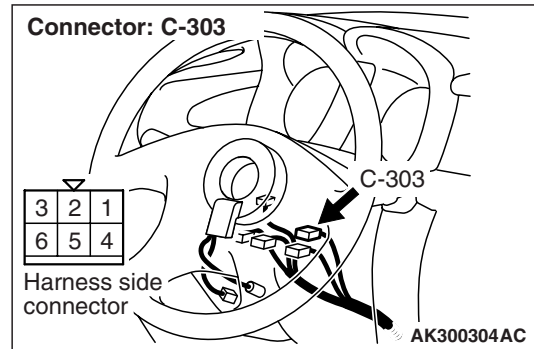
**OK: System voltage****Q: Is the check result normal?****YES :** Go to Step 7 .

**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?**

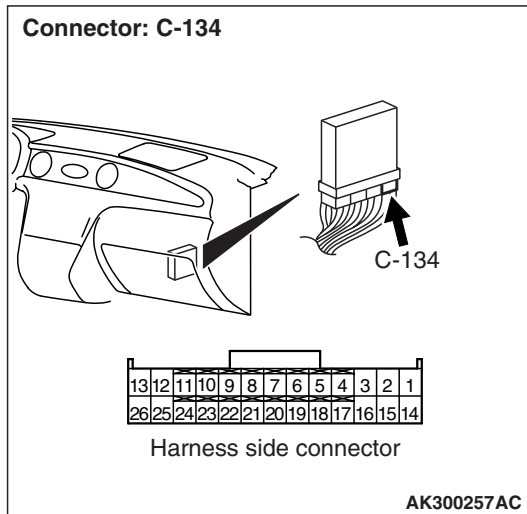
**YES :** Check intermediate connector C-203, and repair if necessary. If intermediate connector is normal, check and repair harness between C-303 (terminal No. 2) ignition switch connector and C-213 (terminal No. 3) fuel pump relay (2) connector.

- Check power supply line for open/short circuit.

**NO :** Repair.



**STEP 9. Connector check: C-134 engine-ECU connector**

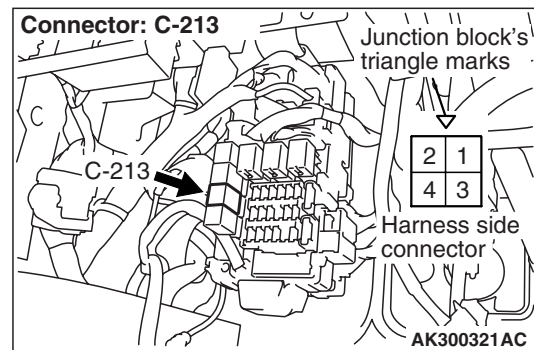
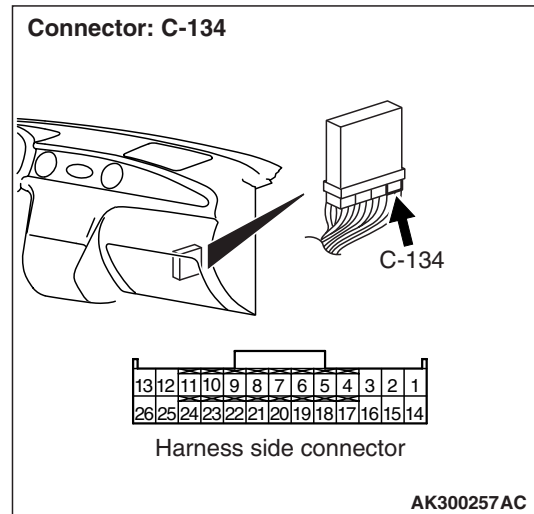


**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Perform voltage measurement at C-134 engine-ECU connector.**



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

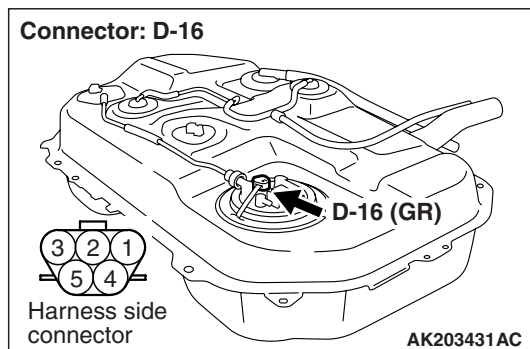
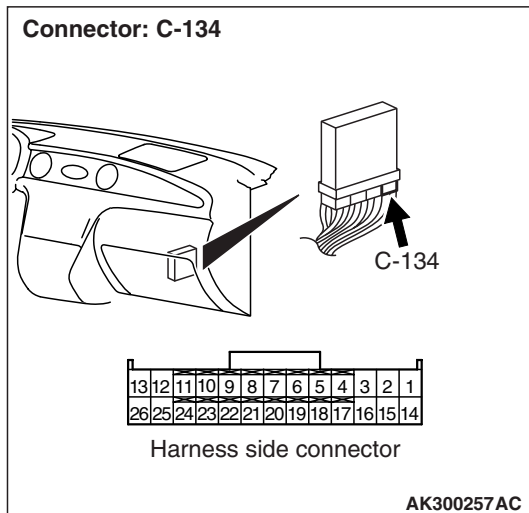
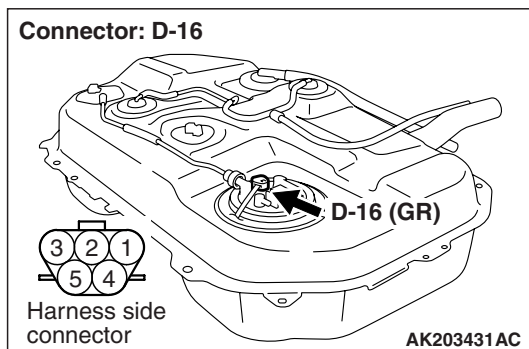
**OK: System voltage**

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

**YES :** Go to Step 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-134 (terminal No. 22) engine-ECU connector.

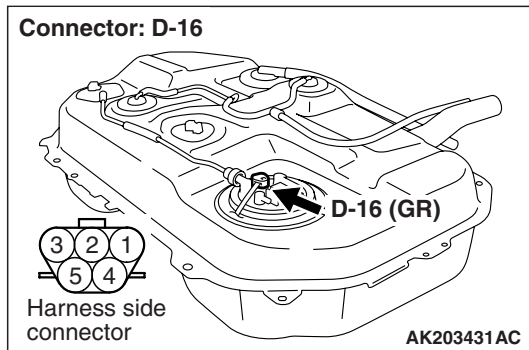
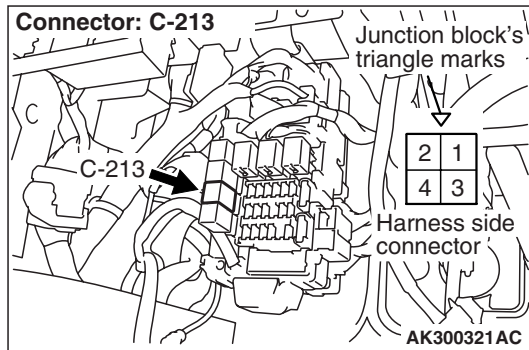
- Check earthing line for open/short circuit.

**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-134 (terminal No. 22) engine-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 connectors C-209 and D-24, and repair if necessary.

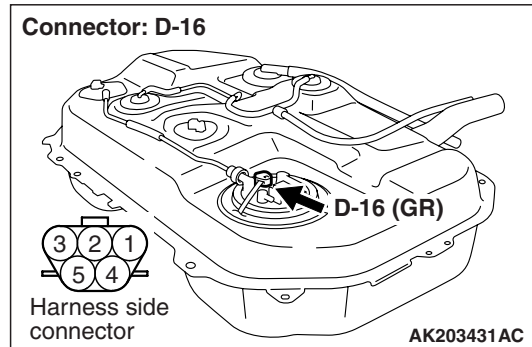
- Check output line for open/short circuit and damage.

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

**YES :** Replace engine-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: Continuity (2  $\Omega$  or less)**

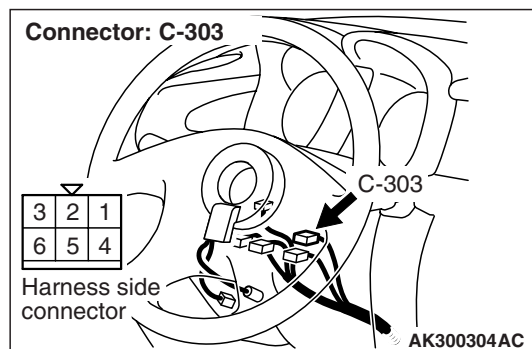
**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Check intermediate connector D-24, 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**

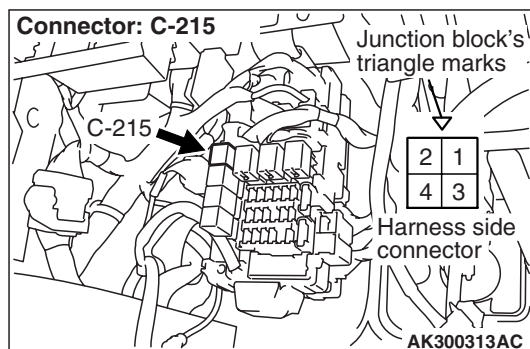
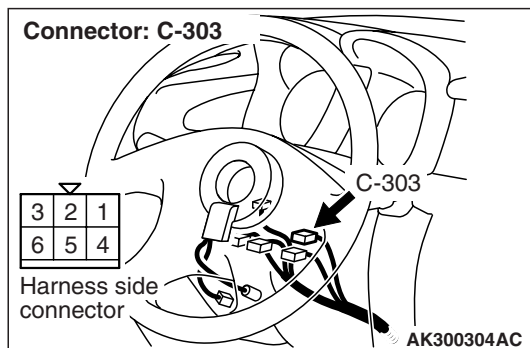


**Q: Is the check result normal?**

**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.

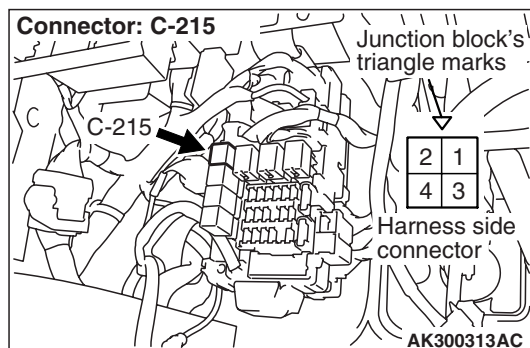
- Check power supply line for damage.

**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 connectors C-116 and C-202, and repair if necessary.

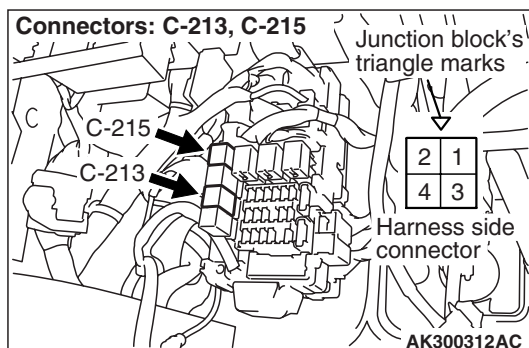
- Check power supply line for damage.

**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.**



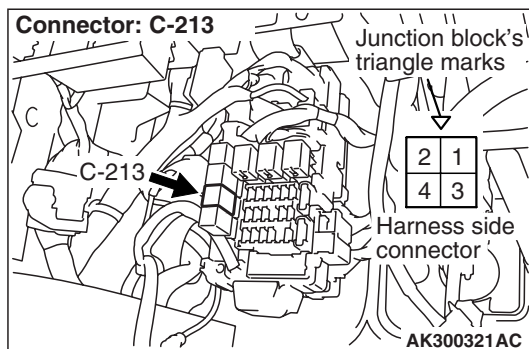
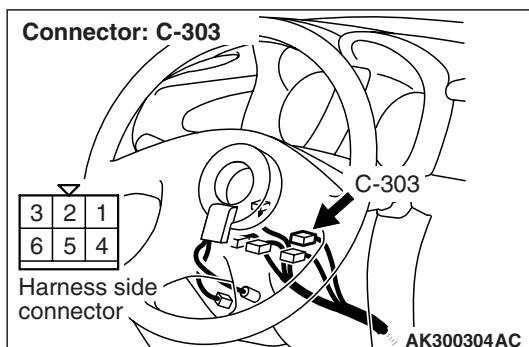
- Check power supply line for damage.

**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.**



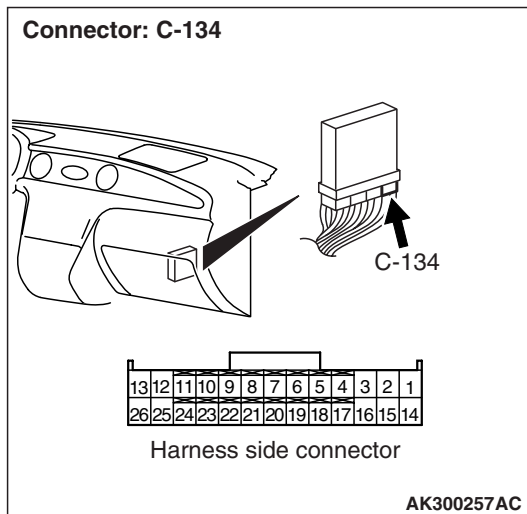
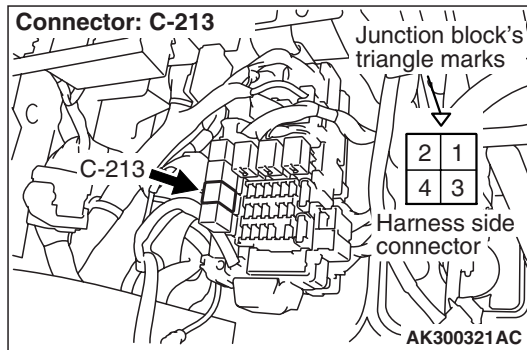
- Check power supply line for damage.

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

**YES :** Go to Step 20.

**NO :** Repair.

**STEP 20. Check harness between C-213 (terminal No. 2) fuel pump relay (2) connector and C-134 (terminal No. 22) engine-ECU connector.**



**NOTE:** Before checking harness, check intermediate connectors C-106 and C-205, and repair if necessary.

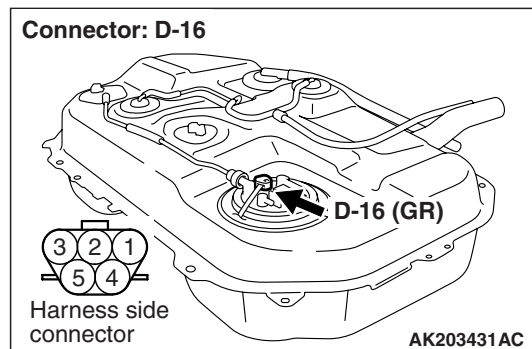
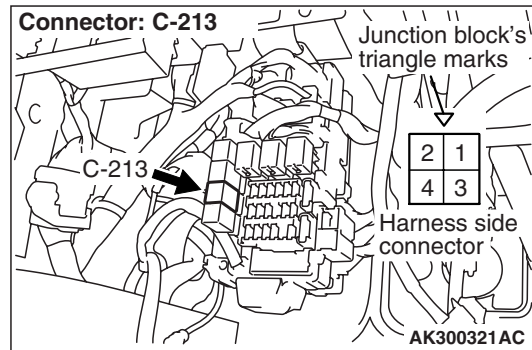
- Check earthing line for open/short circuit.

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

**YES :** Go to Step 21.

**NO :** Repair.

**STEP 21. Check harness between C-213 (terminal No. 4) fuel pump relay (2) connector and D-16 (terminal No.5) fuel pump connector.**



**NOTE:** Before checking harness, check intermediate connectors D-24 and C-209, and repair if necessary.

- Check output line for open/short circuit.

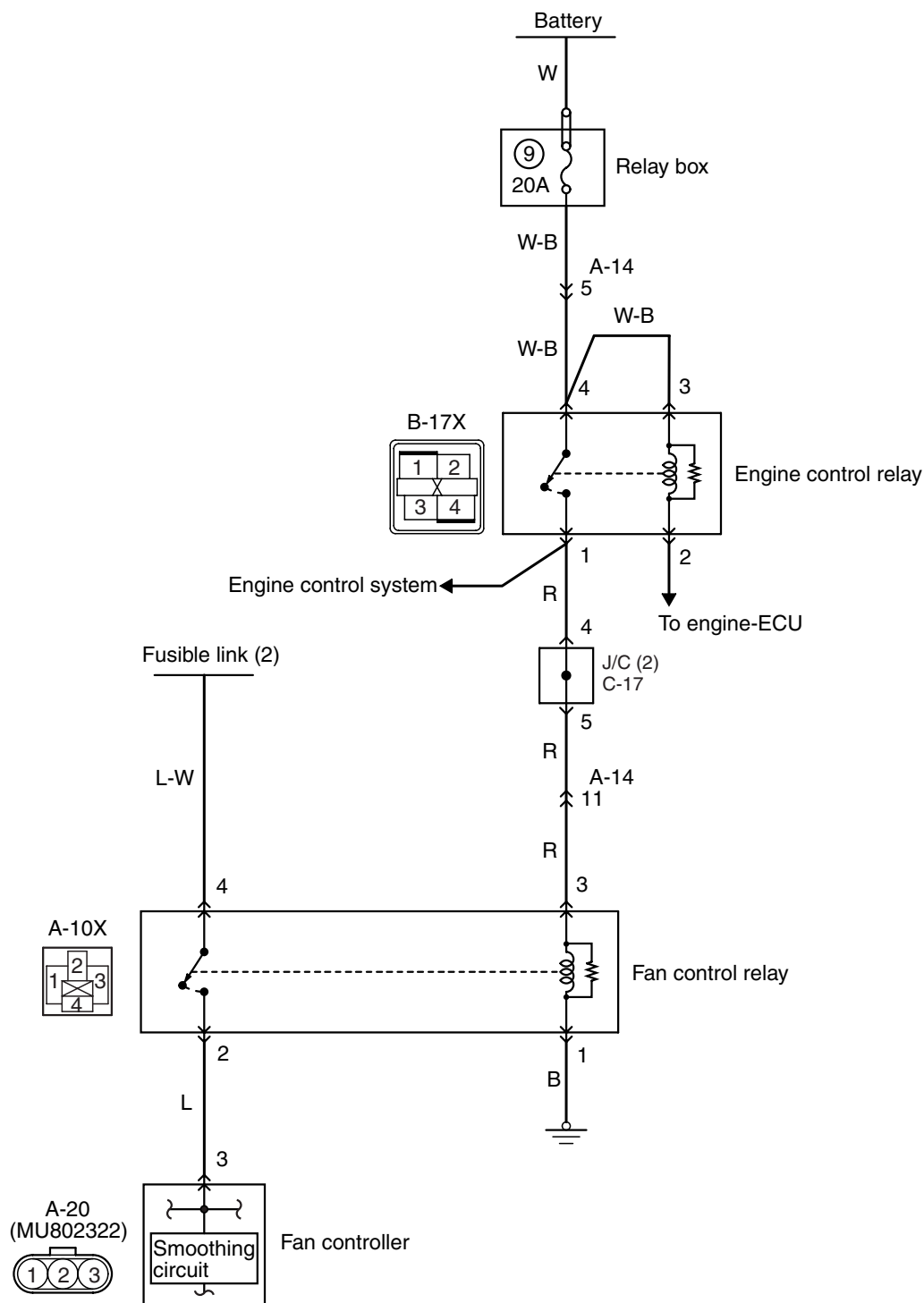
**Q: Is the check result normal?**

**YES :** Replace fuel pump.

**NO :** Repair.

## Inspection Procedure 25: Fan Control Relay System

Fan control relay Circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet



## OPERATION

- The battery voltage is applied to the fan control relay (terminal No. 3) from the engine control relay (terminal No. 1) and is earthed to the vehicle body from the fan control relay (terminal No. 1).
- 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

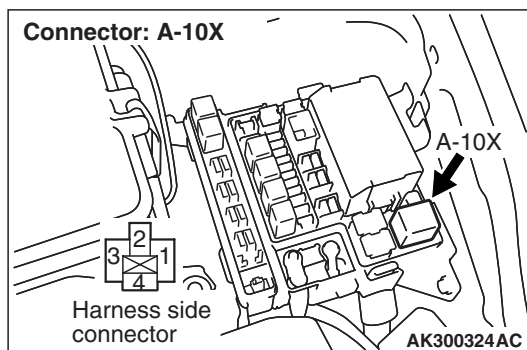
- When the engine control relay is in "ON" position, the fan control relay is also simultaneously placed in "ON" position. Accordingly, the battery voltage is supplied to the fan controller.

## 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-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.

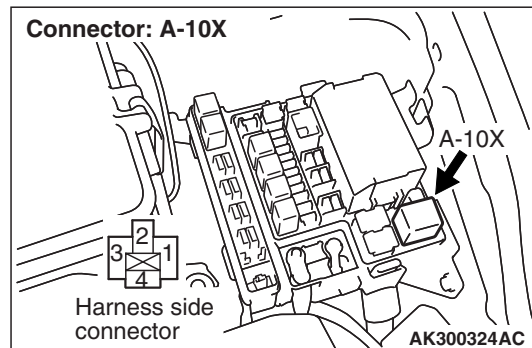
- Check fan control relay (Refer to GROUP 14 – On-vehicle Service [P.14-19](#)).

**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. 1 and earth.

**OK: Continuity (2 Ω or less)**

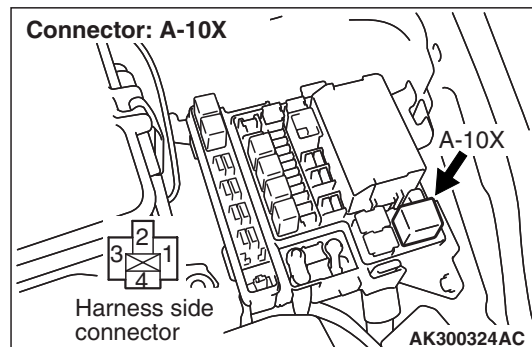
**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Check and repair harness between A-10X (terminal No. 1) 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. 3 and earth.

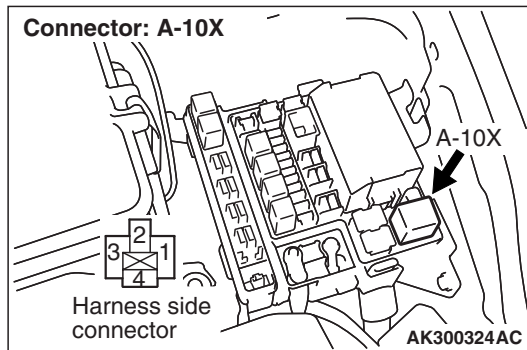
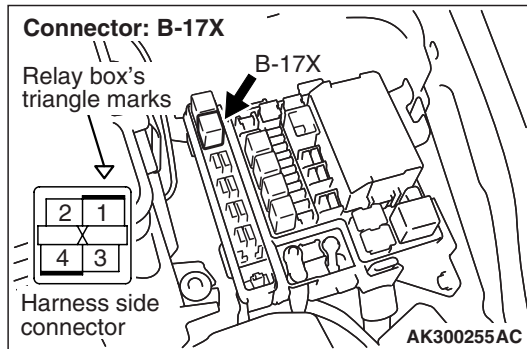
**OK: System voltage**

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

**YES :** Go to Step 6 .

**NO :** Go to Step 5 .

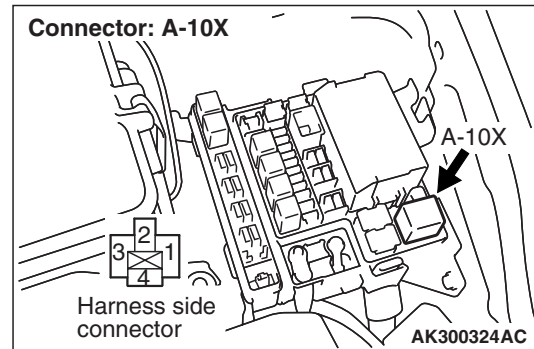


**STEP 5. Connector check: B-17X engine control relay connector****Q: Is the check result normal?**

**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. 3) 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

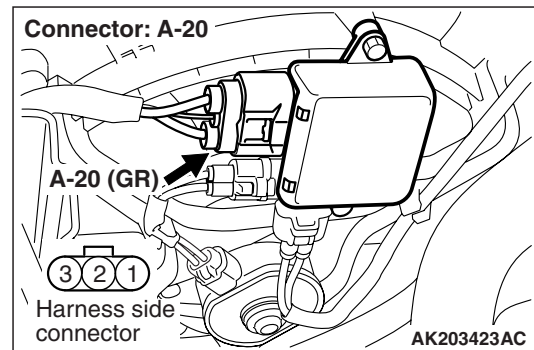
**OK: System voltage**

**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.

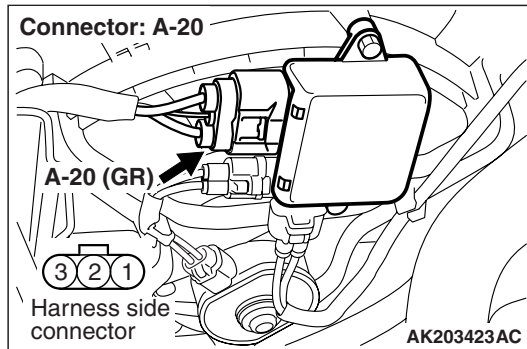
- Check power supply line for open/short circuit.

