

GROUP 13A

MULTIPOINT FUEL INJECTION (MPI)

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GENERAL INFORMATION

M1131000101618

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

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 <M/T> or engine-A/T-ECU <A/T> provides a richer air/fuel

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

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 <M/T> or engine-A/T-ECU <A/T> 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.

THROTTLE VALVE OPENING CONTROL

This system electrically controls the opening of the throttle valve. The engine-ECU <M/T> or engine-A/T-ECU <A/T> detects the amount of travel of the accelerator pedal via the accelerator pedal position sensor, and controls the actuation of the throttle valve control servo, which is mounted on the throttle body, in order to attain the target throttle valve opening that has been predetermined in accordance with driving conditions.

IDLE AIR CONTROL

The idle speed is kept at the optimum speed by controlling the amount of air that passes through the throttle valve in accordance with changes in idling conditions and engine load during idling.

The engine-ECU <M/T> or engine-A/T-ECU <A/T> drives the throttle valve control servo to keep the engine running at the pre-set idle target speed in accordance with the engine coolant temperature and A/C and other electrical load. In addition, when the

air conditioning switch is turned off and on while the engine is idling, the throttle valve control servo adjusts the throttle valve passes through air amount according to the engine load conditions 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 <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> that is related to the sensors and actuators can be read by means of the MUT-III. In addition, the actuators can be force-driven under certain circumstances.

OTHER CONTROL FUNCTIONS

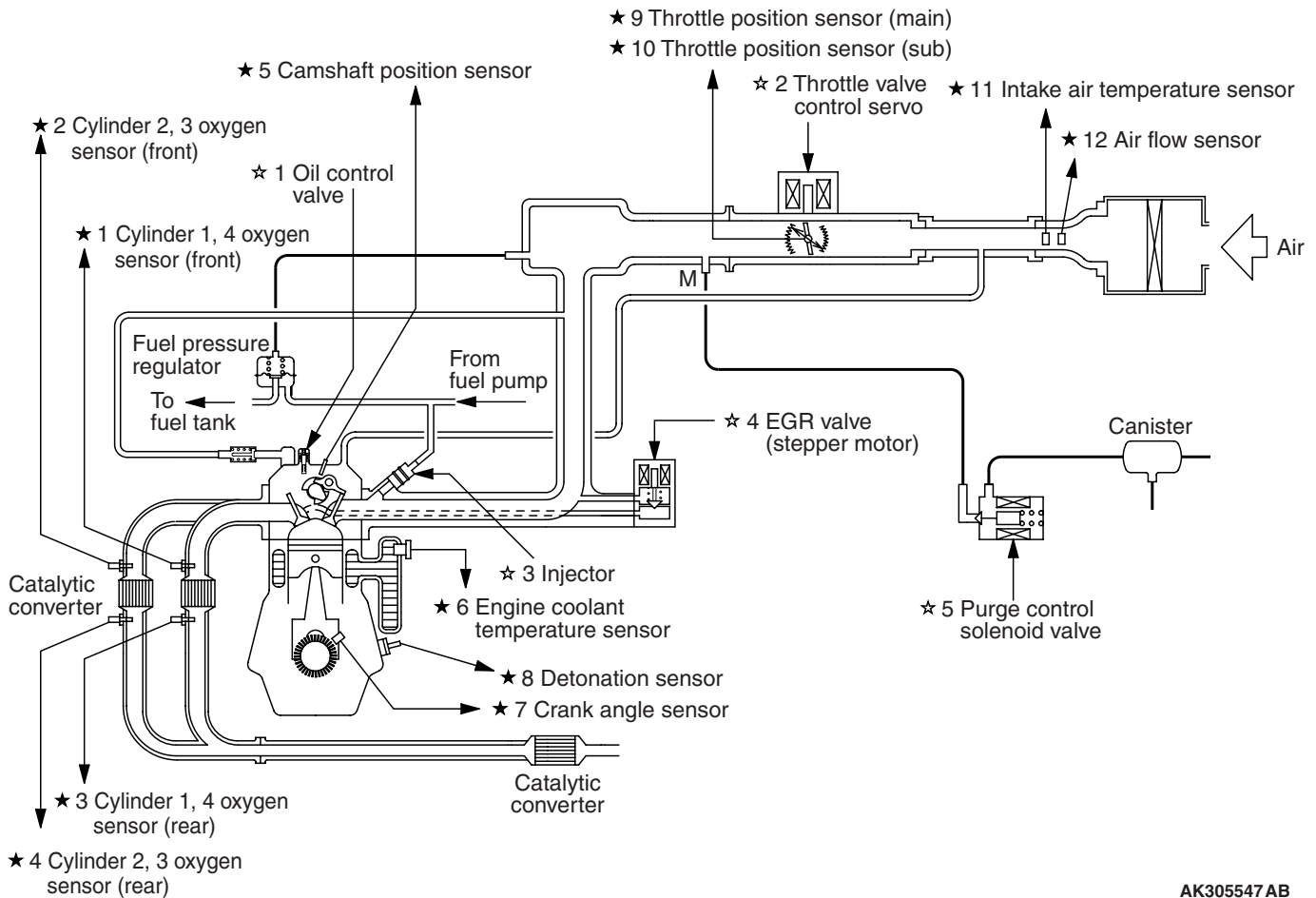
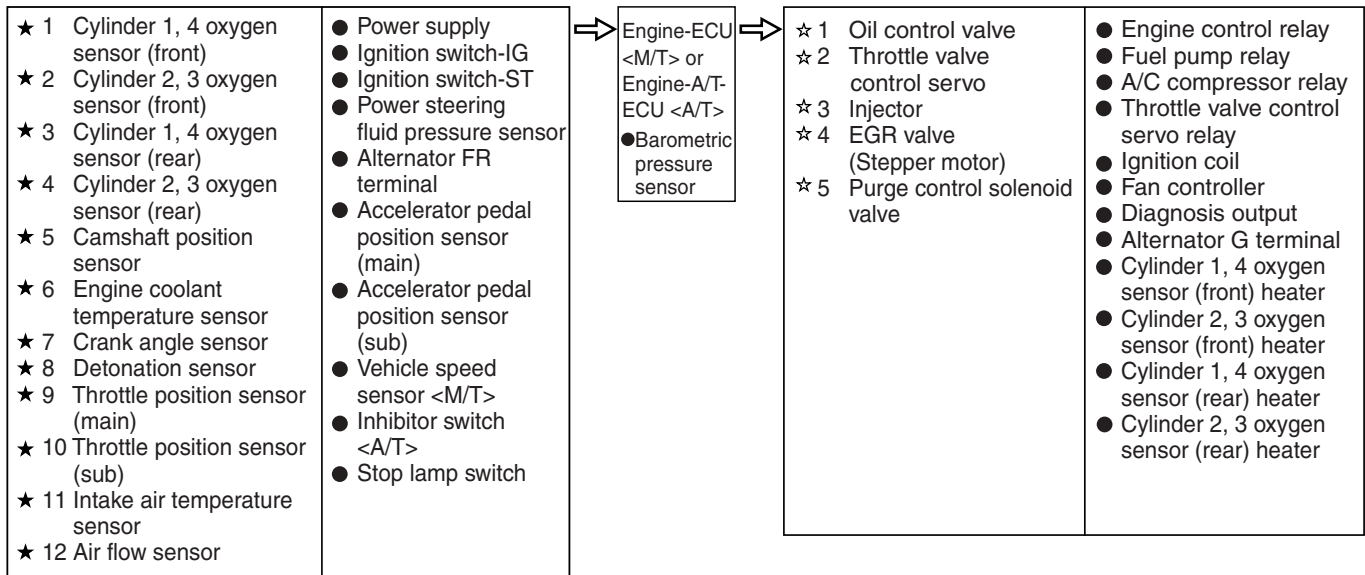
- Fuel Pump Control**
Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.
- A/C Relay Control**
Turns the compressor clutch of the A/C ON and OFF.
- Oil Control Valve Control**
The engine-ECU <M/T> or engine-A/T-ECU <A/T> effects duty cycle control on the engine oil control valve, in accordance with the engine speed. This regulates the supply of engine oil to the intake rocker shaft, which switches the cams.
- Fan Motor Control**
The revolutions of the radiator fan and condenser fan are controlled in response to the engine coolant temperature and vehicle speed.
- Alternator Output Current Control**
Prevents alternator output current from increasing suddenly and idle speed from dropping at times such as when the headlamp are turned on.
- Purge Control Solenoid Valve Control**
(Refer to [P.17-61](#), GROUP 17 – Engine And Emission Control – Evaporative Emission Control System).
- EGR Control Solenoid Valve Control**
[Refer to [P.17-64](#), GROUP 17 – Engine And Emission Control – Exhaust Gas Recirculation (EGR) System].

GENERAL SPECIFICATIONS

| Items | | Specifications |
|----------------------|--------------------------------------|---------------------------------|
| Throttle body | Throttle bore mm | 60 |
| | Throttle position sensor | Hall element type |
| | Throttle valve control servo | DC motor type, having broshes |
| engine-ECU <M/T> | Identification No. | E6T41876 |
| Engine-A/T-ECU <A/T> | Identification No. | E6T41875 |
| Sensors | Air flow sensor | Heat sensitizing type |
| | Barometric pressure Sensor | Semiconductor type |
| | Intake air temperature sensor | Thermistor type |
| | Engine coolant temperature sensor | Thermistor type |
| | Oxygen sensor | Zirconia type |
| | Accelerator pedal position sensor | Hall element type |
| | Vehicle speed sensor <M/T> | Magnetic resistive element type |
| | Inhibitor switch <A/T> | Contact switch type |
| | Camshaft position sensor | Magneto resistance element type |
| | Crank angle sensor | Magneto resistance element type |
| | Detonation sensor | Piezoelectric type |
| | Power steering fluid pressure sensor | Semiconductor type |

| Items | | Specifications |
|-------------------------|---------------------------------------|--------------------------------|
| 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 | HDA305E |
| | Throttle actuator control motor relay | Contact switch type |
| | Oil control valve | Duty cycle type solenoid valve |
| | EGR valve | Stepper motor |
| | Purge control solenoid valve | Duty cycle type solenoid valve |
| Fuel pressure regulator | Regulator pressure kPa | 328 |

MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM



SERVICE SPECIFICATIONS

M1131000301009

| Items | | Specifications |
|---|---------------------------|---------------------------------|
| Intake air temperature sensor resistance k Ω | -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 – 0.45 |
| Engine coolant temperature sensor resistance k Ω | -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 | 324 – 334 at curb idle |
| | Vacuum hose connection | Approximately. 248 at curb idle |
| Injector coil resistance (at 20°C) Ω | | 10.5 – 13.5 |
| Throttle valve control servo coil resistance (at 20°C) Ω | | 0.3 – 100 |
| Oil control valve (at 20°C) Ω | | 6.9 – 7.9 |

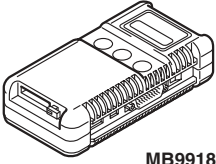
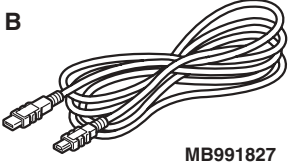
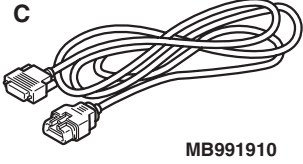
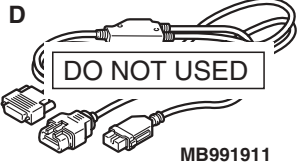
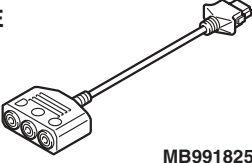
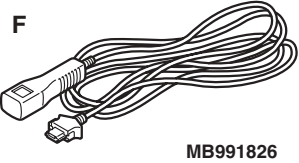


SEALANT


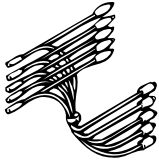
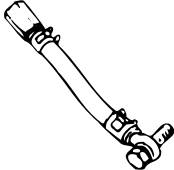


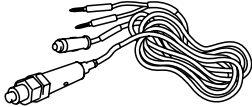
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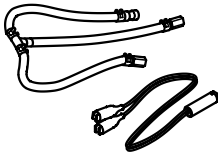
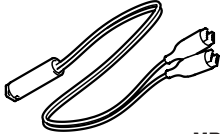
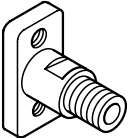
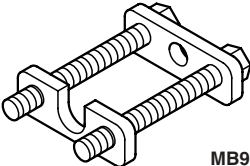
| Item | Specified sealant | Remark |
|---|--|----------------|
| Engine coolant temperature sensor Threaded portion | 3M Nut Locking Part No. 4171 or equivalent | Drying sealant |

SPECIAL TOOLS

M1131000600999

| Tool | Number | Name | Use |
|--|---|---|---|
| <p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991825</p> <p>F</p>  <p>MB991826</p> <p>MB991955</p> | <p>MB991955</p> <p>A: MB991824</p> <p>B: MB991827</p> <p>C: MB991910</p> <p>D: MB991911</p> <p>E: MB991825</p> <p>F: MB991826</p> | <p>MUT-III sub assembly</p> <p>A: Vehicle communication interface (V.C.I.)</p> <p>B: MUT-III USB cable</p> <p>C: MUT-III main harness A (Vehicles with CAN communication system)</p> <p>D: MUT-III main harness B (Vehicles without CAN communication system)</p> <p>E: MUT-III measurement adapter</p> <p>F: MUT-III trigger harness</p> | <ul style="list-style-type: none"> • Reading diagnosis code • MPI system inspection • Measurement of fuel pressure <p>CAUTION</p> <p>For vehicles with CAN communication, use MUT-III main harness A to send simulated vehicle speed. If you connect MUT-III main harness B instead, the CAN communication does not function correctly.</p> |
|  | MB991709 | Test harness | <ul style="list-style-type: none"> • Measurement of voltage during troubleshooting • Inspection using an oscilloscope |
|  | MB991316 | Test harness (4-pin, square) | <ul style="list-style-type: none"> • Measurement of voltage during Troubleshooting • Inspection of oxygen sensor (front) |

| Tool | Number | Name | Use |
|---|----------|---------------------------------|--|
|  | MD998464 | Test harness (4-pin, square) | <ul style="list-style-type: none"> • Measurement of voltage during Troubleshooting • Inspection of oxygen sensor (rear) |
|  MB991658 | MB991658 | Test harness | <ul style="list-style-type: none"> • Measurement of voltage during Troubleshooting • Inspection using an oscilloscope • Inspection of data list |
|  | MD998709 | Adaptor hose | Measurement of fuel pressure |
|  | MD998742 | Hose adaptor | |
|  MB991637 | MB991637 | Fuel pressure gauge set | |
|  MB991981 | MB991981 | Fuel pressure gauge set | |

| Tool | Number | Name | Use |
|---|----------|-------------------------------|---|
|  MD998706 | MD998706 | Injector test set | Checking the spray condition of injectors |
|  MB991607 | MB991607 | Injector test harness | |
|  MD998741 | MD998741 | Injector test adaptor | |
|  MB991976 | MB991976 | Injector test holder assembly | |

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

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

DIAGNOSIS FUNCTION

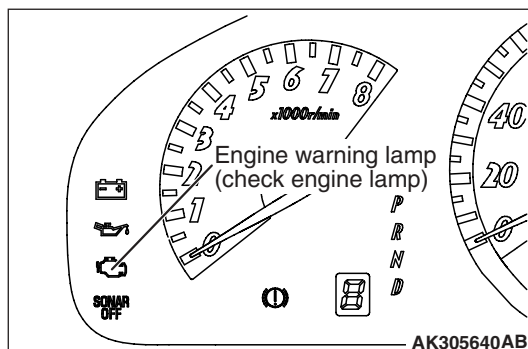
ENGINE WARNING LAMP (CHECK ENGINE LAMP)

M1131155500609

M1131150000999

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 <M/T> or engine-A/T-ECU <A/T> |
| P0100 | Air flow sensor system |
| P0105 | Barometric pressure sensor system |
| P0110 | Intake air temperature sensor system |
| P0115 | Engine coolant temperature sensor system |
| P0122* | Throttle position sensor (main) circuit low input |
| P0123* | Throttle position sensor (main) circuit high input |
| P0125* | Feedback system monitor |
| P0130 | Cylinder 1, 4 oxygen sensor (front) system |
| P0135 | Cylinder 1, 4 oxygen sensor (front) heater system |
| P0136 | Cylinder 1, 4 oxygen sensor (rear) system |
| P0141 | Cylinder 1, 4 oxygen sensor (rear) heater system |
| P0150 | Cylinder 2, 3 oxygen sensor (front) system |
| P0155 | Cylinder 2, 3 oxygen sensor (front) heater system |
| P0156 | Cylinder 2, 3 oxygen sensor (rear) system |
| P0161 | Cylinder 2, 3 oxygen sensor (rear) heater system |
| P0170 | Abnormal fuel system (cylinder 1,4) |
| P0173 | Abnormal fuel system (cylinder 2,3) |
| P0201 | No.1 injector system |
| P0202 | No.2 injector system |
| P0203 | No.3 injector system |
| P0204 | No.4 injector system |
| P0222* | Throttle position sensor (sub) circuit low input |
| P0223* | Throttle position sensor (sub) circuit high input |
| P0300* | Random/multiple cylinder misfire detected |
| P0301* | No.1 cylinder misfire detected |
| P0302* | No.2 cylinder misfire detected |
| P0303* | No.3 cylinder misfire detected |
| P0304* | No.4 cylinder misfire detected |
| P0325 | Detonation sensor system |
| P0335 | Crank angle sensor system |
| P0340 | Camshaft position sensor system |
| P0403 | Exhaust gas recirculation control system |
| P0421 | Warm up catalyst malfunction (cylinder 1,4) |
| P0431 | Warm up catalyst malfunction (cylinder 2,3) |
| P0443 | Purge control solenoid valve system |
| P0500 | Vehicle speed sensor system <M/T> |
| P0500 | Vehicle speed signal system <A/T> |
| P0505 | Idle speed control (ISC) system |

| Code No. | Diagnosis item |
|-----------------|--|
| P0513 | Immobilizer malfunction |
| P0551* | Power steering fluid pressure sensor system |
| P0603 | EEP ROM system |
| P0606* | Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction |
| P0622 | Alternator FR terminal system |
| P0638* | Throttle valve control servo circuit range/performance problem |
| P0642* | Throttle position sensor power supply |
| P0657* | Throttle valve control servo relay circuit malfunction |
| P0705 | Inhibitor switch system |
| P0710 | A/T fluid temperature sensor system |
| P0715* | Input shaft speed sensor system |
| P0720* | Output shaft speed sensor system |
| P0740* | Torque converter clutch solenoid valve system |
| P0750* | Low-reverse solenoid valve system |
| P0755* | Underdrive solenoid valve system |
| P0760* | Second solenoid valve system |
| P0765* | Overdrive solenoid valve system |
| P1021 | Oil control valve system |
| P1602* | Communication malfunction (between engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor and system LSI) |
| P1603* | Battery backup circuit malfunction |
| P1751* | A/T control relay system |
| P2100* | Throttle valve control servo circuit (open) |
| P2101* | Throttle valve control servo magneto malfunction |
| P2102* | Throttle valve control servo circuit (shorted low) |
| P2103* | Throttle valve control servo circuit (shorted high) |
| P2122* | Accelerator pedal position sensor (main) circuit low input |
| P2123* | Accelerator pedal position sensor (main) circuit high input |
| P2127* | Accelerator pedal position sensor (sub) circuit low input |
| P2128* | Accelerator pedal position sensor (sub) circuit high input |
| P2135* | Throttle position sensor (main and sub) range/performance problem |
| P2138* | Accelerator pedal position sensor (main and sub) range/performance problem |
| P2173* | Abnormal intake air amount |
| U1108* | Combination meter time-out |

NOTE:

- If the engine warning lamp illuminates because of a malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>, communication between MUT-III and the engine-ECU <M/T> or engine-A/T-ECU <A/T> is impossible. In this case, the diagnosis code cannot be read.
- After the engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> 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.00-5, GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS USING DIAGNOSIS 2 MODE

1. Switch the diagnosis mode of the engine control unit to DIAGNOSIS 2 mode using the MUT-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 <M/T> or engine-A/T-ECU <A/T> will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.

5. Erase the diagnosis codes.

INSPECTION USING MUT-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 MUT-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 MUT-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 <M/T> or engine-A/T-ECU <A/T> 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 MUT-III, an effective troubleshooting can be performed. The display items of freeze frame data are shown below.

DISPLAY ITEM LIST

| Item No. | Data | Unit |
|----------|-----------------------------------|-------|
| 12 | Air flow sensor | gm/s |
| 13 | Intake air temperature sensor | °C |
| 21 | Engine coolant temperature sensor | °C |
| 22 | Crank angle sensor | r/min |
| 24 | Vehicle speed | km/h |
| 44 | Ignition advance | deg |

| Item No. | Data | | Unit |
|----------|--|--|----------|
| 81 | Long-term fuel compensation (cylinder 1, 4) | | % |
| 82 | Short-term fuel compensation (cylinder 1, 4) | | % |
| 83 | Long-term fuel compensation (cylinder 2, 3) | | % |
| 84 | Short-term fuel compensation (cylinder 2, 3) | | % |
| 87 | Calculation load value | | % |
| 88 | Fuel control condition (cylinder 1, 4) | Open loop | OL |
| | | Closed loop | CL |
| | | Open loop owing to drive condition | OL-DRV. |
| | | Open loop owing to system malfunction | OL-SYS. |
| | | Closed loop based on one oxygen sensor | CL- H02S |
| 89 | Fuel control condition (cylinder 2, 3) | Open loop | OL |
| | | Closed loop | CL |
| | | Open loop owing to drive condition | OL-DRV. |
| | | Open loop owing to system malfunction | OL-SYS. |
| | | Closed loop based on one oxygen sensor | CL- H02S |
| 8A | Throttle position sensor (main) | | % |
| — | 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

The following five drive cycle patterns are performed on the diagnosis codes monitored during the vehicle driving. The vehicle driving requires the patterns to identify the fault. In other words, doing such a drive allows to regenerate any kind of trouble which involves illuminating the engine warming lamp (check engine lamp) and to verify the repair procedure has eliminated the trouble [the engine warming 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

| Procedure | Monitor item | Diagnosis code |
|-----------|-------------------------------|---|
| 1 | Catalytic converter monitor | P0421, P0431 |
| 2 | Oxygen sensor (front) monitor | P0130, P0150 |
| 3 | Other monitor | P0135, P0136, P0141, P0155, P0156, P0161, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0325, P0500, P0551, P0638 |

Procedure 1

| Catalytic converter monitor | |
|-----------------------------|--|
| Diagnosis code No. | P0421, P0431 |
| 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"> Atmospheric temperature: -10°C or more |
| Test procedure | <ol style="list-style-type: none"> Engine: start Accelerate until the vehicle speed is 90 km/h or more. Travel for 6 minutes or more while keeping the vehicle speed at 90 km/h or more. Decelerate until the vehicle speed is within 80 km/h or less. 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"> Do not repeat deceleration too often. Vehicle speed may go below 55 km/h after the deceleration. 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.) 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"> Repeat the above deceleration at least 5 times. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position. |

Procedure 2

| Oxygen sensor (front) monitor | |
|--------------------------------------|---|
| Diagnosis code No. | P0130, P0150 |
| 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"> • Engine coolant temperature: After engine warm up • Atmospheric temperature: -10°C or more |
| Test procedure | <ol style="list-style-type: none"> 1. Engine: start 2. Accelerate until the vehicle speed is 55 – 80 km/h. 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"> • Stopping and braking during this operation are permitted. 4. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position. |

Procedure 3

| Other monitor | |
|-----------------------|---|
| Diagnosis code No. | P0135, P0136, P0141, P0155, P0156, P0161, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0325, P0500, P0551, P0638 |
| 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"> Engine coolant temperature: After engine warm up Atmospheric temperature: -10°C or more |
| Test procedure | <ol style="list-style-type: none"> Engine: start Accelerate until the vehicle speed is 55 km/h. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 55 km/h and travel for 16 minutes or more. Return the vehicle to the shop. After stopping the vehicle, continue idling for 5 minutes, and then turn the ignition switch to "LOCK" (OFF) position. |

READINESS TEST STATUS

The engine-ECU <M/T> or engine-A/T-ECU <A/T> monitors the following main diagnosis items, judges if these items are in good condition or not, and the stores its history. this history can be read out by using MUT-III. (If the ECU has judged a item before, the MUT-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: P0421, P0431
- Oxygen sensor: P0130, P0136, P0150, P0156
- Oxygen sensor heater: P0135, P0141, P0155, P0161

FAIL-SAFE FUNCTION REFERENCE TABLE

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

| Malfunctioning item | Control contents during malfunction |
|--|---|
| Air flow sensor | Uses the throttle position sensor signal and engine speed signal (crankshaft position sensor signal) for basic injector drive time and basic ignition timing from the pre-set mapping. |
| 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 (main) | <ul style="list-style-type: none"> Controls the throttle valve position through the use of the throttle position sensor (sub) signal. Renders the amount of accelerator pedal travel as being approximately one-half the normal opening angle. Prohibits the operation of the engine speed feedback control. Cuts off fuel when the engine speed exceeds 3,000 r/min. Suppresses the engine output by stopping the electronic-controlled throttle valve system if the throttle position sensor (sub) is also malfunctioning. |
| Throttle position sensor (sub) | <ul style="list-style-type: none"> Controls the throttle valve position through the use of the throttle position sensor (main) signal. Renders the amount of accelerator pedal travel as being approximately one-half the normal opening angle. Cuts off fuel when the engine speed exceeds 3,000 r/min. Suppresses the engine output by stopping the electronic-controlled throttle valve system if the throttle position sensor (main) is also malfunctioning. |
| Accelerator pedal position sensor (main) | <ul style="list-style-type: none"> Detects the amount of the accelerator pedal travel through the use of the accelerator pedal position sensor (sub) signal, but rendering it only as being approximately one-half the normal opening angle. Cuts off fuel when the engine speed exceeds 3,000 r/min. Suppresses the engine output by stopping the electronic-controlled throttle valve system if the accelerator pedal position sensor (sub) is also malfunctioning. |
| Accelerator pedal position sensor (sub) | <ul style="list-style-type: none"> Detects the amount of the accelerator pedal travel through the use of the accelerator pedal position sensor (main) signal, but rendering it only as being approximately one-half the normal opening angle. Cuts off fuel when the engine speed exceeds 3,000 r/min. Suppresses the engine output by stopping the electronic-controlled throttle valve system if the accelerator pedal position sensor (main) is also malfunctioning. |
| Engine coolant temperature sensor | Controls as if the engine coolant temperature is 80°C. (This control will be continued until the ignition switch is turned to the "LOCK" (OFF) position even though the sensor signal returns to normal.) |
| Camshaft position sensor | Injects fuel into the cylinders in the order 1-3-4-2 with irregular timing. (After the ignition switch is turned to the "ON" position, the No. 1 cylinder top dead center is not detected at all.) |
| Oxygen sensor <front> | Air/fuel ratio closed loop control is not performed. |
| Oxygen sensor <rear> | Performs the closed loop control of the air/fuel ratio by using only the signal of the oxygen sensor (front) installed on the front side of the catalytic converter. |
| Detonation sensor | Switches the ignition timing from ignition timing for high octane to ignition timing for standard octane fuel. |

| Malfunctioning item | Control contents during malfunction |
|---|---|
| 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. |
| Throttle valve position feedback | <ul style="list-style-type: none"> • Suppresses the engine output by stopping the electronic-controlled throttle valve system. • Prohibits the operation of the engine speed feedback control. |
| Throttle valve control servo | <ul style="list-style-type: none"> • Suppresses the engine output by stopping the electronic-controlled throttle valve system. • Prohibits the operation of the engine speed feedback control. |
| Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor | <ul style="list-style-type: none"> • Suppresses the engine output by stopping the electronic-controlled throttle valve system. • Prohibits the operation of the engine speed feedback control. |
| Communication between powertrain control module main processor and system LSI | <ul style="list-style-type: none"> • Renders the amount of accelerator pedal travel as being approximately one-half the normal opening angle. • Prohibits the operation of the engine speed feedback control. • Cuts off fuel when the engine speed exceeds 3,000 r/min. |
| Intake air monitor | <ul style="list-style-type: none"> • Suppresses the engine output by stopping the electronic-controlled throttle valve system. • Prohibits the operation of engine speed feedback. |
| Oil control valve | <ul style="list-style-type: none"> • Do not switch to high-speed cam. • Cut off fuel when the engine speed exceeds 5,000 r/min. |

INSPECTION CHART FOR DIAGNOSIS CODE

M1131151001188

| Code No. | Diagnosis item | Reference page |
|----------|--|--------------------------|
| P0100 | Air flow sensor system | P.13A-24 |
| P0105 | Barometric pressure sensor system | P.13A-29 |
| P0110 | Intake air temperature sensor system | P.13A-30 |
| P0115 | Engine coolant temperature sensor system | P.13A-37 |
| P0122* | Throttle position sensor (main) circuit low input | P.13A-44 |
| P0123* | Throttle position sensor (main) circuit high input | P.13A-48 |
| P0125* | Feedback system monitor | P.13A-50 |
| P0130 | Cylinder 1, 4 oxygen sensor (front) system | P.13A-57 |
| P0135 | Cylinder 1, 4 oxygen sensor (front) heater system | P.13A-63 |
| P0136 | Cylinder 1, 4 oxygen sensor (rear) system | P.13A-69 |
| P0141 | Cylinder 1, 4 oxygen sensor (rear) heater system | P.13A-76 |
| P0150 | Cylinder 2, 3 oxygen sensor (front) system | P.13A-82 |
| P0155 | Cylinder 2, 3 oxygen sensor (front) heater system | P.13A-89 |

| Code No. | Diagnosis item | | Reference page |
|----------|---|---|-----------------------|
| P0156 | Cylinder 2, 3 oxygen sensor (rear) system | | P.13A-95 |
| P0161 | Cylinder 2, 3 oxygen sensor (rear) heater system | | P.13A-102 |
| P0170 | Abnormal fuel system (cylinder 1,4) | | P.13A-108 |
| P0173 | Abnormal fuel system (cylinder 2,3) | | P.13A-111 |
| P0201 | No.1 injector system | | P.13A-115 |
| P0202 | No.2 injector system | | P.13A-120 |
| P0203 | No.3 injector system | | P.13A-125 |
| P0204 | No.4 injector system | | P.13A-130 |
| P0222* | Throttle position sensor (sub) circuit low input | | P.13A-135 |
| P0223* | Throttle position sensor (sub) circuit high input | | P.13A-139 |
| P0300* | Random/multiple cylinder misfire detected | | P.13A-141 |
| P0301* | No.1 cylinder misfire detected | | P.13A-143 |
| P0302* | No.2 cylinder misfire detected | | P.13A-146 |
| P0303* | No.3 cylinder misfire detected | | P.13A-148 |
| P0304* | No.4 cylinder misfire detected | | P.13A-151 |
| P0325 | Detonation sensor system | | P.13A-154 |
| P0335 | Crank angle sensor system | | P.13A-157 |
| P0340 | Camshaft position sensor system | | P.13A-167 |
| P0403 | Exhaust gas recirculation control system | | P.13A-176 |
| P0421 | Warm Up Catalyst Malfunction (cylinder 1,4) | | P.13A-182 |
| P0431 | Warm Up Catalyst Malfunction (cylinder 2,3) | | P.13A-183 |
| P0443 | Purge control solenoid valve system | | P.13A-184 |
| P0500 | Vehicle speed sensor system <M/T> | | P.13A-189 |
| P0500 | Vehicle speed signal system <A/T> | | P.13A-191 |
| P0505 | Idle speed control (ISC) system | | P.13A-192 |
| P0513 | Immobilizer malfunction | | P.13A-193 |
| P0551* | Power steering fluid pressure sensor system | | P.13A-196 |
| P0603 | EEP ROM malfunction | | P.13A-206 |
| P0606* | Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction | | P.13A-206 |
| P0622 | Alternator FR terminal system | | P.13A-207 |
| P0638* | Throttle valve control servo circuit range/performance problem | | P.13A-210 |
| P0642* | Throttle position sensor power supply | | P.13A-216 |
| P0657* | Throttle valve control servo relay circuit malfunction | | P.13A-218 |
| P0705 | Inhibitor switch system | <ul style="list-style-type: none"> • A/T DTC No. 27 (Inhibitor switch system: open circuit) • A/T DTC No. 28 (Inhibitor switch system: short circuit) | P.23A-52, P.23A-59 |

| Code No. | Diagnosis item | | Reference page |
|----------|--|---|-----------------------|
| P0710 | A/T fluid temperature sensor system | <ul style="list-style-type: none"> A/T DTC No. 15 (A/T fluid temperature sensor system: open circuit) A/T DTC No. 16 A/T (fluid temperature sensor system: short circuit) | P.23A-18, P.23A-23 |
| P0715* | Input shaft speed sensor system | <ul style="list-style-type: none"> A/T DTC No. 22 (Input shaft speed sensor system) | P.23A-27 |
| P0720* | Output shaft speed sensor system | <ul style="list-style-type: none"> A/T DTC No. 23 (Output shaft speed sensor system) | P.23A-37 |
| P0740* | Torque converter clutch solenoid valve system | <ul style="list-style-type: none"> A/T DTC No. 36 (Torque converter clutch solenoid valve system) A/T DTC No. 52 (Torque converter clutch system) | P.23A-74, P.23A-80 |
| P0750* | Low-reverse solenoid valve system | <ul style="list-style-type: none"> A/T DTC No. 31 (Low-reverse solenoid valve system) A/T DTC No. 41, No. 46 (Gear incorrect ratio) | P.23A-62, P.23A-78 |
| P0755* | Underdrive solenoid valve system | <ul style="list-style-type: none"> A/T DTC No. 32 (Underdrive solenoid valve system) A/T DTC No. 41, No. 42, No. 43 (Gear incorrect ratio) | P.23A-65, P.23A-78 |
| P0760* | Second solenoid valve system | <ul style="list-style-type: none"> A/T DTC No. 33 (Second solenoid valve system) A/T DTC No. 42, No. 44 (Gear incorrect ratio) | P.23A-68, P.23A-78 |
| P0765* | Overdrive solenoid valve system | <ul style="list-style-type: none"> A/T DTC No. 34 (Overdrive solenoid valve system) A/T DTC No. 43, No. 44 (Gear incorrect ratio) | P.23A-71, P.23A-78 |
| P1021 | Oil control valve circuit | | P.13A-225 |
| P1602* | Communication malfunction (between engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor and system LSI) | | P.13A-229 |
| P1603* | Battery backup circuit malfunction | | P.13A-231 |
| P1751* | A/T control relay system | <ul style="list-style-type: none"> A/T DTC No. 54 (A/T control relay system) | P.23A-82 |
| P2100* | Throttle valve control servo circuit (open) | | P.13A-234 |
| P2101* | Throttle valve control servo magneto malfunction | | P.13A-239 |
| P2102* | Throttle valve control servo circuit (shorted low) | | P.13A-242 |
| P2103* | Throttle valve control servo circuit (shorted high) | | P.13A-245 |
| P2122* | Accelerator pedal position sensor (main) circuit low input | | P.13A-248 |
| P2123* | Accelerator pedal position sensor (main) circuit high input | | P.13A-253 |
| P2127* | Accelerator pedal position sensor (sub) circuit low input | | P.13A-256 |
| P2128* | Accelerator pedal position sensor (sub) circuit high input | | P.13A-261 |
| P2135* | Throttle position sensor (main and sub) range/performance problem | | P.13A-265 |
| P2138* | Accelerator pedal position sensor (main and sub) range/performance problem | | P.13A-267 |

| Code No. | Diagnosis item | Reference page |
|----------|----------------------------|---------------------------|
| P2173* | Abnormal intake air amount | P.13A-274 |
| U1073 | Bus off | P.13A-274 |
| U1102 | ABS-ECU time-out | P.13A-275 |
| U1108 | Combination meter time-out | P.13A-276 |
| U1110 | A/C-ECU time-out | P.13A-278 |

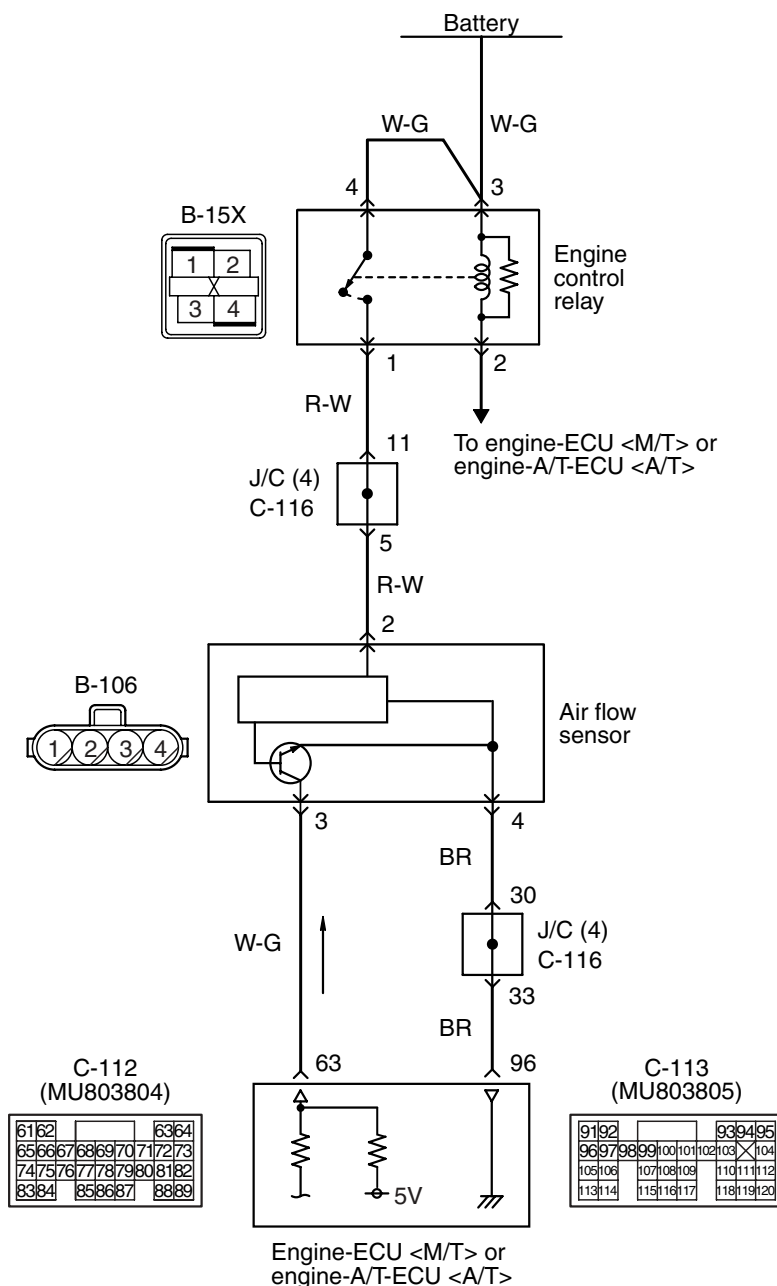
NOTE:

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

INSPECTION PROCEDURE FOR
DIAGNOSIS CODES

Code No. P0100: Air Flow Sensor System

Air flow 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 by the engine control relay (terminal No. 1) to the air flow sensor (terminal No. 2), and the air flow sensor (terminal No. 4) is grounded through the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96).
- The air flow sensor (terminal No. 3) outputs a sensor signal, which is input into the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 63).

FUNCTION

- The air flow sensor outputs amperage that varies in accordance with the intake air volume.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> uses the amperage output by the air flow sensor and the engine speed signal in order to determine the basic injection duration of the injector.

TROUBLE JUDGMENT

Check Condition

- After 3 seconds have passed since the ignition switch was turned to ON position.

Judgment Criteria

- Air flow sensor output voltage has continued to be 0.2 V or lower for 2 seconds.

Or

- Air flow sensor output voltage has continued to be 4.9 V or higher for 2 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

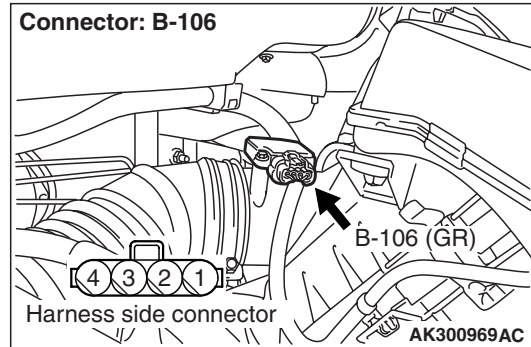
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 12: Air flow sensor

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-106 air flow sensor connector

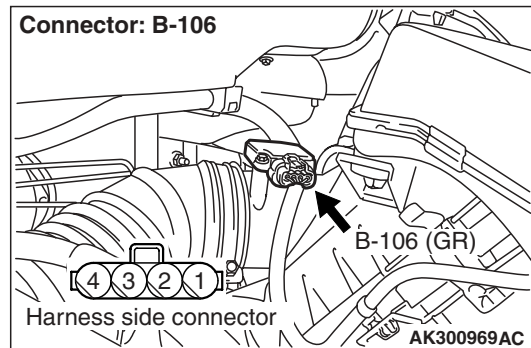


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform voltage measurement at B-106 air flow sensor connector.



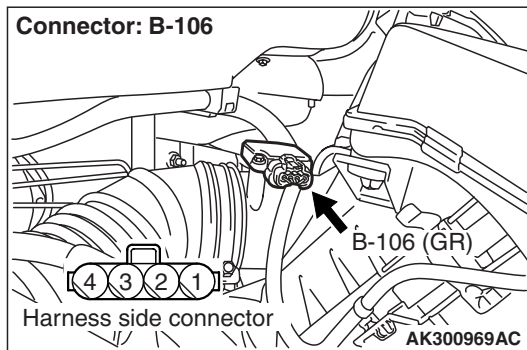
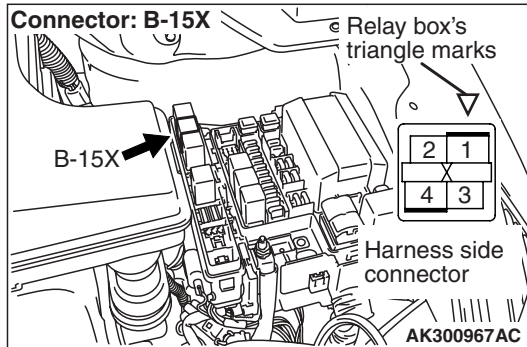
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

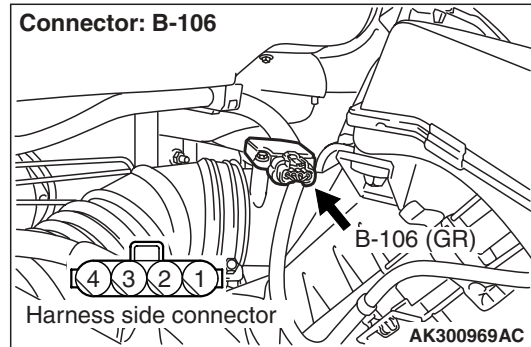
NO : Go to Step 4 .

STEP 4. Connector check: B-15X engine control relay connector**Q: Is the check result normal?**

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-106 (terminal No. 2) air flow sensor connector and B-15X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Check resistance measurement at B-106 air flow sensor connector.

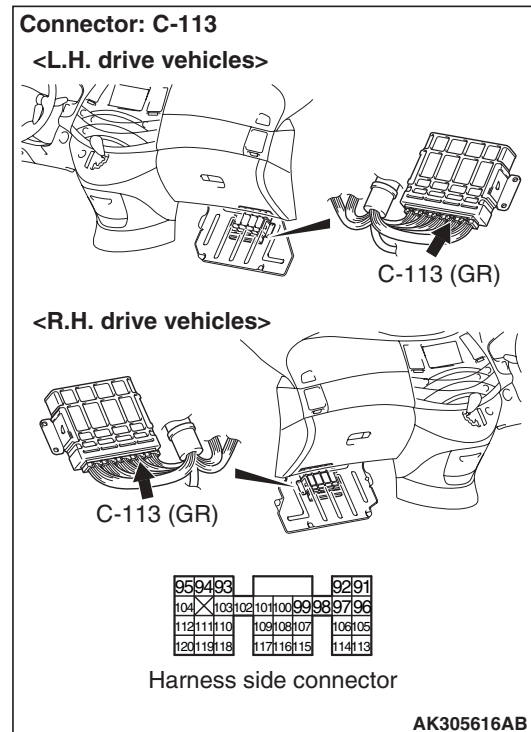
- Disconnect and measure at harness side.
- Resistance between terminal No. 4 and earth.

OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 9 .

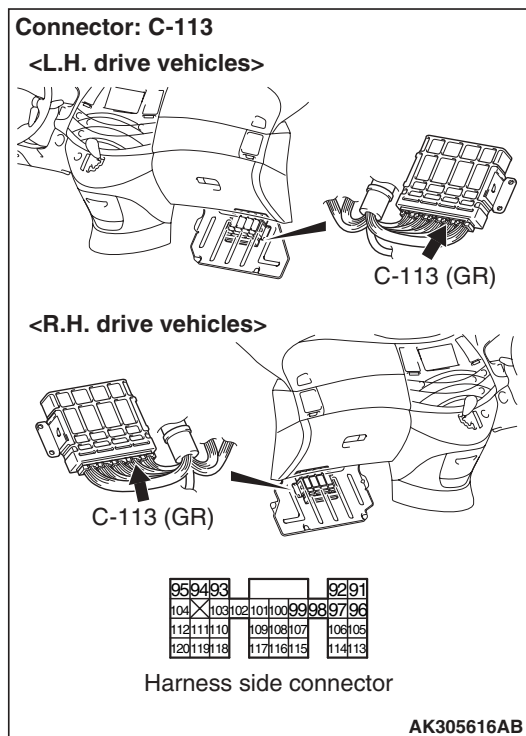
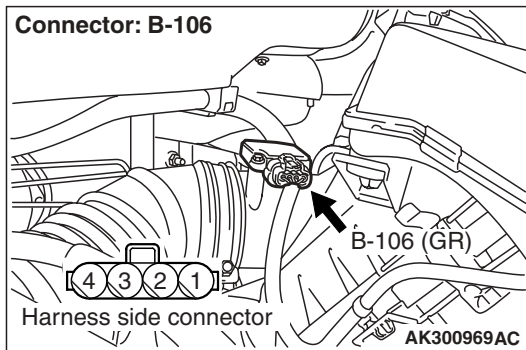
NO : Go to Step 6 .

STEP 6. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**Q: Is the check result normal?**

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-106 (terminal No. 4) air flow sensor connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

- Check earthing line for open circuit.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. MUT-III data list

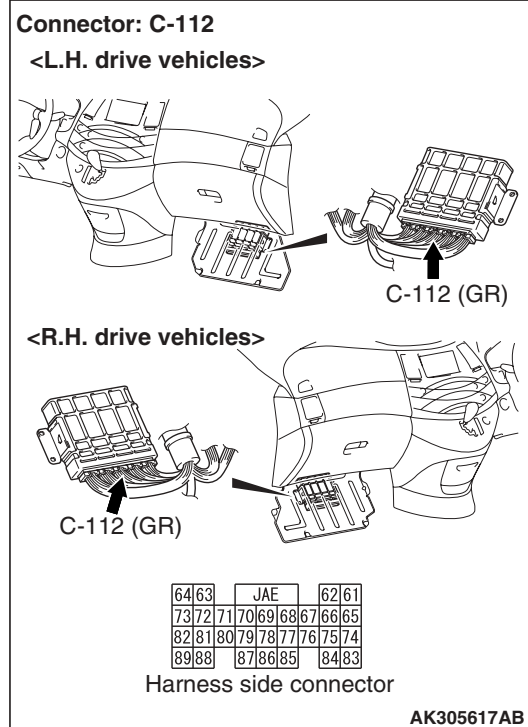
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 12: Air flow sensor

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 9. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

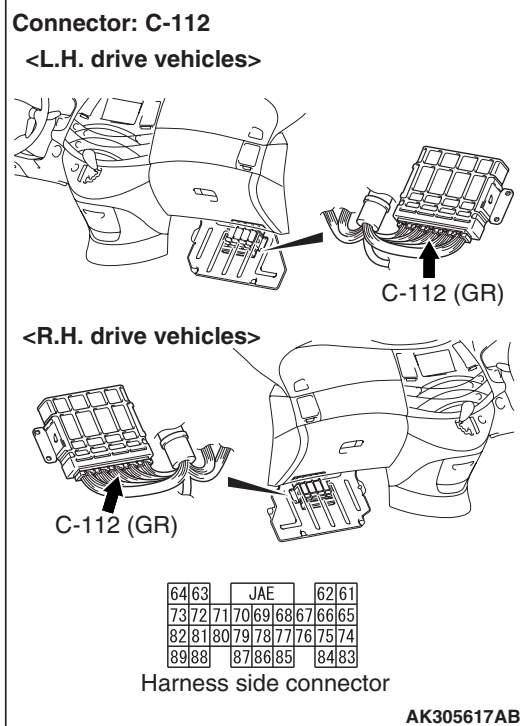
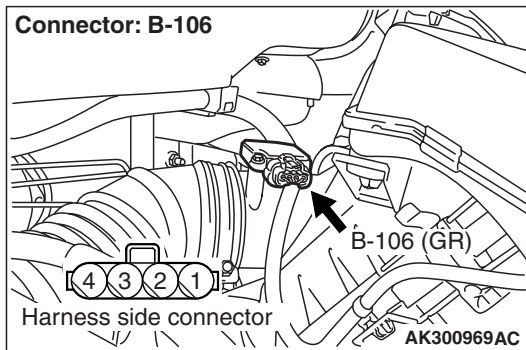


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. Check harness between B-106 (terminal No. 3) air flow sensor connector and C-112 (terminal No. 63) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



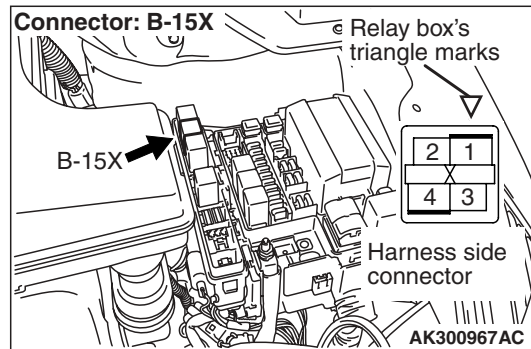
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. Connector check: B-15X engine control relay connector

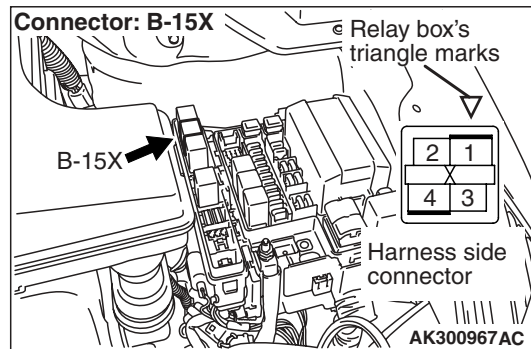
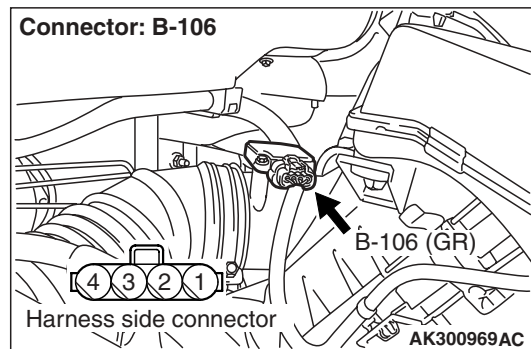


Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace.

STEP 12. Check harness between B-106 (terminal No. 2) air flow sensor connector and B-15X (terminal No. 1) engine control relay connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

STEP 13. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 12: Air flow sensor

Q: Is the check result normal?

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

NO : Go to Step 14 .

STEP 14. Replace air flow sensor.

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

Q: Is the check result normal?

YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Check end.