**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.

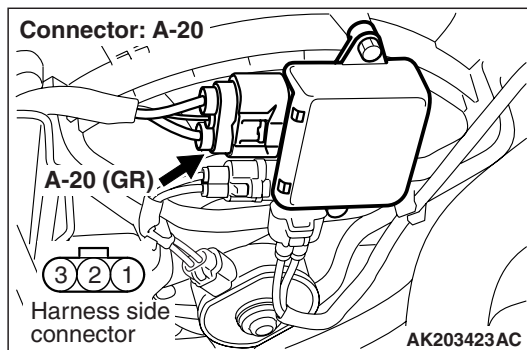
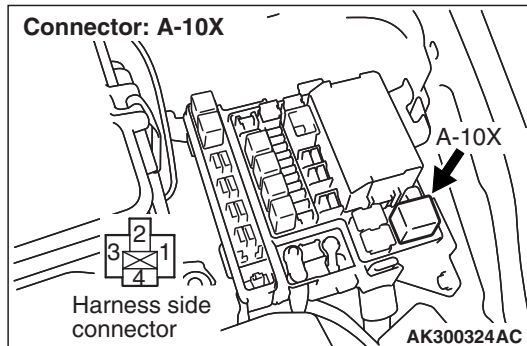
**OK: System voltage**

**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.**



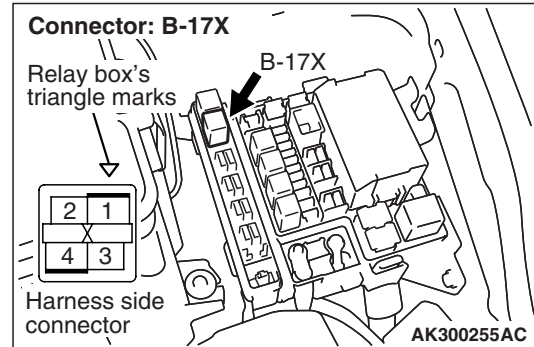
- Check output line for open/short circuit.

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

**YES :** Go to Step 10 .

**NO :** Repair.

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

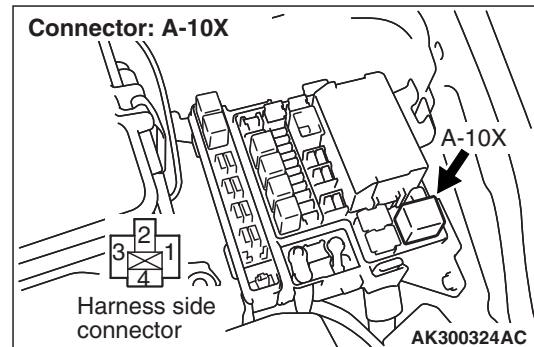
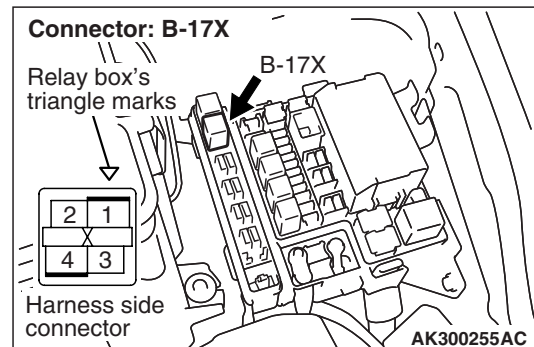


**Q: Is the check result normal?**

**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. 3) fan control relay connector.**



**NOTE:** Before checking harness, check intermediate connectors A-14 and C-17, and repair if necessary.

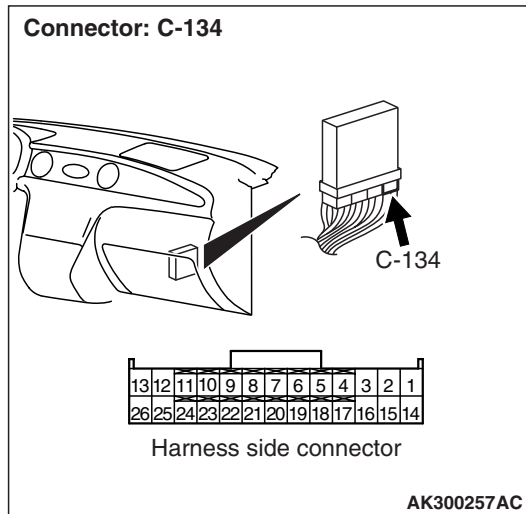
- Check power supply line for damage.

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

**YES :** Check and repair harness between A-10X (terminal No. 1) fan control relay connector and body earth.

- Check earthing line for damage.

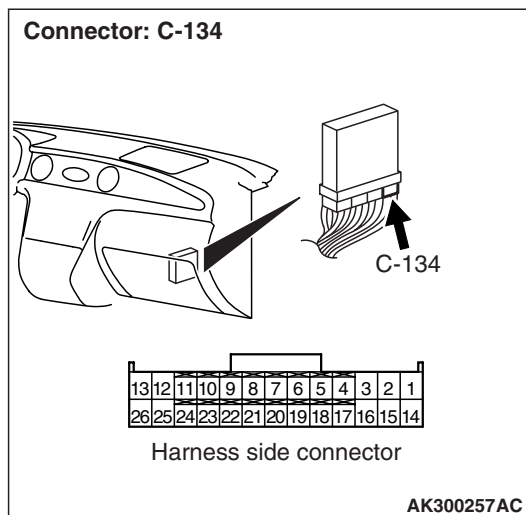
**NO :** Repair.

**STEP 12. Connector check: C-134 engine-ECU connector**

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

**YES :** Go to Step 13 .

**NO :** Repair.

**STEP 13. Fan motor drive test.**

- Disconnect C-134 engine-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**

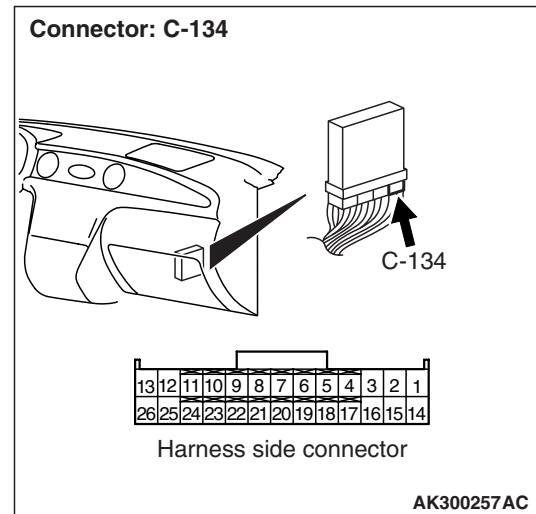
- Item 21: Fan controller

**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.00-6).

**NO :** Replace engine-ECU.

**STEP 15. Perform voltage measurement at C-134 engine-ECU connector.**

- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 21 and earth.

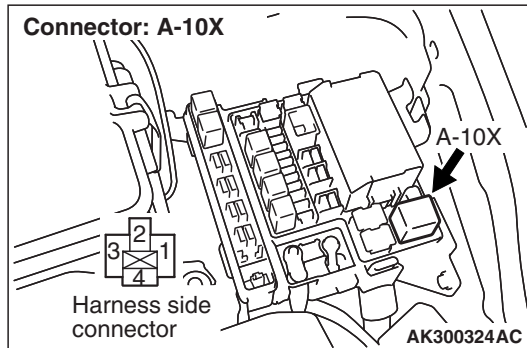
**OK: 4.9 – 5.1 V**

**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.**



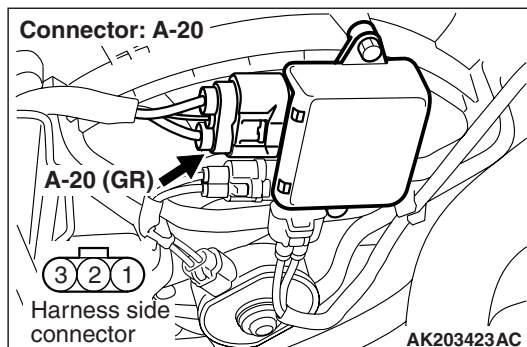
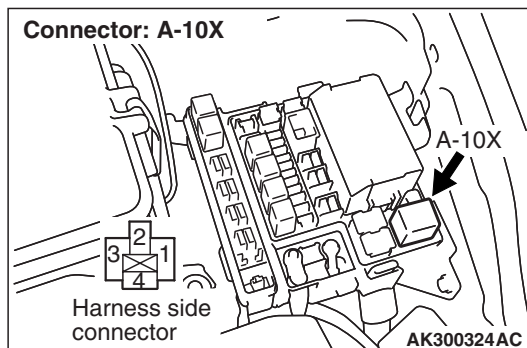
- Check power supply line for damage.

**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.**



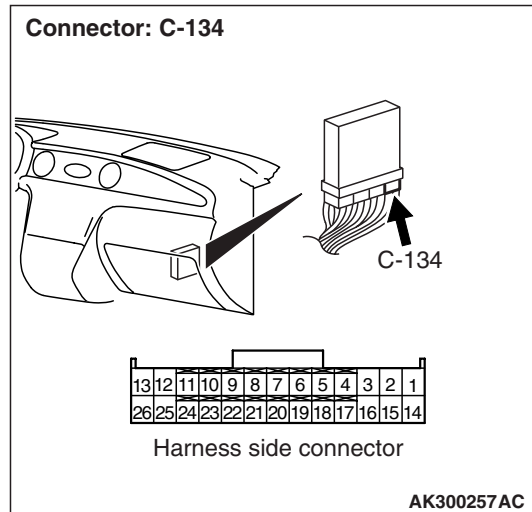
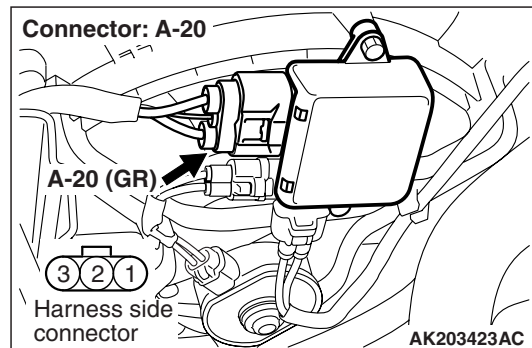
- Check output line for damage.

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

**YES :** Replace fan motor and fan controller.

**NO :** Repair.

**STEP 18. Check harness between A-20 (terminal No. 2) fan controller connector and C-134 (terminal No. 21) engine-ECU connector.**



**NOTE:** Before checking harness, check intermediate connector A-14, and repair if necessary.

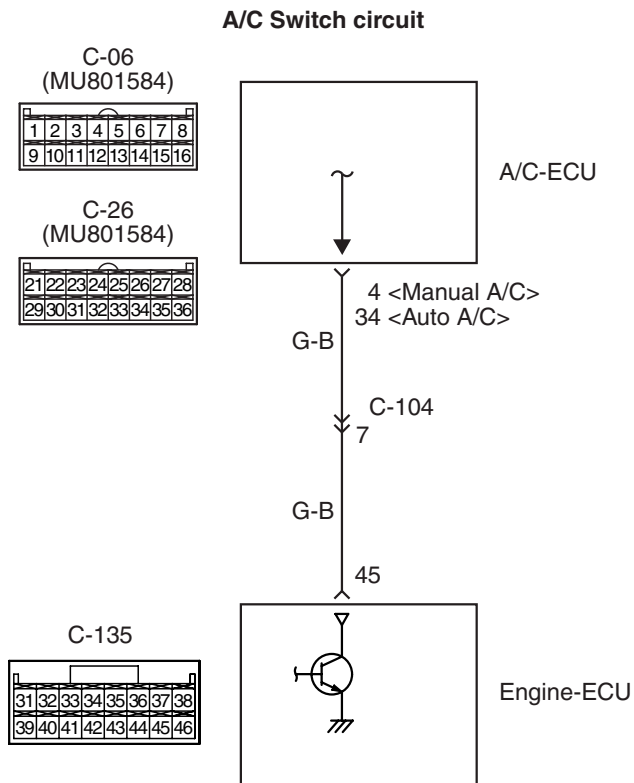
- Check output line for short circuit.

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

**YES :** Replace fan motor and fan controller.

**NO :** Repair.

## Inspection Procedure 26: A/C Switch System



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401060 AB

**OPERATION**

- The battery voltage is applied to the engine-ECU (terminal No. 45) from the A/C-ECU (terminal No. 4) <Manual A/C> or A/C-ECU (terminal No. 34) <Auto A/C>.

**FUNCTION**

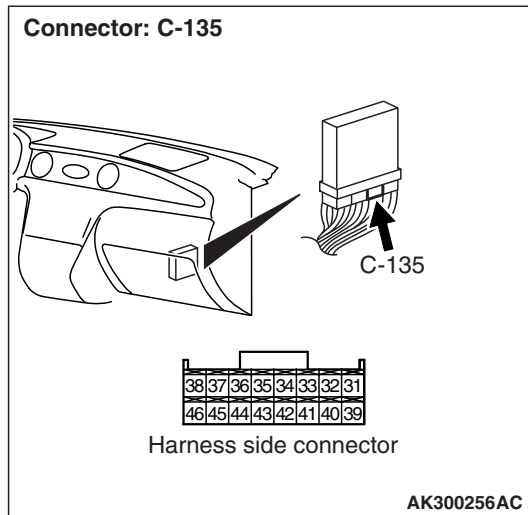
- When the A/C switch is in "ON" position, A/C switch ON signal is inputted to the engine-ECU from the A/C-ECU. In response to the signal, the engine-ECU controls the A/C compressor relay.

**PROBABLE CAUSE**

- Failed A/C
- Failed A/C system
- Open/short circuit in A/C circuit or loose connector contact
- Failed engine-ECU

## DIAGNOSIS PROCEDURE

### STEP 1. Perform voltage measurement at C-135 engine-ECU connector.



- Measure engine-ECU terminal voltage.
- Engine: Running at idle
- 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. 45 and earth.

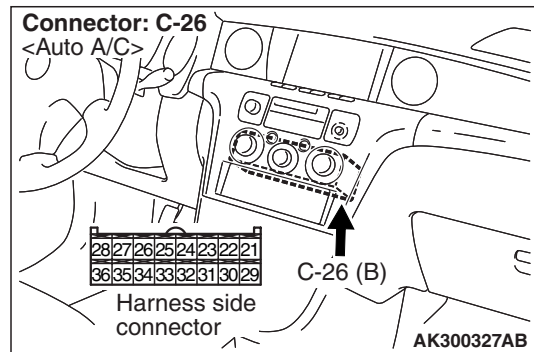
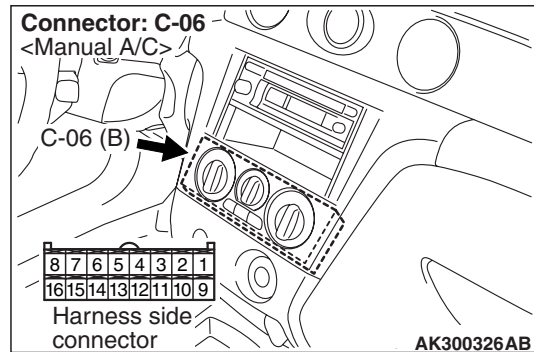
**OK:**

**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 <Manual A/C> or C-26 A/C-ECU connector <Auto A/C>.



- Measure engine-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 <Manual A/C>
- Voltage between terminal No. 34 and earth <Auto A/C>

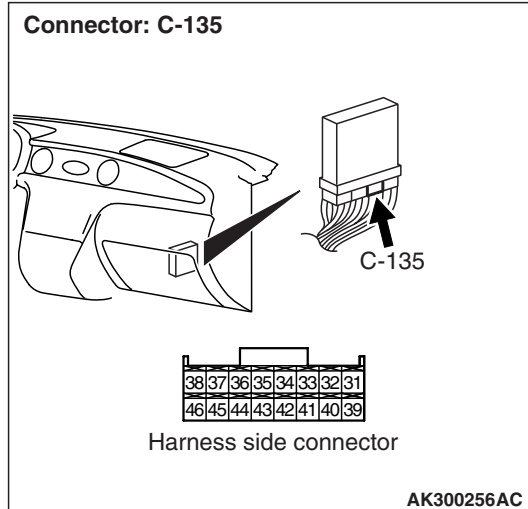
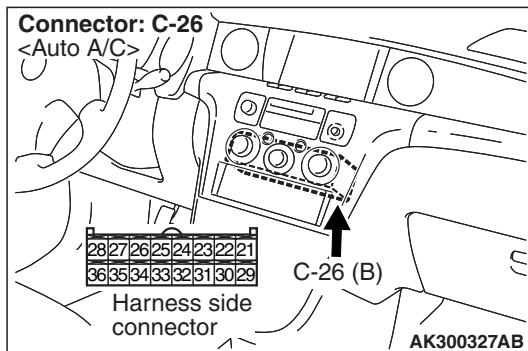
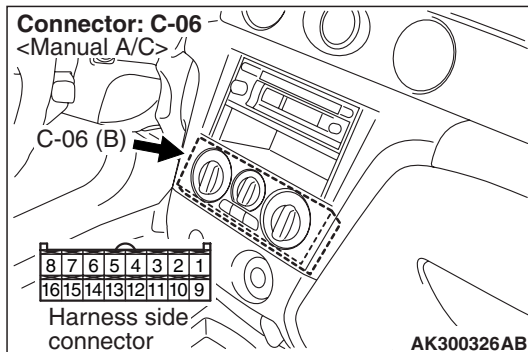
**OK: System voltage**

**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 <Manual A/C> or C-26 A/C-ECU connector <Auto A/C> C-135 engine-ECU connector**

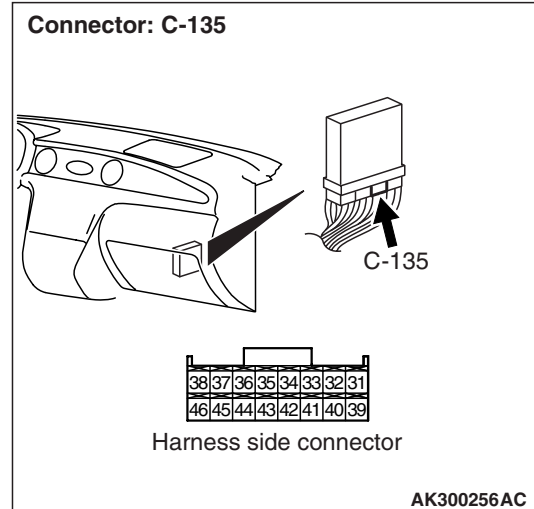
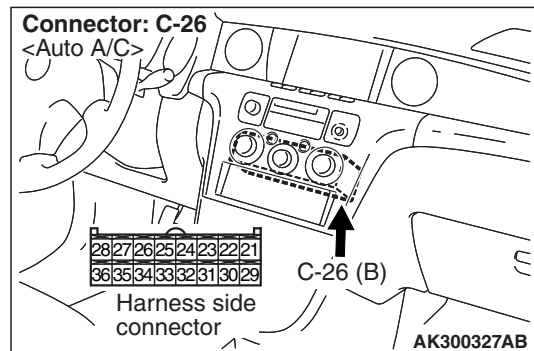
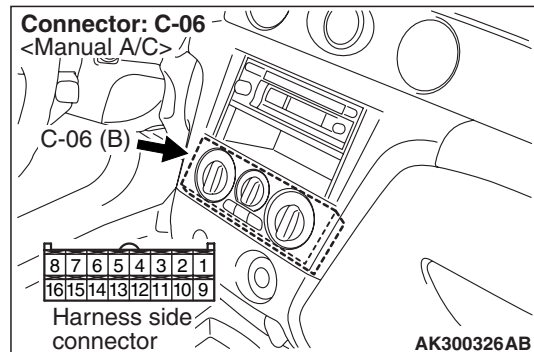


**Q: Is the check result normal?**

**YES :** Go to Step 4 .

**NO :** Repair.

**STEP 4. Check harness between C-06 A/C-ECU connector <Manual A/C> or C-26 A/C-ECU connector <Auto A/C> and C-135 (terminal No. 45) engine-ECU connector.**



**NOTE:** Before checking harness, check intermediate connector C-104, and repair if necessary.

- Check output line for short circuit.

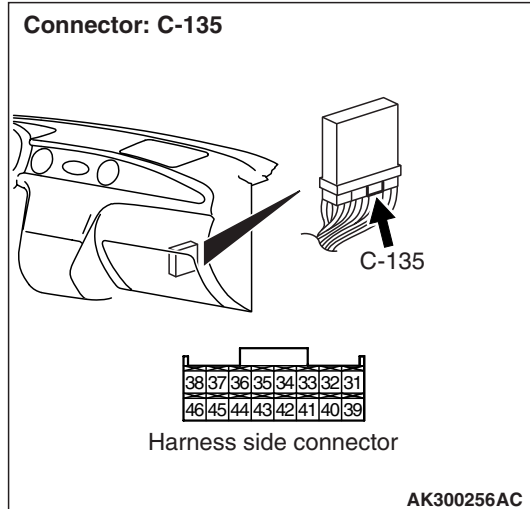
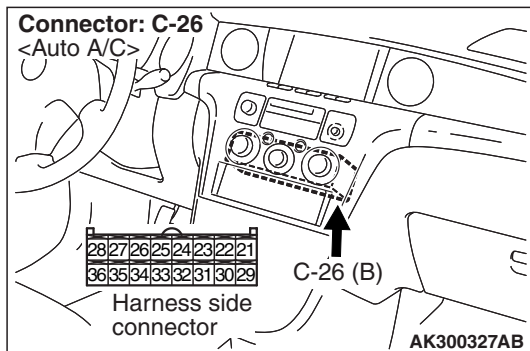
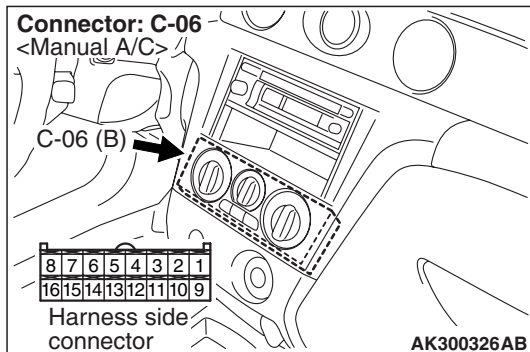
**Q: Is the check result normal?**

**YES :** Check A/C system (Refer to GROUP 55A – Troubleshooting P.55A-5).

**NO :** Repair.



**STEP 5. Connector check: C-06 A/C-ECU connector <Manual A/C> or C-26 A/C-ECU connector <Auto A/C> and C-135 engine-ECU connector**



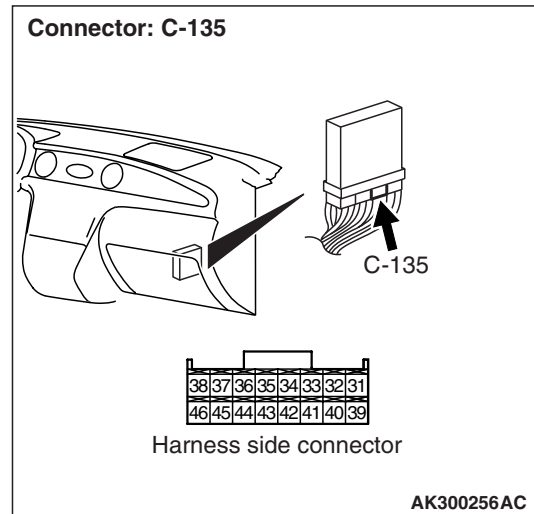
**Q: Is the check result normal?**

**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) or C-26 (terminal No. 34) A/C-ECU connector and C-135 (terminal No. 45) engine-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 6. Connector check: C-135 engine-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)

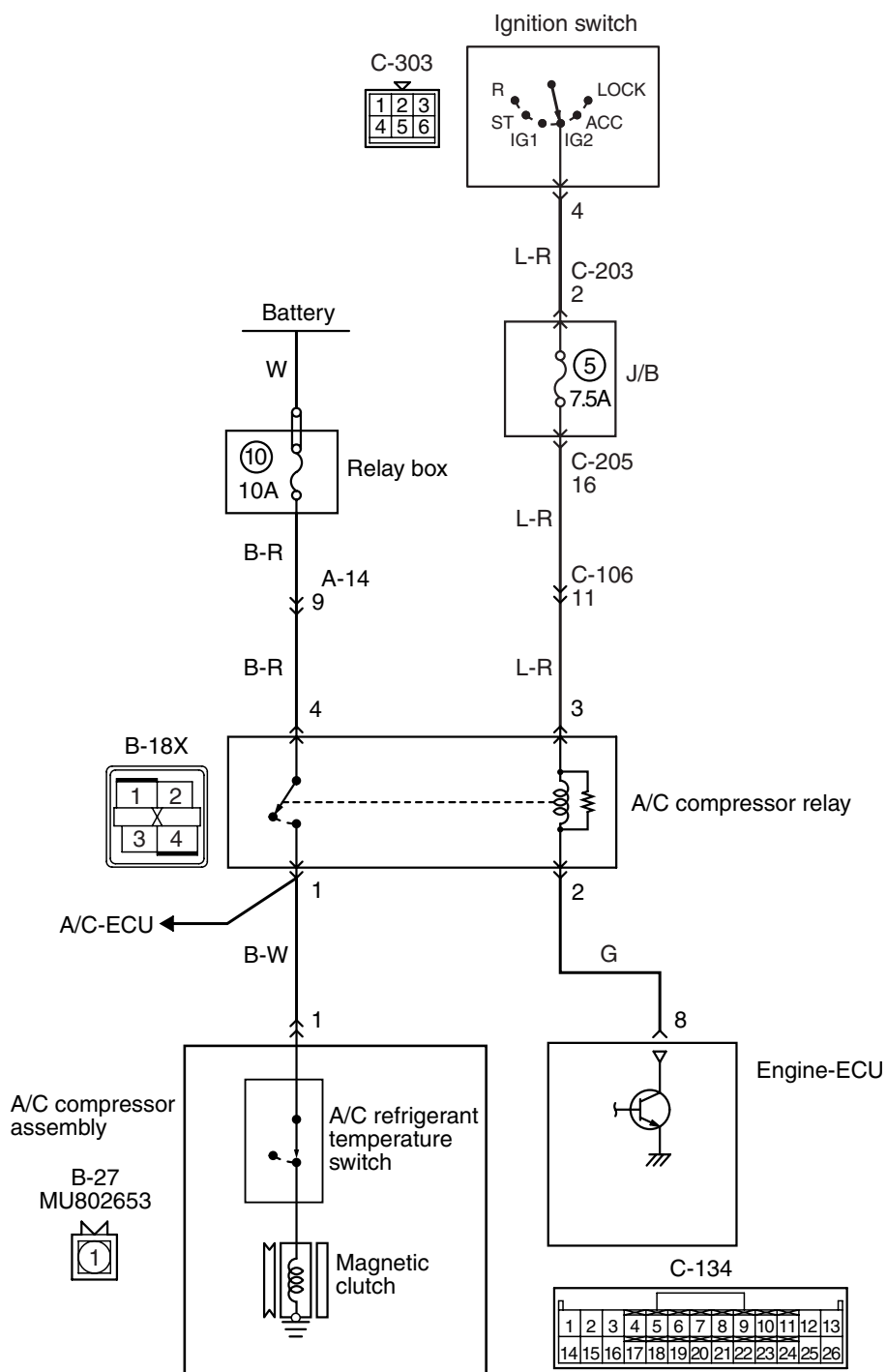
**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

## Inspection Procedure 27: A/C Compressor Relay System

A/C compressor relay Circuit



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

## 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-ECU (terminal No. 8) 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

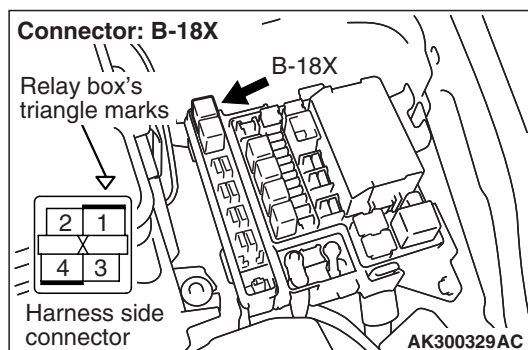
- When the A/C switch "ON" signal is input to the engine-ECU, the engine-ECU places the A/C compressor relay in the "ON" position. Accordingly, the battery voltage supplied to the A/C compressor operates the magnet clutch.

## 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-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.

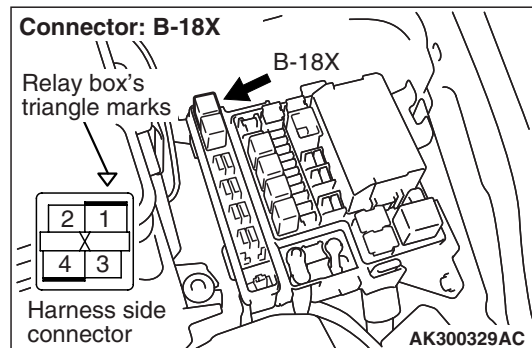
- Check A/C compressor relay (Refer to GROUP 55A – On-vehicle Service [P.55A-55](#)).

**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.



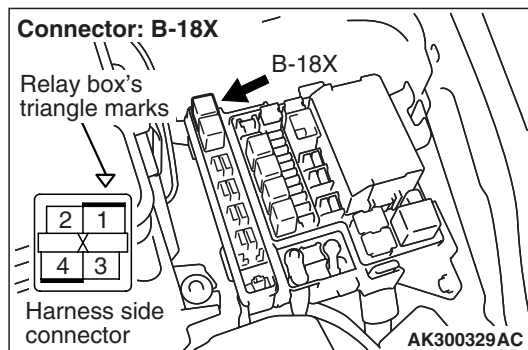
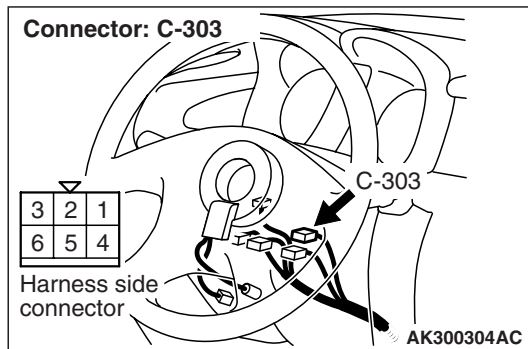
- Remove relay, and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

**OK: System voltage**

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

**YES :** Go to Step 5 .

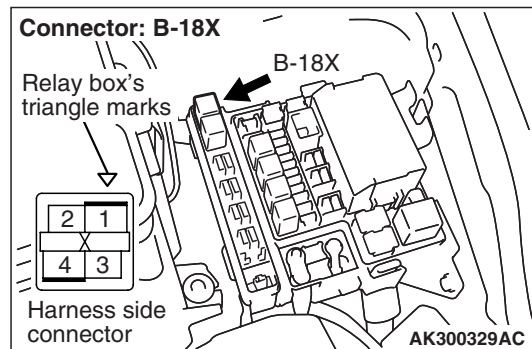
**NO :** Go to Step 4 .

**STEP 4. Connector check: C-303 ignition switch connector****Q: Is the check result normal?**

**YES :** Check intermediate connectors C-106, C-203 and C-205, 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.

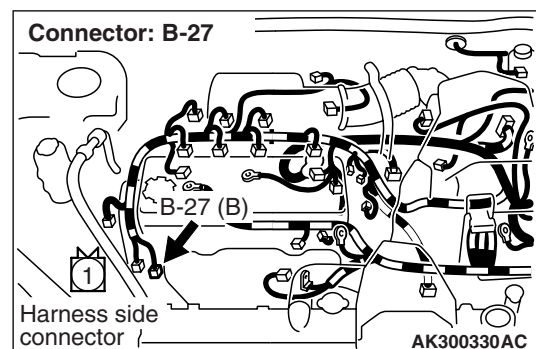
**OK: System voltage**

**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.

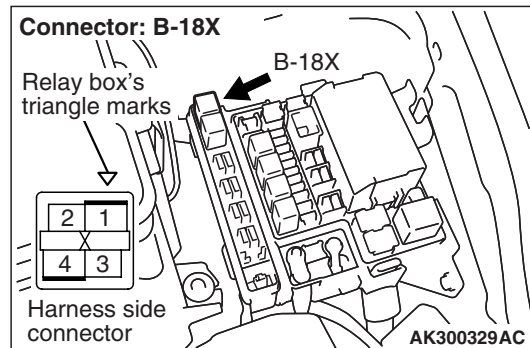
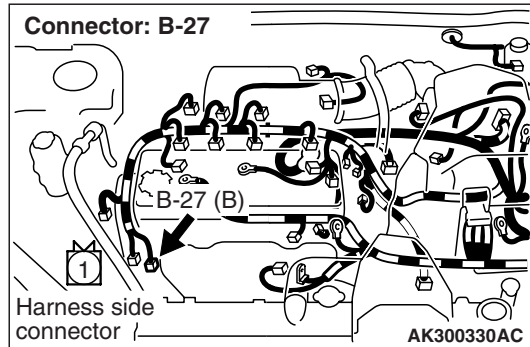
- Check power supply line for open/short circuit.

**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**

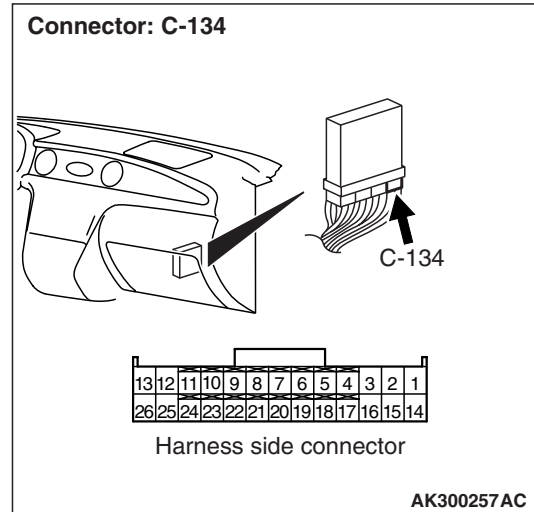
**Q: Is the check result normal?**

**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-134 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 8 and earth.

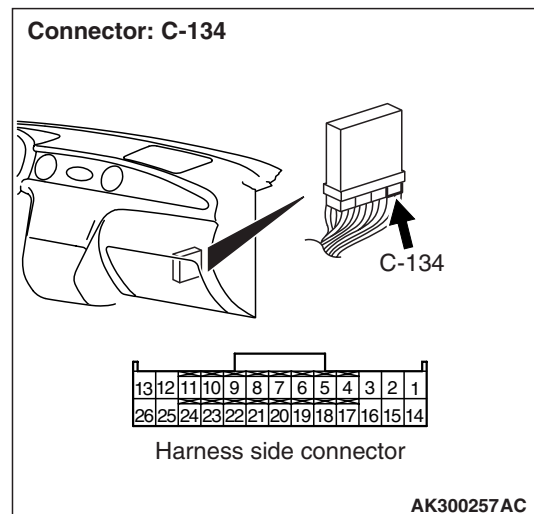
**OK: System voltage**

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

**YES :** Go to Step 12 .

**NO :** Go to Step 9 .

**STEP 9. Connector check: C-134 engine-ECU connector**

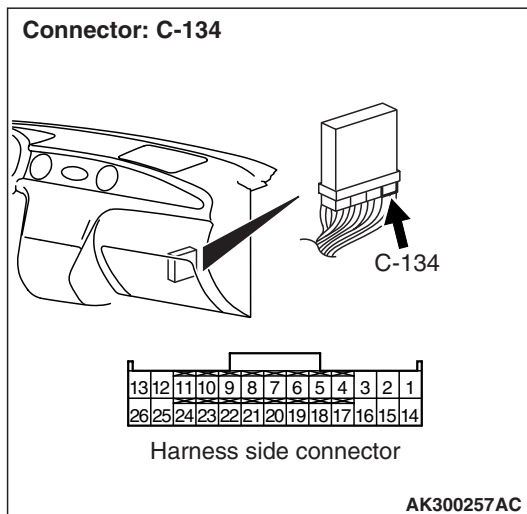
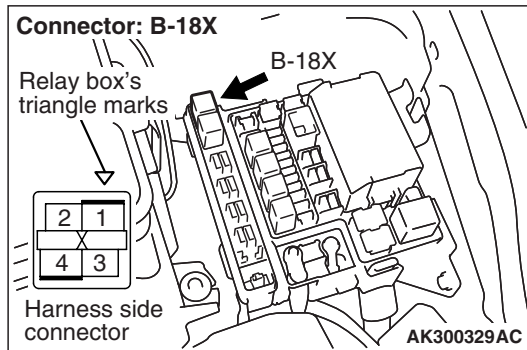


**Q: Is the check result normal?**

**YES :** Go to Step 10 .

**NO :** Repair.

**STEP 10. Check harness between B-18X (terminal No. 2) A/C compressor relay connector and C-134 (terminal No. 8) engine-ECU connector.**



- Check earthing line for open circuit and damage.

**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)**

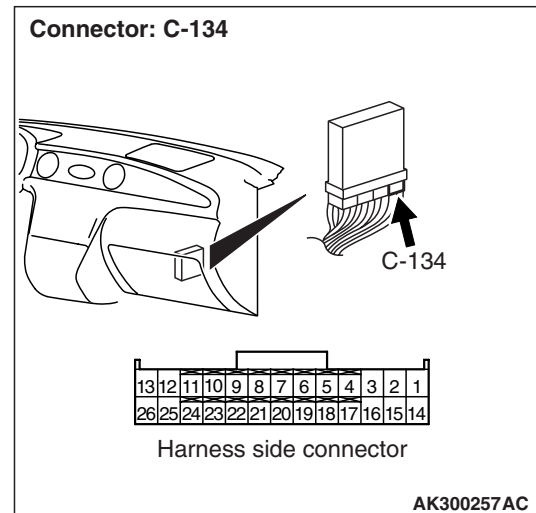
**OFF (when A/C is OFF)**

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

**STEP 12. Connector check: C-134 engine-ECU connector**



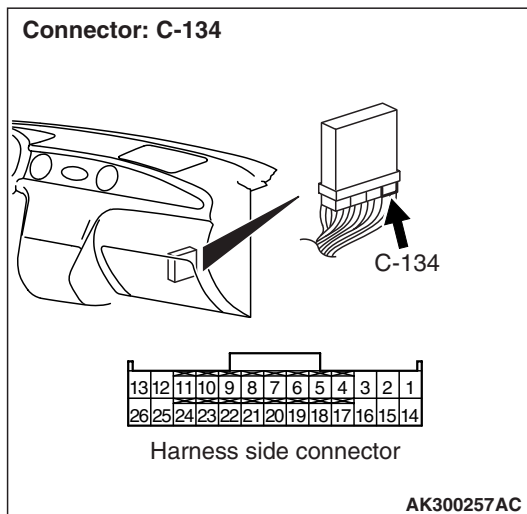
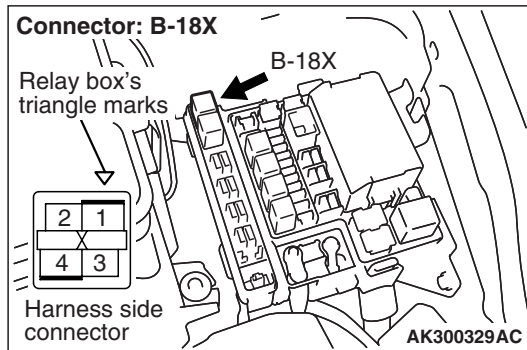
**Q: Is the check result normal?**

**YES :** Go to Step 13 .

**NO :** Repair.



**STEP 13. Check harness between B-18X (terminal No. 2) A/C compressor relay connector and C-134 (terminal No. 8) engine-ECU connector.**



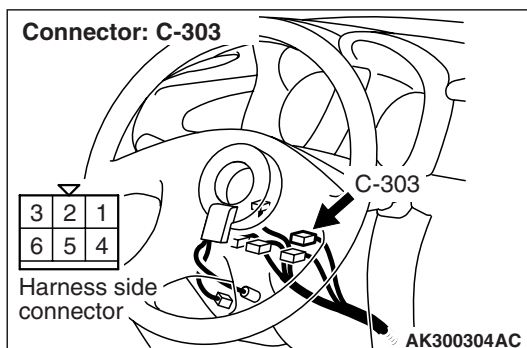
- Check earthing line for damage.

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

**YES :** Go to Step 14 .

**NO :** Repair.

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

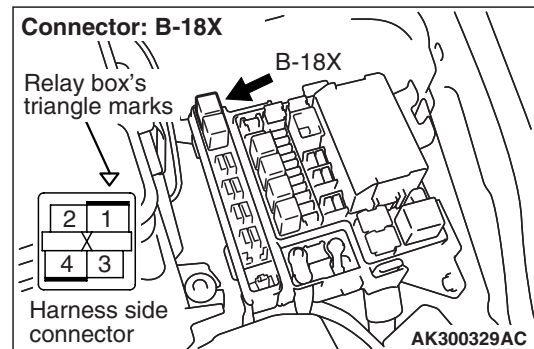
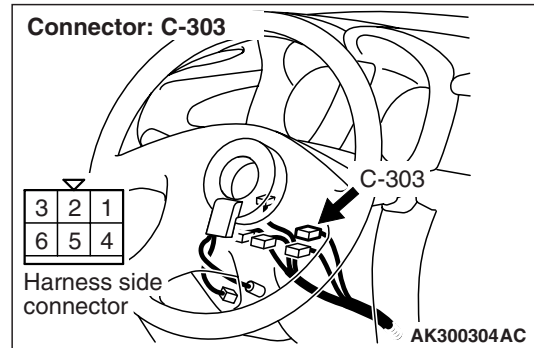


**Q: Is the check result normal?**

**YES :** Go to Step 15 .

**NO :** Repair.

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

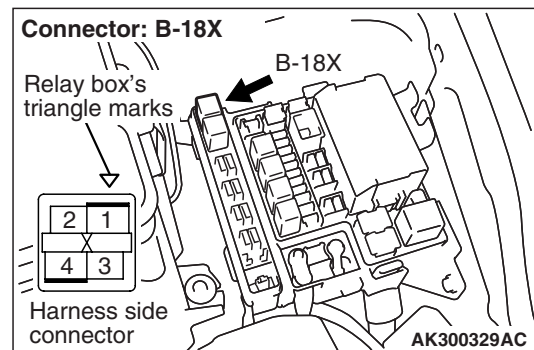
- Check power supply line for damage.

**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.

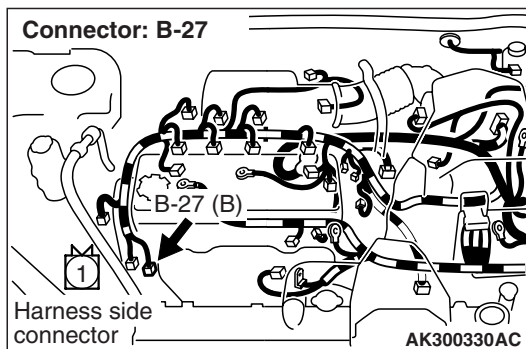
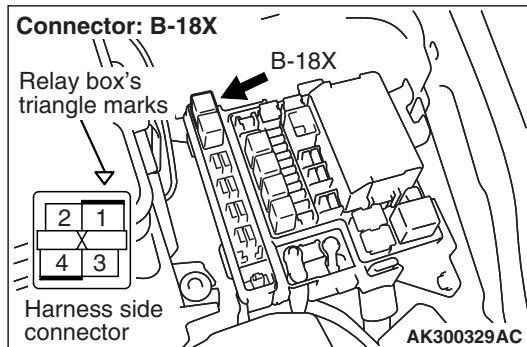
**Q: Is the check result normal?**

**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 relay  
connector.**



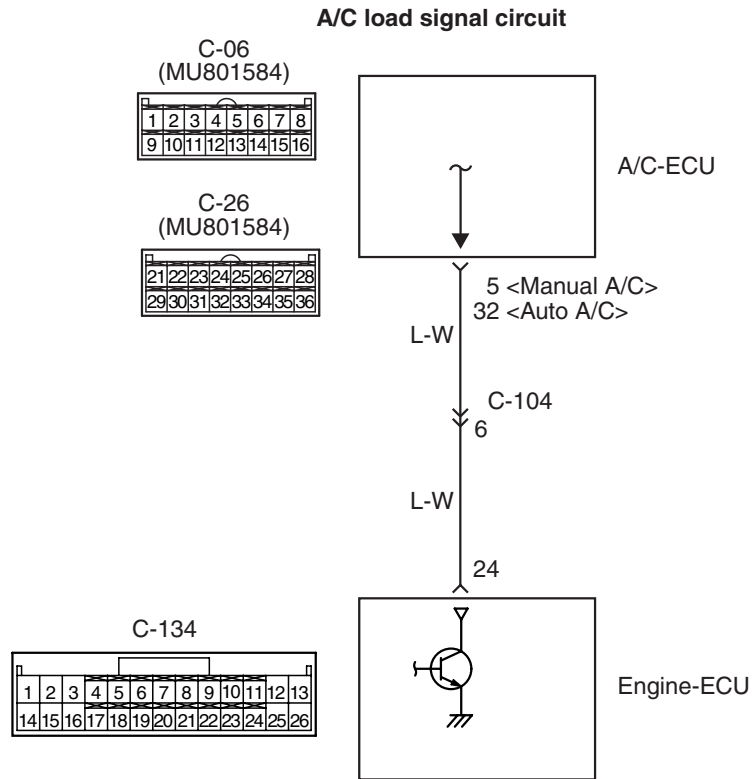
- Check output line for damage.

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

**YES :** Replace A/C compressor magnet clutch.

**NO :** Repair.

**Inspection Procedure 28: A/C Load Signal System**



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

AK401061 AB

**OPERATION**

- The A/C load signal is inputted to the engine-ECU (terminal No. 24) from the A/C-ECU (terminal No. 5). <Manual A/C> or (terminal No. 32) <Auto A/C>

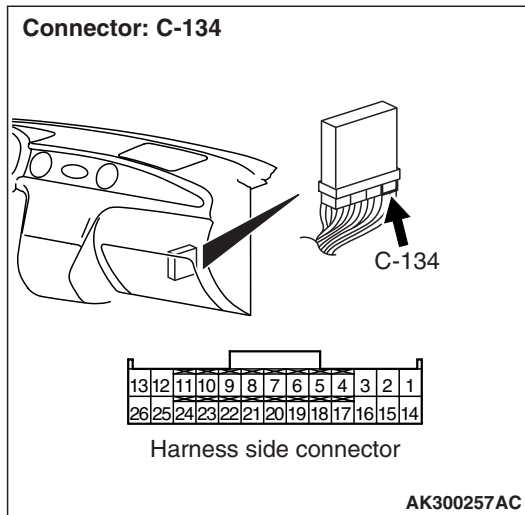
**PROBABLE CAUSE**

- Failed A/C-ECU
- Open/short circuit in A/C load signal circuit or loose connector contact
- Failed engine-ECU

**FUNCTION**

- The magnitude of the A/C compressor load is detected and input to the engine-ECU. The engine-ECU provides A/C idle up control according to the A/C compressor load condition.

## DIAGNOSIS PROCEDURE

**STEP 1. Perform voltage measurement at C-134 engine-ECU connector.**

- Measure engine-ECU terminal voltage.
- Engine: Idling
- A/C switch: ON (A/C compressor in driven state)
- Voltage between terminal No. 24 and earth

**OK:**

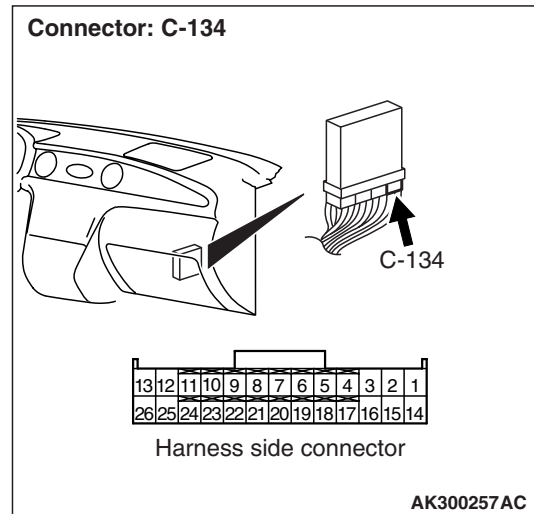
**1 V or less (when the temperate around the atmospheric air temperature sensor is 18°C or more, and the A/C is set to the lowest temperature and the maximum air flow rate)**

**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-134 engine-ECU connector**

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

**YES :** Go to Step 3 .

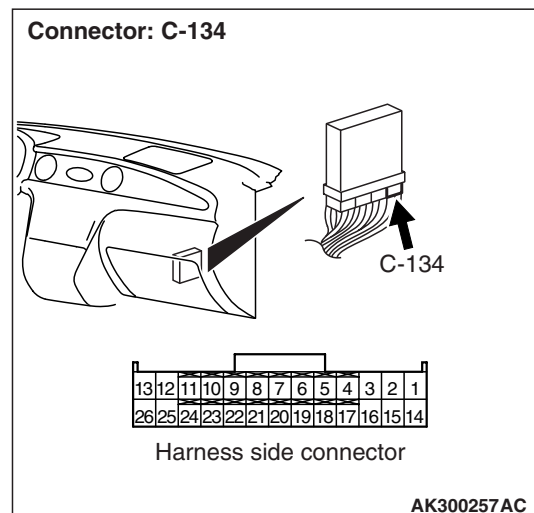
**NO :** Repair.

**STEP 3. Check the trouble symptoms.**

**Q: Does trouble symptom persist?**

**YES :** Replace engine-ECU.

**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

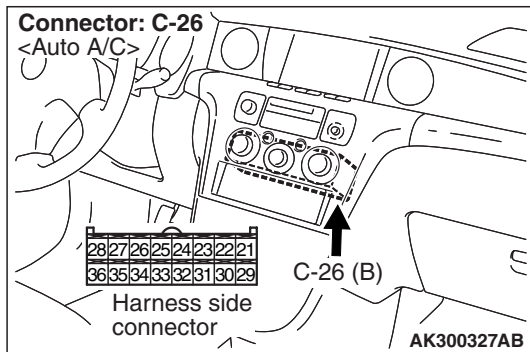
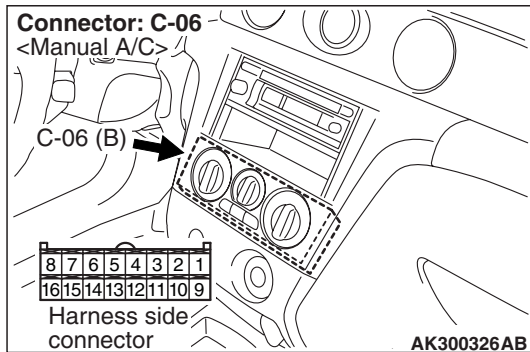
**STEP 4. Connector check: C-134 engine-ECU connector**

**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 <Manual A/C> or C-26 A/C-ECU connector <Auto A/C>.**



- 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 <Manual A/C>
- Voltage between terminal No. 32 and earth <Auto A/C>

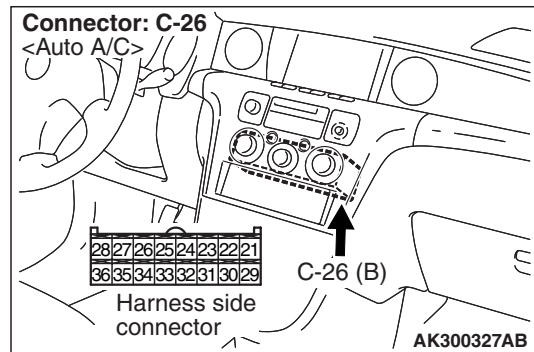
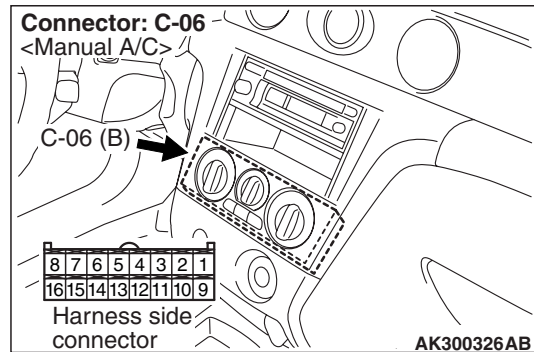
**OK: System voltage**

**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 <Manual A/C> or C-26 A/C-ECU connector <Auto A/C>**

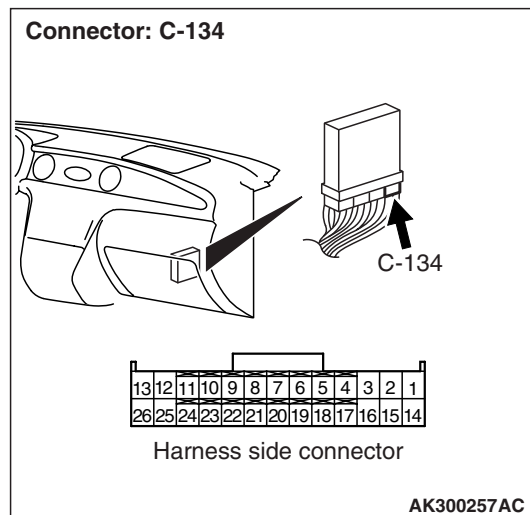
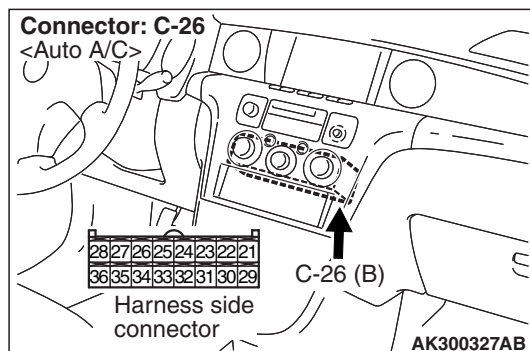
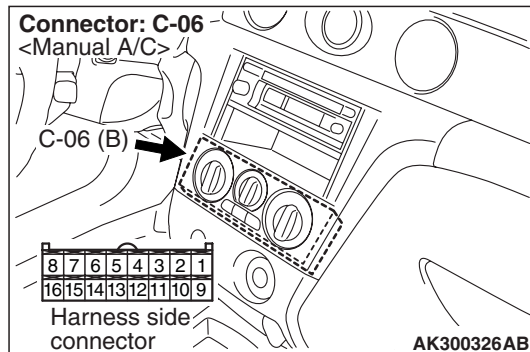


**Q: Is the check result normal?**

**YES :** Go to Step 7 .

**NO :** Repair.

**STEP 7. Check harness between C-06 (terminal No. 5) or C-26 (terminal No. 32) A/C-ECU connector and C-134 (terminal No. 24) engine-ECU connector.**



**NOTE:** Before checking harness, check intermediate connector C-104, and repair if necessary.

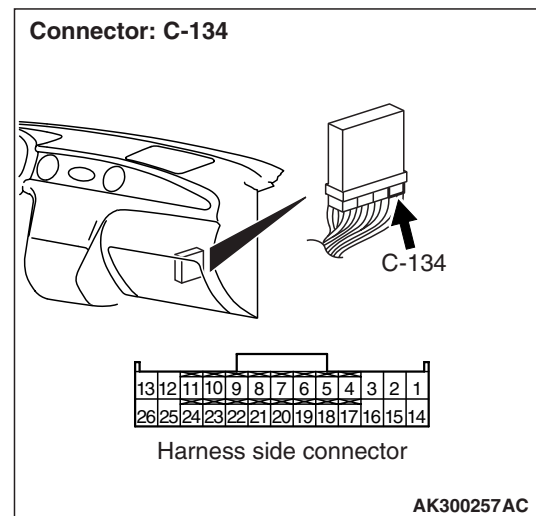
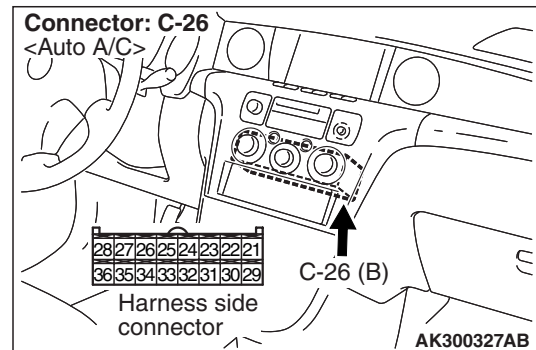
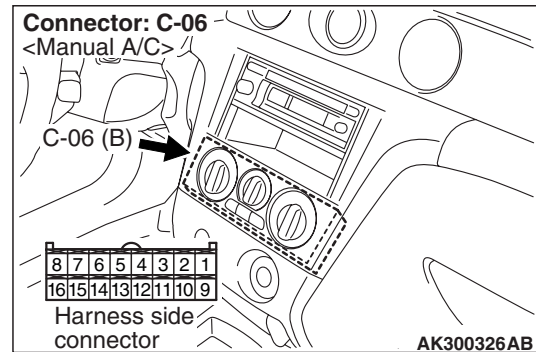
- Check output line for short circuit.