Code No. P0105: Barometric Pressure Sensor System

FUNCTION

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

or

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

PROBABLE CAUSE

- Failed barometric pressure sensor

DIAGNOSIS PROCEDURE

TROUBLE JUDGMENT**Check Conditions**

- 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 Criteria

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

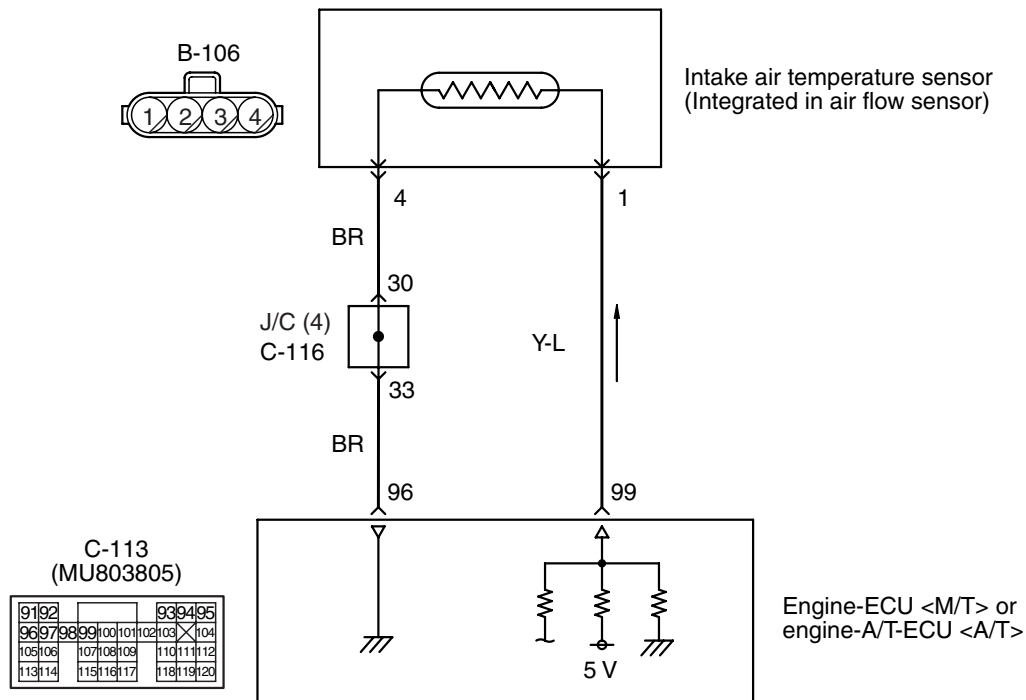
STEP 1. MUT-III diagnosis code**Q: Diagnosis code set?**

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

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

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OPERATION

- A power voltage of 5 V is applied to the intake air temperature sensor output terminal (terminal No. 1) of the air flow sensor connector from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 99).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU (terminal No. 96) from the air flow sensor (terminal No. 4).

FUNCTION

- The intake air temperature sensor converts the intake air temperature into a voltage and inputs the voltage signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- In response to the signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 Conditions

- 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 Criteria

- The sensor output voltage is 4.6V or more (intake air temperature of below -45°C or equivalent) for 4 seconds.

Or

- The sensor output voltage is 0.2V or less (intake air temperature of above 125°C or equivalent) for 4 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 13: Intake air temperature sensor

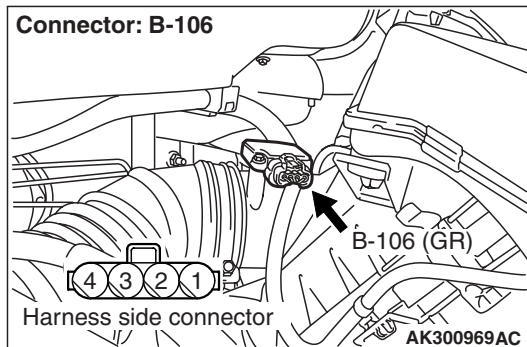
OK: At ambient temperature (atmospheric temperature) or equivalent.

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-106 air flow sensor connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Check intake air temperature sensor itself.

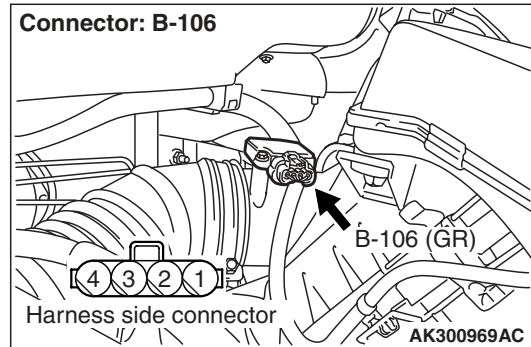
- Check intake air temperature sensor itself (Refer to [P.13A-389](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace air flow sensor.

STEP 4. Perform resistance measurement at B-106 air flow sensor connector.



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

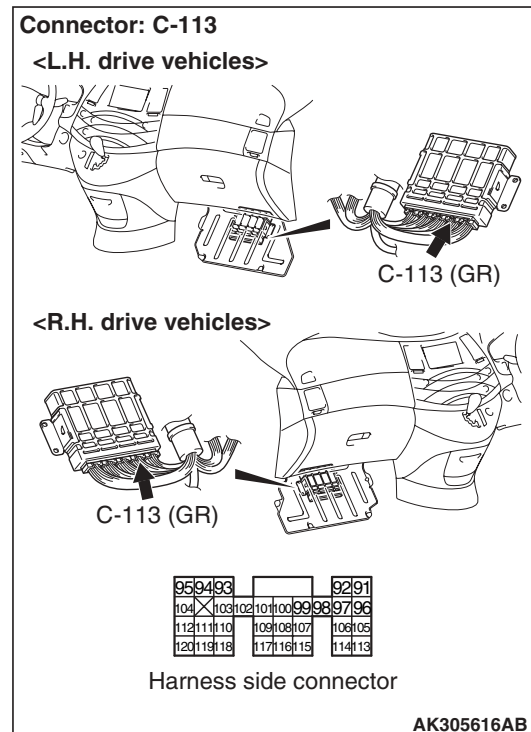
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 5 .

STEP 5. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

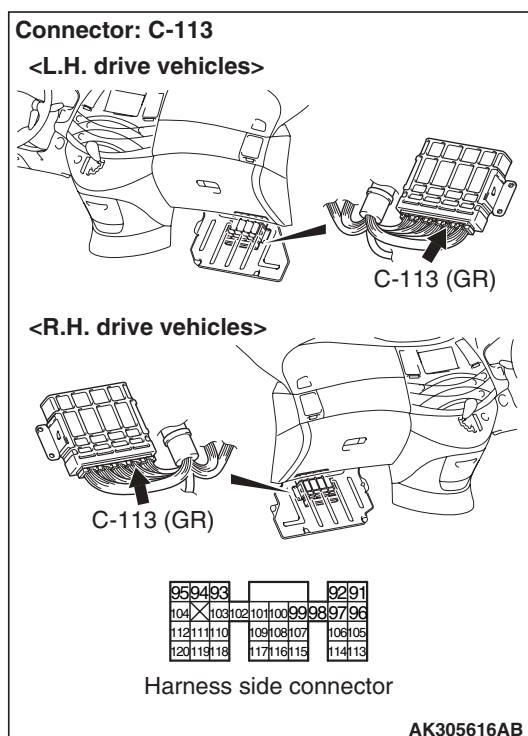
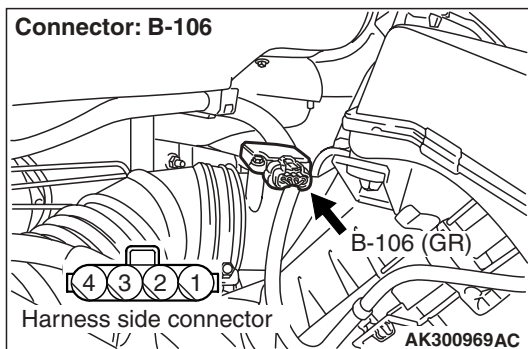


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check harness between B-106 (terminal No. 4) air flow sensor connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector C-116, 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. MUT-III data list

- Item No. 13: Intake air temperature sensor

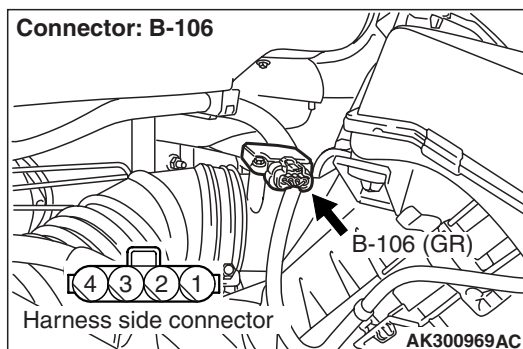
OK: At ambient temperature (atmospheric temperature) or equivalent.

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 8. Perform voltage measurement at B-106 air flow sensor connector.



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

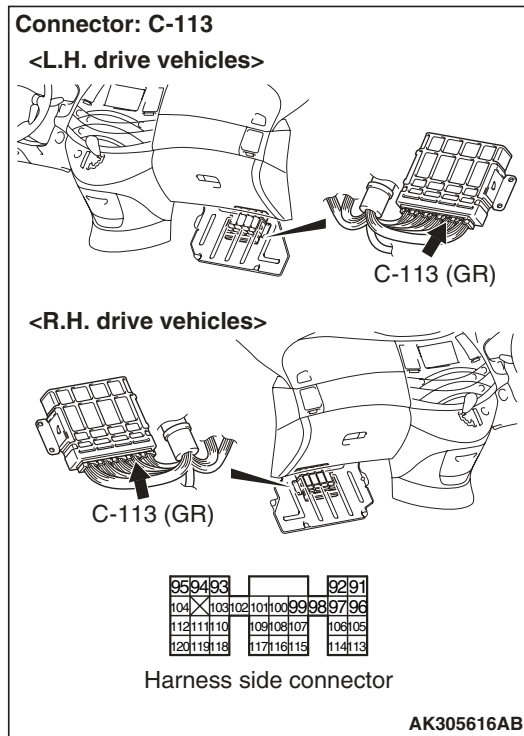
OK: 4.5 – 4.9 V

Q: Is the check result normal?

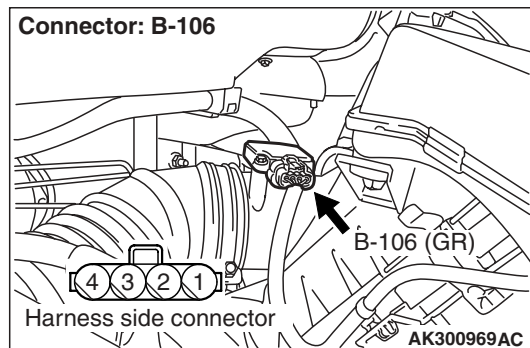
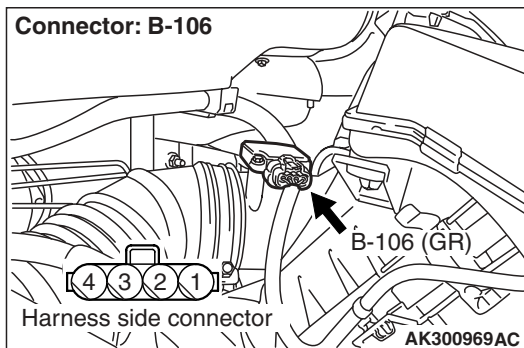
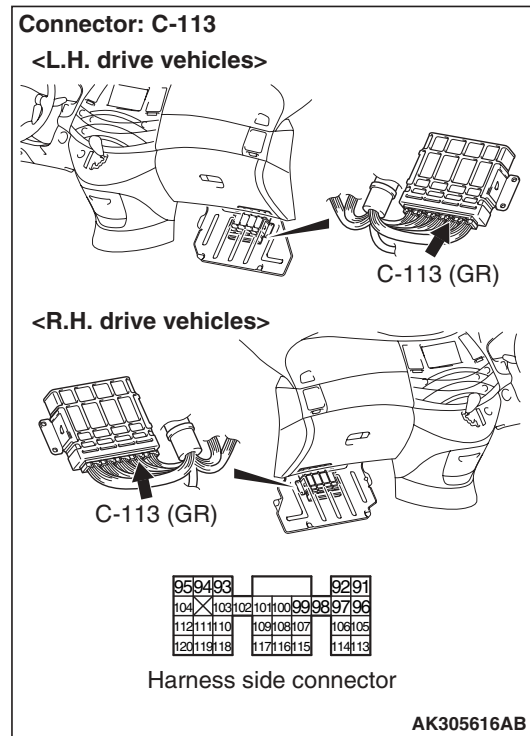
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Go to Step 9 .

STEP 9. Perform voltage measurement at C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 10. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Disconnect B-106 air flow sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 99 and earth.

OK: 4.5 – 4.9 V

Q: Is the check result normal?

YES : Go to Step 10 .

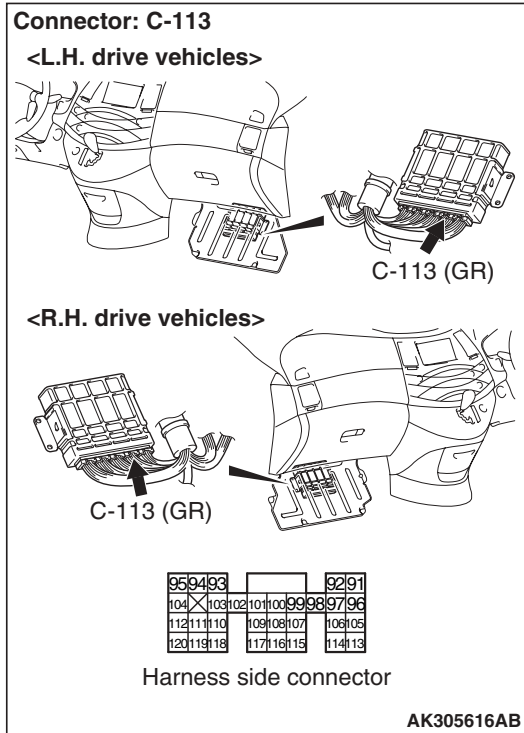
NO : Go to Step 11 .

Q: Is the check result normal?

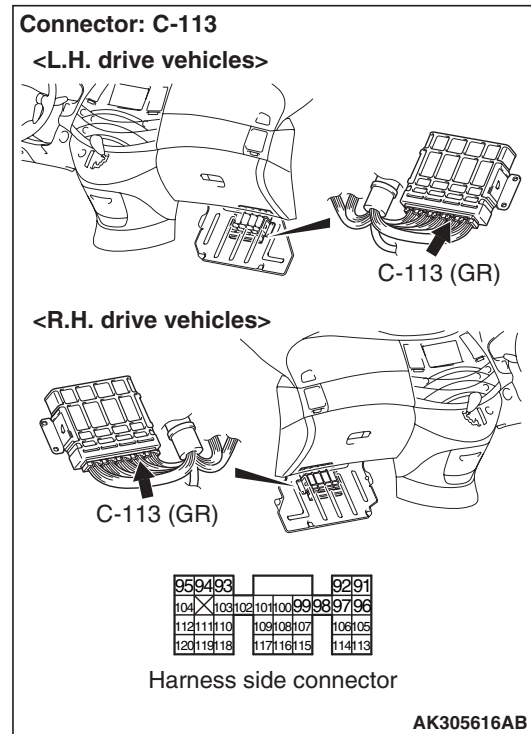
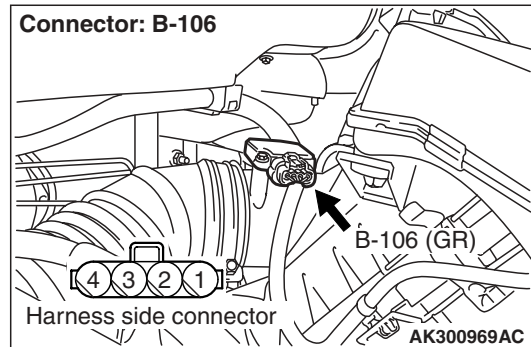
YES : Check and repair harness between B-106 (terminal No. 1) air flow sensor connector and C-113 (terminal No. 99) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

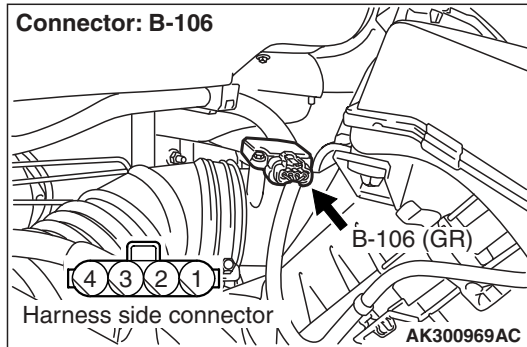
NO : Repair or replace.

STEP 11. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**Q: Is the check result normal?****YES :** Go to Step 12 .**NO :** Repair or replace.**STEP 12. Check harness between B-106 (terminal No. 1) air flow sensor connector and C-113 (terminal No. 99) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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-106 air flow sensor connector.



- Use special tool test harness (MB991709) to connect only terminal No. 1 and No. 4, and then measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK:

Ambient temperature at -20°C: 3.8 – 4.4 V

Ambient temperature at 0°C: 3.2 – 3.8 V

Ambient temperature at 20°C: 2.3 – 2.9 V

Ambient temperature at 40°C: 1.5 – 2.1 V

Ambient temperature at 60°C: 0.8 – 1.4 V

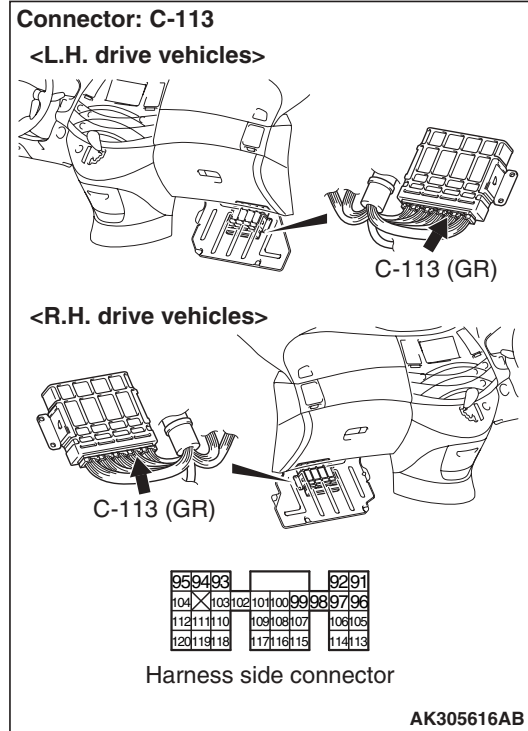
Ambient temperature at 80°C: 0.4 – 1.0 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 14 .

STEP 14. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



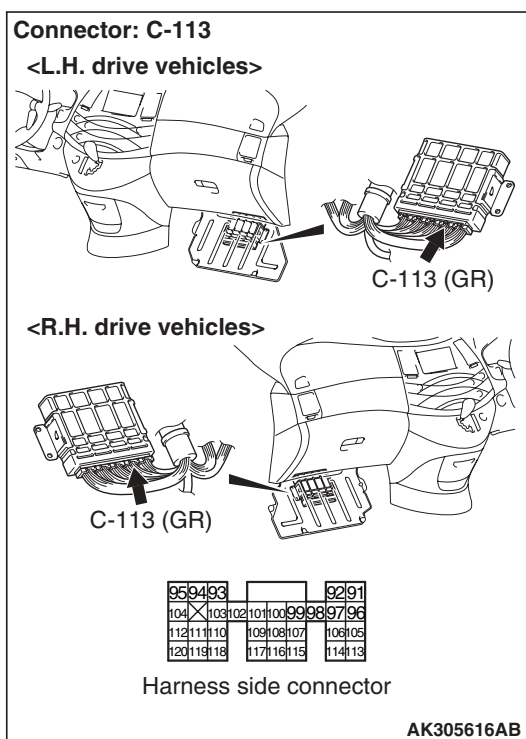
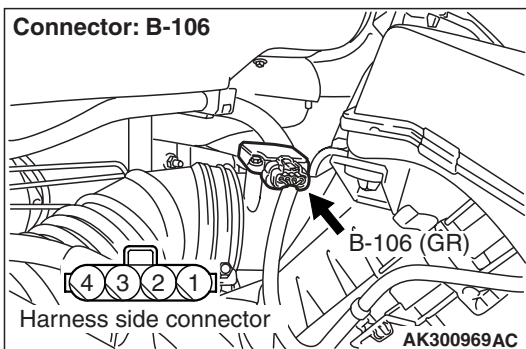
Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair or replace.

STEP 15. Check harness between B-106 (terminal No. 1) air flow sensor connector and C-113 (terminal No. 99) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

YES : Go to Step 7 .
NO : Repair.

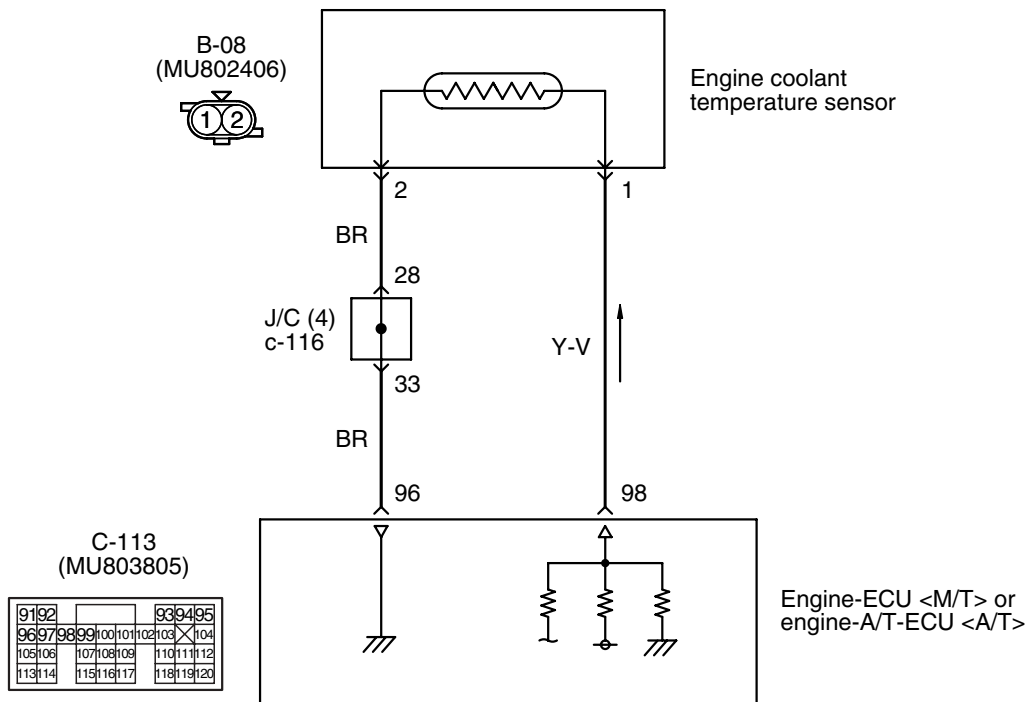


- Check output line for damage.

Q: Is the check result normal?

Code No. P0115: Engine Coolant Temperature Sensor System

Engine coolant temperature sensor circuit



AK305549 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 <M/T> or engine-A/T-ECU <A/T> (terminal No. 98).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96) 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 <M/T> or engine-A/T-ECU <A/T>.
- In response to the signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the fuel injection amount and the fast idle speed when the engine is cold state.
- The sensor output voltage is 0.1V or less (water temperature of above 140°C or equivalent) for 4

- 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 Criteria

- The sensor output voltage is 4.6V or more (water temperature of below -45°C or equivalent) for 4 seconds.

Or

seconds.

Check Conditions

- After the engine has started up.

Judgment Criteria

- The sensor output voltage rises 1.6V or more (engine coolant temperature below 40°C or equivalent) from 1.6V 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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. MUT-III data list**

- Item 21: Engine coolant temperature sensor

OK:

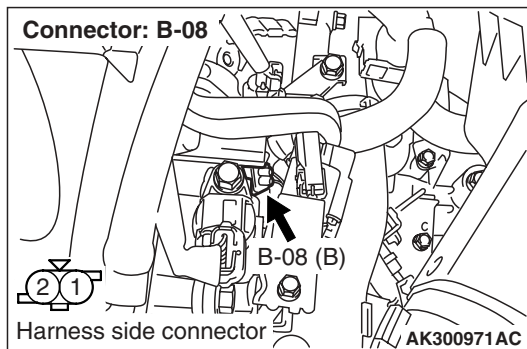
Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.

Engine hot state: At 80 – 120°C

Q: Is the check result normal?

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

NO : Go to Step 2 .

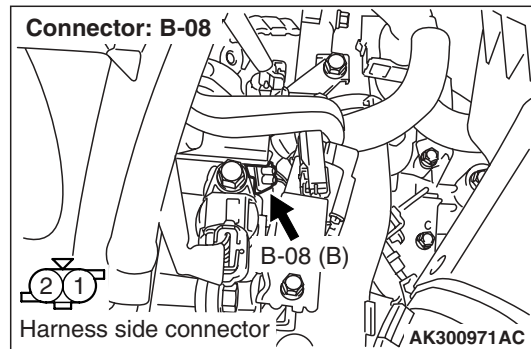
STEP 2. Connector check: B-08 engine coolant temperature sensor connector

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

YES : Go to Step 8 .

STEP 3. Perform resistance measurement at B-08 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

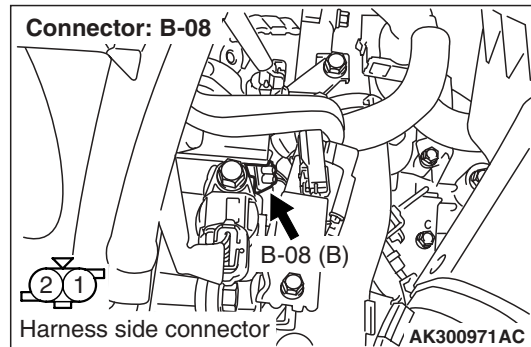
Engine coolant temperature at 60°C: 0.48 – 0.68 kΩ

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 resistance measurement at B-08 engine coolant temperature sensor connector.

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

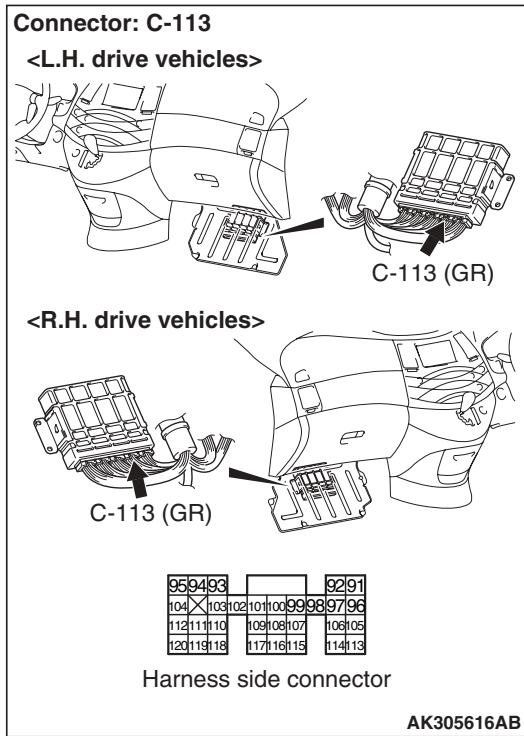
OK: 2 Ω or less

Q: Is the check result normal?