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

**YES :** Check A/C system (Refer to GROUP 55A – Troubleshooting P.55A-5).

**NO :** Repair.

**STEP 8. Check connector: C-06 A/C-ECU connector <Manual A/C> or C-26 A/C-ECU connector <Auto A/C>**



**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. 5) or C-26 (terminal No. 32) A/C-ECU connector and C-134 (terminal No. 24) engine-ECU connector.

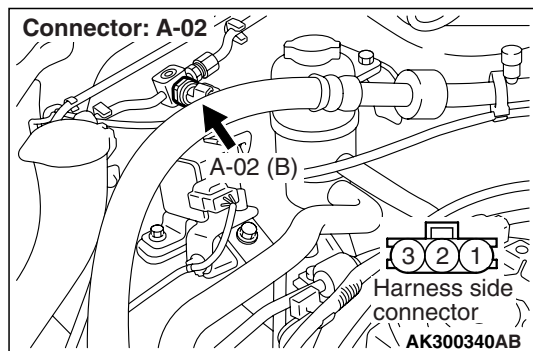
- Check output line for open circuit.

**NO :** Repair.



## DIAGNOSIS PROCEDURE

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



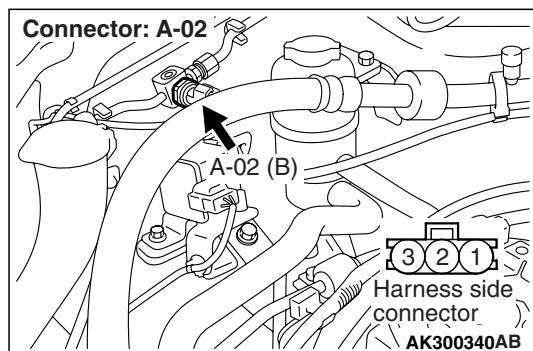
- Refer to Data list reference table [P.13A-293](#).  
a. Item 3A: A/C pressure sensor

## Q: Is the check result normal?

**YES** : Intermittent malfunction (Refer to GROUP  
00 – How to Use  
Troubleshooting/Inspection Service Points  
[P.00-6](#)).

**NO** : Go to Step 2 .

## STEP 2. Connector check: A-02 A/C pressure sensor connector

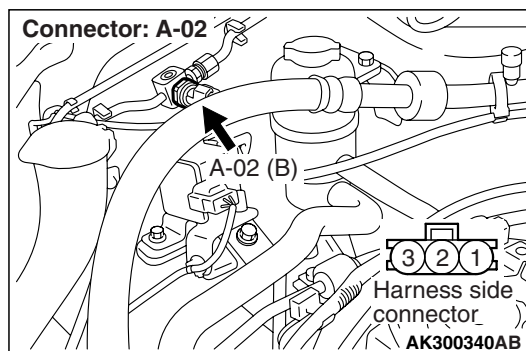


## Q: Is the check result normal?

**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.

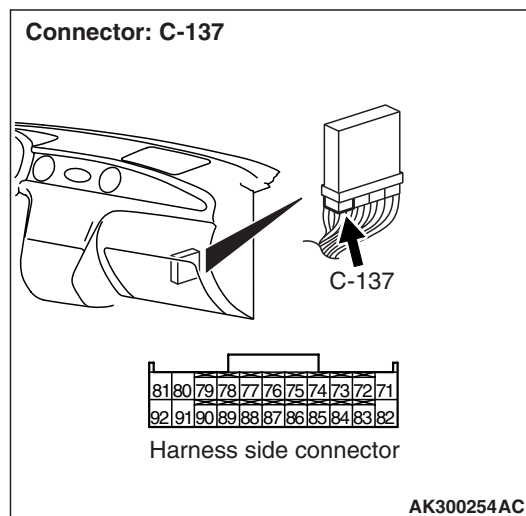
**OK: 4.9 – 5.1 V**

## Q: Is the check result normal?

**YES** : Go to Step 9 .

**NO** : Go to Step 4 .

## STEP 4. Perform voltage measurement at C-137 engine-ECU connector.



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 81 and earth.

**OK: 4.9 – 5.1 V**

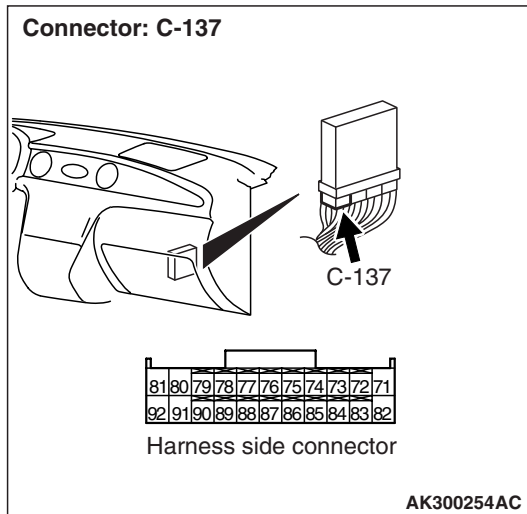
## Q: Is the check result normal?

**YES** : Go to Step 6 .

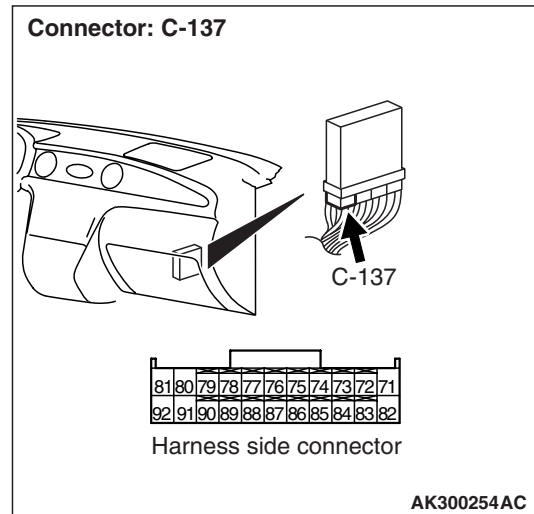
**NO** : Go to Step 5 .



**STEP 5. Connector check: C-137 engine-ECU connector**



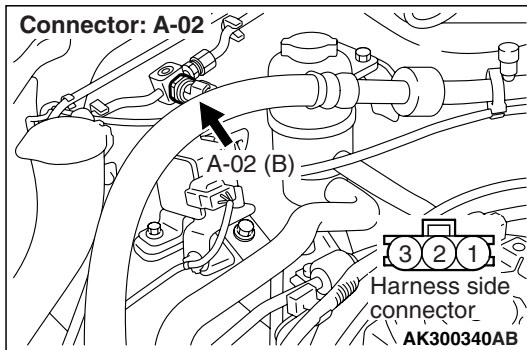
**STEP 6. Connector check: C-137 engine-ECU connector**



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

**YES :** Go to Step 7 .

**NO :** Repair.



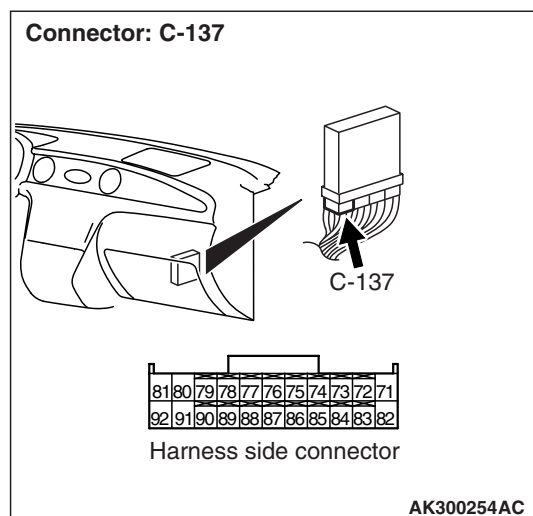
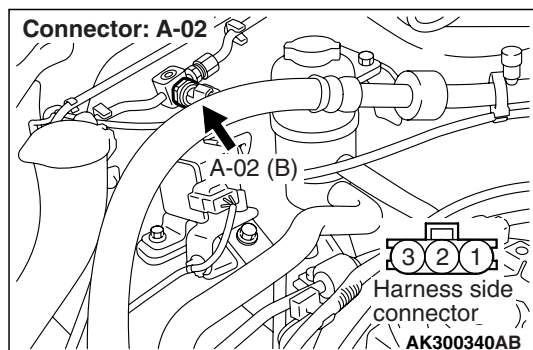
**Q: Is the check result normal?**

**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-137 (terminal No. 81) engine-ECU connector.

- Check power supply line for open circuit.

**NO :** Repair.

**STEP 7. Check harness between A-02 (terminal No. 3) A/C pressure sensor connector and C-137 (terminal No. 81) engine-ECU connector.**



**NOTE:** Before checking harness, check intermediate connector A-14, and repair if necessary.

- 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

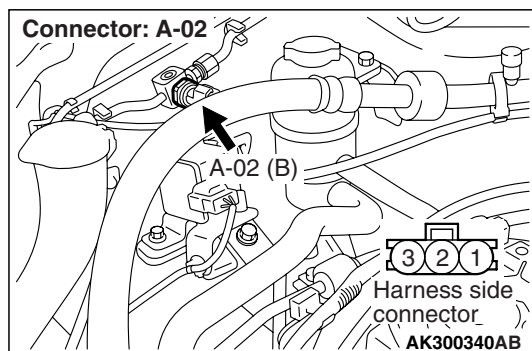
- Refer to Data list reference table [P.13A-293](#).
  - a. Item 3A: A/C pressure sensor

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

**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

**NO :** Replace engine-ECU.

**STEP 9. Perform resistance measurement at A-02 A/C pressure sensor connector.**



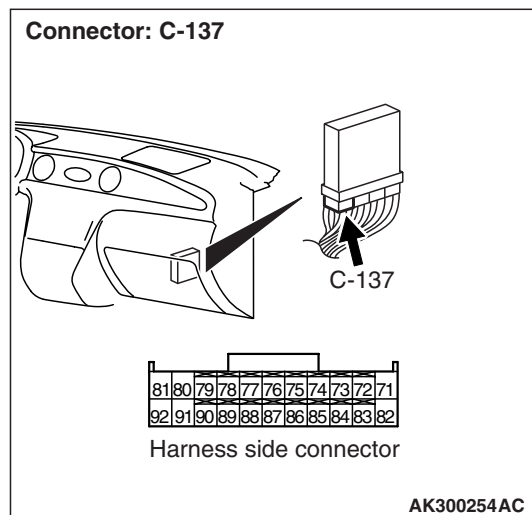
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth  
**OK: Continuity (2 Ω or less)**

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

**YES :** Go to Step 12 .

**NO :** Go to Step 10 .

**STEP 10. Connector check: C-137 engine-ECU connector**

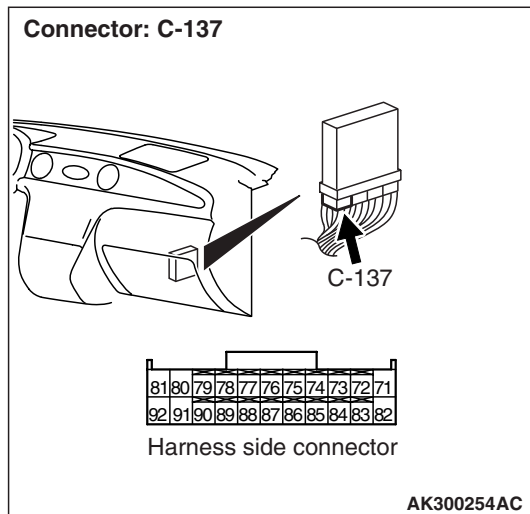
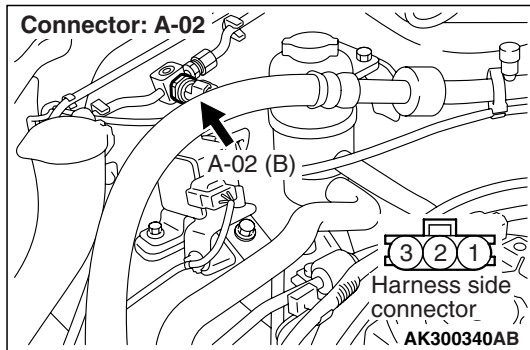


**Q: Is the check result normal?**

**YES :** Go to Step 11 .

**NO :** Repair.

**STEP 11. Check harness between A-02 (terminal No. 1) A/C pressure sensor connector and C-137 (terminal No. 92) engine-ECU connector.**



**NOTE:** Before checking harness, check intermediate connectors C-105 and C-116, and repair if necessary.

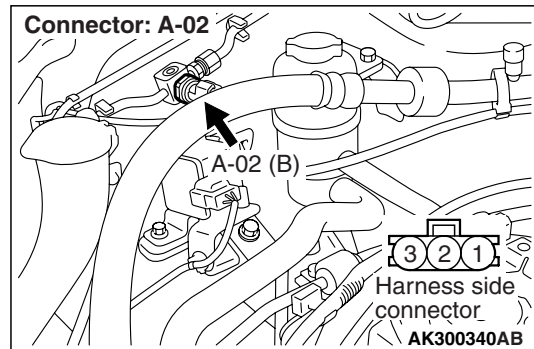
- Check earthing line for open circuit or damage.

**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.**



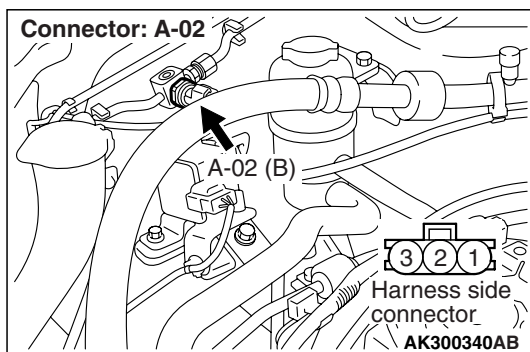
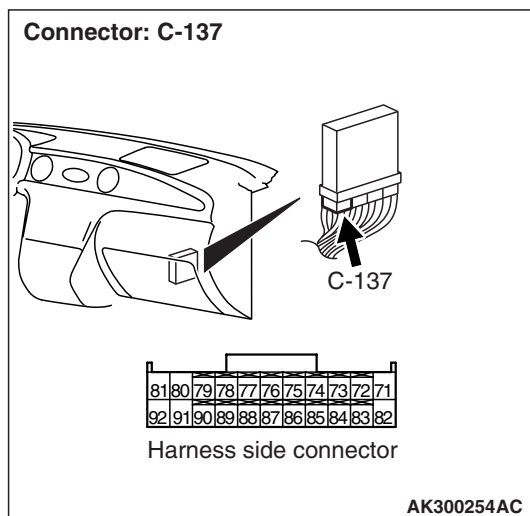
- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

**OK: 4.9 – 5.1 V**

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

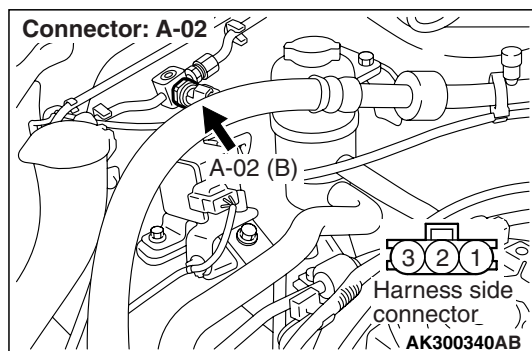
**YES :** Go to Step 14 .

**NO :** Go to Step 13 .

**STEP 13. Connector check: C-137 engine-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-137 (terminal No. 81) engine-ECU connector.
- Check power supply line for damage.

**NO :** Repair.

**STEP 14. Perform voltage measurement at A-02 A/C pressure sensor connector.**

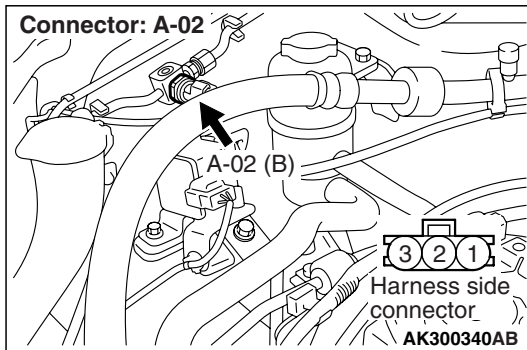
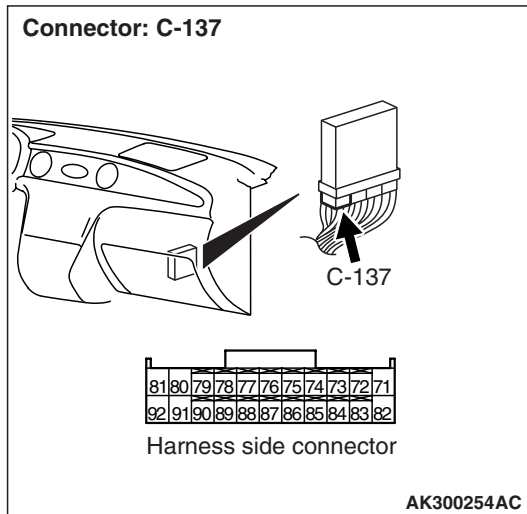
- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

**OK: 0.5 or less**

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

- YES :** Go to Step 16 .
- NO :** Go to Step 15 .

**STEP 15. Connector check: C-137 engine-ECU connector**



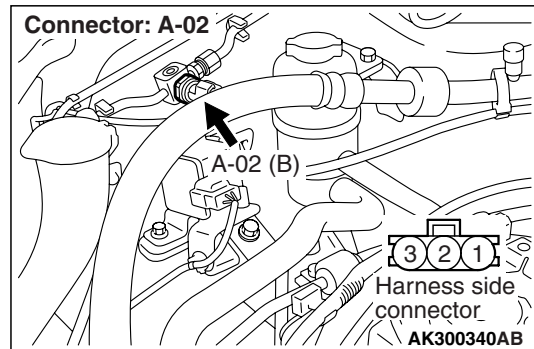
**Q: Is the check result normal?**

**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-137 (terminal No. 92) engine-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: Running at idle
- A/C switch: ON
- Voltage between terminal No. 2 and earth.

**OK:**

**1.8 – 2.0 V (A/C refrigerant pressure: 1 kPa)**

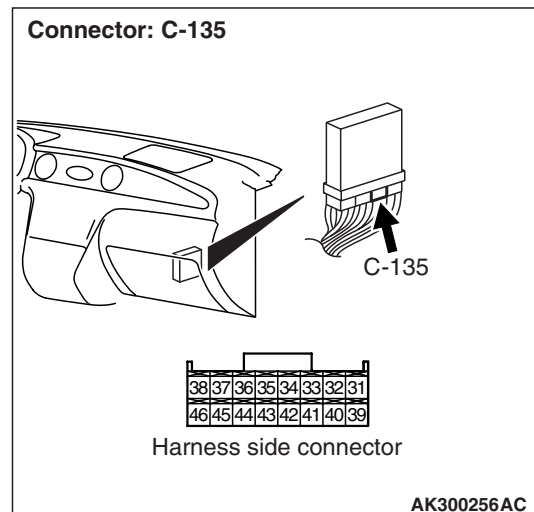
**3.23 – 3.57 V (A/C refrigerant pressure: 2 kPa)**

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

**YES :** Go to Step 19 .

**NO :** Go to Step 17 .

**STEP 17. Connector check: C-135 engine-ECU connector**

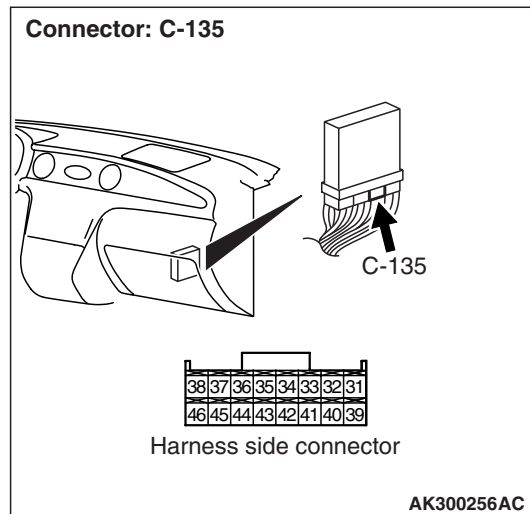
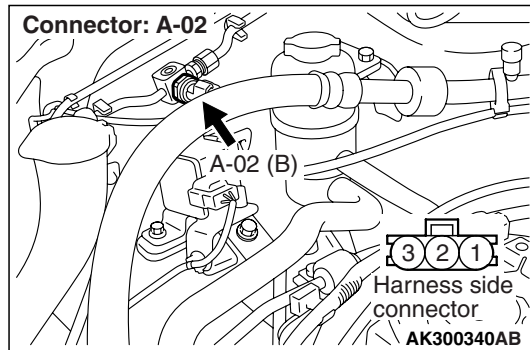


**Q: Is the check result normal?**

**YES :** Go to Step 18 .

**NO :** Repair.

**STEP 18. Check harness between A-02 (terminal No. 2) A/C pressure sensor connector and C-135 (terminal No. 42) engine-A/T-ECU connector.**



**NOTE:** Before checking harness, check intermediate connectors C-104 and C-116, and repair if necessary.

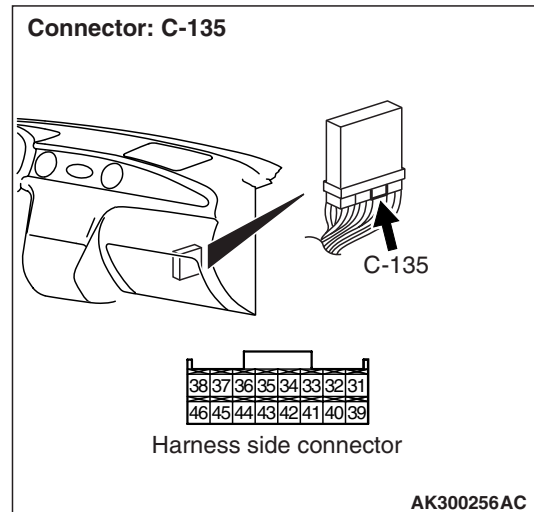
- Check output line for short circuit and damage.

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

**YES :** Replace A/C pressure sensor.

**NO :** Repair.

**STEP 19. Perform voltage measurement at C-135 engine-ECU connector.**



- Measure engine-ECU terminal voltage.
- Engine: Running at idle
- A/C switch: ON
- Voltage between terminal No. 42 and earth.