NO : Go to Step 5 .

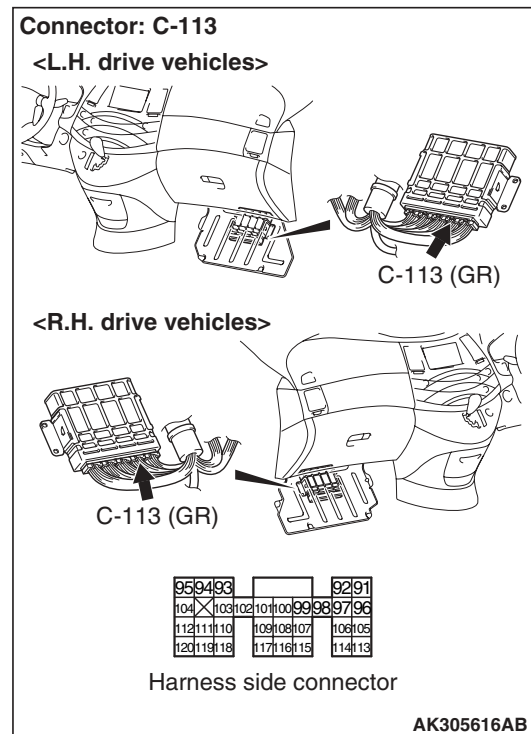
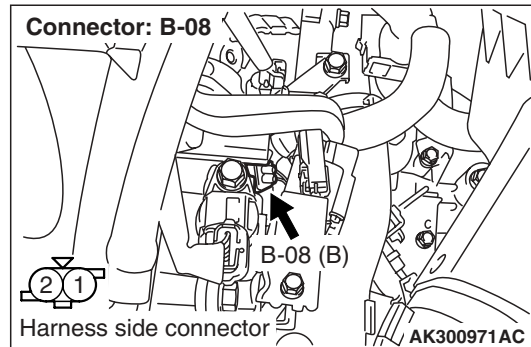
STEP 5. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

Q: Is the check result normal?



YES : Go to Step 6 .
NO : Repair or replace.

STEP 6. Check harness between B-08 (terminal No. 2) engine coolant temperature sensor connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector C-116, 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. MUT-III data list

- Item 21: Engine coolant temperature sensor

OK:

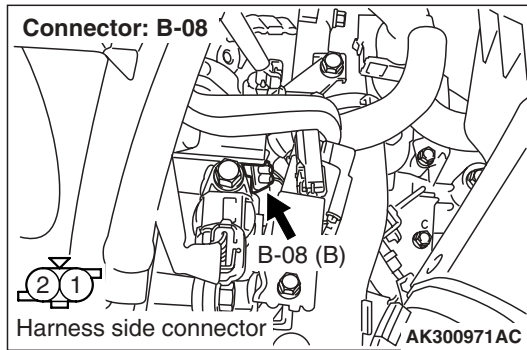
Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.

Engine hot state: At 80 – 120 °C

Q: Is the check result normal?

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

STEP 8. Perform voltage measurement at B-08 engine coolant temperature sensor connector.

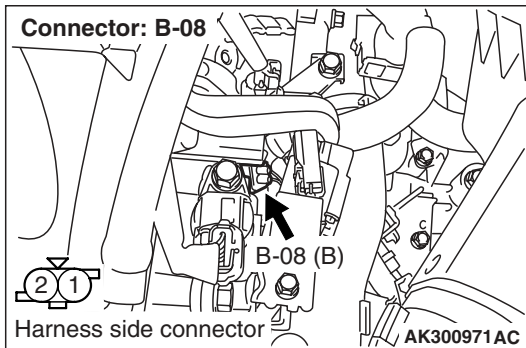
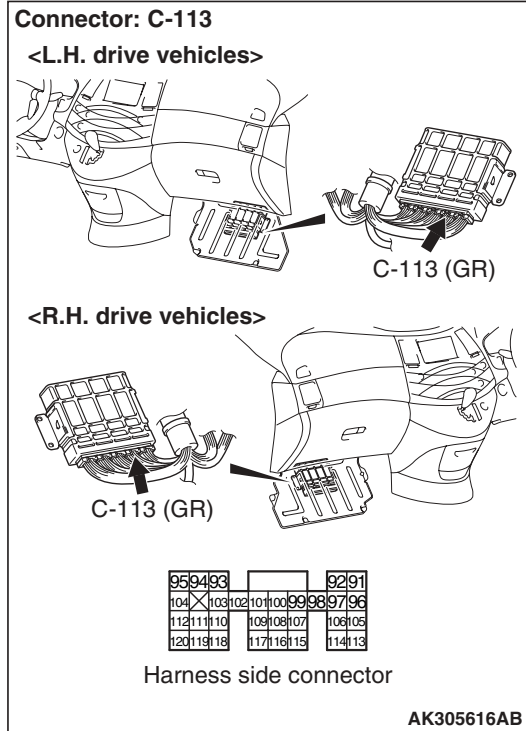


- Disconnect connector, and measure at harness side.
 - Ignition switch: ON
 - Voltage between terminal No. 1 and earth.
- OK: 4.5 – 4.9 V**

Q: Is the check result normal?

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

STEP 9. Perform voltage measurement at C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

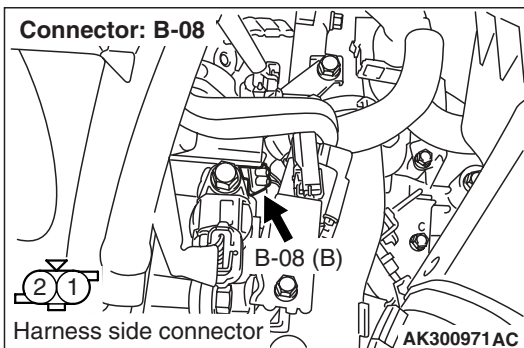
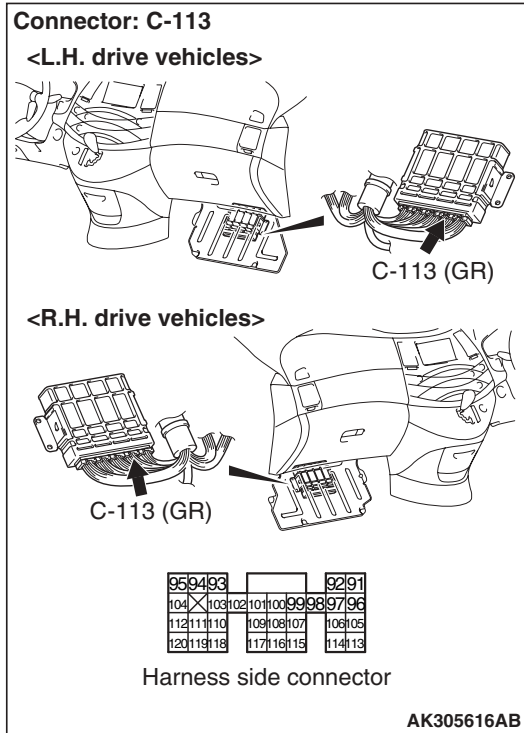


- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
 - Disconnect B-08 engine coolant temperature sensor.
 - Ignition switch: ON
 - Voltage between terminal No. 98 and earth.
- OK: 4.5 – 4.9 V**

Q: Is the check result normal?

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

**STEP 10. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



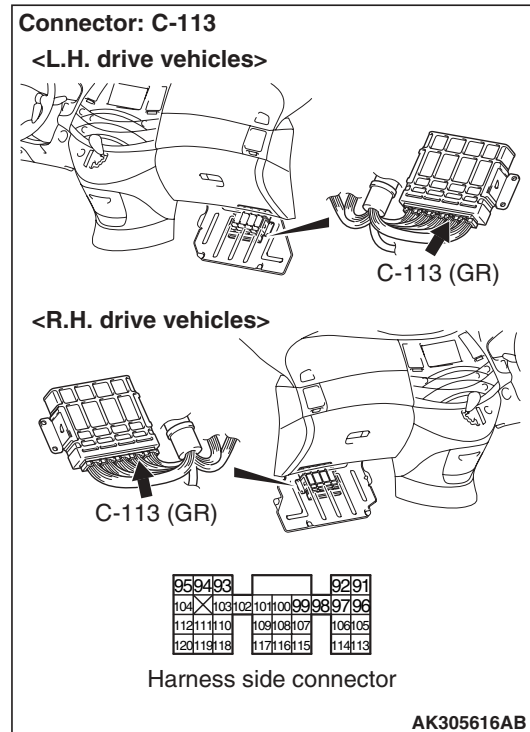
Q: Is the check result normal?

YES : Check and repair harness between B-08 (terminal No. 1) engine coolant temperature sensor connector and C-113 (terminal No. 98) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

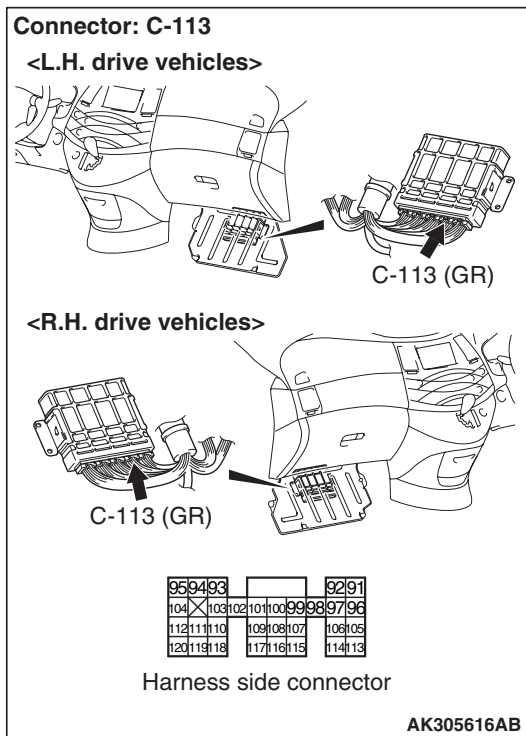
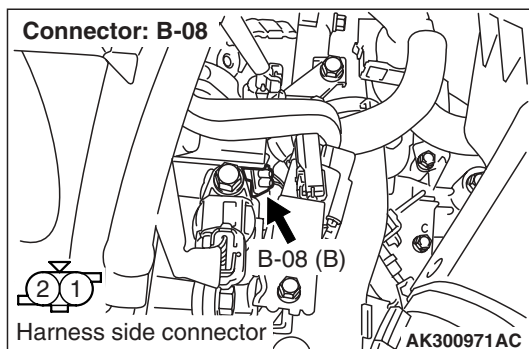
NO : Repair or replace.

**STEP 11. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



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

STEP 12. Check harness between B-08 (terminal No. 1) engine coolant temperature sensor connector and C-113 (terminal No. 98) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

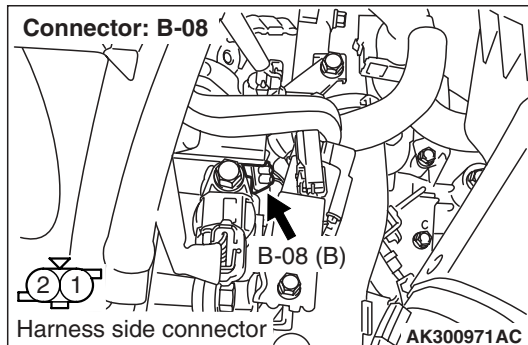


- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 7 .
NO : Repair.

STEP 13. Perform voltage measurement at B-08 engine coolant temperature sensor connector.



- Use special tool test harness (MB991709) 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

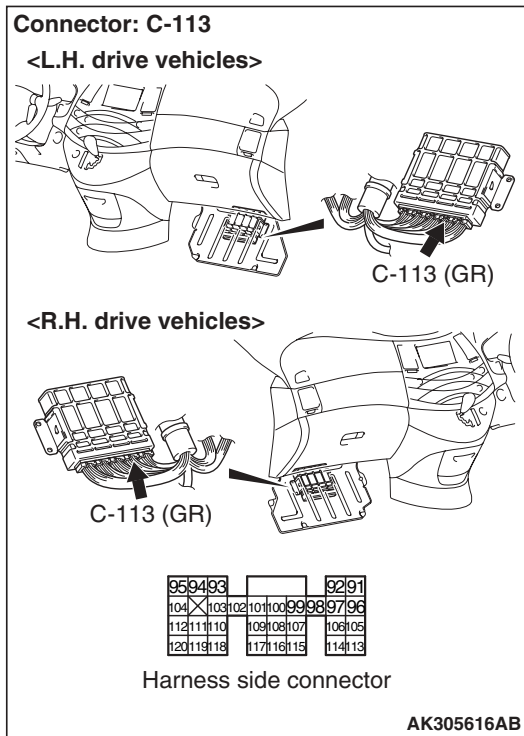
Engine coolant temperature at 80°C : 0.3 – 0.9 V

Q: Is the check result normal?

YES : Go to Step 7 .

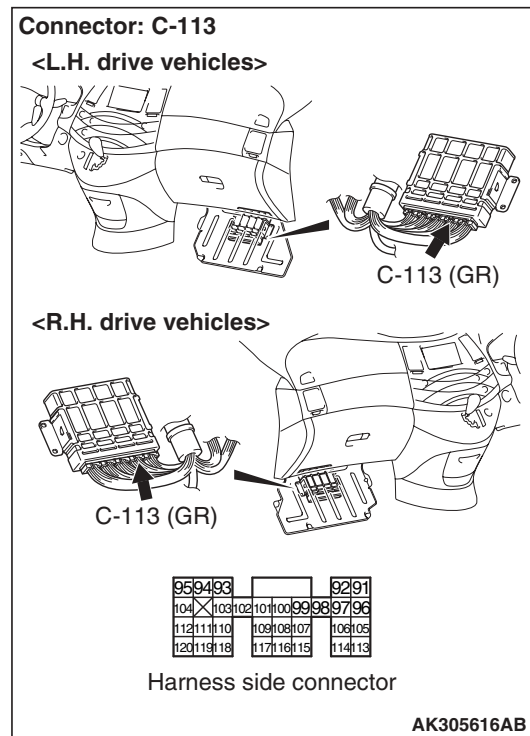
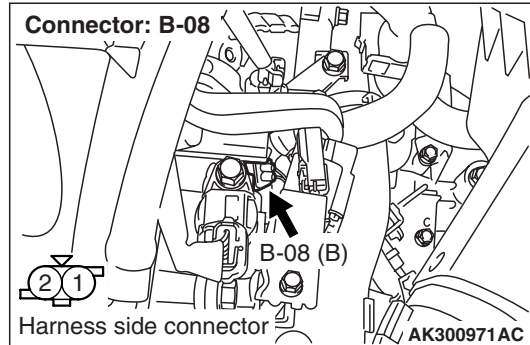
NO : Go to Step 14 .

**STEP 14. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



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

**STEP 15. Check harness between B-08 (terminal
No. 1) engine coolant temperature sensor
connector and C-113 (terminal No. 98)
engine-ECU <M/T> connector or engine-A/T-ECU
<A/T> connector.**

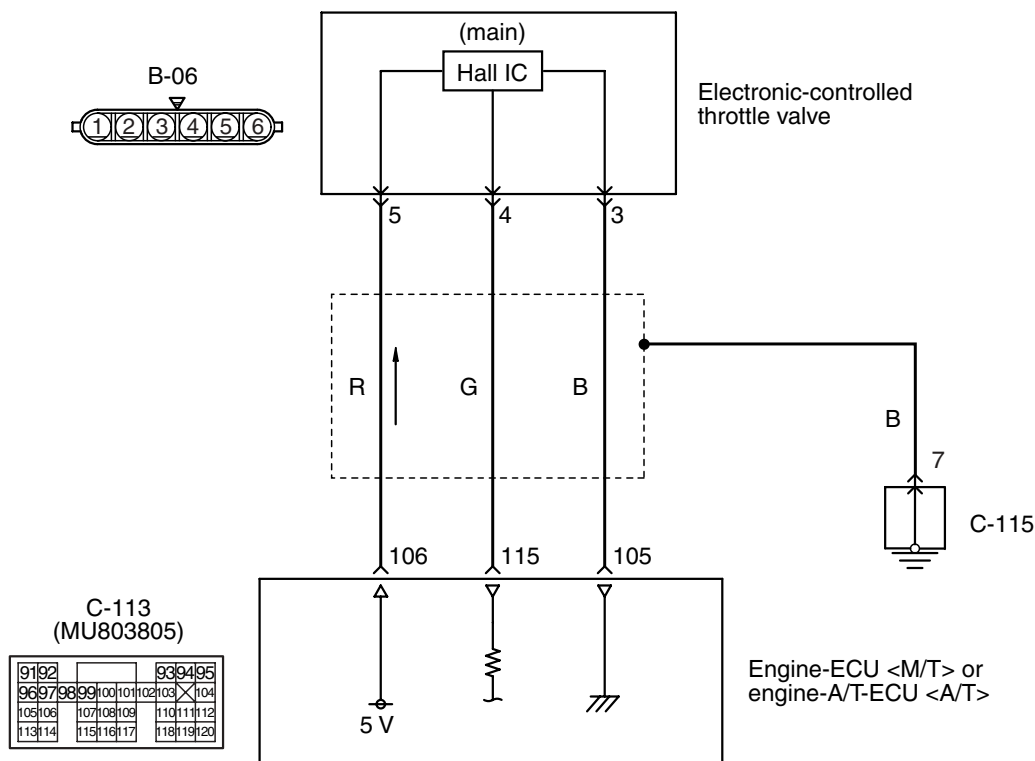


- Check output line for damage.

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

Code No. P0122: Throttle Position Sensor (Main) Circuit Low Input

Throttle position sensor (main) 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

AK305550AB

OPERATION

- A power voltage of 5 V is applied to the electronic-controlled throttle valve (terminal No. 5) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 106).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 105) from the electronic-controlled throttle valve (terminal No. 3).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 115) from the electronic-controlled throttle valve output terminal (terminal No. 4).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the throttle valve position.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

- Throttle position sensor (main) output voltage is 0.35 V or less for 0.5 second.

PROBABLE CAUSE

- Failed throttle position sensor (main)

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

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

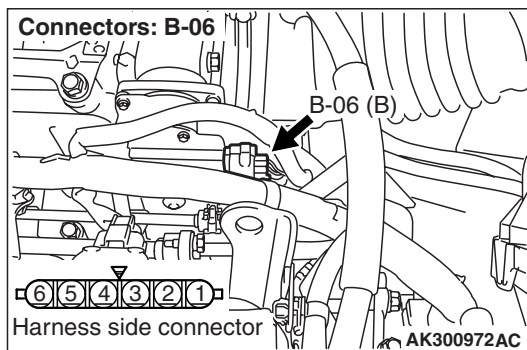
- Refer to Data List Reference Table [P.13A-363](#).
 - Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-06 electronic-controlled throttle valve connector

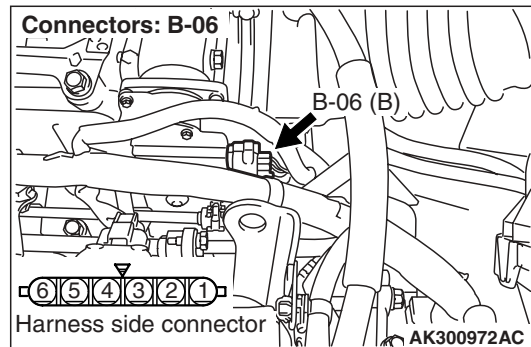


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform voltage measurement at B-06 electronic-controlled throttle valve connector.



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

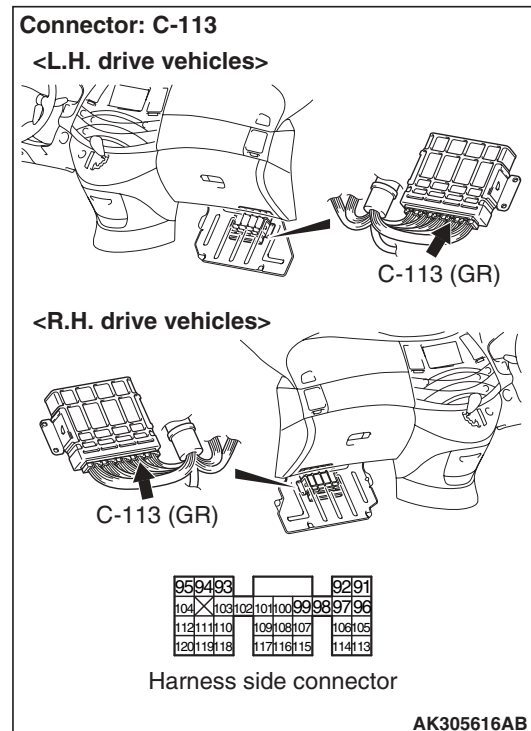
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

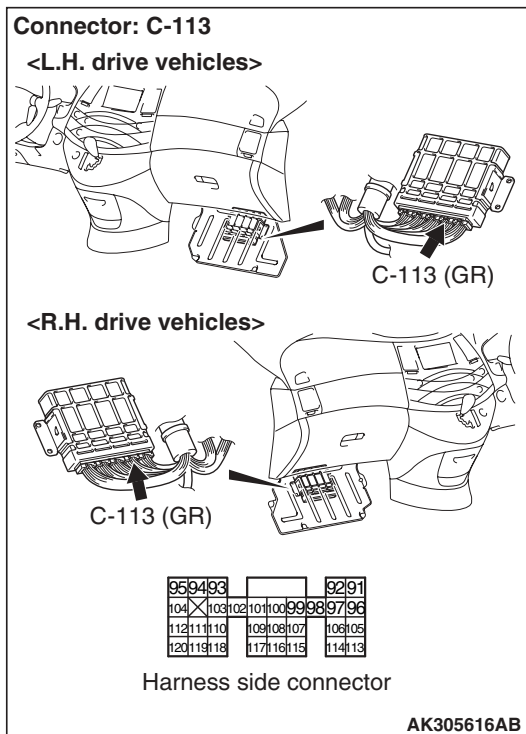
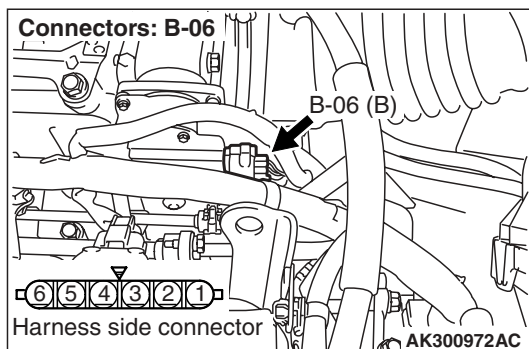


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-06 (terminal No. 5) electronic-controlled throttle valve connector and C-113 (terminal No. 106) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.



- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. MUT-III data list

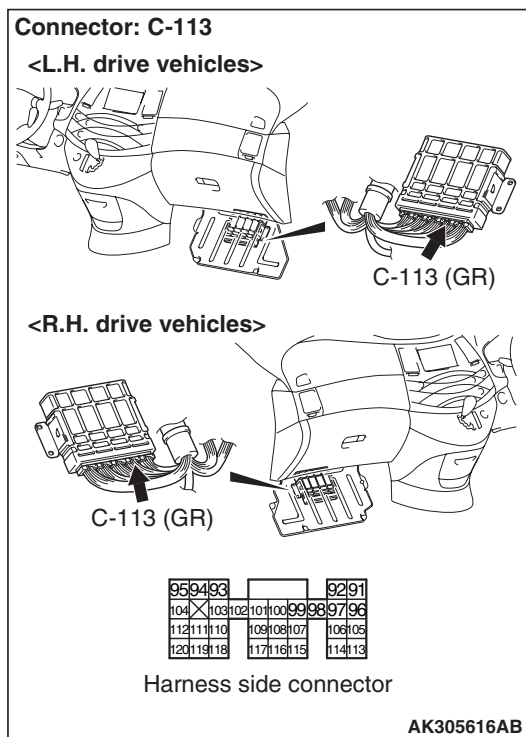
- Refer to Data List Reference Table [P.13A-363](#).
a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

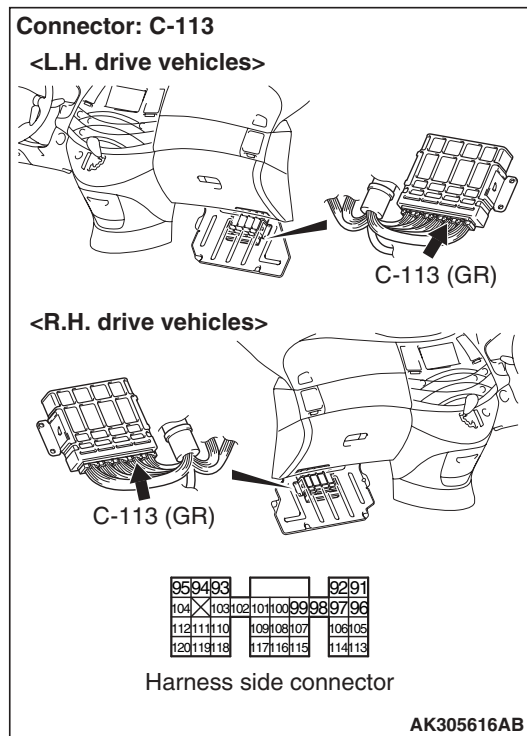
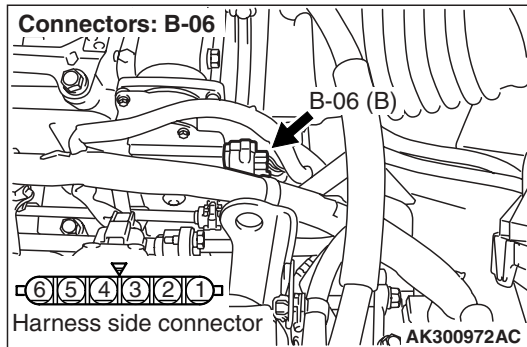


Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Check harness between B-06 (terminal No. 5) electronic-controlled throttle valve connector and C-113 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



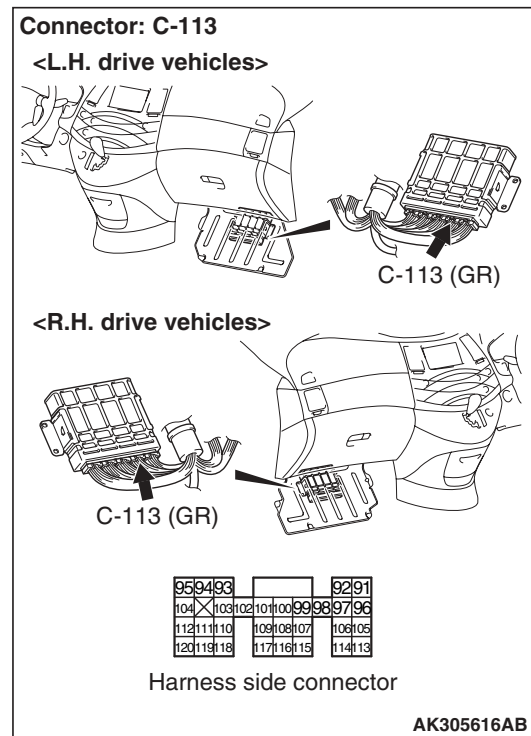
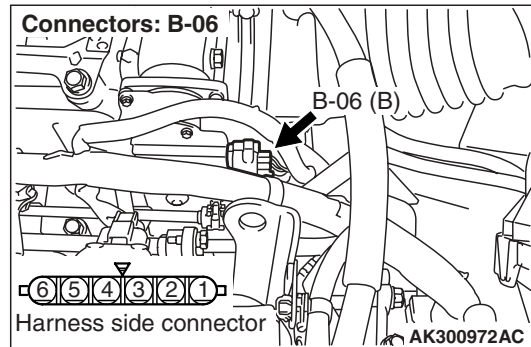
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check harness between B-06 (terminal No. 4) electronic-controlled throttle valve connector and C-113 (terminal No. 115) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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. Replace the electronic-controlled throttle valve

- After replacing the electronic-controlled throttle valve, re-check the trouble symptoms.