**OK:**

**1.8 – 2.0 V (A/C refrigerant pressure: 1 kPa)**

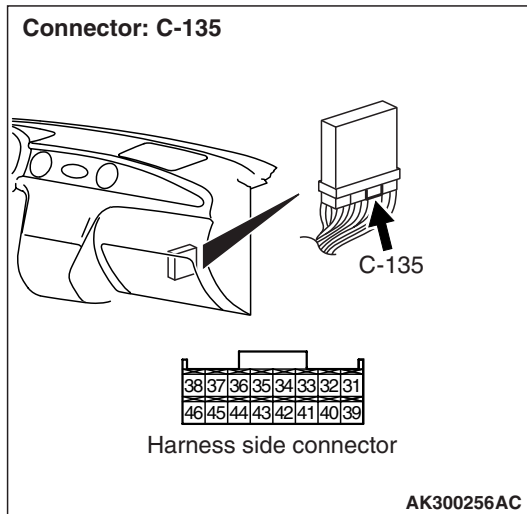
**3.23 – 3.57 V (A/C refrigerant pressure: 2 kPa)**

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

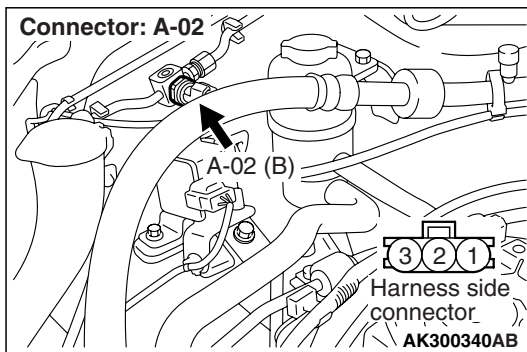
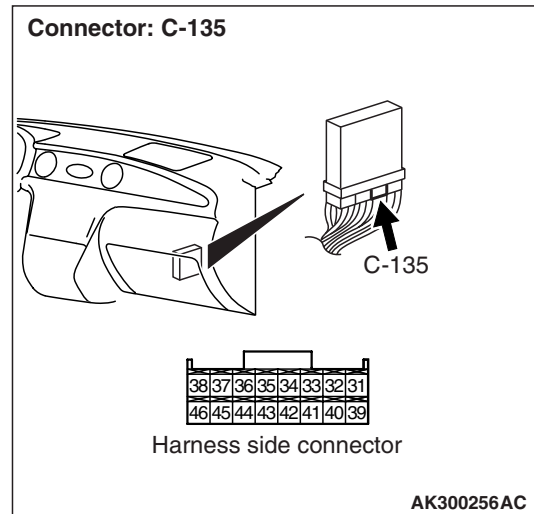
**YES :** Go to Step 21 .

**NO :** Go to Step 20 .

**STEP 20. Connector check: C-135 engine-ECU connector**



**STEP 21. Connector check: C-135 engine-ECU connector**



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

**YES :** Go to Step 8 .

**NO :** Repair.

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

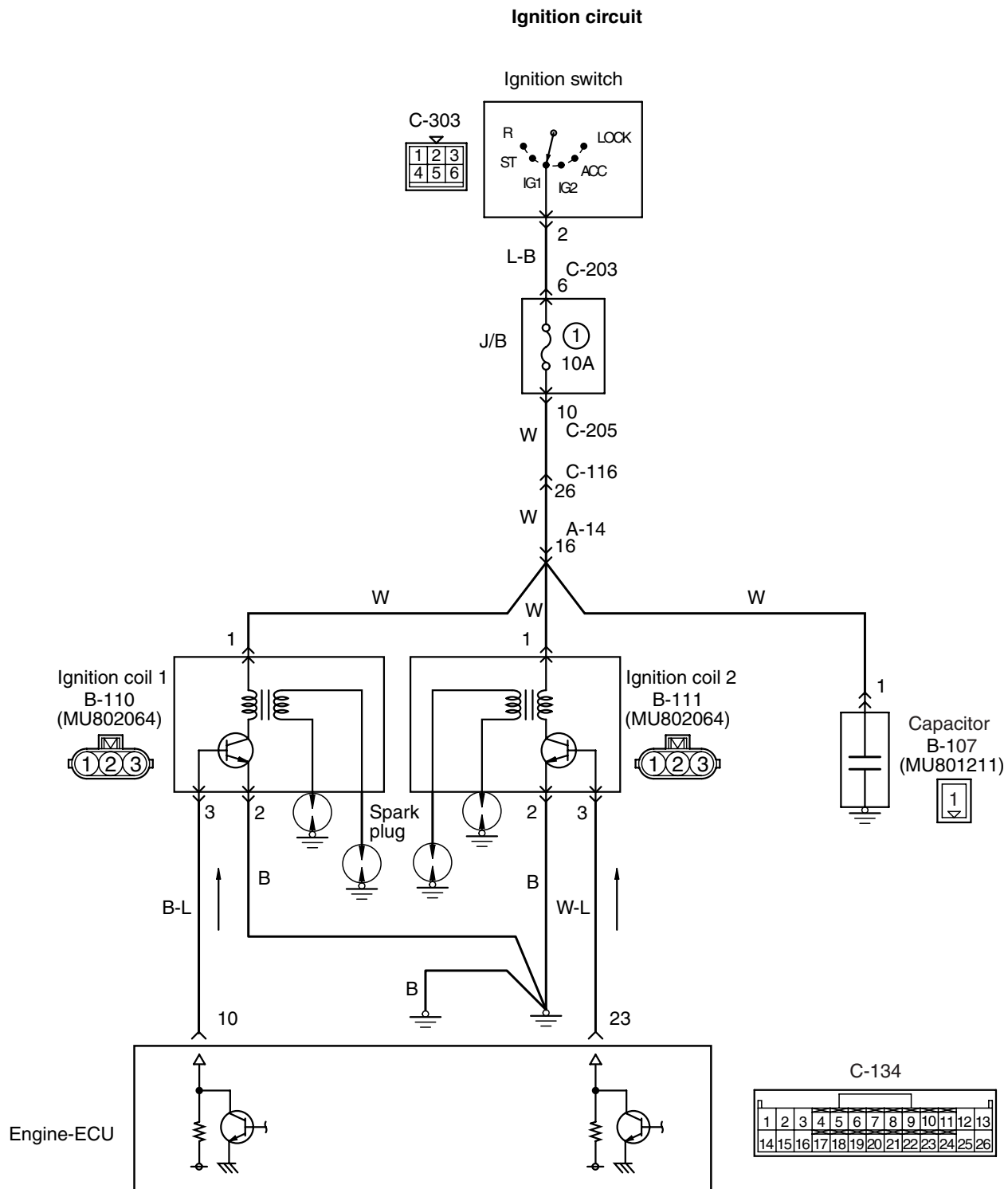
**YES :** Check intermediate connectors C-104 and C-116, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-02 (terminal No. 2) A/C pressure sensor connector and C-135 (terminal No. 42) engine-ECU connector.

- Check power supply line for open circuit and damage.

**NO :** Repair.



## Inspection Procedure 30: Ignition Circuit System



Wire colour code

B: Black LG: Light green G: Green L: Blue W: White Y: Yellow SB: Sky blue BR: Brown O: Orange GR: Gray  
R: Red P: Pink V: Violet

## 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-ECU (terminal No. 10 and No. 23).

## FUNCTION

- When the engine-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-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-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.

## 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-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.16-40](#)).

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

**YES :** Go to Step 2 .

**NO :** Replace spark plug cable.

### STEP 2. Check spark plug.

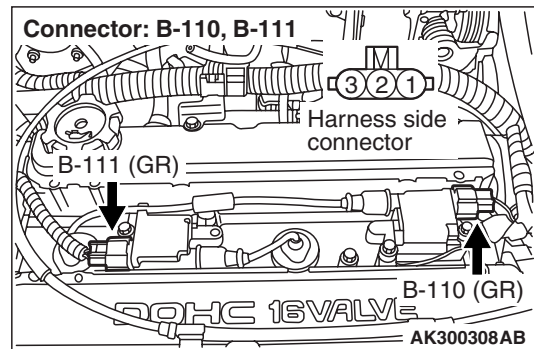
- Check spark plug (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#))

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

**YES :** Go to Step 3 .

**NO :** Replace spark plug.

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



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

**YES :** Go to Step 4 .

**NO :** Repair.

### STEP 4. Check ignition coil itself.

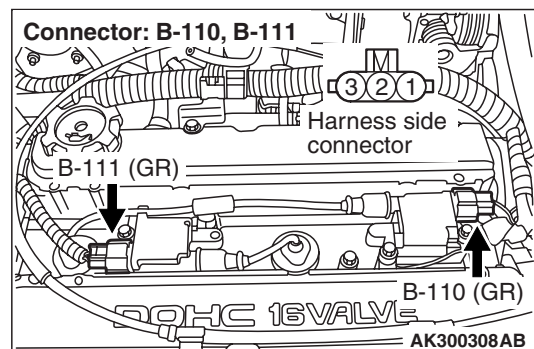
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

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

**YES :** Go to Step 5 .

**NO :** Replace ignition coil.

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



- Disconnect connector, and measure at harness side.

- Ignition switch: ON

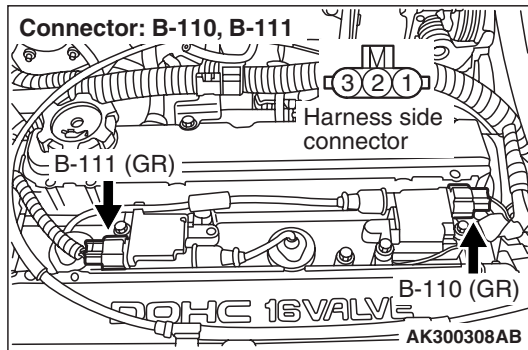
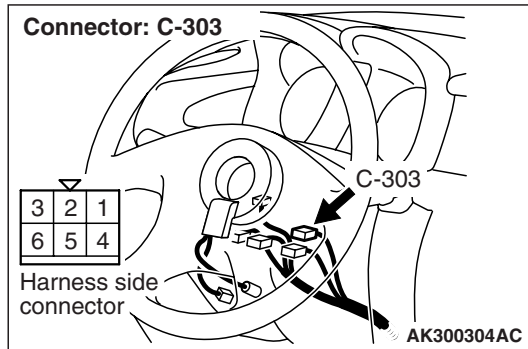
- Voltage between terminal No. 1 and earth.

**OK: System voltage**

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

**YES :** Go to Step 7 .

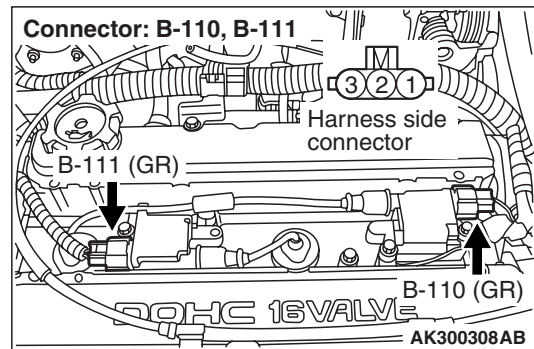
**NO :** Go to Step 6 .

**STEP 6. Connector check: C-303 ignition switch connector****Q: Is the check result normal?**

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

- Check power supply line for open/short circuit.

**NO :** Repair.

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

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

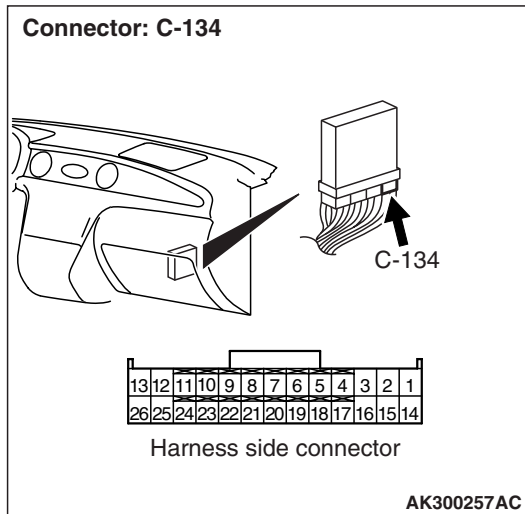
**OK: 0.5 – 4.0 V**

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

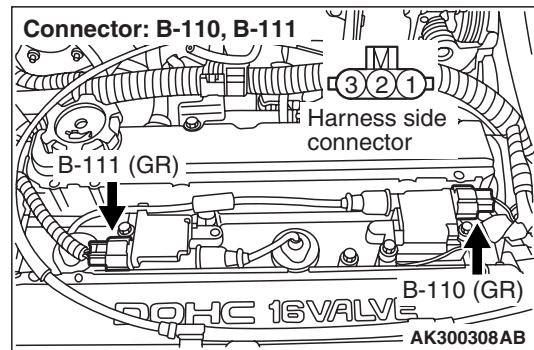
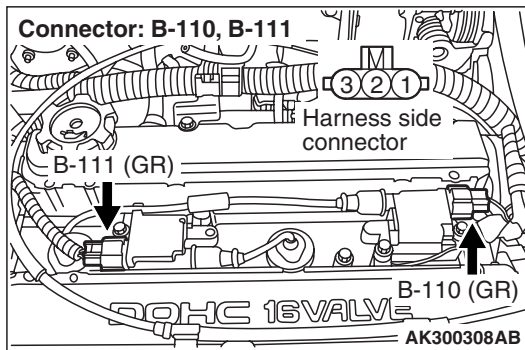
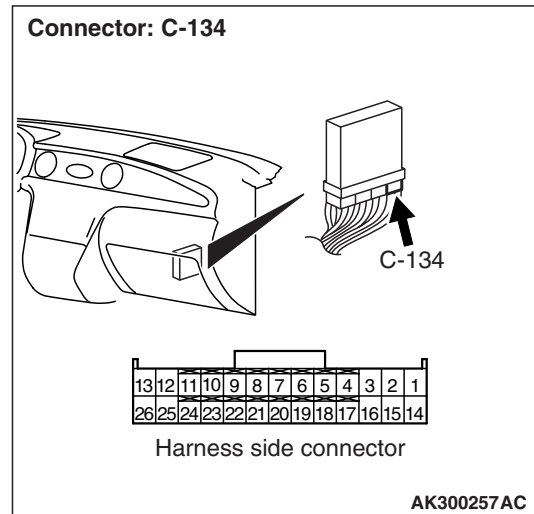
**YES :** Go to Step 13 .

**NO :** Go to Step 8 .

**STEP 8. Perform voltage measurement at C-134 engine-ECU connector.**



**STEP 9. Connector check: C-134 engine-ECU connector**



- Measure engine-ECU terminal voltage.
- Disconnect B-111 and B-110 ignition coil connectors.
- Engine: Cranking
- Voltage between terminal No. 10 and earth, also between terminal No. 23 and earth.

**OK: 0.5 – 4.0 V**

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

**YES :** Go to Step 9 .

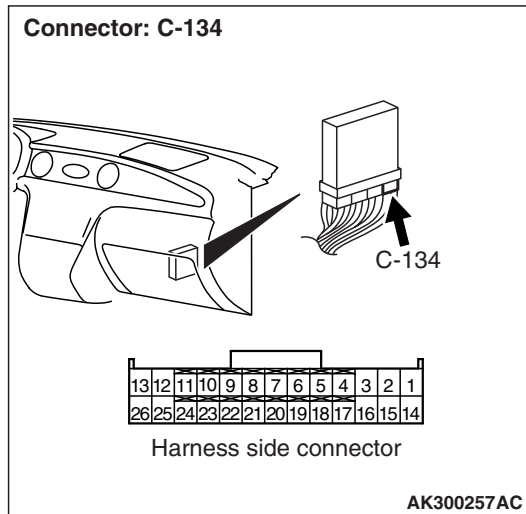
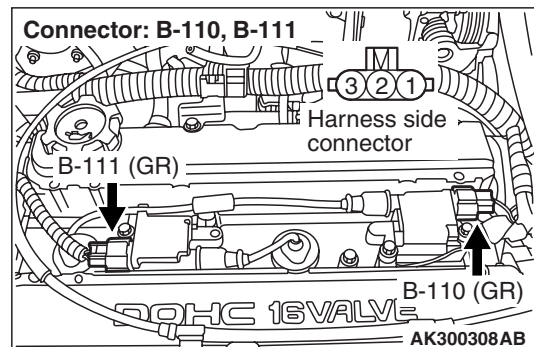
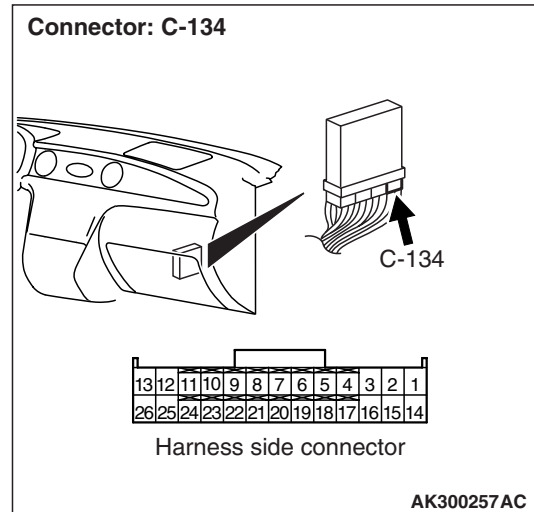
**NO :** Go to Step 10 .

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

**YES :** Check and repair harness between B-111 (terminal No. 3) ignition coil connector and C-134 (terminal No. 23) engine-ECU connector, also between B-110 (terminal No. 3) ignition coil connector and C-134 (terminal No. 10) engine-ECU connector.

- Check output line for open circuit.

**NO :** Repair.

**STEP 10. Connector check: C-134 engine-ECU connector****Q: Is the check result normal?****YES :** Go to Step 11 .**NO :** Repair.**STEP 11. Check harness between B-111 (terminal No. 3) ignition coil connector and C-134 (terminal No. 23) engine-ECU connector, also between B-110 (terminal No. 3) ignition coil connector and C-134 (terminal No. 10) engine-ECU connector.**

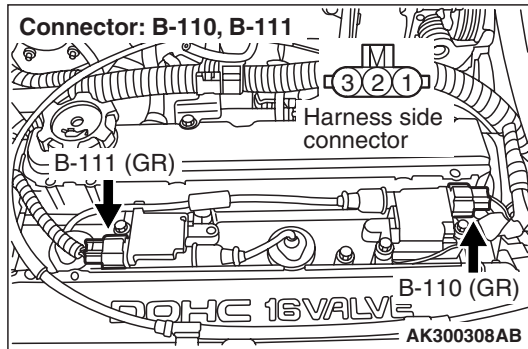
- Check output line for short circuit.

**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-ECU.**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use

Troubleshooting/Inspection Service Points

[P.00-6](#)).

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



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

**OK: Continuity ( $2\ \Omega$  or less)**

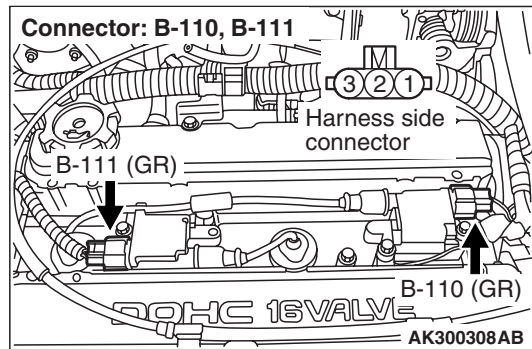
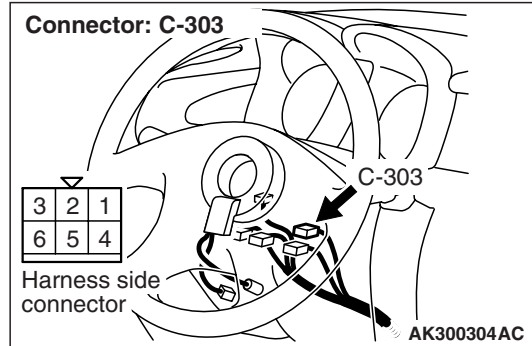
**Q: Is the check result normal?**

**YES :** Go to Step 14 .

**NO :** Check and repair harness between B-111 (terminal No. 2) ignition coil connector and body earth, also between B-110 (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-111 (terminal No. 1) ignition coil connector, also between C-303 (terminal No. 2) ignition switch connector and B-110 (terminal No. 1) ignition coil connector.**



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

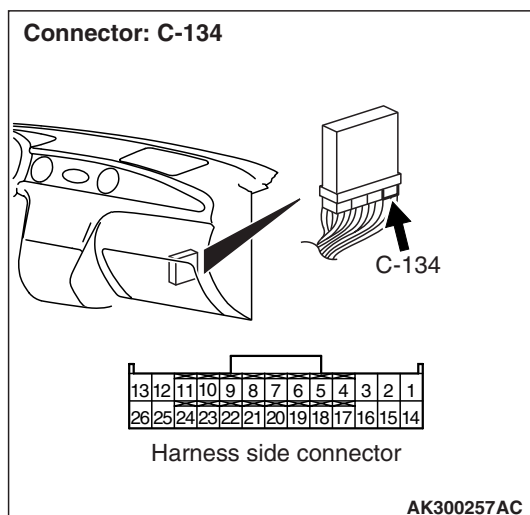
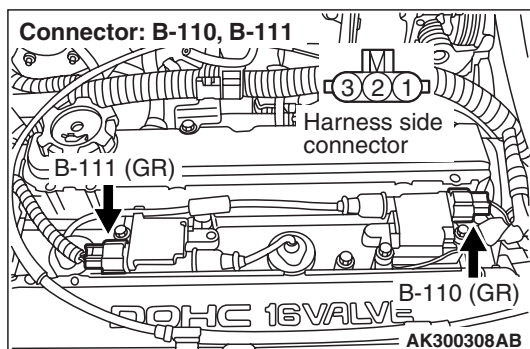
- Check power supply line for damage.

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

**YES :** Go to Step 15 .

**NO :** Repair.

**STEP 15. Check harness between B-111 (terminal No. 3) ignition coil connector and C-134 (terminal No. 23) engine-ECU connector, also between B-110 (terminal No. 3) ignition coil connector and C-134 (terminal No. 10) engine-ECU connector.**



- Check output line for damage.

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

**YES :** Go to Step 12 .

**NO :** Repair.



**Data List Reference Table**

M1131152002753

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
11	Oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	200 mV or less	Code No. P0130	P.13A-61
			At excessive acceleration	600 – 1,000 mV		
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU.	Idle operation	400 mV or less ⇔ 600 – 1,000 mV (altered)		
			2,500 r/min			
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: Neutral</li></ul>	Idle operation	16 – 24 Hz	–	–
			2,500 r/min	72 – 112 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. P0110	P.13A-36
			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. P0120	P.13A-49
			Release accelerator pedal gradually	Increased according to accelerator pedal stroke		
			Release accelerator pedal fully	4,500 – 5,000 mV		
16	Power supply voltage	Ignition switch: “ON”		System voltage	Procedure No. 23	P.13A-239
18	Cranking signal (ignition switch-ST)	Ignition switch: “ON”	Engine: Stopped	OFF	Procedure No. 23	P.13A-239
			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. P0115	P.13A-42
			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	Code No. P0335	P.13A-124
		Engine: Idle operation	Coolant temperature: -20°C	1,100 – 1,300 r/min		
			Coolant temperature: 0°C	1,100 – 1,300 r/min		
			Coolant temperature: 20°C	1,100 – 1,300 r/min		
			Coolant temperature: 40°C	940 – 1,140 r/min		
			Coolant temperature: 80°C	650 – 850 r/min		
25	Barometric pressure sensor	Ignition switch: "ON"	Altitude: 0m	101 kPa	Code No. P0105	P.13A-27
			Altitude: 600m	95 kPa		
			Altitude: 1,200m	88 kPa		
			Altitude: 1,800m	81 kPa		
27	Power steering fluid pressure switch	Engine: Idle operation	Steering wheel: Not operated	OFF	Code No. P0551	P.13A-164
			Steering wheel: Operated	ON		
28	A/C switch	Engine: Idle	AC switch: OFF	OFF	Procedure No. 26	P.13A-262
			AC switch: ON	A/C compressor is not driven		
				A/C compressor is driven		

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	13 – 33%	—	—
			2,500 r/min	12 – 32%		
			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 MAX COOL state (under high load)	2,200 mV or more	Procedure No. 29	<a href="#">P.13A-277</a>
			A/C in MAX 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)	5.6 – 8.4 ms	—	—
			Coolant temperature: 20°C	5.6 – 8.4 ms		
			Coolant temperature: 80°C	5.6 – 8.4 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: Neutral</li> </ul>	Idle operation	2.0 – 3.2 ms		
			2,500 r/min	2.2 – 3.4 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	Procedure No. 30	<a href="#">P.13A-286</a>
			2,500 r/min	18 – 38°BTDC		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
45	ISC (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: Neutral</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		
49	A/C relay	Engine: After warm-up, idle operation after warm-up	A/C switch: OFF	OFF	Procedure No. 27	P.13A-273
			A/C switch: ON	A/C compressor is not driven		
				A/C compressor is driven		
59	Oxygen sensor (rear)	Engine: After warm-up	At excessive acceleration	0 mV or less ⇔ 600 - 1,000 mV (altered)	Code No. P0136	P.13A-72
12*5	Air flow sensor	<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: Neutral</li> </ul>	Idle operation	0.9 – 4.9 g/s	–	–
			2,500 r/min	7.2 – 13.2 g/s		
			Acceleration	According to acceleration, frequency is amplified.		
13*5	Intake air temperature sensor	Ignition switch: "ON" or engine running	Intake air temperature: –20°C	–20°C	Code No. P0110	P.13A-36
			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		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
21 *5	Engine coolant temperature sensor	Ignition switch: "ON" or engine running	Coolant temperature: -20°C	-20°C	Code No. P0115	<a href="#">P.13A-42</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 *5	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	1,100 – 1,300 r/min		
			Coolant temperature: 0°C	1,100 – 1,300 r/min		
			Coolant temperature: 20°C	1,100 – 1,300 r/min		
			Coolant temperature: 40°C	940 – 1,140 r/min		
			Coolant temperature: 80°C	650 – 850 r/min		
24 *5	Vehicle speed sensor	Drive 40 km/h		Approximately 40 km/h	Code No. P0500	<a href="#">P.13A-156</a>
44 *5	Ignition advance	• Engine: After warm-up • Install timing light (for use to measure actual ignition timing)	Idle operation	2 – 18 deg	—	—
			2,500 r/min	18 – 38 deg		
81 *5	Long-term fuel compensation	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		-12.5 – 12.5%	Code No. P0170	<a href="#">P.13A-83</a>
82 *5	Short-term fuel compensation	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		-25 – 25%	Code No. P0170	<a href="#">P.13A-83</a>
87 *5	Calculation load value	Engine: After warm-up	Idle operation	13 – 33%	—	—
			2,500 r/min	12 – 32%		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
88 *5	Fuel control condition	Engine: After warm-up	2,500 r/min	Closed loop	—	—
			Acceleration	Open loop-drive condition		
8A *5	Throttle position sensor (Throttle opening angle)	Ignition switch: "ON"	Set to Idle position	0 – 10%	Code No. P0120	P.13A-49
			Release accelerator pedal gradually	Increased according to accelerator pedal stroke		
			Release accelerator pedal fully	80 – 100%		
A1 *5	Oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	0.2 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0130	P.13A-61
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU.	Idle operation 2,500 r/min	0.4 V or less ⇔ 0.6 – 1 V (altered)		
A1 *5	Oxygen sensor (rear)	Engine: After warm-up	At excessive acceleration	0 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0136	P.13A-72

**⚠ 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 approx. 10%.*

*NOTE: \*2: Injector drive time ranges shown are when power voltage is 11 V and the cranking speed is 250 r/min. or less.*

*NOTE: \*3: On the new vehicle (mileage: 500 km or less), injector drive time may be longer by approx. 10%.*

*NOTE: \*4: On the new vehicle (mileage: 500 km or less), the number of steps of stepper motor may be larger by approx. 30 steps.*

*NOTE: \*5: When service data in check mode is selected, the data is not displayed.*

## Actuator Test Reference Table

M1131152500644

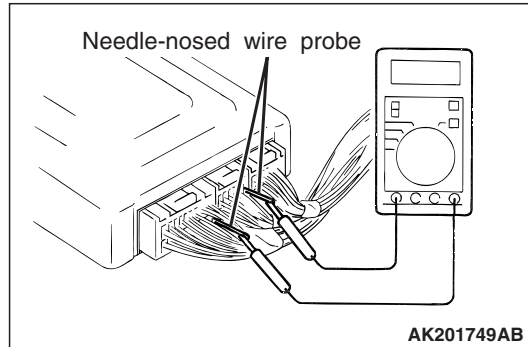
Item No.	Inspection item	Drive content	Inspection conditions		Normal condition	Code No. /Inspection procedure No.	Reference page
01	Injector	Cut off No. 1 injector	Engine: After warm-up, idle operation (Cut off injectors sequentially to check for a cylinder that does not change engine in idle status.		Engine is changed (becomes unstable or stalled)	Code No. P0201	<a href="#">P.13A-87</a>
02		Cut off No. 2 injector				Code No. P0202	<a href="#">P.13A-92</a>
03		Cut off No. 3 injector				Code No. P0203	<a href="#">P.13A-97</a>
04		Cut off No. 4 injector				Code No. P0204	<a href="#">P.13A-102</a>
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-247</a>
				Check for pump operating noise near fuel tank	Operating noise audible		
08	Purge control solenoid valve	Switch solenoid valve from OFF to ON	Ignition switch: "OFF"		When the valve is actuated, operating noise is audible	Code No. P0443	<a href="#">P.13A-148</a>
10	EGR control solenoid valve	Switch solenoid valve from OFF to ON	Ignition switch: "ON"		When the valve is actuated, operating noise is audible.	Code No. P0403	<a href="#">P.13A-142</a>
17	Basic ignition timing	Switch engine-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-235</a>



## CHECK AT THE ECU TERMINALS

M1131153500960

## 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-ECU connector terminals from the wire side, and measure the voltage while referring to the check chart.