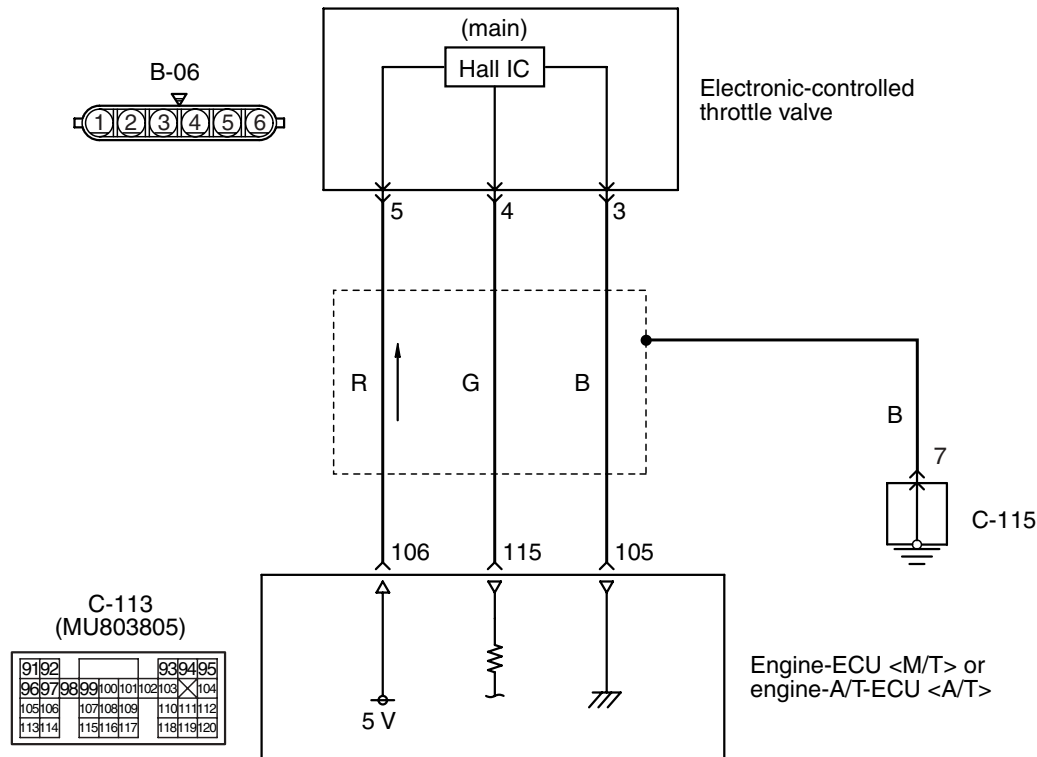
Q: Is the check result normal?

YES : Check end.

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Code No. P0123: Throttle Position Sensor (Main) Circuit High Input

Throttle position sensor (main) 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

AK305550AB

OPERATION

- A power voltage of 5 V is applied to the electronic-controlled throttle valve (terminal No. 5) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 106).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 105) from the electronic-controlled throttle valve (terminal No. 3).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 115) from the electronic-controlled throttle valve output terminal (terminal No. 4).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the throttle valve position.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.

Judgment Criteria

- Throttle position sensor (main) output voltage is 4.8 V or more for 0.5 second.

PROBABLE CAUSE

- Failed throttle position sensor (main)

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

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

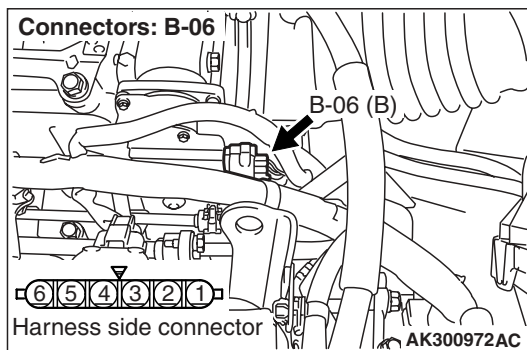
- Refer to Data List Reference Table [P.13A-363](#).
 - Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-06 electronic-controlled throttle valve connector

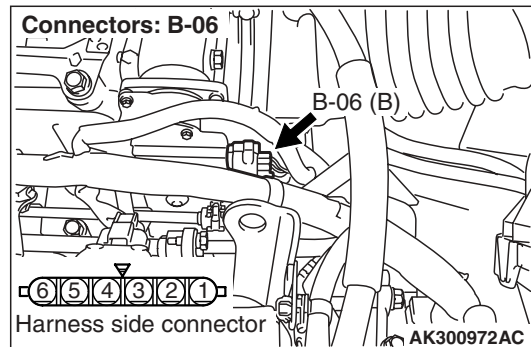


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at B-06 electronic-controlled throttle valve connector.



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

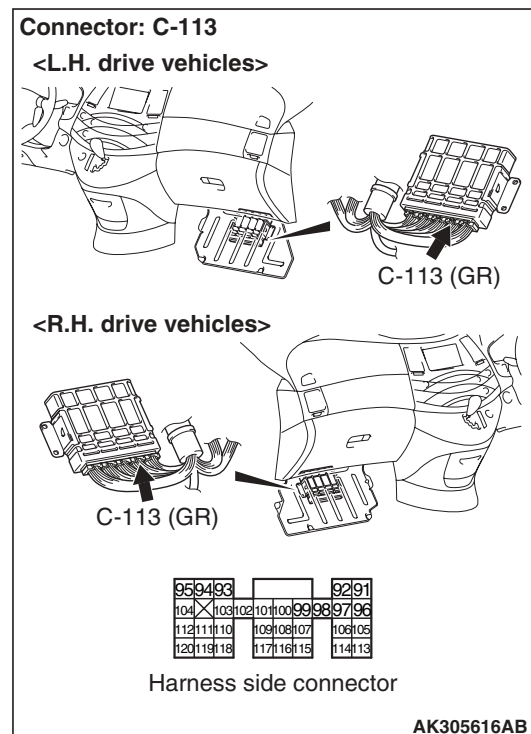
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

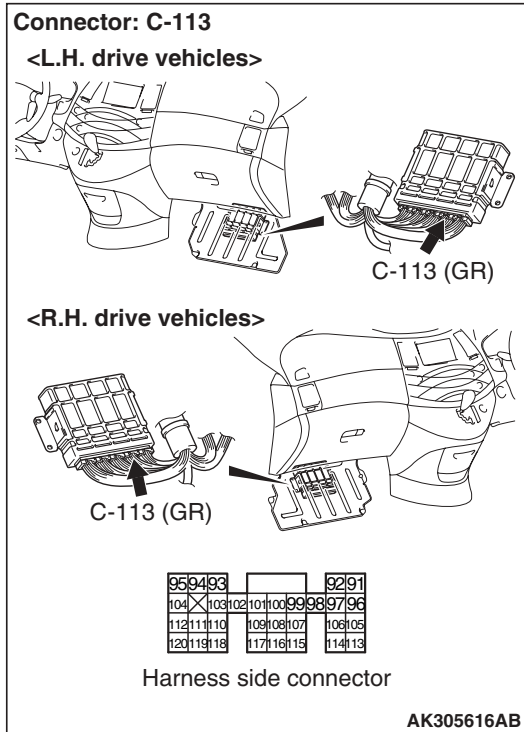
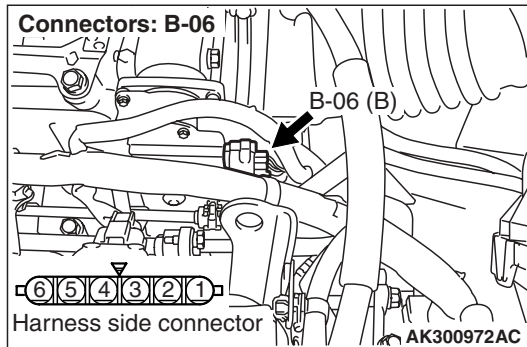


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-06 (terminal No. 3) electronic-controlled throttle valve connector and C-113 (terminal No. 105) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Replace the electronic-controlled throttle valve

- After replacing the electronic-controlled throttle valve, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Check end.

NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Code No. P0125: Feedback System Monitor

OPERATION

- Refer to Code No. P0201 No. 1 Injector System [P.13A-115](#).

Refer to Code No. P0202 No. 2 Injector System [P.13A-120](#).

Refer to Code No. P0203 No. 3 Injector System [P.13A-125](#).

Refer to Code No. P0204 No. 4 Injector System [P.13A-130](#).

- Refer to Code No. P0130 Cylinder 1, 4 Oxygen Sensor (Front) Circuit [P.13A-57](#).
- Refer to Code No. P0150 Cylinder 2, 3 Oxygen Sensor (Front) Circuit [P.13A-82](#).

FUNCTION

- The engine-ECU <M/T> or engine-A/T-ECU <A/T> effects air-fuel ratio feedback control in accordance with the signals from the oxygen sensor (front).
- If the oxygen sensor (front) has deteriorated, corrections will be made by the 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 76°C or more.
- Within the range of air-fuel ratio feedback operation.
- Not in low speed operation.

Judgment Criterion

- 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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Is any other diagnosis code than P0170 or P0173 output?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2.MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 12: Air flow sensor
 - Item 21: Engine coolant temperature sensor
 - Item 59: Cylinder 1, 4 oxygen sensor (front)
 - Item 69: Cylinder 2, 3 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 Code [P.13A-20](#)).

STEP 3: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 4 .

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 4.Check for intake of air from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5.Check for leakage of exhaust emission from exhaust manifold.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

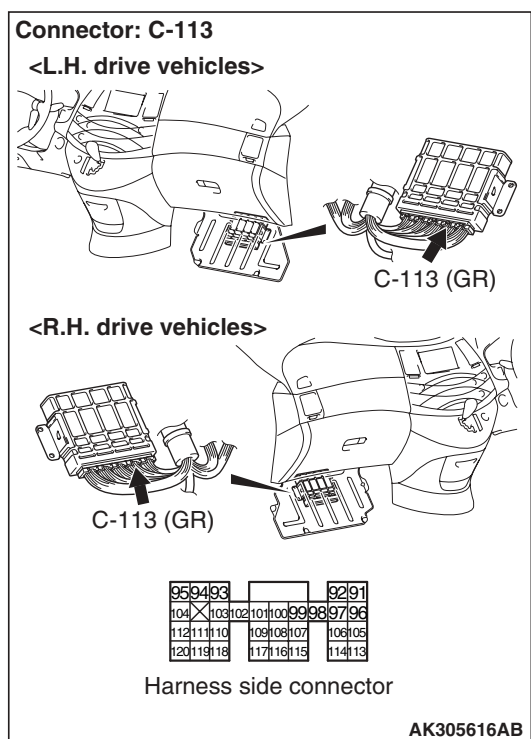
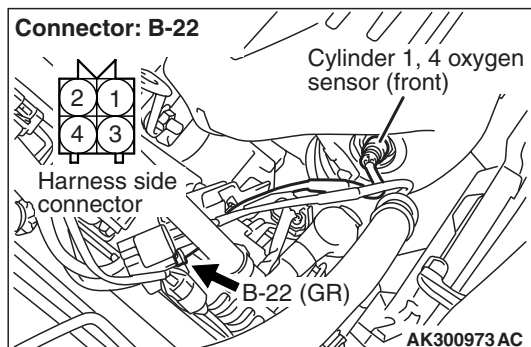
STEP 6.Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-383](#)).

STEP 7. Connector check: B-22 cylinder 1, 4 oxygen sensor (front) connector, C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP8. Check cylinder 1, 4 oxygen sensor (front) itself.

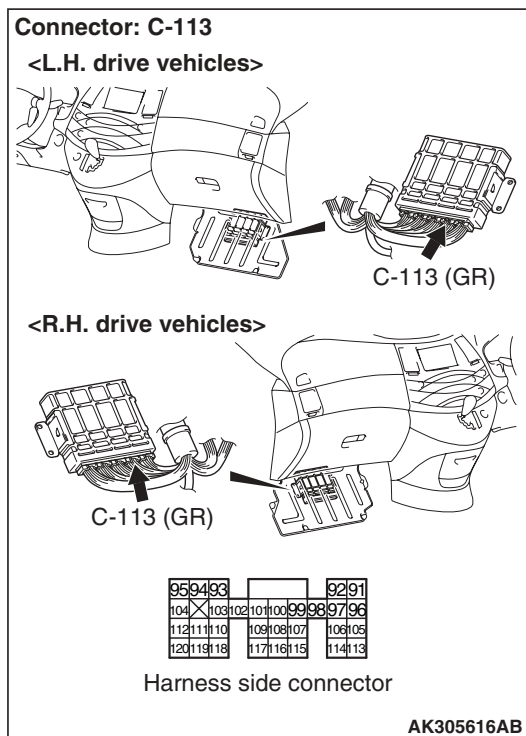
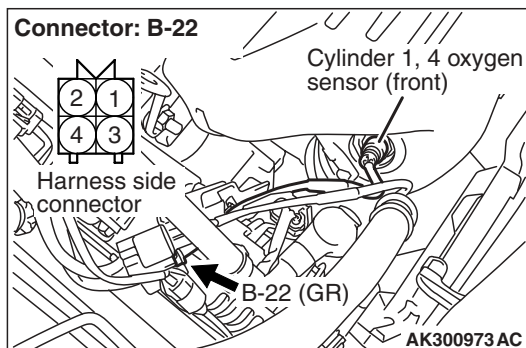
- Check cylinder 1, 4 oxygen sensor (front) itself (Refer to P.13A-391).

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace cylinder 1, 4 oxygen sensor (front).

STEP 9. Check harness between B-22 (terminal No. 4) cylinder 1, 4 oxygen sensor (front) connector and C-113 (terminal No. 109) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



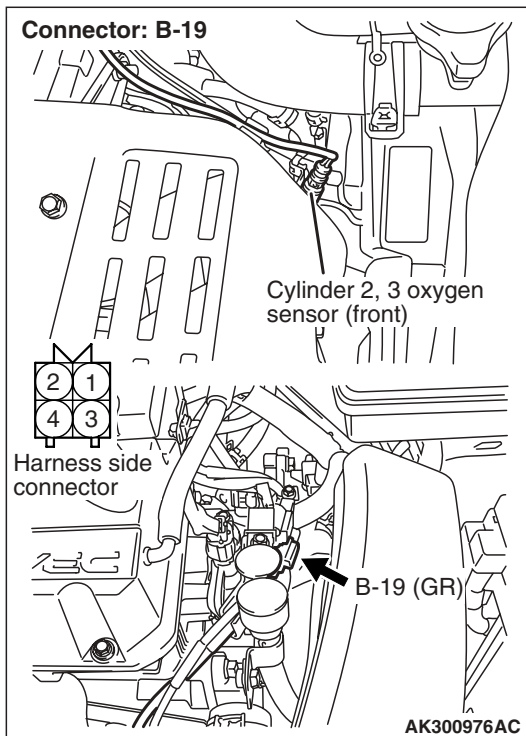
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Connector check: B-19 cylinder 2, 3 oxygen sensor (front) connector, C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



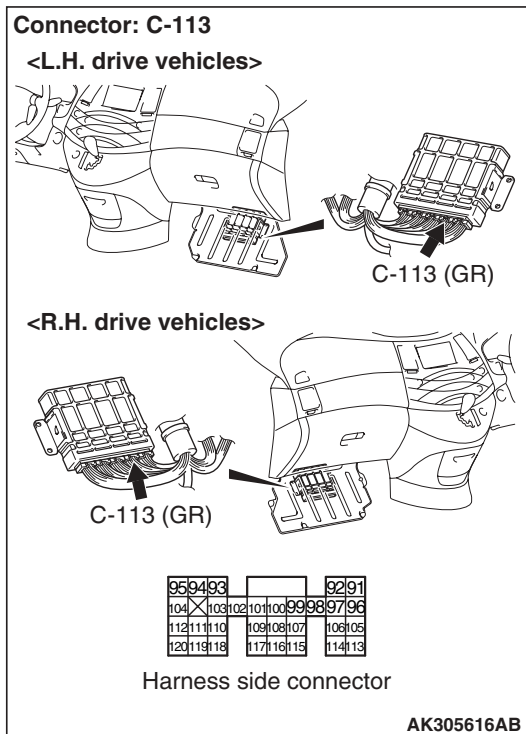
YES : Go to Step 11 .
NO : Repair or replace.

STEP 11. Check cylinder 2, 3 oxygen sensor (front) itself.

- Check cylinder 2, 3 oxygen sensor (front) itself (Refer to [P.13A-391](#)).

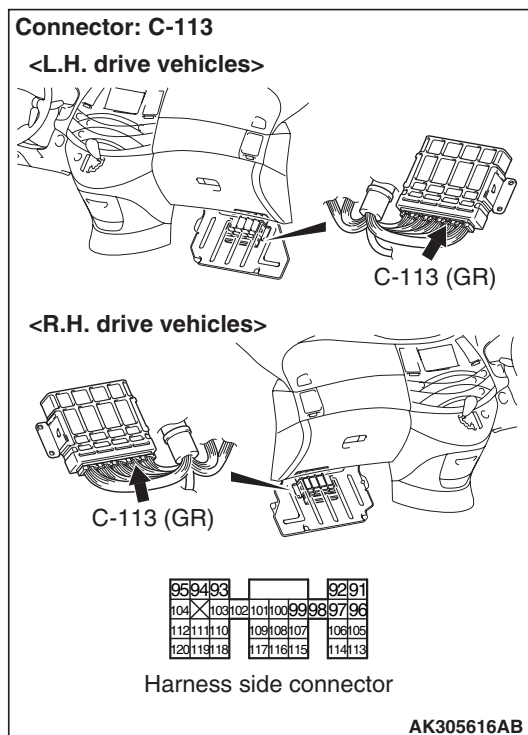
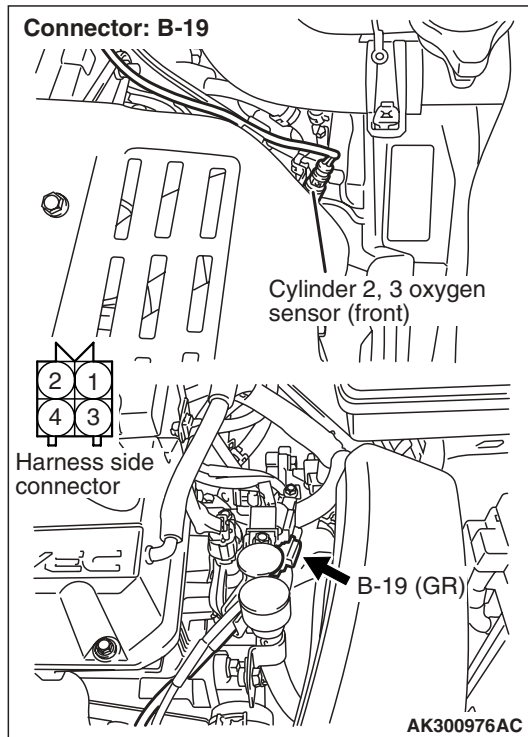
Q: Is the check result normal?

YES : Go to Step 12 .
NO : Replace cylinder 2, 3 oxygen sensor (front).



Q: Is the check result normal?

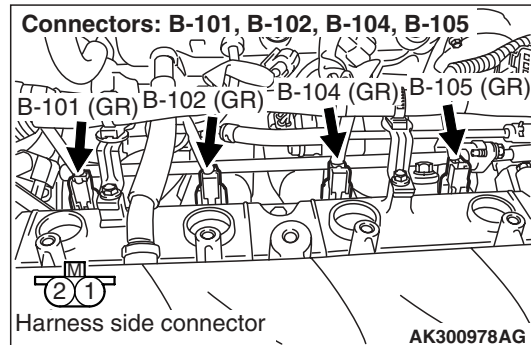
STEP 12. Check harness between B-19 (terminal No. 4) cylinder 2, 3 oxygen sensor (front) connector and C-113 (terminal No. 108) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



YES : Go to Step 13 .

NO : Repair.

STEP 13. Connector check: Injector connector



- B-101 (No.1 injector connector)
- B-102 (No.2 injector connector)
- B-104 (No.3 injector connector)
- B-105 (No.4 injector connector)

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair or replace.

STEP 14. Check injector itself.

- Check Injector itself (Refer to [P.13A-393](#)).

Q: Is the check result normal?

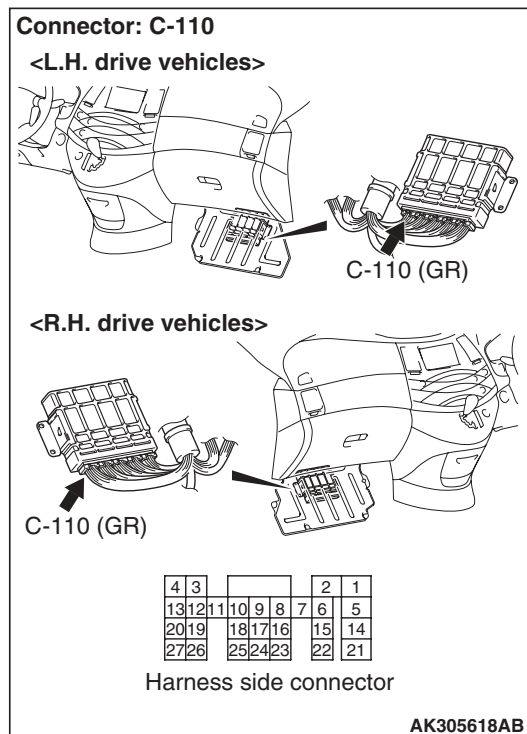
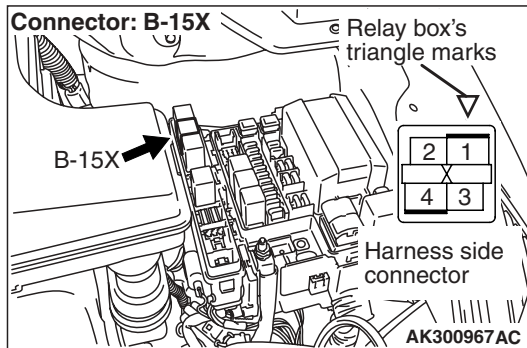
YES : Go to Step 15 .

NO : Replace injector.

- Check output line for damage.

Q: Is the check result normal?

STEP 15. Connector check: B-15X engine control relay connector and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

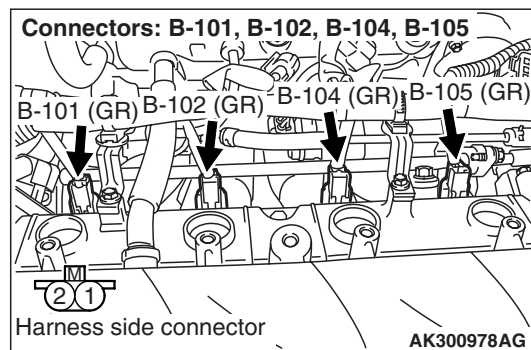
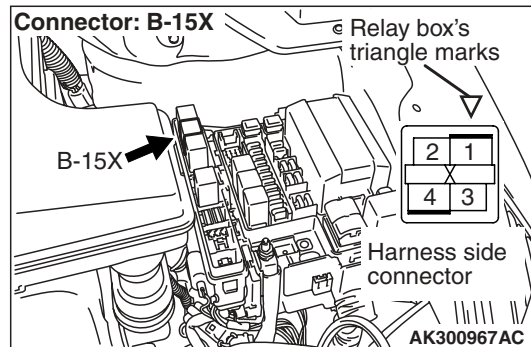


Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair or replace.

STEP 16. Check harness between B-15X engine control relay connector and injector connector.



- Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check harness between B-15X (terminal No. 1) engine control relay connector and B-101 (terminal No. 1) No. 1 injector connector.
- Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check harness between B-15X (terminal No. 1) engine control relay connector and B-102 (terminal No. 1) No. 2 injector connector.
- Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check harness between B-15X (terminal No. 1) engine control relay connector and B-104 (terminal No. 1) No. 3 injector connector.
- Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check harness between B-15X (terminal No. 1) engine control relay connector and B-105 (terminal No. 1) No. 4 injector connector.

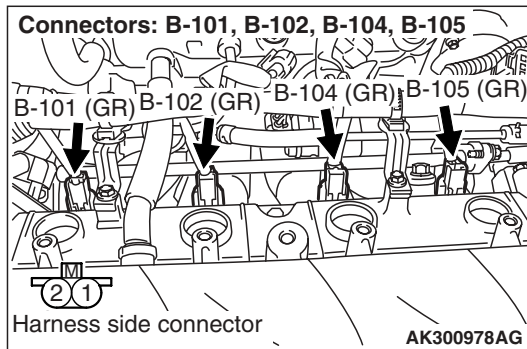
NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

- Check power supply line for damage.

Q: Are the check results normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Check harness between injector connector and C-110 engine-ECU connector.

YES : Go to Step 18 .

NO : Repair.

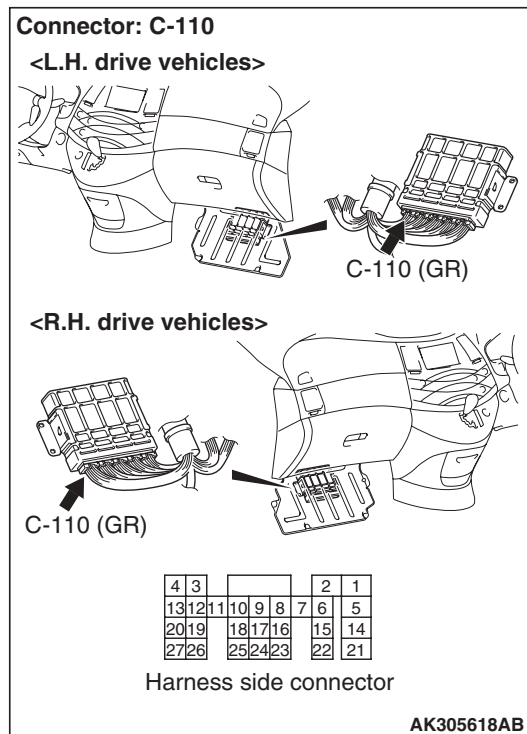
STEP 18. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-383](#)).

Q: Is the check result normal?

YES : Repair.

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

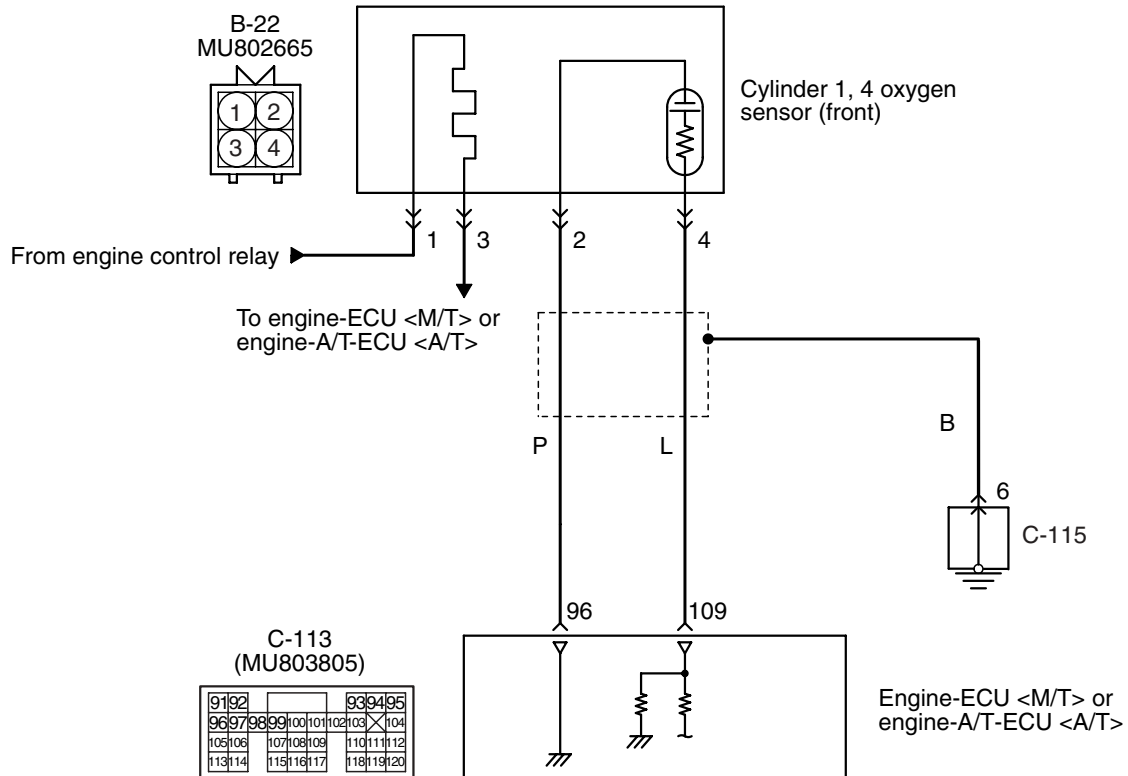


- Check harness between B-101 (terminal No. 2) No. 1 injector connector and C-110 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
 - Check harness between B-102 (terminal No. 2) No. 2 injector connector and C-110 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
 - Check harness between B-104 (terminal No. 2) No. 3 injector connector and C-110 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
 - Check harness between B-105 (terminal No. 2) No. 4 injector connector and C-110 (terminal No. 21) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check output line for damage.

Q: Are the check results normal?

Code No. P0130: Cylinder 1, 4 Oxygen Sensor (Front) System

Cylinder 1, 4 oxygen sensor circuit (front)



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

AK305551AB

OPERATION

- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 109) from the cylinder 1, 4 oxygen sensor (front) output terminal (terminal No. 4).
- The cylinder 1, 4 oxygen sensor (front) (terminal No. 2) is earthed with engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96).

FUNCTION

- The cylinder 1, 4 oxygen sensor (front) converts the concentration of oxygen in the exhaust emission into a voltage and inputs the signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the cylinder 1, 4 oxygen sensor (front) 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 <M/T> or engine-A/T-ECU <A/T> 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 approx. 82°C or higher.
- The engine speed is 1200 r/min or more.
- The monitoring time is 5 seconds.

Judgment Criteria

- When the cylinder 1, 4 oxygen sensor (front) output voltage is 0.2 V or less and a power voltage of 5 V is applied to the cylinder 1, 4 oxygen sensor (front) in the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the sensor output voltage is 4.5V or more.
- To be monitored once per driving cycle.

Check Conditions

- The engine speed is 1200 – 3000 r/min.
- The engine coolant temperature is approx. 60°C or higher.
- Volumetric efficiency is 20 – 60 %.
- During the air-fuel ratio feedback control

Judgment Criterion

- When the cylinder 1, 4 oxygen sensor (front) output frequency is 6 or less for 10 seconds on the average.

PROBABLE CAUSE

- Failed cylinder 1, 4 oxygen sensor (front)
- Open/short circuit in cylinder 1, 4 oxygen sensor (front) heater circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

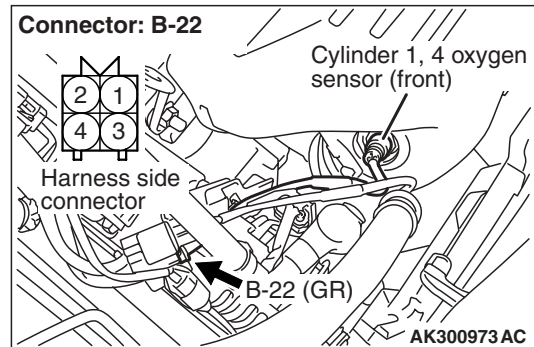
- Refer to Data List Reference Table [P.13A-363](#).
 - Item 11: Cylinder 1, 4 oxygen sensor (front)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-22 cylinder 1, 4 oxygen sensor (front) connector

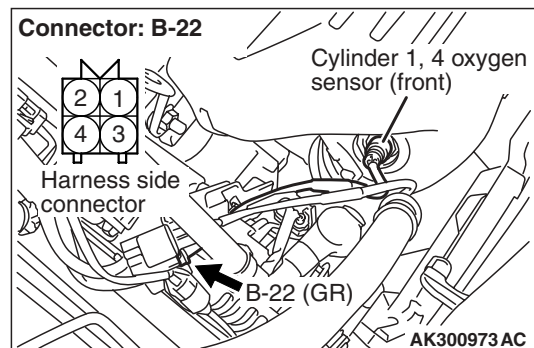


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at B-22 cylinder 1, 4 oxygen sensor (front) connector.



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

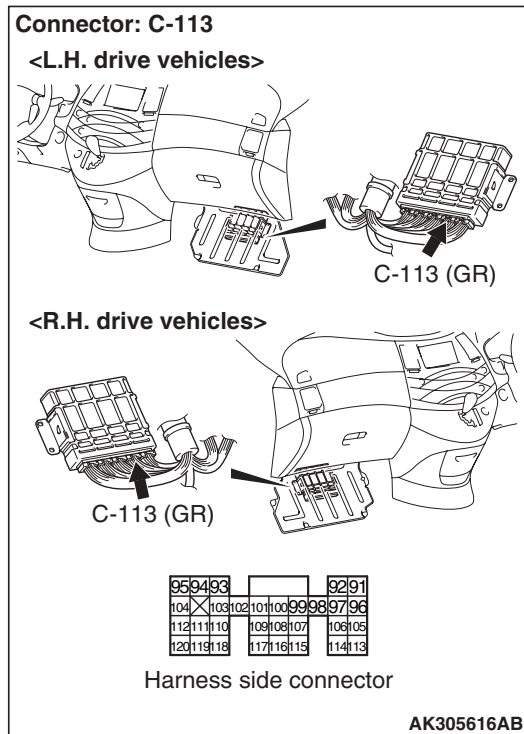
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

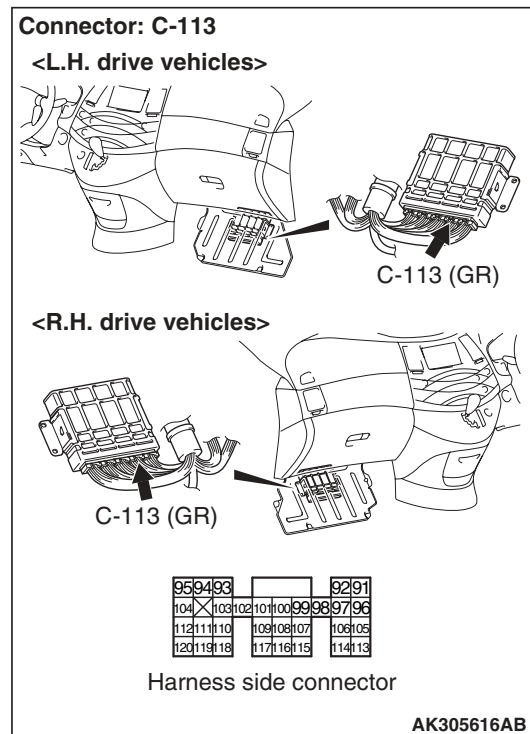
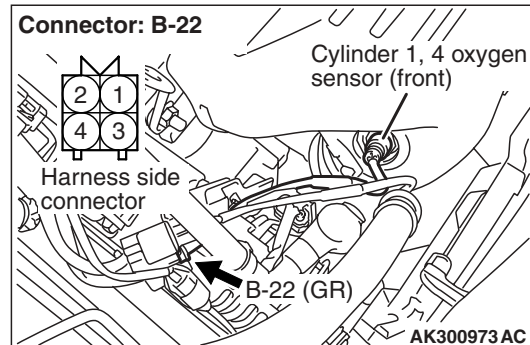
NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 5. Check harness between B-22 (terminal No. 2) cylinder 1, 4 oxygen sensor (front) connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



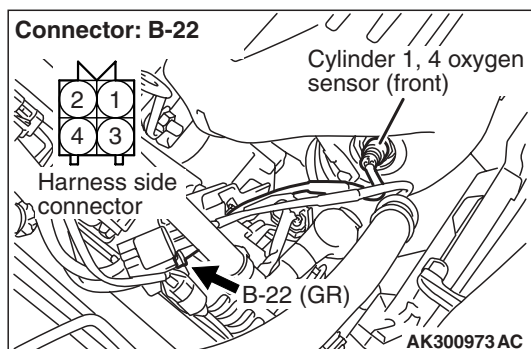
- Check earthing line for open circuit and damage.

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

STEP 6. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor (front)

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Perform voltage measurement at B-22 cylinder 1, 4 oxygen sensor (front) connector.

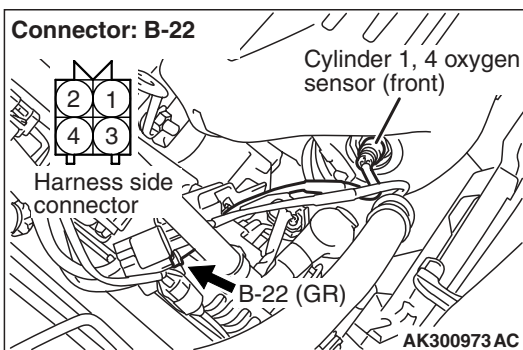
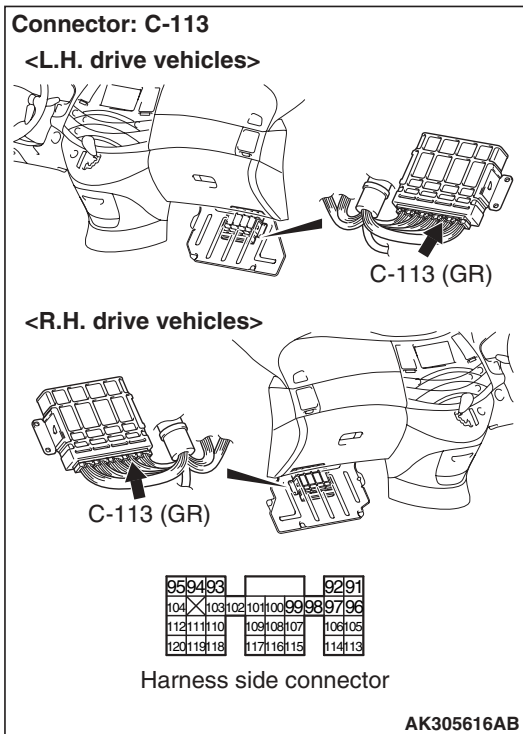
- Use special tool test harness (MB991316) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Transmission: Neutral <M/T> or P range <A/T>.
- Voltage between terminal No. 4 and earth.

OK:

When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

Q: Is the check result normal?**YES :** Go to Step 10 .**NO :** Go to Step 8 .**STEP 8. Check cylinder 1, 4 oxygen sensor (front) itself.**

- Check cylinder 1, 4 oxygen sensor (front) itself (Refer to [P.13A-391](#)).

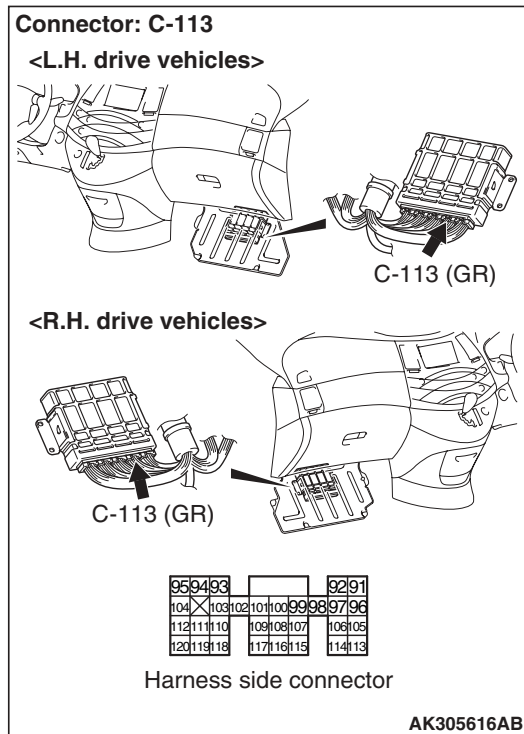
Q: Is the check result normal?**YES :** Go to Step 9 .**NO :** Replace cylinder 1, 4 oxygen sensor (front).**STEP 9. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector****Q: Is the check result normal?**

YES : Check and repair harness between B-22 (terminal No. 4) Cylinder 1, 4 oxygen sensor (front) connector and C-113 (terminal No. 109) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

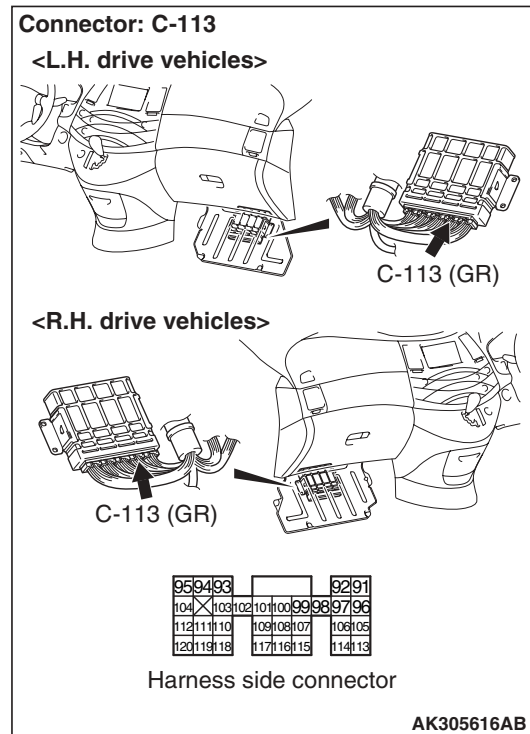
- Check output line for damage.

NO : Repair or replace.

STEP 10. Perform voltage measurement at C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 11. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Transmission: Neutral <M/T> or P range <A/T>
- Engine: After warm-up
- Voltage between terminal No. 109 and earth.

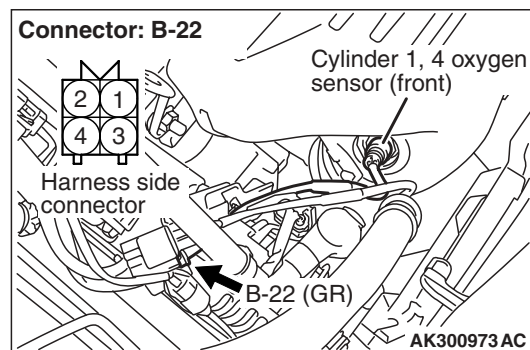
OK:

When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .

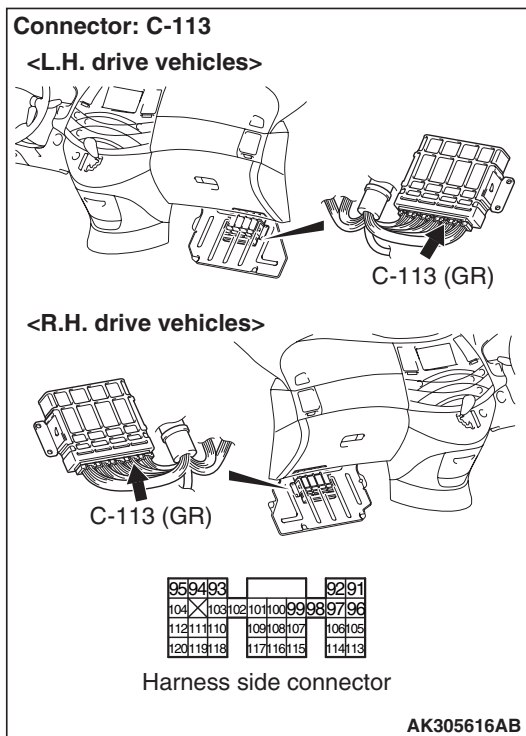


Q: Is the check result normal?

YES : Check and repair harness between B-22 (terminal No. 4) oxygen sensor (front) connector and C-113 (terminal No. 109) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

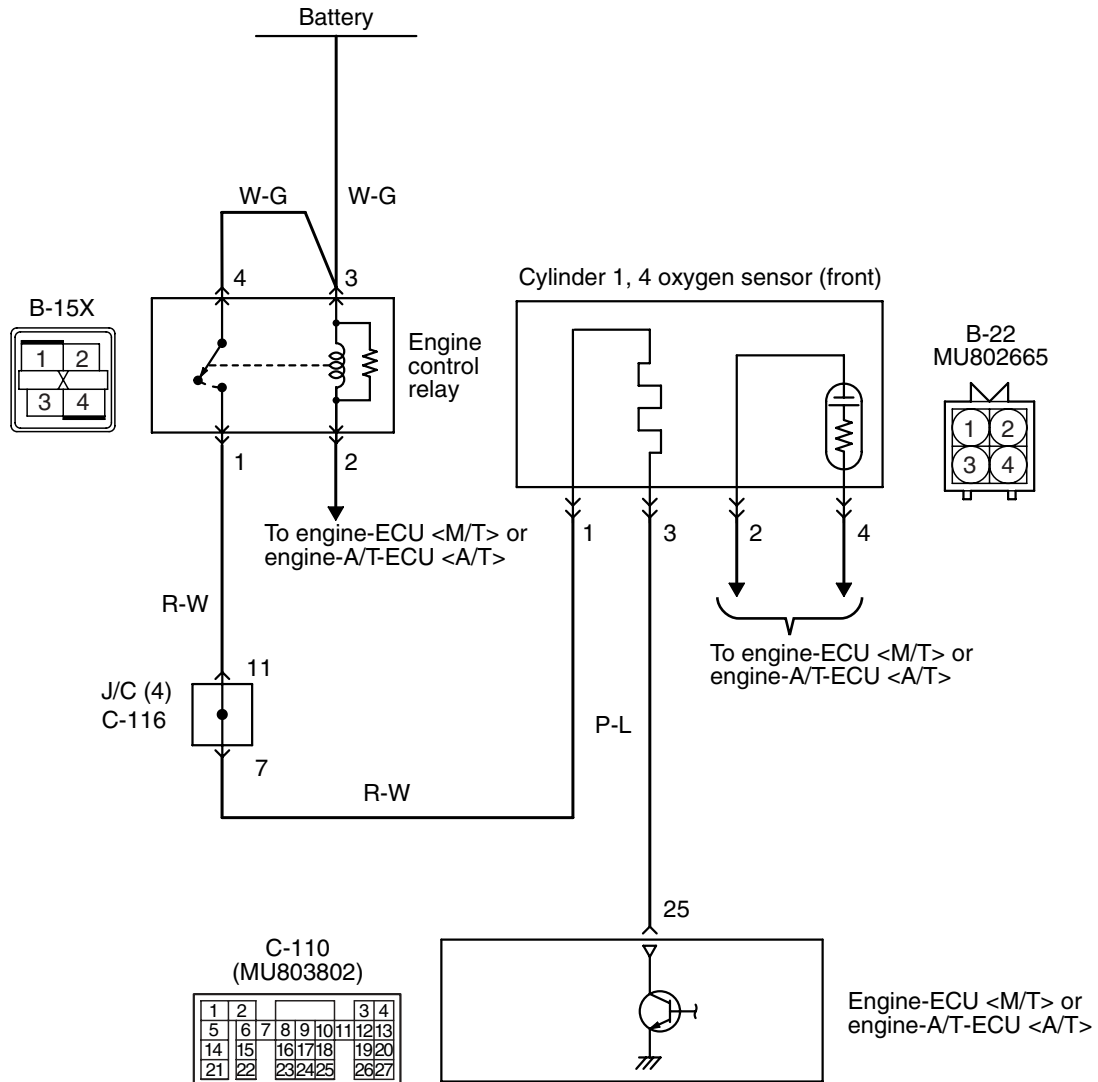
- Check output line for open circuit.

NO : Repair or replace.

**STEP 12. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector****YES** : Go to Step 6 .**NO** : Repair or replace.**Q: Is the check result normal?**

Code No. P0135: Cylinder 1, 4 Oxygen Sensor (Front) Heater System

Cylinder 1, 4 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

AK305552AB

OPERATION

- Power is supplied to the heater power terminal (terminal No. 1) of the Cylinder 1, 4 oxygen sensor (front) connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 3) of the Cylinder 1, 4 oxygen sensor (front) connector is controlled by the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 25).

FUNCTION

- The power supply to the cylinder 1, 4 oxygen sensor (front) heater is controlled by the ON/OFF control of the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- Heating the cylinder 1, 4 oxygen sensor (front) heater enables the cylinder 1, 4 oxygen sensor (front) to provide good response even when the exhaust emission temperature is low.

TROUBLE JUDGMENT**Check Conditions**

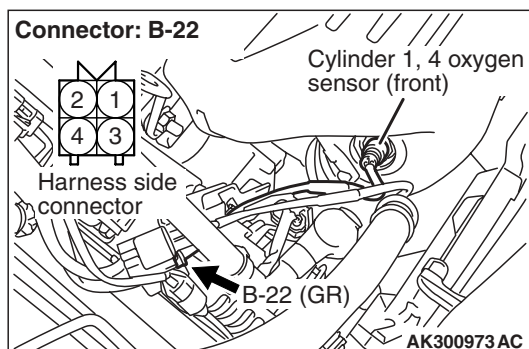
- 60 seconds have elapsed since the previous monitoring started.
- Engine coolant temperature is 20°C or higher.
- While cylinder 1, 4 oxygen sensor (front) heater is on.
- Battery positive voltage is 11 – 16 V.

Judgment Criterion

- Cylinder 1, 4 oxygen sensor (front) heater current has continued to be 0.16 A or lower, or 7.5 A or higher for 4 seconds.

PROBABLE CAUSE

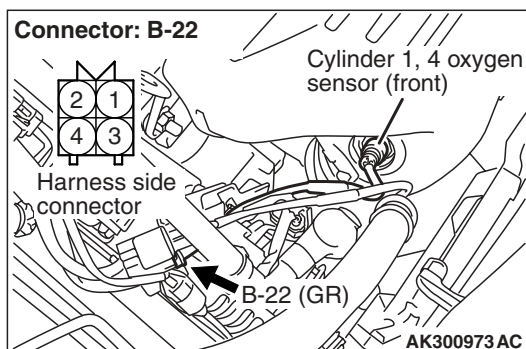
- Failed cylinder 1, 4 oxygen sensor (front) heater
- Open/short circuit in cylinder 1, 4 oxygen sensor (front) circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. Connector check: B-22 cylinder 1, 4 oxygen sensor (front) connector**

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-22 cylinder 1, 4 oxygen sensor (front) connector.

- Disconnect connector, and measure at sensor side.

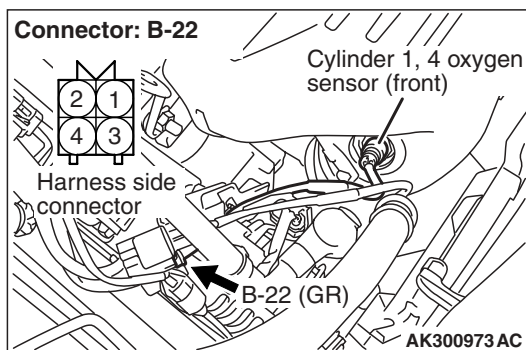
- Resistance between terminal No. 1 and No. 3.

OK: 4.5 – 8.0 Ω

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace cylinder 1, 4 oxygen sensor (front).

STEP 3. Perform voltage measurement at B-22 cylinder 1, 4 oxygen sensor (front) connector.

- Disconnect connector, and measure at harness side.

- Ignition switch: ON

- Voltage between terminal No. 1 and earth.