## NOTE:

1. Make the voltage measurement with the engine-ECU connector connected.
2. You may find it convenient to pull out the engine-ECU to make it easier to reach the connector terminals.
3. The checks can be carried out off the order given in the chart.

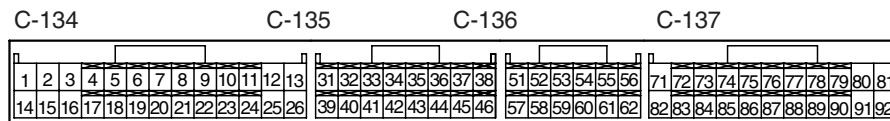
**CAUTION**

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU or all of them. Be careful to prevent this!

3. If voltmeter shows any division 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-ECU Connector Terminal Arrangement

Engine-ECU Connector



AK300342AB

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
14	No. 2 injector		
2	No. 3 injector		
15	No. 4 injector		
4	Stepper motor coil <A1>	<ul style="list-style-type: none"> <li>• Engine: Soon after the warmed up engine is star</li> <li>• A/C switch: OFF → ON (A/C compressor is operating)</li> </ul>	System voltage ⇔ 1 V or less (Changes repeatedly)
17	Stepper motor coil <A2>		
5	Stepper motor coil <B1>		
18	Stepper motor coil <B2>		
6	EGR control solenoid Valve	Ignition switch: "ON"	System Voltage
		While engine is idling, suddenly depress the accelerator pedal.	From system voltage, momentarily drops

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
8	A/C relay	<ul style="list-style-type: none"> <li>Engine: Idle speed</li> <li>A/C switch: OFF → ON (A/C compressor is operating)</li> </ul>		System voltage or Momentarily 6V or more → 1 V or less
9	Purge control solenoid valve	Ignition switch: "ON"		System voltage
		Running at 3,500 r/min while engine is warming up after having been started.		1 V or less
10	Ignition coil – No. 1, No. 4	Engine r/min: 3,000 r/min		0.3 – 3.0 V
23	Ignition coil – No. 2, No. 3			
12	Power supply	Ignition switch: "ON"		System voltage
25				
19	Air flow sensor reset Signal	Engine: Idle speed		0 – 1 V
		Engine r/min: 3,000 r/min		6 – 9 V
21	Fan controller	Radiator and condenser fan is not operating		0 – 0.3 V
		Radiator and condenser fan is operating		0.7 V or more
22	Fuel pump relay	Ignition switch: ON		System voltage
		Engine: Idle speed		1 V or less
24	A/C load signal	Refer to GROUP 55 - Troubleshooting (Inspection at the Automatic compressor - ECU Terminal)		
33	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
36	Engine warming lamp	Ignition switch: "LOCK" (OFF) → "ON"		1 V or less → System voltage (After several seconds have elapsed)
37	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
38	Control relay (Power supply)	Ignition switch: "LOCK" (OFF)		System voltage
		Ignition switch: "ON"		1 V or less
41	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
42	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 "MAX, COOL" condition (when the load by A/C is high)	2.2 V or more
			When A/C is "MAX, HOT" condition (when the load by A/C is low)	1.8 V or less

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
45	A/C switch	Engine: Idle speed	Turn the A/C switch OFF	0.5 V or less
			Turn the A/C switch ON (A/C compressor is operating)	System voltage
54	Oxygen sensor heater (rear)	Engine: Idling after warming up		1 V or less
		Engine: Racing		System voltage
58	Tachometer signal	Engine: 3,000 r/min		0.3 – 3.0 V
60	Oxygen sensor heater (front)	Engine: Idling after warming up		1 V or less
		Engine: 5,000 r/min		System voltage
71	Ignition switch – ST	Engine: Cranking		8 V or more
72	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
75	Oxygen sensor (rear)	Engine: Idling after warmed up (Check using a digital type voltmeter)		0 ⇔ 0.6 V (Changes repeatedly)
76	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)		0 ⇔ 0.8 V (Changes repeatedly)
80	Backup power supply	Ignition switch: "LOCK" (OFF)		System voltage
81	Sensor impressed voltage	Ignition switch: "ON"		4.9 – 5.1 V
82	Ignition switch – IG	Ignition switch: "ON"		System voltage

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
83	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
84	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
85	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
86	Vehicle speed sensor	• Ignition switch: "ON" • Move the vehicle forward slowly		0 ⇔ 5 V Changes repeatedly
88	Camshaft position sensor	Engine: Cranking		0.4 – 3.0 V
		Engine: Idling		1.5 – 3.0 V
89	Crank angle sensor	Engine: Cranking		0.4 – 4.0 V
		Engine: Idling speed		1.5 – 2.5 V
90	Air flow sensor	Engine: Idle speed		2.2 – 3.2 V
		Engine: 2,500 r/min		

**CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS**

1. Turn the ignition switch to "LOCK" (OFF) position.
2. Disconnect the engine-ECU connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU harness-side connector while referring to the check chart.

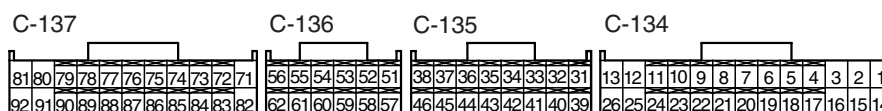
**NOTE:**

1. When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.
2. 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-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-ECU Harness Side Connector Terminal Arrangement****Engine-ECU Harness Side Connector**

AK300343AB

Terminal No.	Inspection item	Normal condition (Check condition)
1 – 12	No. 1 injector	13 – 16 $\Omega$ (At 20°C)
12 – 14	No. 2 injector	
2 – 12	No. 3 injector	
12 – 15	No. 4 injector	
4 – 12	Stepper motor coil (A1)	26 – 33 $\Omega$ (At 20°C)
12 – 17	Stepper motor coil (A2)	
5 – 12	Stepper motor coil (B1)	
12 – 18	Stepper motor coil (B2)	
6 – 12	EGR control solenoid valve	29 – 35 $\Omega$ (At 20°C)
9 – 12	Purge control solenoid valve	29 – 35 $\Omega$ (At 20°C)
12 – 54	Oxygen sensor heater(rear)	11 – 18 $\Omega$ (At 20°C)
12 – 60	Oxygen sensor heater(front)	4.5 – 8.0 $\Omega$ (At 20°C)
13 – Body earth	ECU earth	Continuity (2 $\Omega$ or less)
26 – Body earth		

Terminal No.	Inspection item	Normal condition (Check condition)
81 – 83	Engine coolant temperature sensor	14 – 17 k $\Omega$ (When coolant temperature is –20°C)
		5.1 – 6.5 k $\Omega$ (When coolant temperature is 0°C)
		2.1 – 2.7 k $\Omega$ (When coolant temperature is 20°C)
		0.9 – 1.3 k $\Omega$ (When coolant temperature is 40°C)
		0.48 – 0.68 k $\Omega$ (When coolant temperature is 60°C)
		0.26 – 0.36 k $\Omega$ (When coolant temperature is 80°C)
72 – 81	Intake air temperature sensor	13 – 17 k $\Omega$ (When intake air temperature is –20°C)
		5.3 – 6.7 k $\Omega$ (When intake air temperature is 0°C)
		2.3 – 3.0 k $\Omega$ (When intake air temperature is 20°C)
		1.0 – 1.5 k $\Omega$ (When intake air temperature is 40°C)
		0.56 – 0.76 k $\Omega$ (When intake air temperature is 60°C)
		0.30 – 0.42 k $\Omega$ (When intake air temperature is 80°C)

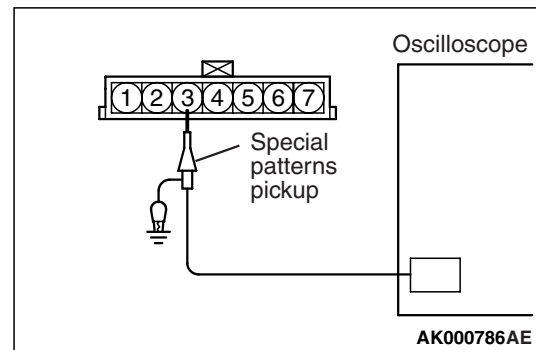
## INSPECTION PROCEDURE USING OSCILLOSCOPE

M1131154500736

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)

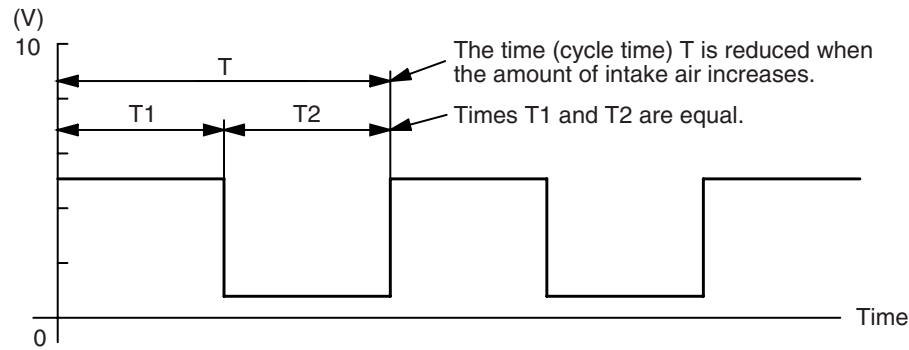
1. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 90.

Standard Wave Pattern

Observation conditions

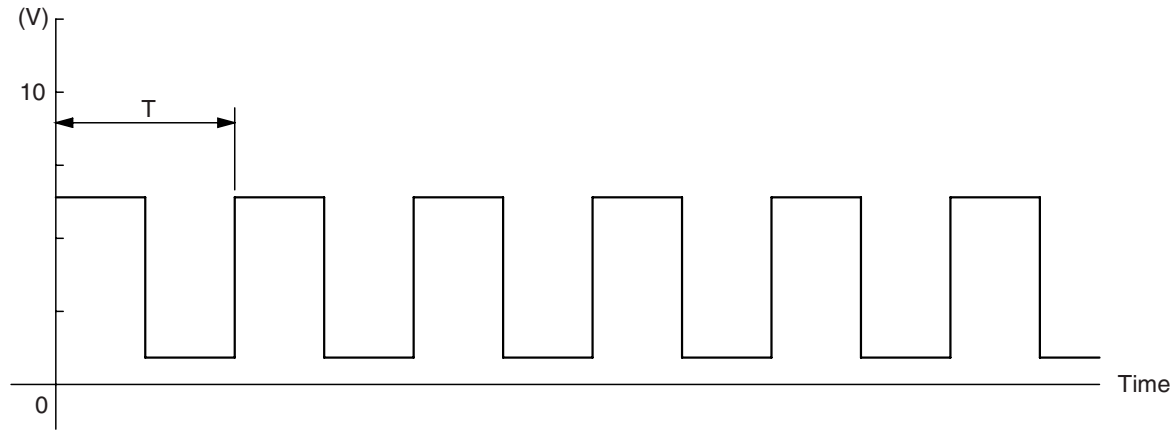
Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine	Idle

Standard wave pattern



AK202334AB

Observation conditions (from conditions above engine is increased by racing.)



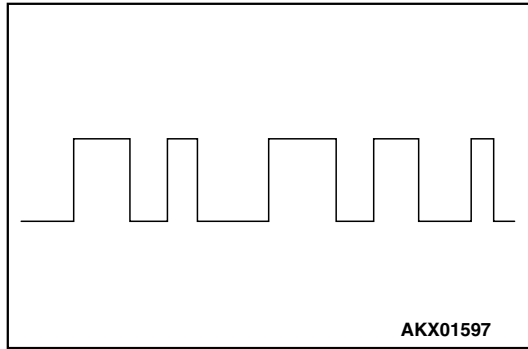
AK202335AB

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**

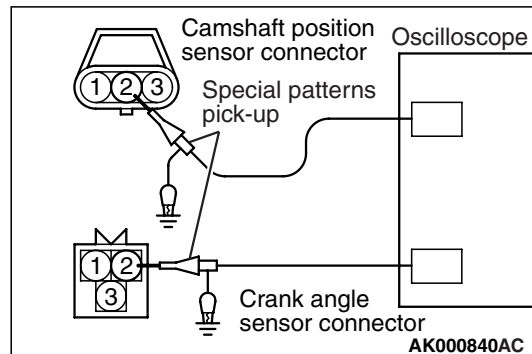
Damaged rectifier or vortex generation column

**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)

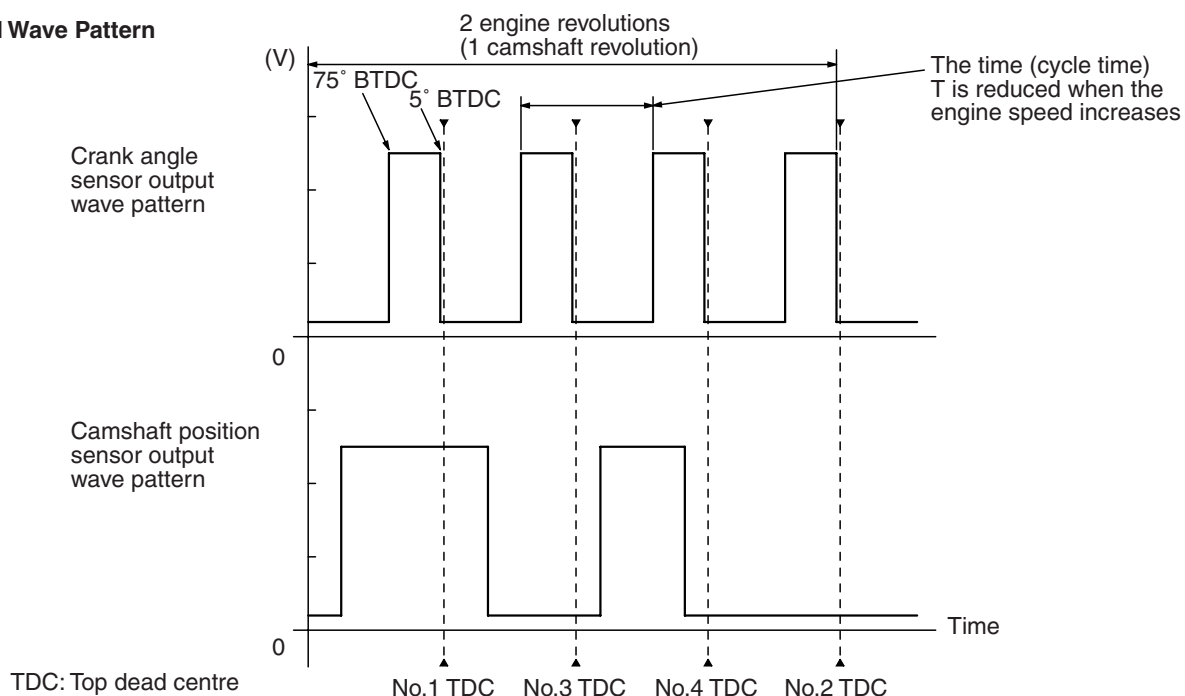
1. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 88 (When checking the camshaft position sensor signal wave pattern).
2. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 89 (When checking the crank angle sensor signal wave pattern).

## Standard Wave Pattern

### Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine speed	Idle

### Standard Wave Pattern



AK202336AB

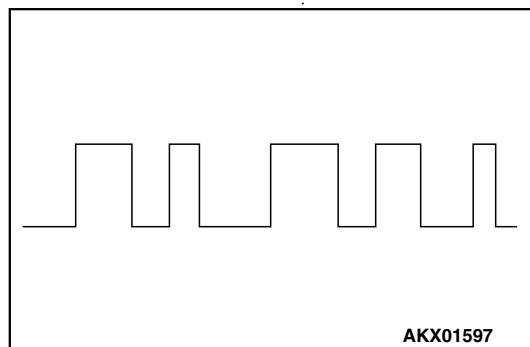
## Wave Pattern Observation Points

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.

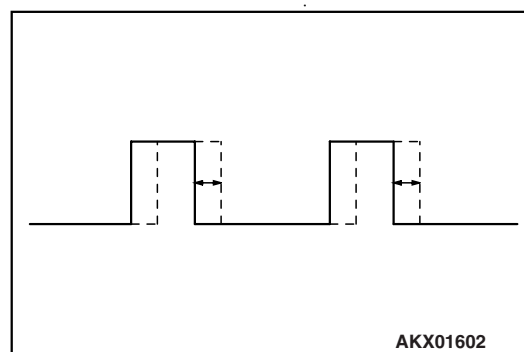
## Examples of Abnormal Wave Patterns



Example 1

### Cause of problem

Sensor interface malfunction



Example 2

### Cause of problem

Loose timing belt

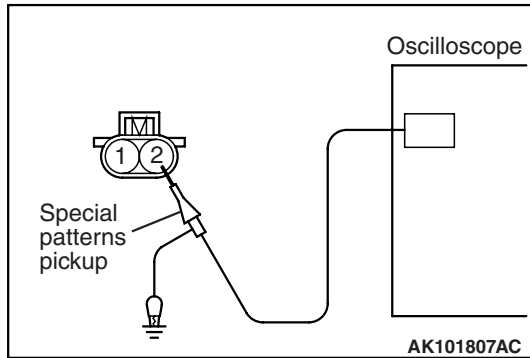
Abnormality in sensor disk

### 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)

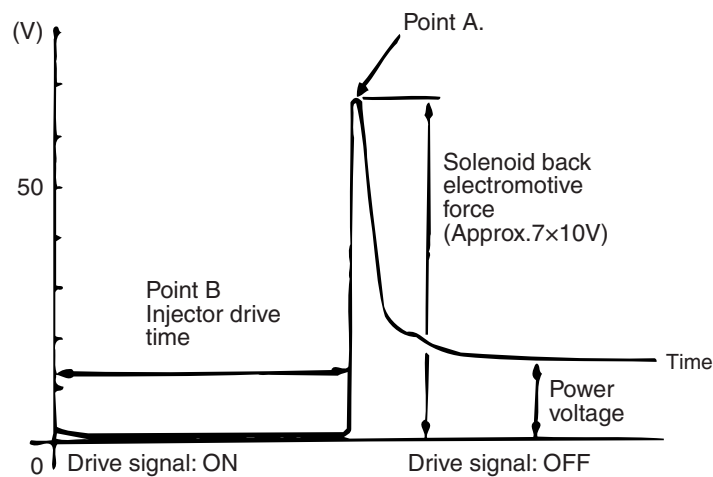
1. Connect the oscilloscope special patterns pickup to engine- ECU terminal No. 1 (When checking the No. 1 cylinder).
2. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 14 (When checking the No. 2 cylinder).
3. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 2 (When checking the No. 3 cylinder).
4. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 15 (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	Idle

### Standard wave pattern

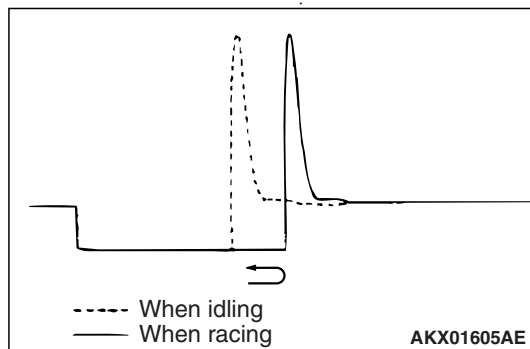


**Wave Pattern Observation Points**

Point A: Height of solenoid back electromotive force

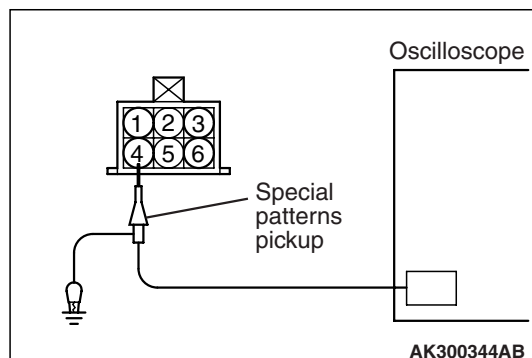
Contrast with standard wave pattern	Probable cause
Solenoid coil back electromotive force is low or doesn't appear at all.	Short in the injector solenoid

Point B: Injector drive time



The injector drive time will be synchronized with the M.U.T.-II/III 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 (ISC) SERVO (STEPPER MOTOR)****Measurement Method**

1. Disconnect the ISC servo connector, and connect the special tool Test harness (MB991709) in between.
2. Connect the oscilloscope special patterns pickup to the ISC servo-side connector terminal No. 1, No. 3, No. 4 and No. 6 respectively.

**Alternate Method (Test harness not available)**

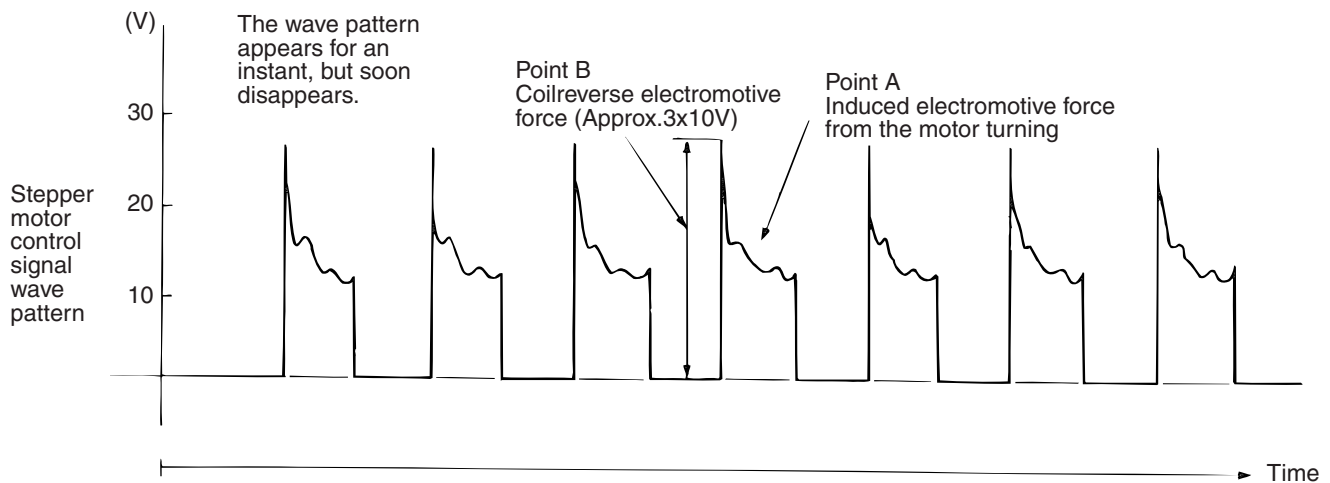
1. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 4, connection terminal No. 5, connection terminal No. 17, and connection terminal No. 18 respectively.

## 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



AK201857AB

## Wave pattern Observation Points

Check that the standard wave pattern appears when the stepper motor is operating.

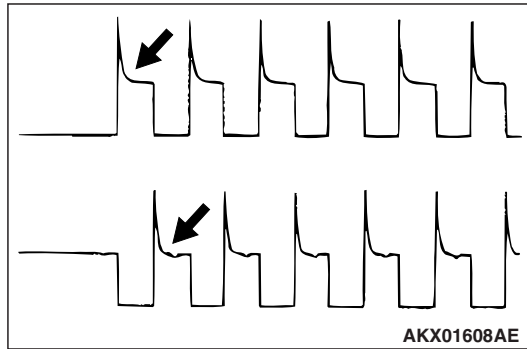
Point A: Presence or absence of induced electromotive force from the motor turning (Refer to the abnormal wave pattern).