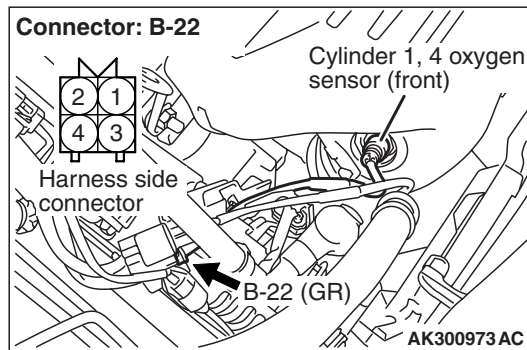
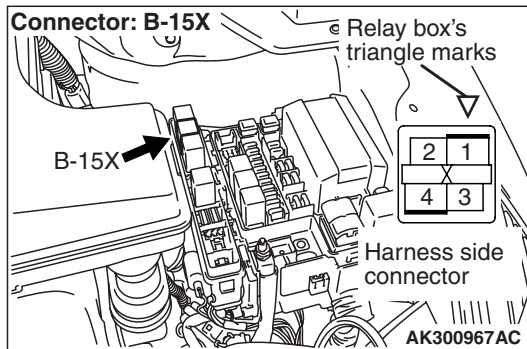
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: B-15X engine control relay connector



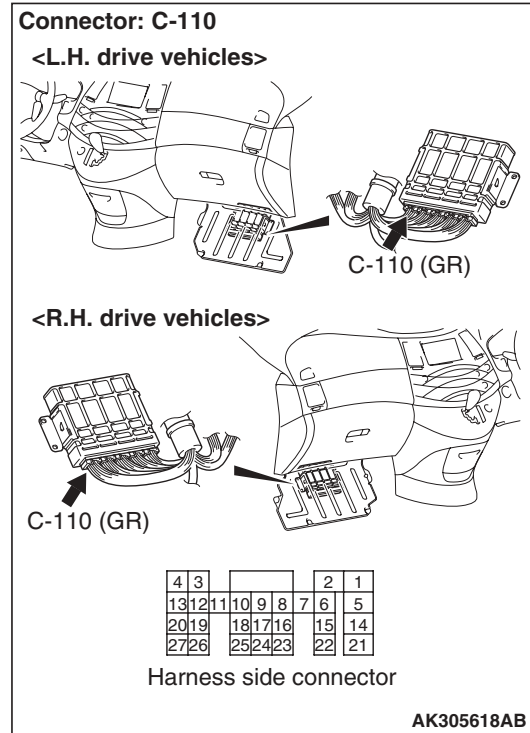
Q: Is the check result normal?

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-22 (terminal No. 1) cylinder 1, 4 oxygen sensor (front) connector and B-15X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 25 and earth.

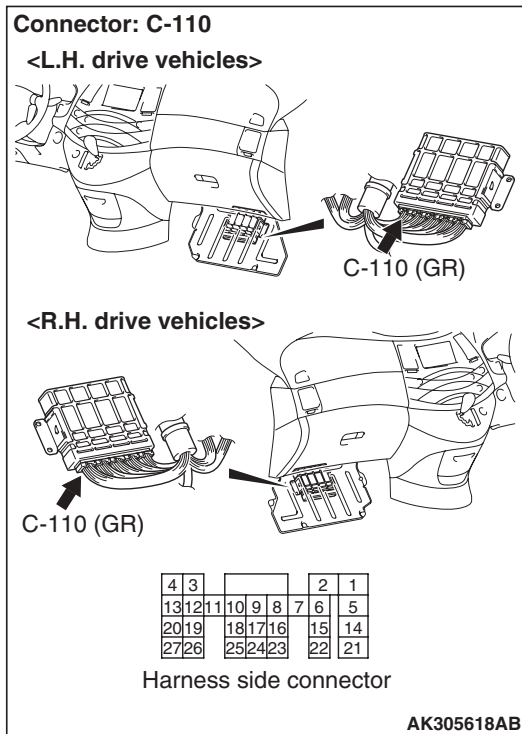
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

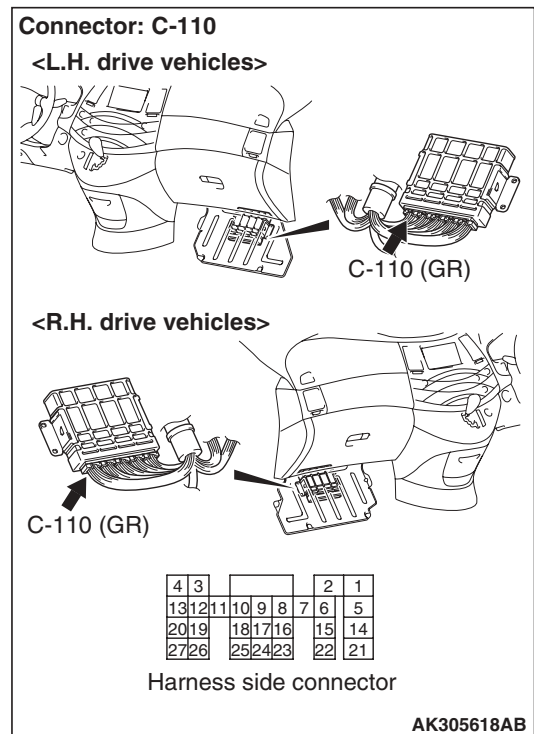
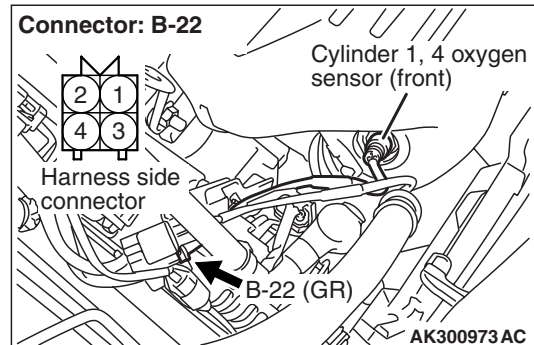
NO : Go to Step 6 .

STEP 6. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

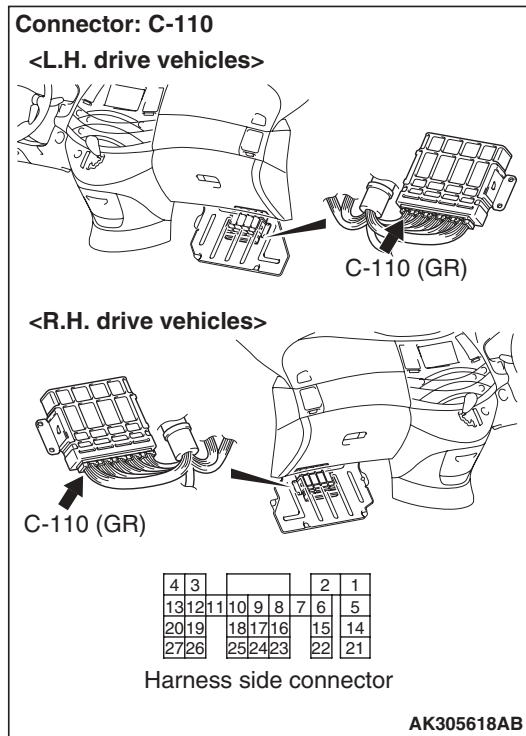
STEP 7. Check harness between B-22 (terminal No. 3) cylinder 1, 4 oxygen sensor (front) connector and C-110 (terminal No. 25) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open/short circuit.

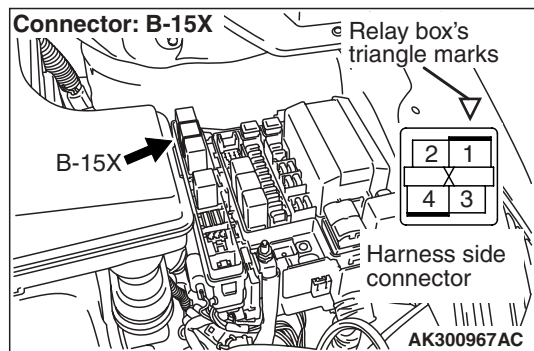
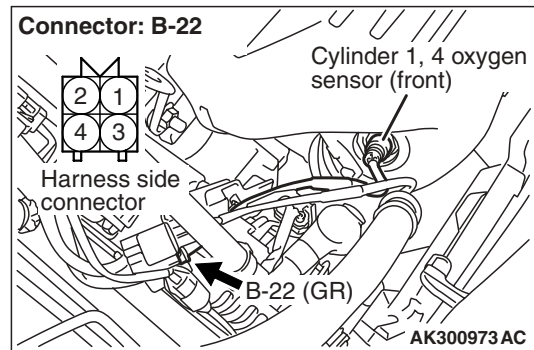
Q: Is the check result normal?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Repair.

**STEP 8. Connector check: C-110 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



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

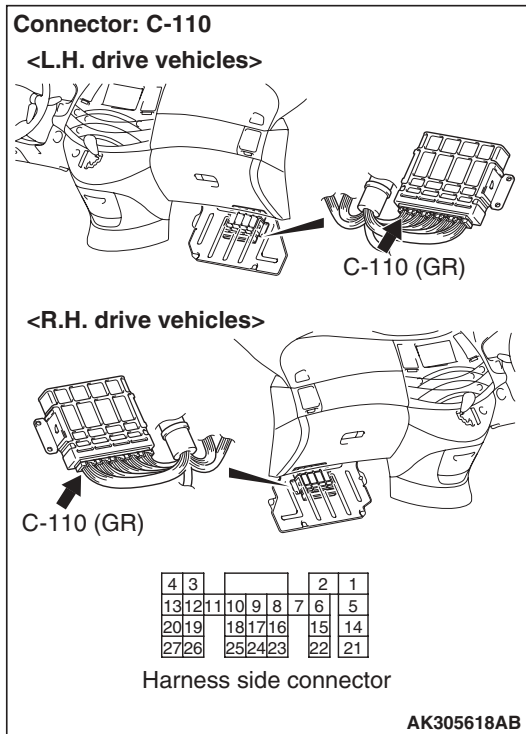
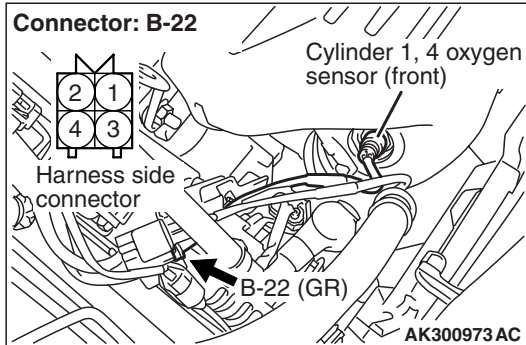
**STEP 9. Check harness between B-22 (terminal
No. 1) cylinder 1, 4 oxygen sensor (front)
connector and B-15X (terminal No. 1) engine
control relay connector.**



**NOTE: Before checking harness check intermediate
connector C-116, 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 B-22 (terminal No. 3) cylinder 1, 4 oxygen sensor (front) connector and C-110 (terminal No. 25) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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.

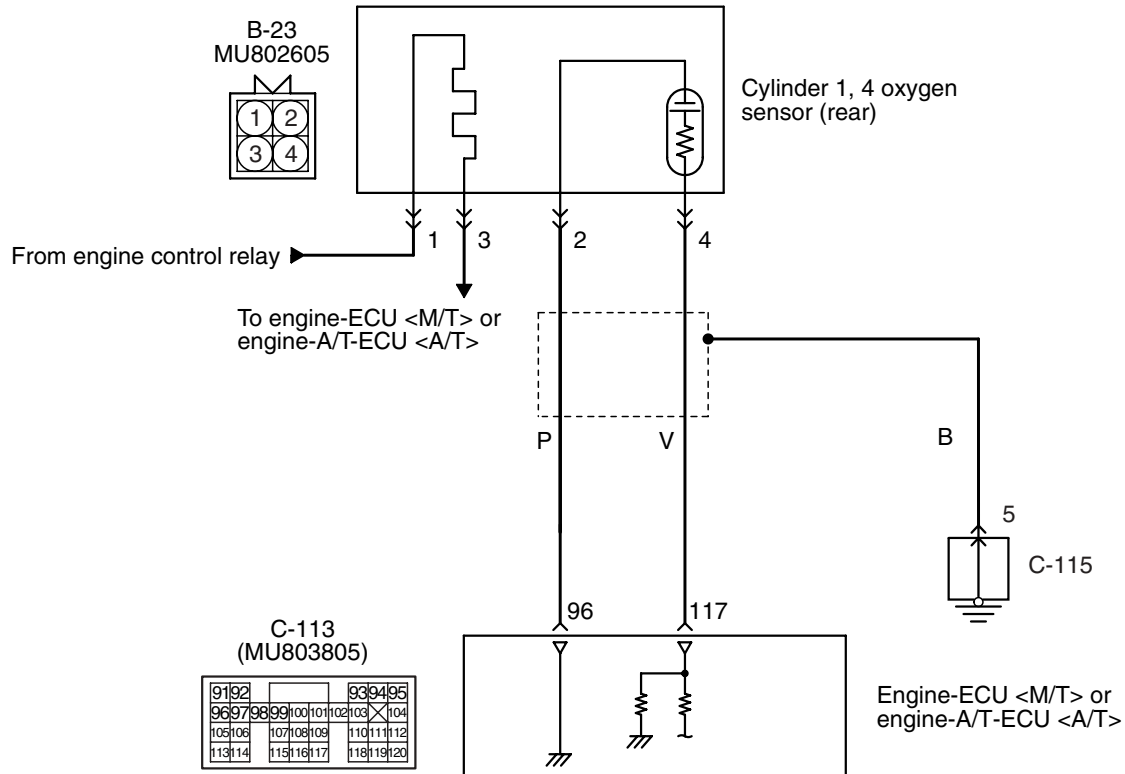
Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P0136: Cylinder 1, 4 Oxygen Sensor (Rear) System

Cylinder 1, 4 oxygen sensor (rear) circuit



AK305553AB

OPERATION

- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 117) from the cylinder 1, 4 oxygen sensor (rear) output terminal (terminal No. 4).
- The cylinder 1, 4 oxygen sensor (rear) (terminal No. 2) is earthed with engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96).

FUNCTION

- The cylinder 1, 4 oxygen sensor (rear) converts the concentration of oxygen in the exhaust emission into a voltage and inputs the signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the cylinder 1, 4 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.
- Based on this signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> corrects the deviation in the signal that is output by the cylinder 1, 4 oxygen sensor (rear).

TROUBLE JUDGMENT

Check Conditions

- Above 3 minutes later after the engine has started up.
- The engine coolant temperature is approx. 82°C or higher.
- The engine speed is 1200 r/min or more.
- The monitoring time is 5 seconds.

Judgment Criteria

- When the cylinder 1, 4 oxygen sensor (rear) output voltage is 0.2V or less and a power voltage of 5 V is applied to the cylinder 1, 4 oxygen sensor (rear) in the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the sensor output voltage is 4.5 V or more.
- To be monitored once per driving cycle.

Check Conditions

- 2 seconds later after lack of circuit continuity is detected.
- When the front oxygen sensor is normally operated.

Judgment Criteria

- When the air-fuel ratio is rich, the cylinder 1, 4 oxygen sensor (front) output voltage is 0.5 V or more.
- The cylinder 1, 4 oxygen sensor (rear) output voltage is less than 0.1 V.
- The maximum and maximum of the cylinder 1, 4 oxygen sensor (rear) output is 0.078 V or less.

PROBABLE CAUSE

- Failed cylinder 1, 4 oxygen sensor (rear)
- Open/short circuit in cylinder 1, 4 oxygen sensor (rear) circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

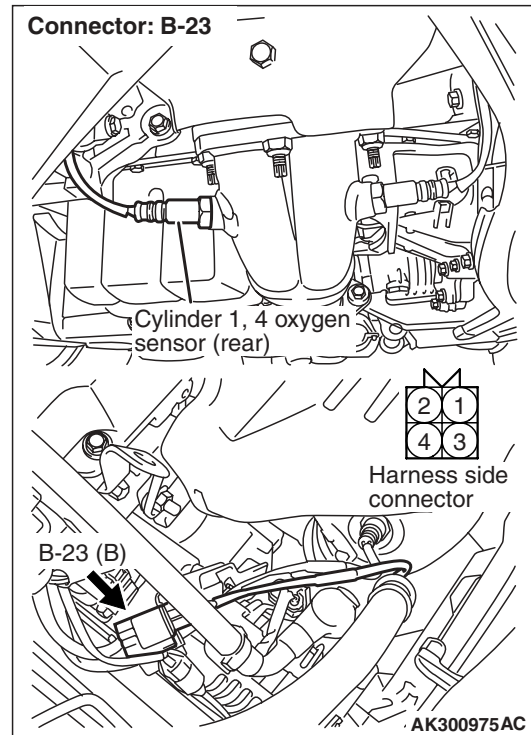
DIAGNOSIS PROCEDURE**STEP 1. MUT-III data list**

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 59: Cylinder 1, 4 oxygen sensor (rear)

Q: Is the check result normal?

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

NO : Go to Step 2 .

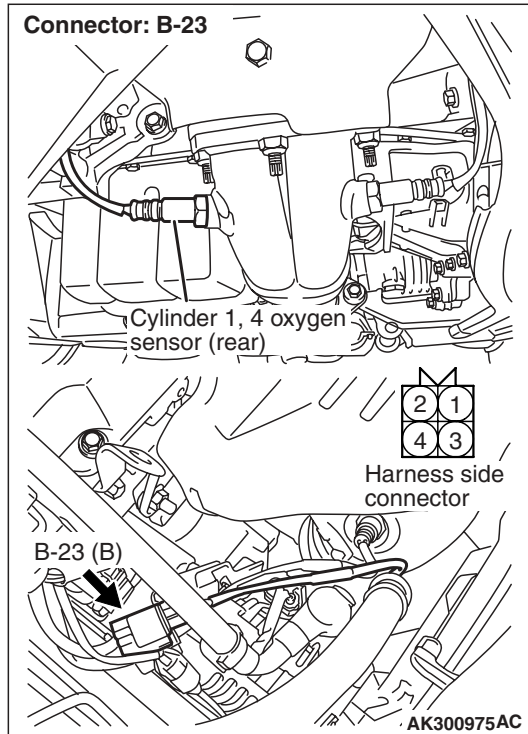
STEP 2. Connector check: B-23 cylinder 1, 4 oxygen sensor (rear) connector

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

**STEP 3. Perform resistance measurement at B-23
cylinder 1, 4 oxygen sensor (rear) connector.**



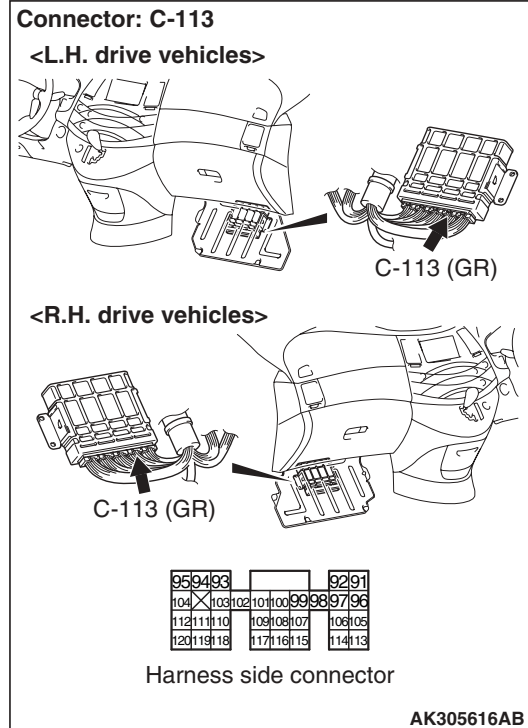
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

**STEP 4. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**

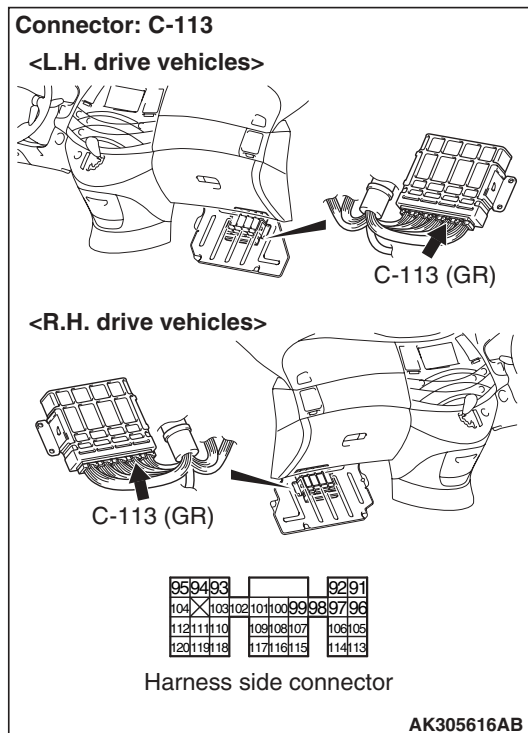
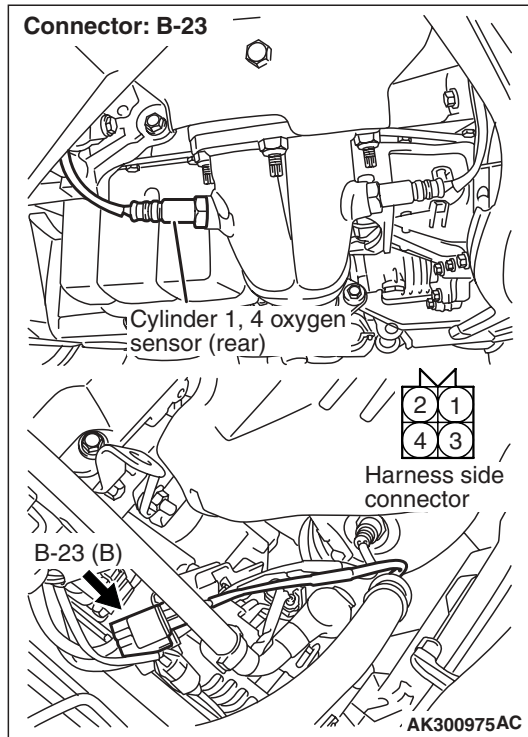


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-23 (terminal No. 2) cylinder 1, 4 oxygen sensor (rear) connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 8. Check Cylinder 1, 4 oxygen sensor (rear) itself.

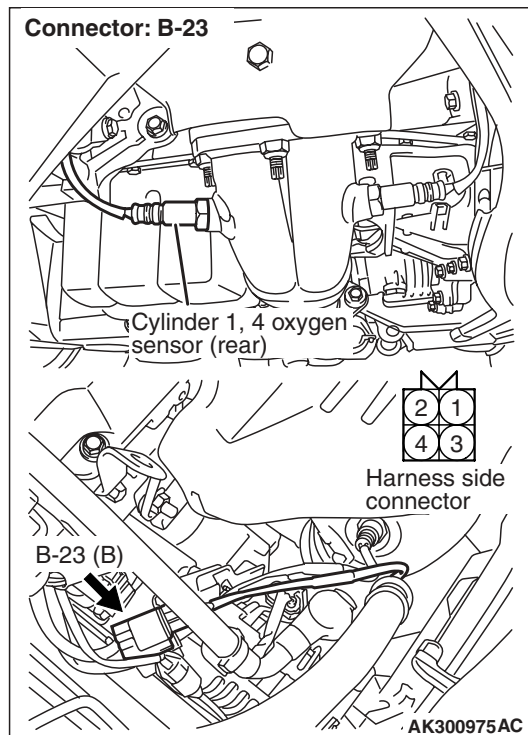
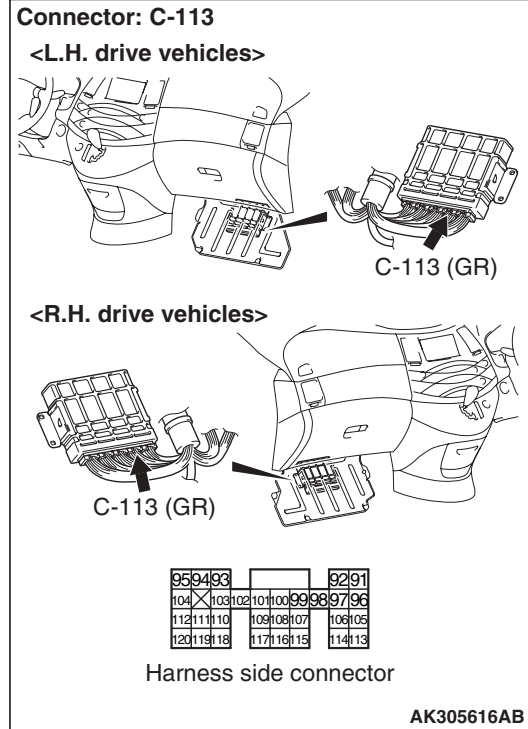
- Check cylinder 1, 4 oxygen sensor (rear) itself (Refer to [P.13A-391](#)).

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace cylinder 1, 4 oxygen sensor (rear).

STEP 9. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



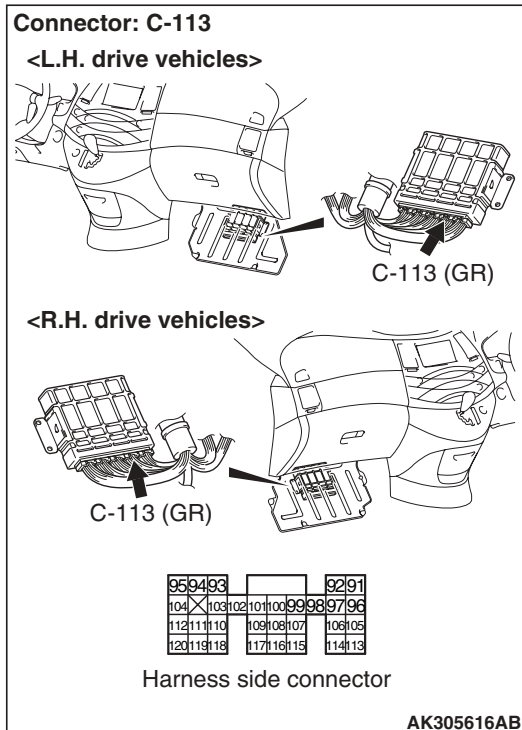
Q: Is the check result normal?

YES : Check and repair harness between B-23 (terminal No. 4) cylinder 1, 4 oxygen sensor (rear) connector and C-113 (terminal No. 117) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for damage.

NO : Repair or replace.

STEP 10. Perform voltage measurement at C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Transmission: Neutral <M/T> or P range <A/T>
- Engine: After warm-up
- Voltage between terminal No. 117 and earth.