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



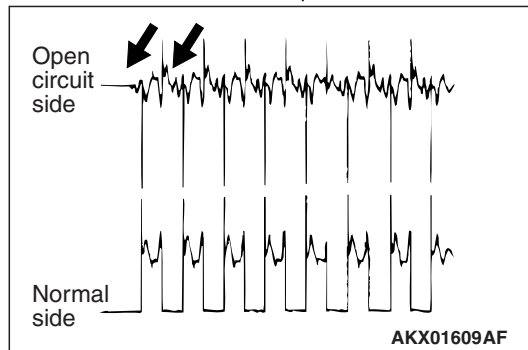
Example 1

**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

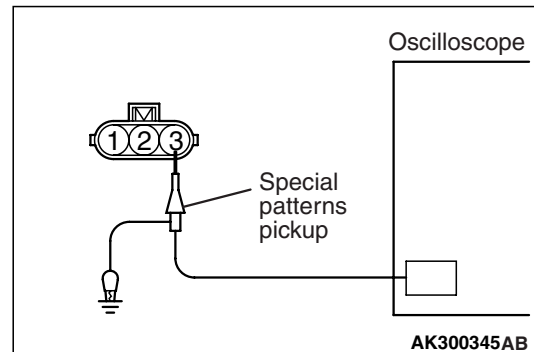
**Cause of problem**

Open circuit in the line between the stepper motor and the engine-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)**

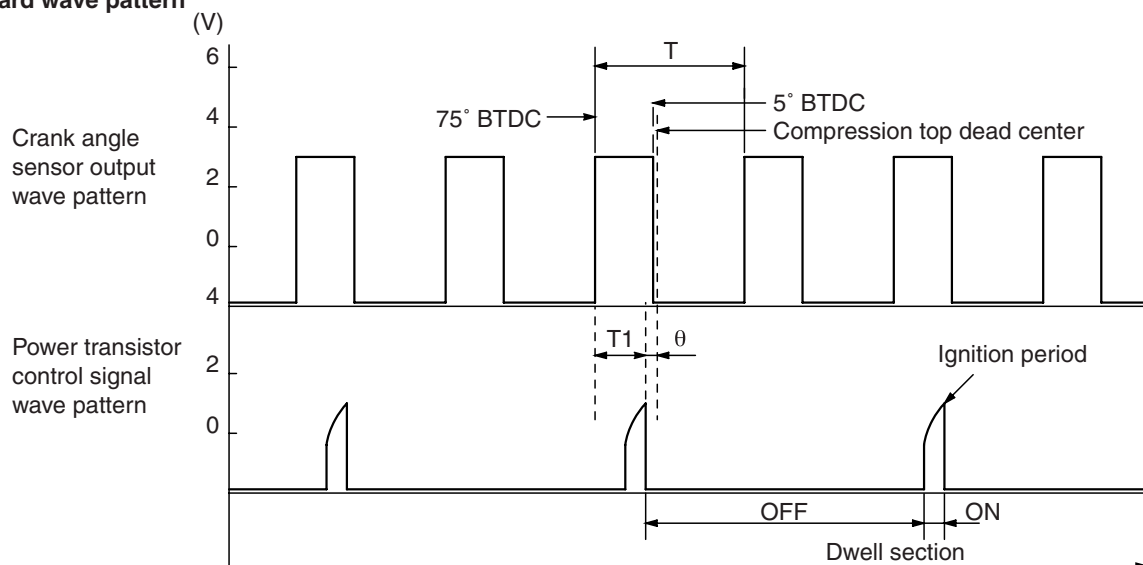
1. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 10 (No. 1 – No. 4), connection terminal No. 23 (No. 2 – No.3) respectively.

## 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°

$T_1$  : Time computed by the engine-ECU

$\theta$  : Spark advance angle

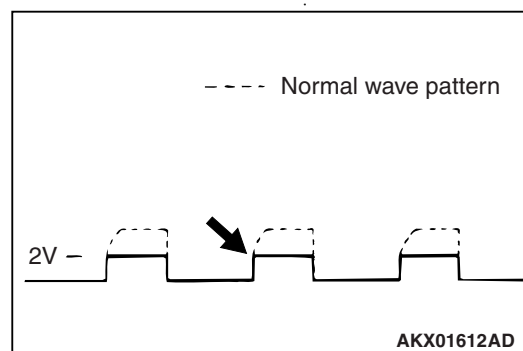
AK204435AC

## 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

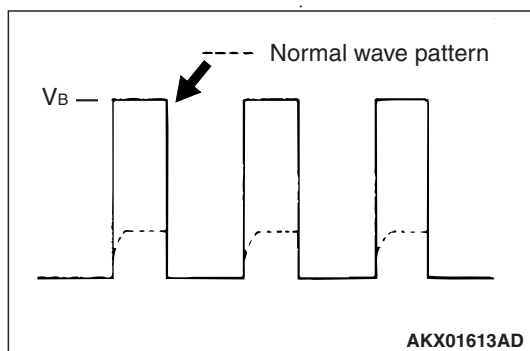
### Cause of problem

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

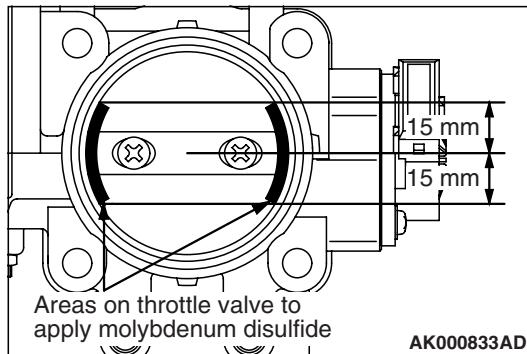
### THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001000837

1. Remove the air intake hose from the throttle body.
2. Spray cleaning fluid on a clean cloth.

#### CAUTION

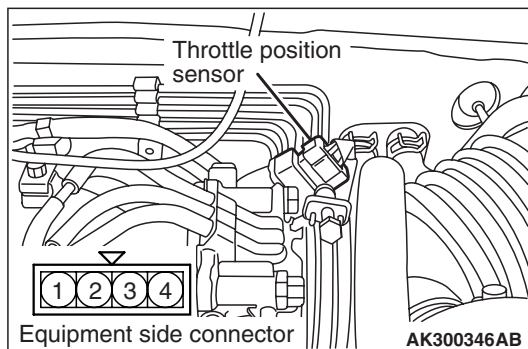
- Do not spray the cleaning fluid directly to the throttle valve.
- Make sure the cleaning fluid does not enter the motor from the bypass line. Also make sure it does not enter the sensor through the shaft.
- Be careful not to rub off the molybden applied around the throttle valve shaft.



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-316).

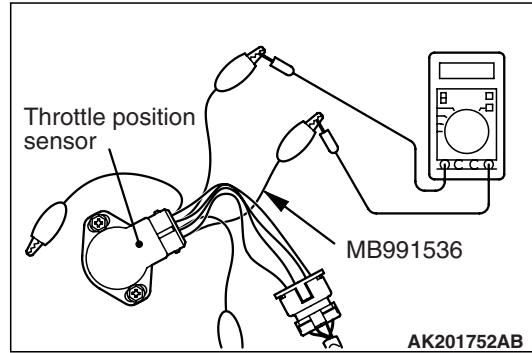
### THROTTLE POSITION SENSOR ADJUSTMENT

M1131001100588



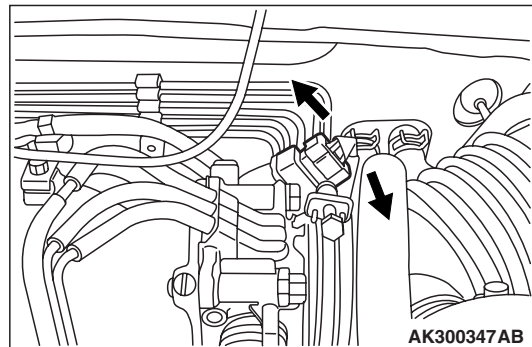
1. Connect the M.U.T.-II/III to the diagnosis connector.

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

M1131001800640

**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.

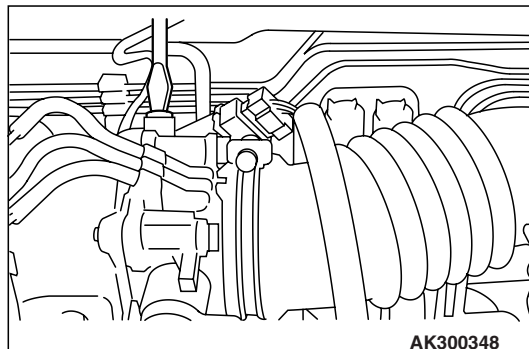
*NOTE: This holds the ISC servo at the basic step to adjust the basic idle speed.*

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-315](#)).



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.

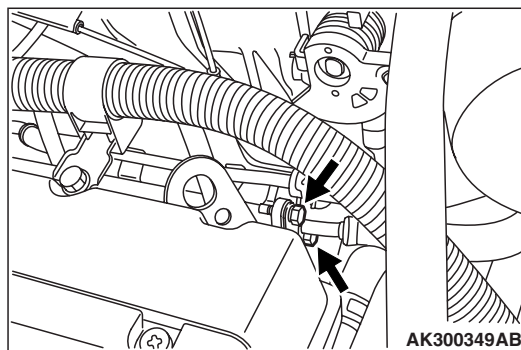
## FUEL PRESSURE TEST

M1131001900960

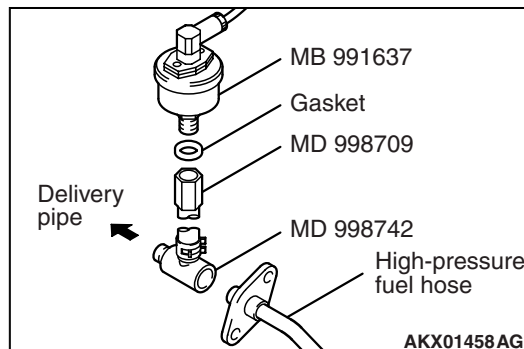
1. Release residual pressure from the fuel pipe line to prevent fuel gush out (Refer to [P.13A-318](#)).

**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.**



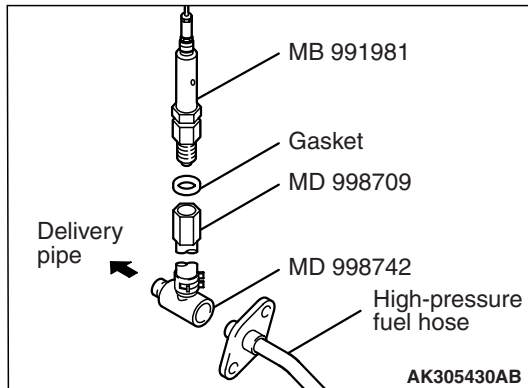
2. Disconnect the high-pressure fuel hose at the delivery pipe side.



3. Assemble the fuel pressure measurement tools as follows.

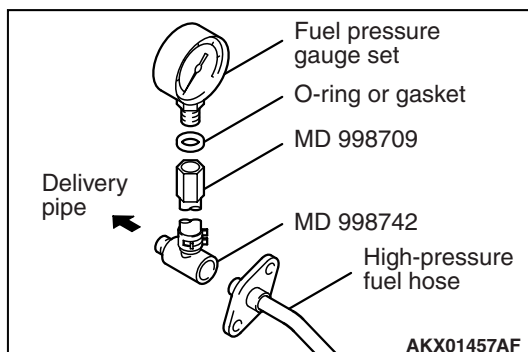
**<When using the fuel pressure gauge set (special tool)>**

- a. 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.
- b. Via a gasket, install the special tool Fuel pressure gauge set (MB991637 or MB991981) into the special tool that has already assembled as described in (a) above.



**<When using the fuel pressure gauge>**

- a. Remove the union joint and bolt from special tool Adaptor hose (MD998709) and attach the special tool Hose adaptor (MD998742) to the adaptor hose.
- b. 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.



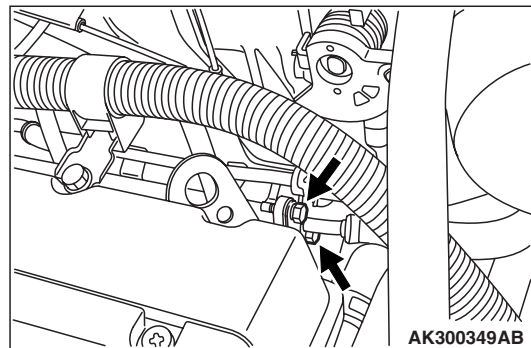
4. Install the assembled fuel pressure measurement tools between the fuel rail and fuel high-pressure hose.

**⚠ 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/III.

5. Connect the M.U.T.-II/III to the diagnosis connector.
6. Turn the ignition switch to "ON" position (But do not start the engine).
7. 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.
8. Finish the actuator test or turn the ignition switch to "LOCK" (OFF) position.
9. Start the engine and run at idle.
10. Fuel pressure measurement while the engine is running at idle.

**Standard value: Approximately. 270 kPa at curb idle**



11. 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 at curb idle**

12. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
13. 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.*

14. 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-318).

#### **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:  $8.8 \pm 1.9$  N·m**

20. Check for any fuel leaks by following the procedure in step 7.

21. Disconnect the M.U.T.-II/III.

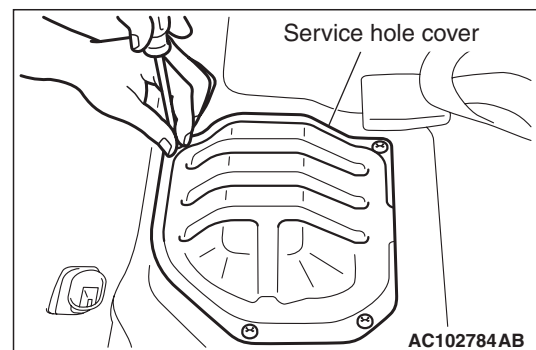
## FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE PRESSURIZED FUEL LINES)

M1131000900558

#### **WARNING**

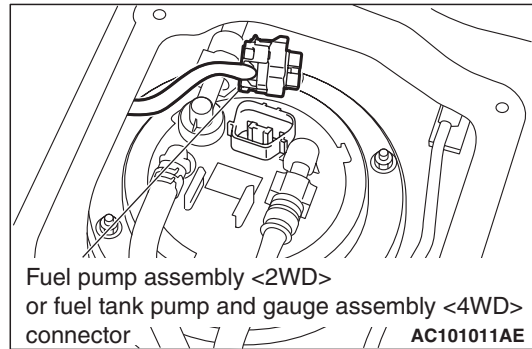
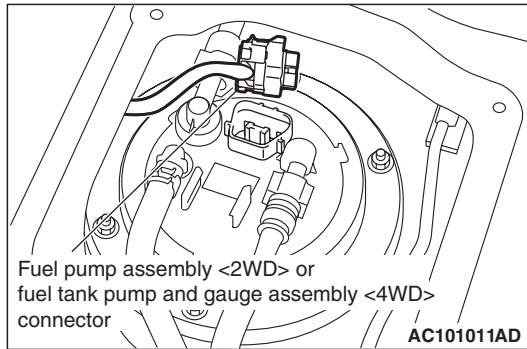
*When removing the fuel pipe, etc., release fuel pressure to prevent fuel spray.*

1. Remove the rear seat assembly (Refer to GROUP 52A – Rear Seat Assembly P.52A-26).



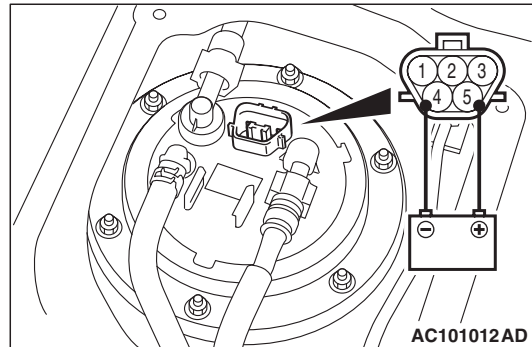
2. Remove the service hole cover.





3. Disconnect the fuel pump assembly connector <2WD> or fuel tank pump and gauge assembly connector <4WD>.
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 pump assembly connector <2WD> or fuel tank pump and gauge assembly connector <4WD>.
6. Install the service hole cover and rear seat assembly (Refer to GROUP 52A – Rear Seat Assembly [P.52A-26](#)).

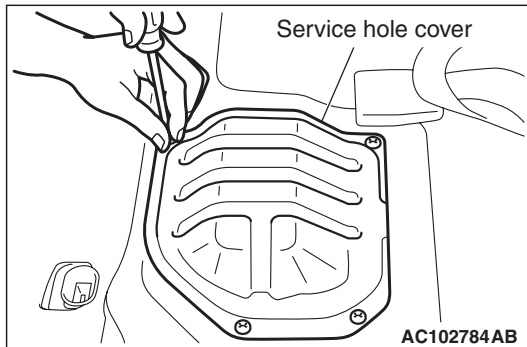
- (4) Disconnect the fuel pump assembly <2WD> or the fuel tank pump and gauge assembly <4WD> connector.



## FUEL PUMP OPERATION CHECK

M1131002000982

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-26](#)).



- (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 13D, Fuel Pump Module Disassembly and Assembly [P.13D-15](#) <2WD>, [P.13D-16](#) <4WD>).

*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.*

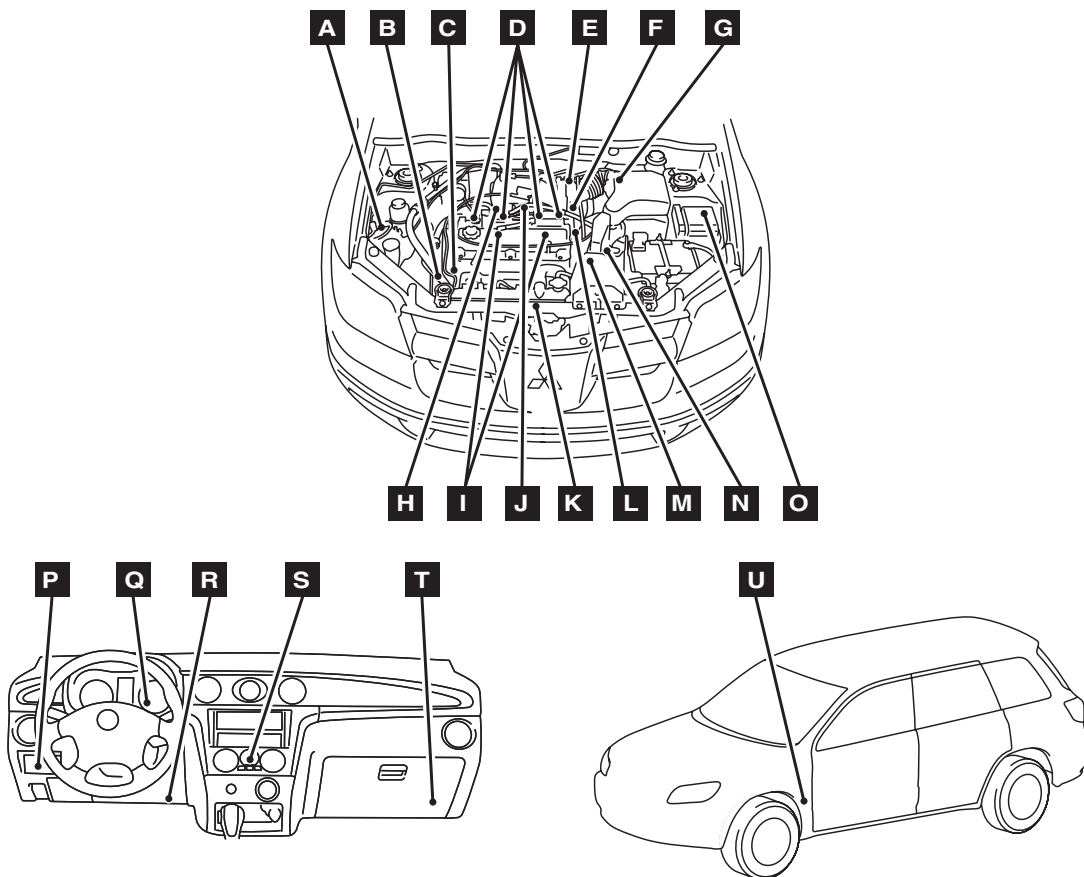
- (6) Check for fuel pressure by pinching the fuel hose with fingertips.
- (7) Connect the fuel pump assembly <2WD> or the fuel tank pump and gauge assembly <4WD> connector.
- (8) Install the service hole cover and rear seat assembly (Refer to GROUP 52A, Rear Seat Assembly Removal and Installation [P.52A-26](#)).

- (3) Remove the service hole cover.

## COMPONENT LOCATION

M1131002100912

Name	Symbol	Name	Symbol
Air flow sensor (with intake air temperature sensor and barometric pressure sensor)	G	Engine-ECU	T
		Engine warming lamp (check engine lamp)	Q
A/C relay	O	Fuel pump relay (1) and (2)	P
A/C switch	S	Idle speed control servo	F
A/C pressure sensor	A	Ignition coil	I
Camshaft position sensor	L	Injector	D
Crank angle sensor	C	Oxygen sensor (front)	K
Detonation sensor	H	Oxygen sensor (rear)	U
Diagnosis connector	R	Power steering fluid pressure switch	B
EGR control solenoid valve	J	Purge control solenoid valve	J
Engine control relay	O	Throttle position sensor	E
Engine coolant temperature sensor	M	Vehicle speed sensor	N

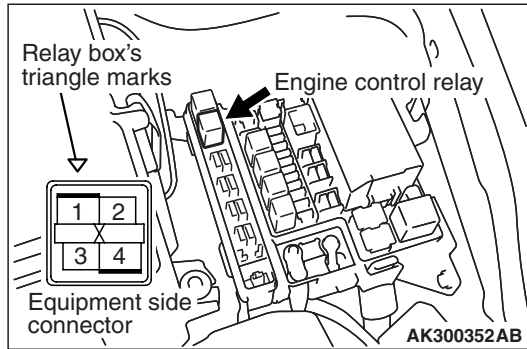


AK300351AB



## ENGINE CONTROL RELAY CONTINUITY CHECK

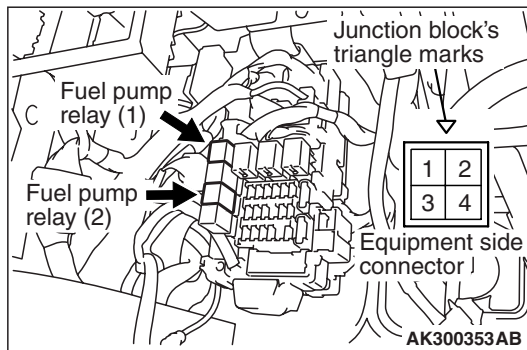
M1131050000981



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 (2 $\Omega$ or less)

## FUEL PUMP RELAY CONTINUITY CHECK

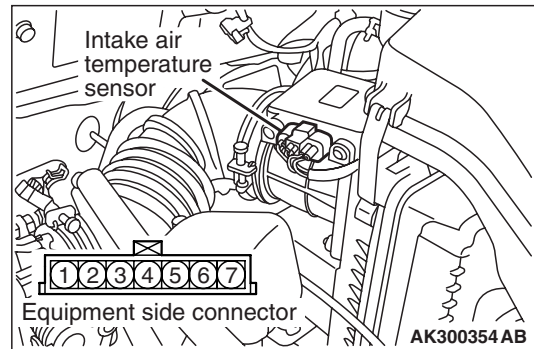
M1131033000988



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 (2 $\Omega$ or less)

## INTAKE AIR TEMPERATURE SENSOR CHECK

M1131002800632



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)

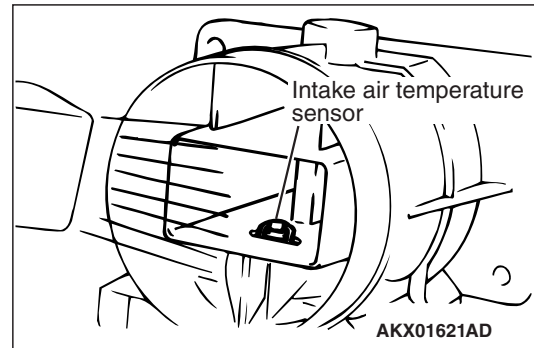
2.3 - 3.0 k $\Omega$  (at 20°C)

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.

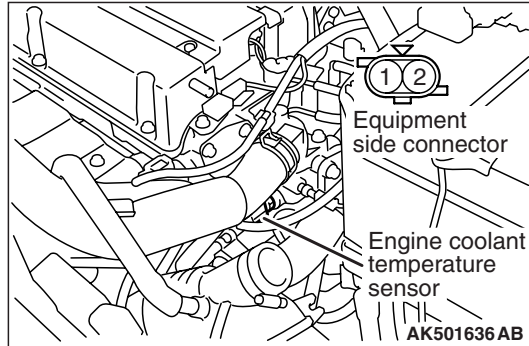
**Tightening torque: 8.8  $\pm$  1 N·m**

ENGINE COOLANT TEMPERATURE  
SENSOR CHECK

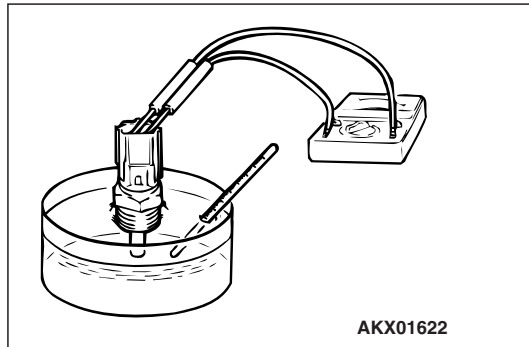
M1131003101059

**CAUTION**

Be careful not to touch the connector (resin section) with the tool when removing and installing.



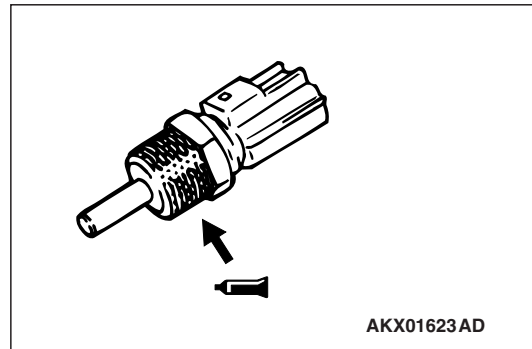
1. Remove the engine coolant temperature sensor.



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.

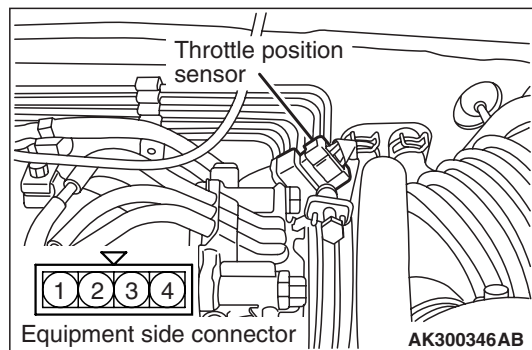
**Specified sealant:****3M NUT Locking Part No. 4171 or equivalent**

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

M1131003200729



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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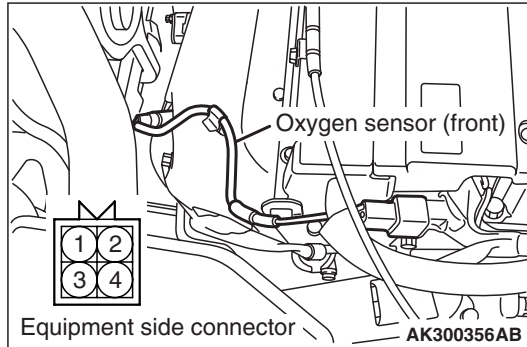
4. If the resistance is outside the standard value, or if it doesn't change smoothly, replace the throttle position sensor.

**NOTE:** For the throttle position sensor adjustment procedure, refer to [P.13A-315](#).

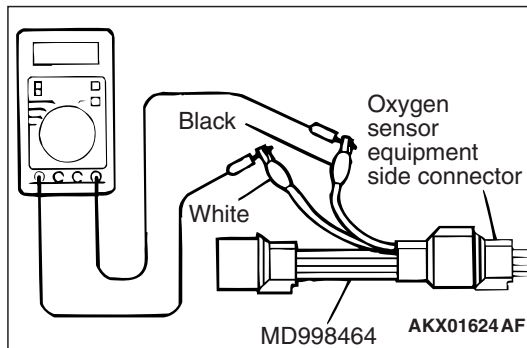
## OXYGEN SENSOR CHECK

M1131005000776

### Oxygen sensor (front)



1. Disconnect the oxygen sensor connector and connect the special tool Test harness (MD998464) to the connector on the oxygen sensor side.
2. Make sure that there is continuity ( $4.5 - 8.0 \Omega$  at  $20^\circ\text{C}$ ) between terminal No. 1 (red clip of special tool) and No. 3 (blue clip of special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is  $80^\circ\text{C}$  or higher.
5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.



6. Connect a digital voltage meter between terminal No. 2 (black clip of special tool) and No. 4 (white clip of special tool).

7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air-fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V.

#### **CAUTION**

- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
- Be careful the heater is broken when voltage of beyond 8V is applied to the oxygen sensor heater.

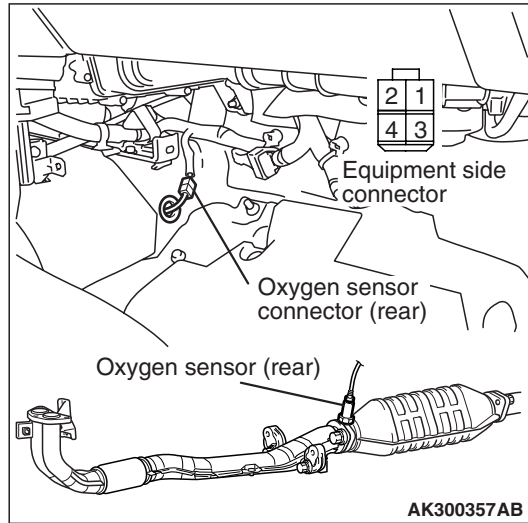
*NOTE: If the sufficiently high temperature (of approximate  $400^\circ\text{C}$  or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.1 (red clip of special tool) and the terminal No. 3 (blue clip of special tool) of the oxygen sensor with a (+) terminal and (-) terminal of 8 V power supply respectively, then check again.*

8. If the sensor is defective, replace the oxygen sensor.

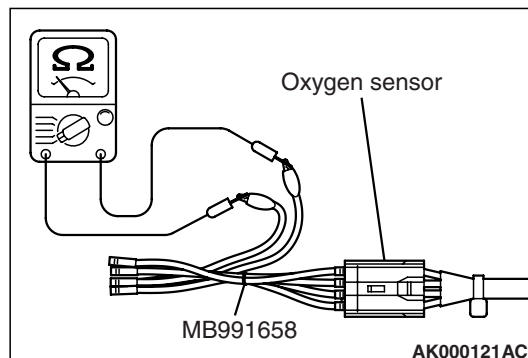
*NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Manifold.*

*P.15-18.*

## Oxygen sensor (rear)



1. Disconnect the oxygen sensor connector and connect the special tool Test harness (MB991658) to the connector on the oxygen sensor side.
2. Make sure that there is continuity ( $11 - 18 \Omega$  at  $20^\circ\text{C}$ ) between terminal No. 1 and No. 2 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is  $80^\circ\text{C}$  or higher.
5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.



6. Connect a digital voltage meter between terminal No. 3 and No. 4.
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

## Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air-fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V.

**CAUTION**

- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
- Be careful the heater is broken when voltage of beyond 8V is applied to the oxygen sensor heater.

*NOTE: If the sufficiently high temperature (of approximate  $400^\circ\text{C}$  or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.2 and the terminal No. 1 of the oxygen sensor with a (+) terminal and (-) terminal of 8 V power supply respectively, then check again.*

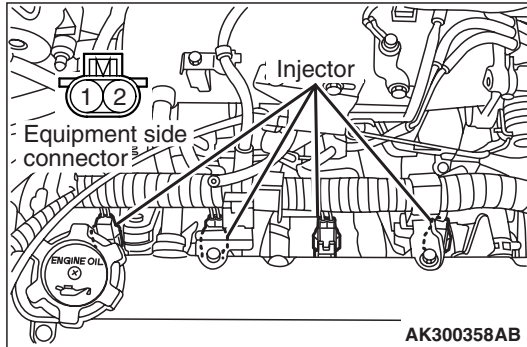
8. If the sensor is defective, replace the oxygen sensor.

*NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler P.15-25.*

## INJECTOR CHECK

M1131005200628

### Check the Operation Sound



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. Disconnect the injector connector.
2. Measure the resistance between terminals.

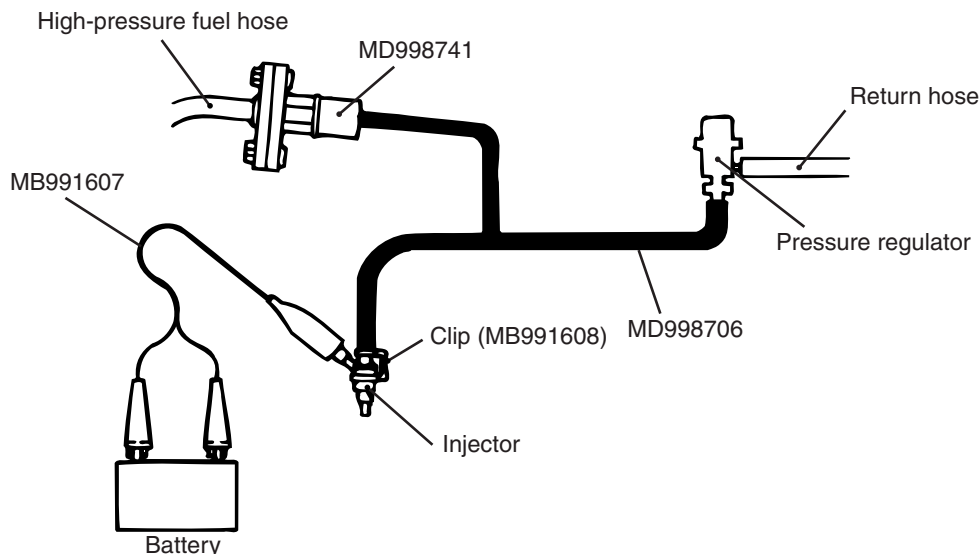
**Standard value: 10.5 – 13.5  $\Omega$  (at 20°C)**

3. Connect the injector connector.

### Check the Injection Condition

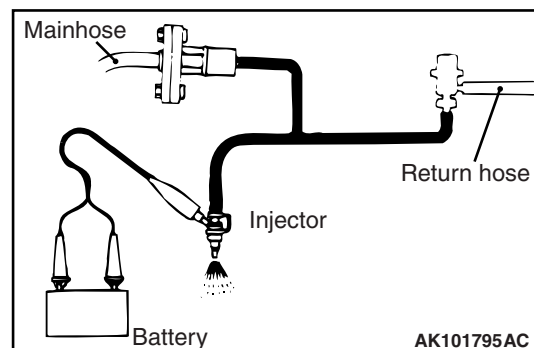
1. Following the steps below, bleed out the residual pressure within the fuel pipe line to prevent flow of the fuel (Refer to P.13A-318).
2. Remove the injector.
3. Assemble the following special tools as shown in Fig.

- Injector test set (MD998706)
- Injector test harness (MB991607)
- Injector test adaptor (MD998741)
- Clip (MB991608)



AK101794 AD

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.



AK101795 AC

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.

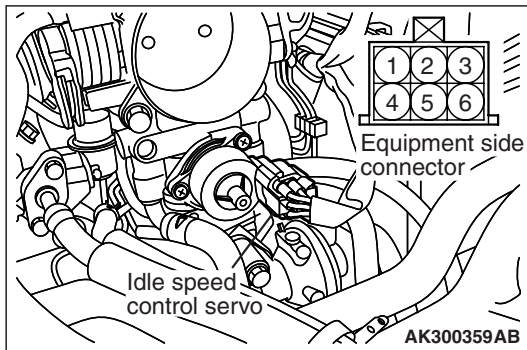
**Standard value: 1 drop or less per minute**

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 (ISC) SERVO (STEPPER MOTOR) CHECK

M1131005400611

### Check the Operation Sound



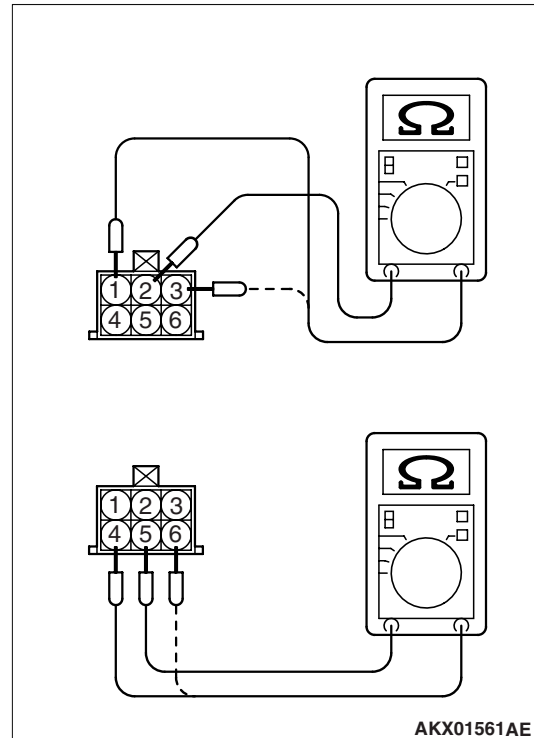
1. Check that the engine coolant temperature is 20°C or below.

**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 turned to the "ON" position (but without starting the engine).
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-ECU.

### 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.

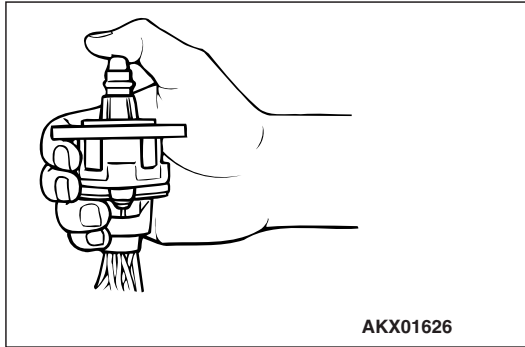
**Standard value: 28 – 33 Ω (at 20°C)**

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: 28 – 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 terminal No. 1 and terminal No. 4.
  - (2) Connect the negative (–) terminal of the power supply to the terminal No. 3 and terminal No. 4.
  - (3) Connect the negative (–) terminal of the power supply to the terminal No. 3 and terminal No. 6.
  - (4) Connect the negative (–) terminal of the power supply to the terminal No. 1 and terminal No. 6.
  - (5) Connect the negative (–) terminal of the power supply to the terminal No. 1 and terminal No. 4.
  - (6) Repeat the tests in sequence from (5) to (1).
6. If vibration is detected during the test, the stepper motor can be considered to be normal.



## INJECTOR

## REMOVAL AND INSTALLATION

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**CAUTION**

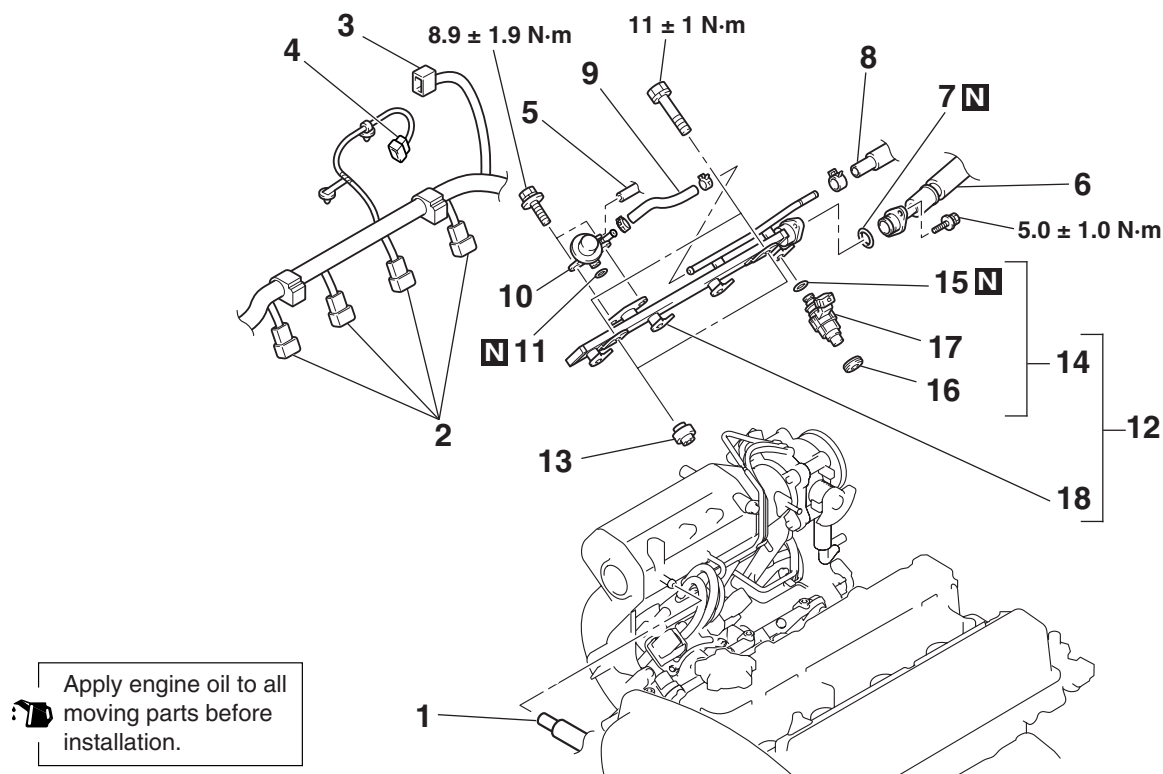
When the fuel injector replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-21).

**Pre-removal Operation**

- Fuel Discharge Prevention (Refer to P.13A-318).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-6).

**Post-installation Operation**

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-6).
- 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
- >>A<< 10. Delivery pipe pressure regulator

**Removal steps (Continued)**

11. O-ring
- <<A>> >>B<< 12. Fuel delivery pipe and fuel injector assembly
13. Insulators
- >>A<< 14. Fuel injector assembly
15. O-ring
16. Insulators
17. Fuel injectors
18. 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 does 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:**

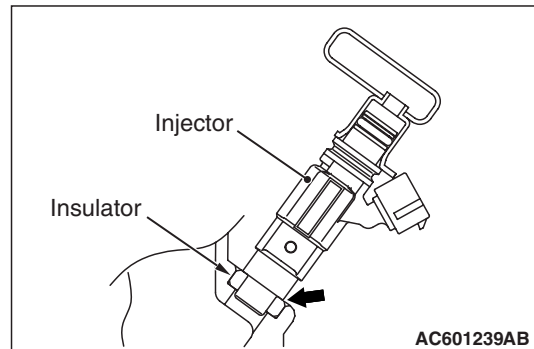
**8.9 ± 1.9 N·m <Delivery pipe pressure regulator>**

**5.0 ± 1.0 N·m <Fuel high-pressure hose>**

### >>B<< FUEL DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY INSTALLATION

#### CAUTION

Securely bring the insulator into contact with the injector to prevent air leak from the insulator area.



Be sure that there is no clearance between the insulator area and the injector, and install them to the cylinder head.

## THROTTLE BODY ASSEMBLY

## REMOVAL AND INSTALLATION

M1131007701354

**CAUTION**

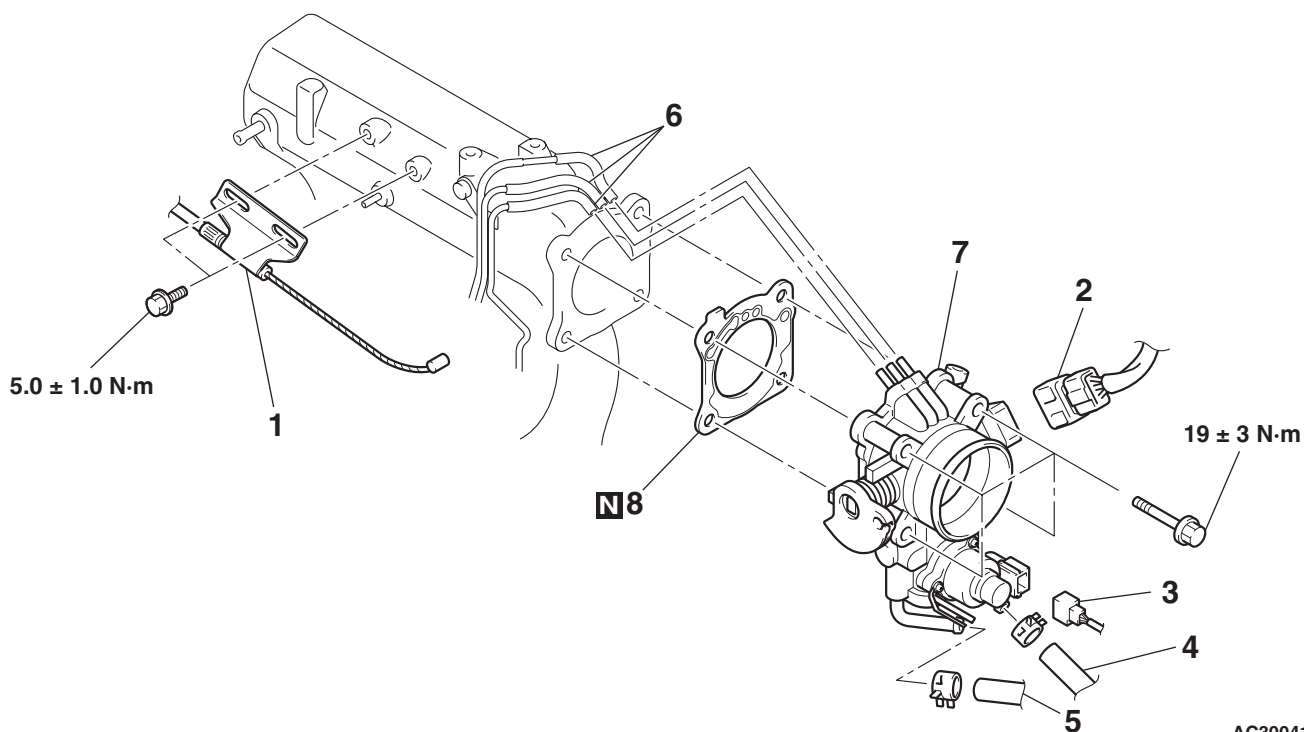
When the throttle body assembly replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-21).

**Pre-removal Operation**

- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-17).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-6).

**Post-installation Operation**

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-6).
- Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-17).
- Accelerator Cable Adjustment (Refer to GROUP 17, On-vehicle Service – Accelerator Cable Adjustment P.17-6).

**Removal steps**

1. Accelerator cable connection
2. Throttle position sensor connector
3. Idle speed control servo connector
4. Water return hose connection
5. Water feed hose connection

**Removal steps (Continued)**

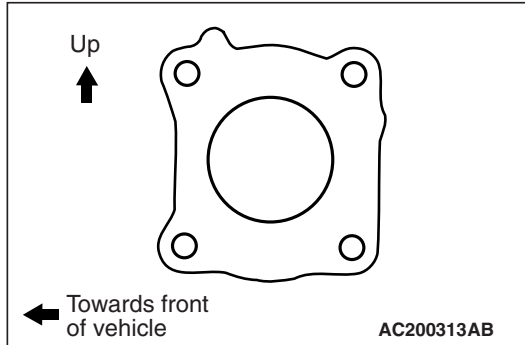
6. Emission vacuum hose connection
  7. Throttle body assembly
  8. Throttle body gasket
- >>A<<

## 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-ECU

## REMOVAL AND INSTALLATION

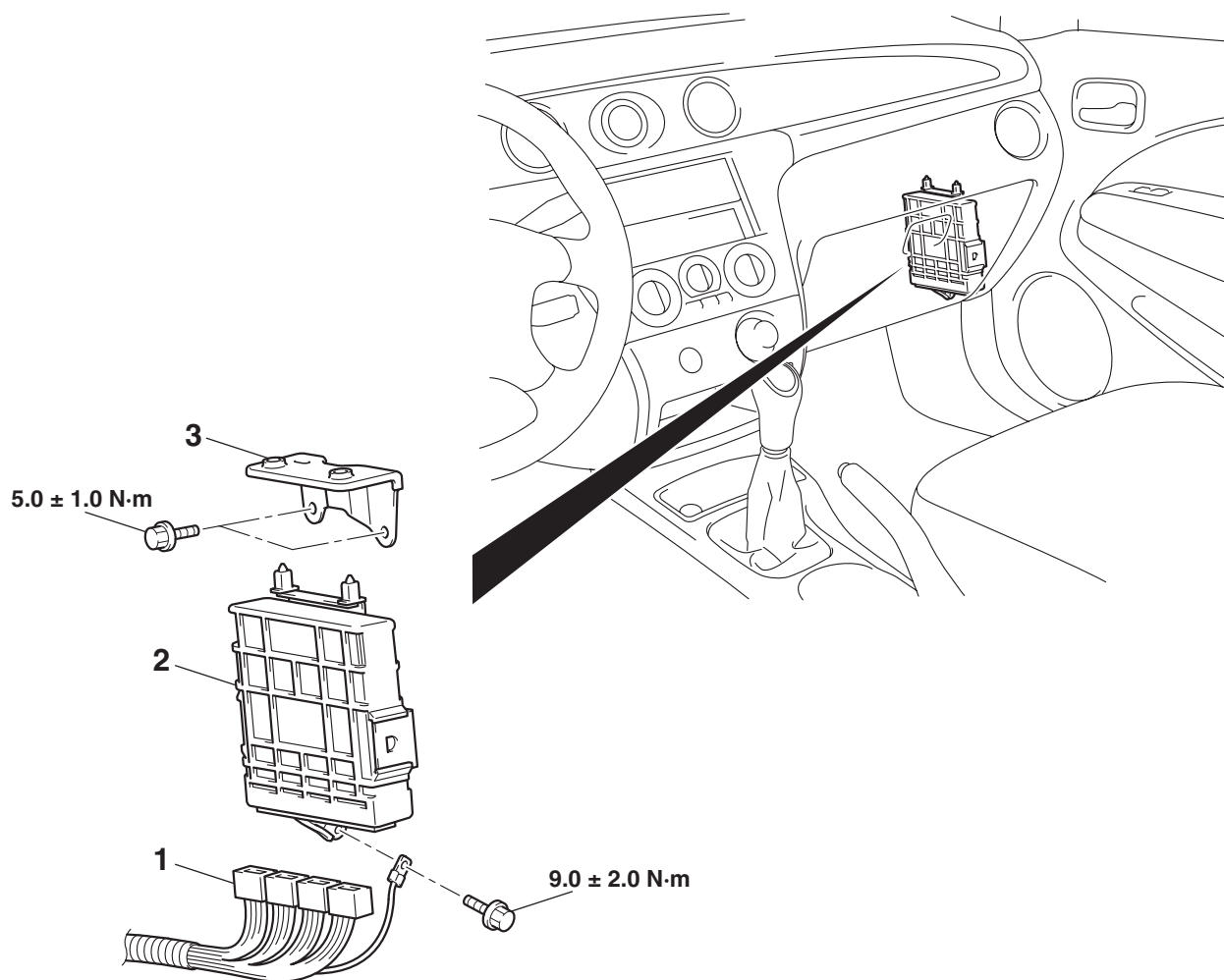
M1131033800445

**CAUTION**

- When the engine-ECU replacement is performed, always refer to GROUP 54A, On-vehicle Service - How to Register Encrypted Code [P.54A-22](#).
- After the engine-ECU is replaced, idling speed may be unstable because the MPI engine learning is not completed. To make it stable, make the system learn the idling (Refer to GROUP 00 – Pre-cautions before Service, Learning Procedure for Idling in MPI Engine [P.00-21](#)).

**Pre-removal and Post-installation Operation**

Cowl Side Trim (RH) Removal and Installation (Refer to GROUP 52A, Trim [P.52A-10](#)).

**REMOVAL STEPS**

1. Engine-ECU connector

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**REMOVAL STEPS (Continued)**

2. Engine-ECU
3. Engine-ECU bracket