OK:

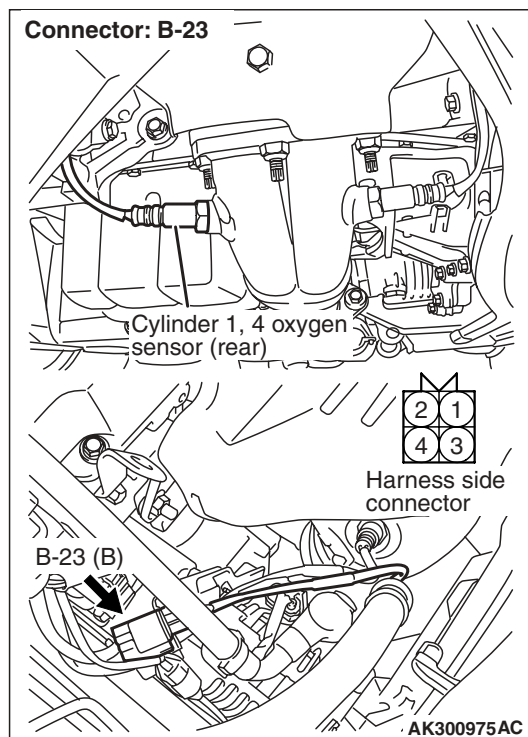
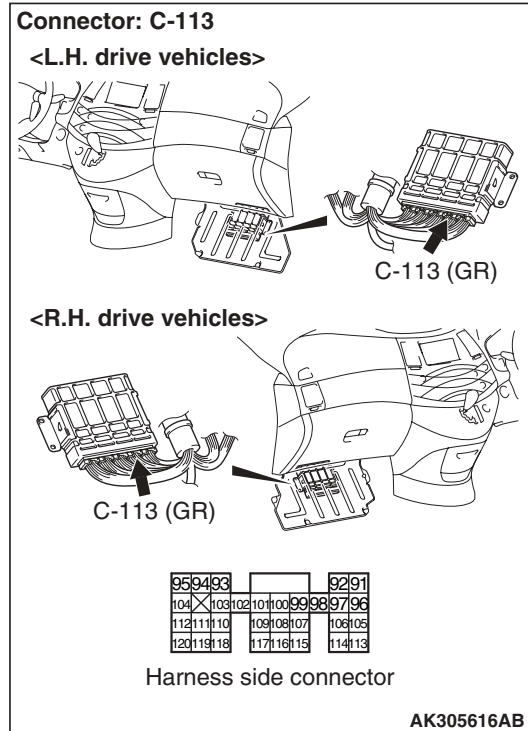
When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .

STEP 11. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



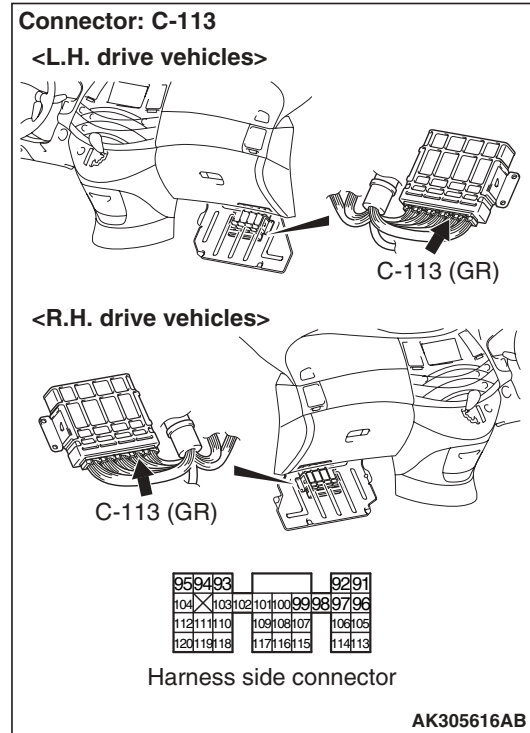
Q: Is the check result normal?

YES : Check and repair harness between B-23 (terminal No. 4) cylinder 1, 4 oxygen sensor (rear) connector and C-113 (terminal No. 117) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair or replace.

STEP 12. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



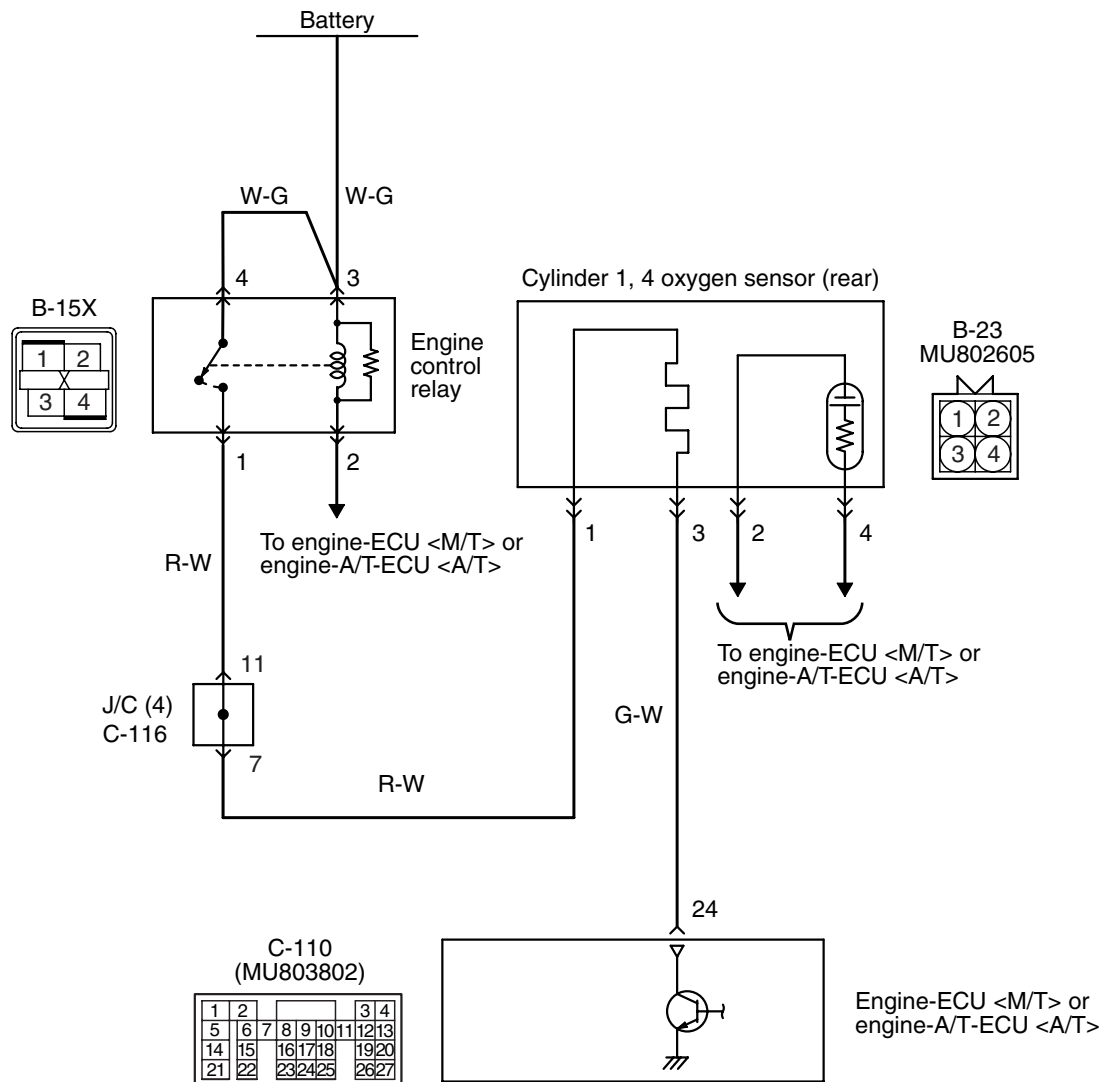
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

Code No. P0141: Cylinder 1, 4 Oxygen Sensor (Rear) Heater System

Cylinder 1,4 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

AK305554AB

OPERATION

- Power is supplied to the heater power terminal (terminal No. 1) of the cylinder 1, 4 oxygen sensor (rear) connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 3) of the cylinder 1, 4 oxygen sensor (rear) connector is controlled by the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 24).

FUNCTION

- The power supply to the cylinder 1, 4 oxygen sensor (rear) heater is controlled by the ON/OFF control of the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- Heating the cylinder 1, 4 oxygen sensor (rear) heater enables the cylinder 1, 4 oxygen sensor (rear) to provide good response even when the exhaust emission temperature is low.

TROUBLE JUDGMENT

Check Conditions

- 60 seconds have elapsed since the previous monitoring started.
- Engine coolant temperature is 20°C or higher.
- While cylinder 1, 4 oxygen sensor (rear) heater is on.
- Battery positive voltage is 11 – 16 V.

Judgment Criterion

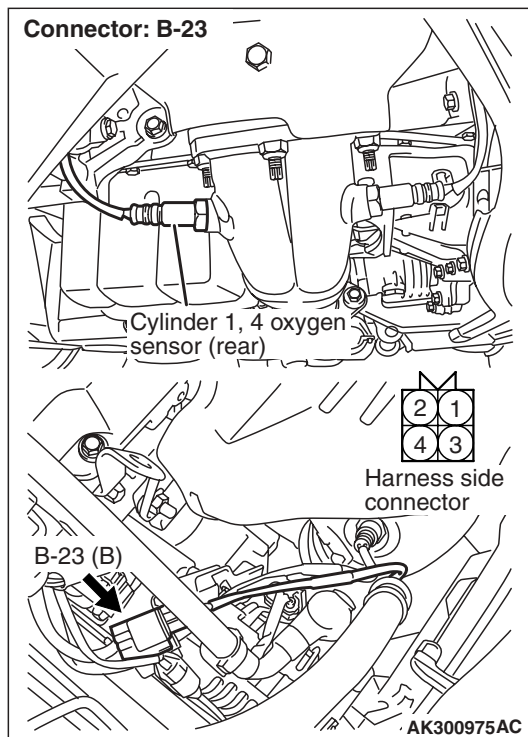
- Cylinder 1, 4 oxygen sensor (rear) heater currents have continued to be 0.16 A or lower, or 5.0 A or higher for 4 seconds.

PROBABLE CAUSE

- Failed cylinder 1, 4 oxygen sensor (rear) heater
- Open/short circuit in cylinder 1, 4 oxygen sensor (rear) heater circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-23 cylinder 1, 4 oxygen sensor (rear) connector

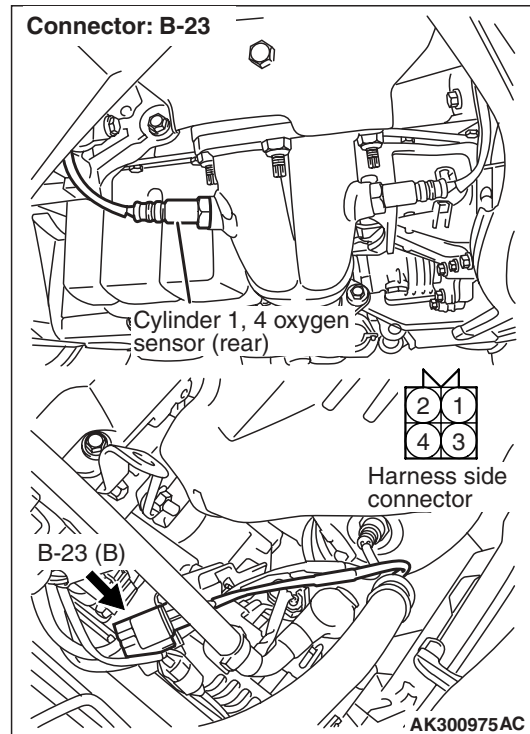


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-23 cylinder 1, 4 oxygen sensor (rear) connector.



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

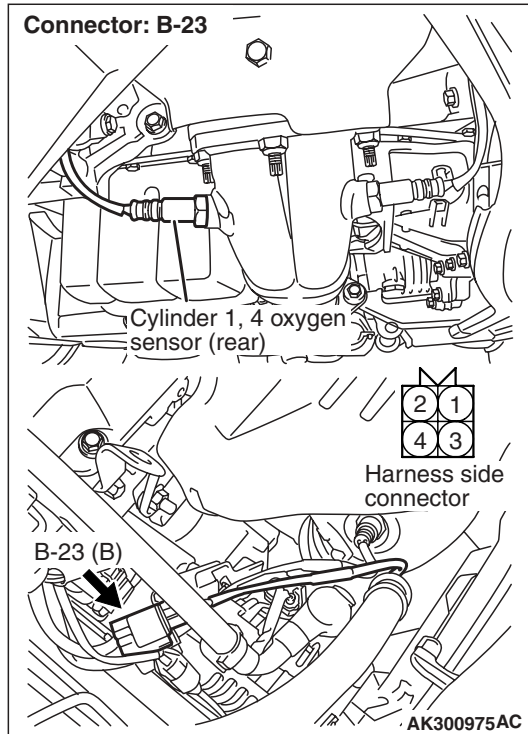
OK: 11 – 18 Ω

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace cylinder 1, 4 oxygen sensor (rear).

STEP 3. Perform voltage measurement at B-23 cylinder 1, 4 oxygen sensor (rear) connector.



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

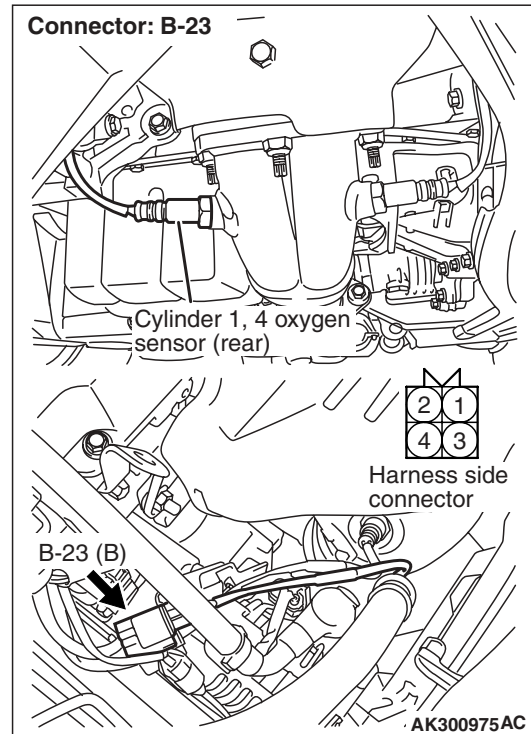
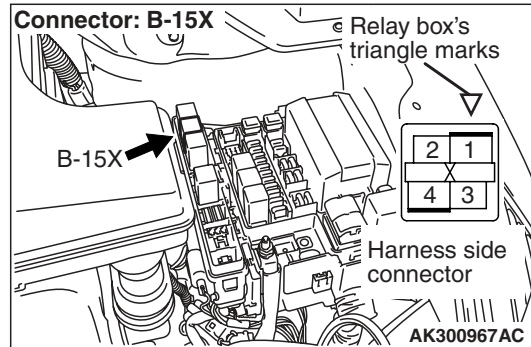
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: B-15X engine control relay connector



Q: Is the check result normal?

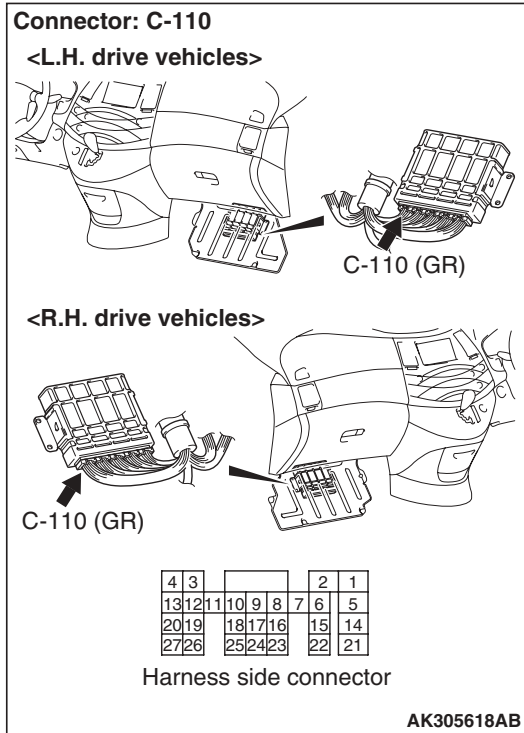
YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-23 (terminal No. 1) cylinder 1, 4 oxygen sensor (rear) connector and B-15X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

YES : Go to Step 8 .
NO : Go to Step 6 .

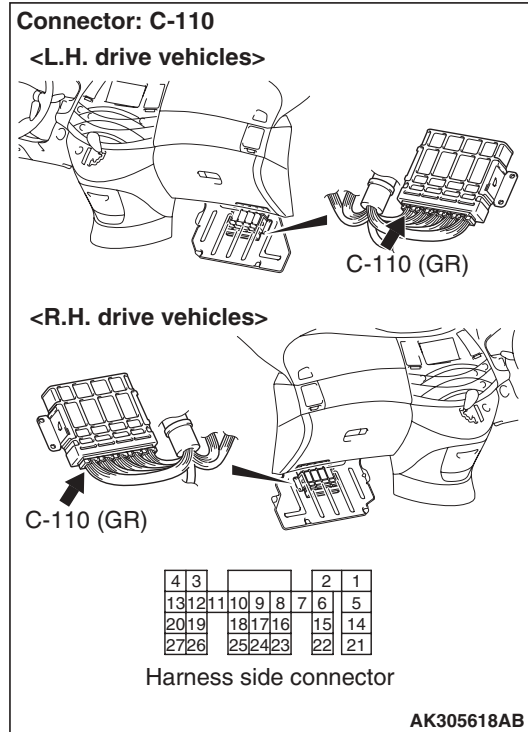


- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 24 and earth.

OK: System voltage

Q: Is the check result normal?

STEP 6. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

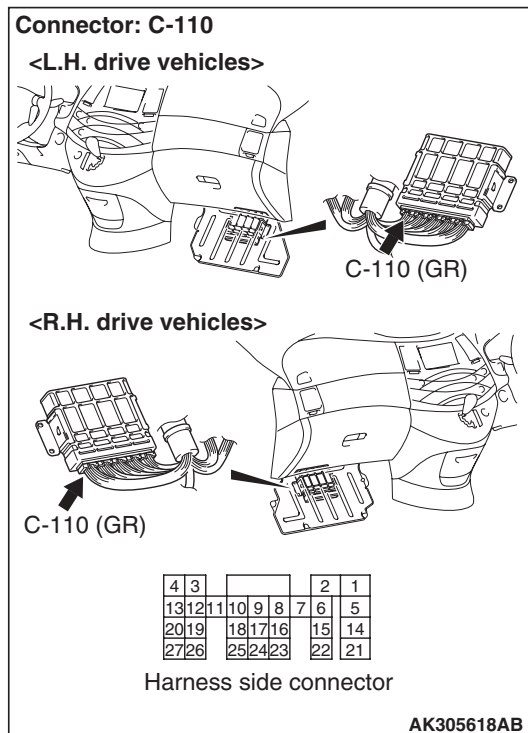
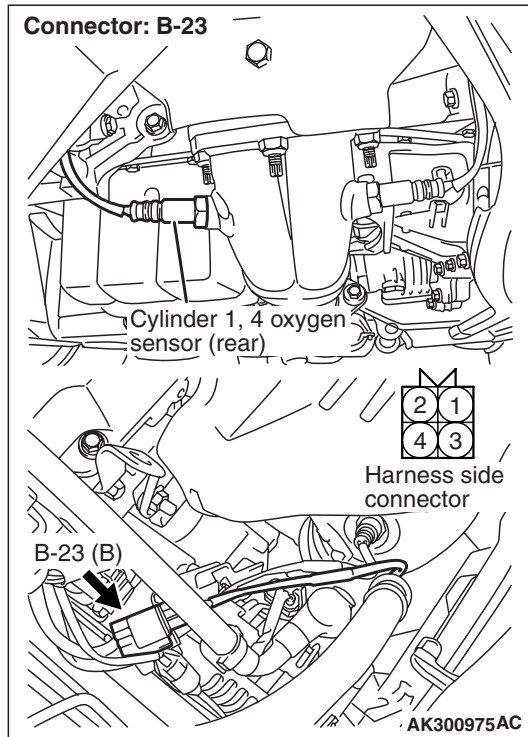


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

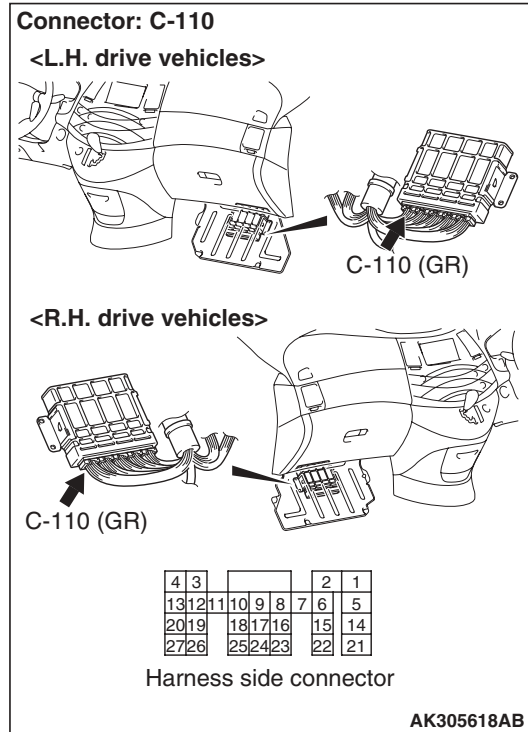
STEP 7. Check harness between B-23 (terminal No. 3) cylinder 1, 4 oxygen sensor (rear) connector and C-110 (terminal No. 24) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Repair.

STEP 8. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

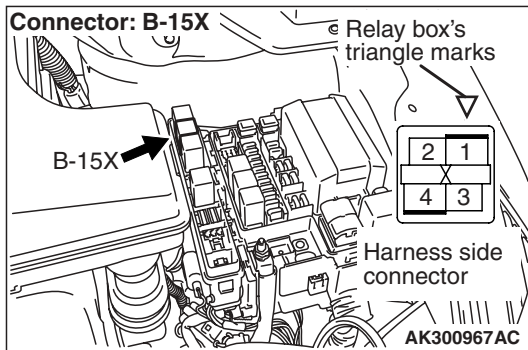
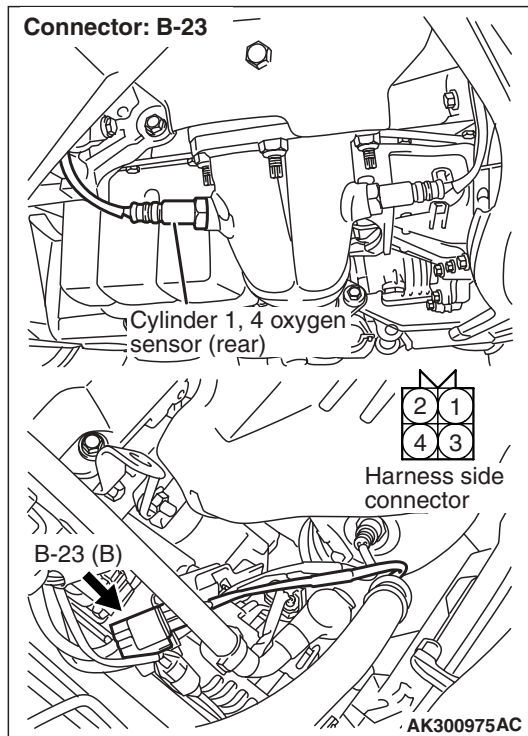
YES : Go to Step 9 .

NO : Repair or replace.

- Check earthing line for open/short circuit.

Q: Is the check result normal?

STEP 9. Check harness between B-23 (terminal No. 1) cylinder 1, 4 oxygen sensor (rear) connector and B-15X (terminal No. 1) engine control relay connector.



NOTE: Before checking harness intermediate connector C-116, and repair if necessary.

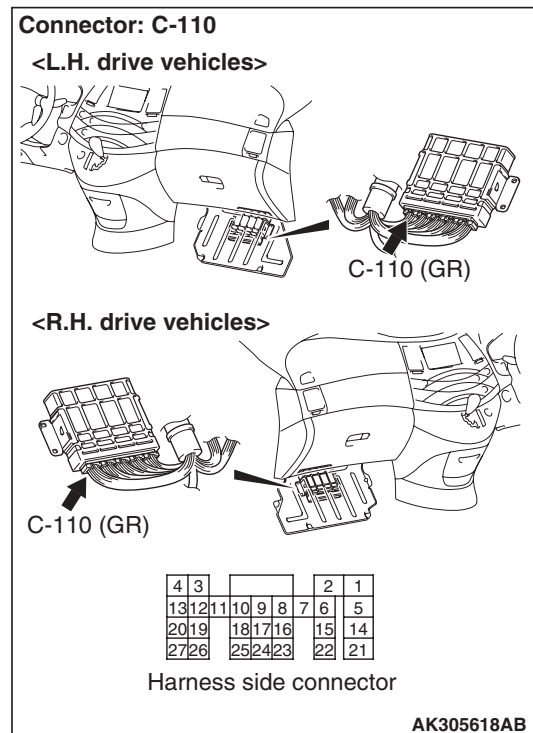
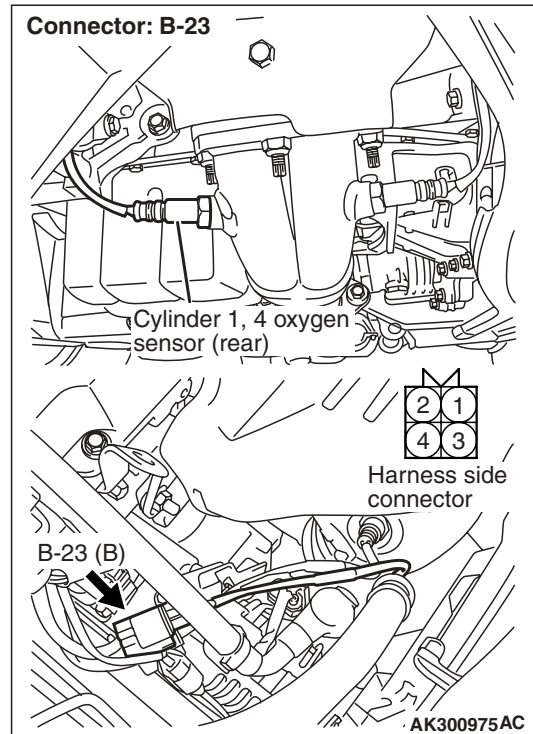
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Check harness between B-23 (terminal No. 3) cylinder 1, 4 oxygen sensor (rear) connector and C-110 (terminal No. 24) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for damage.

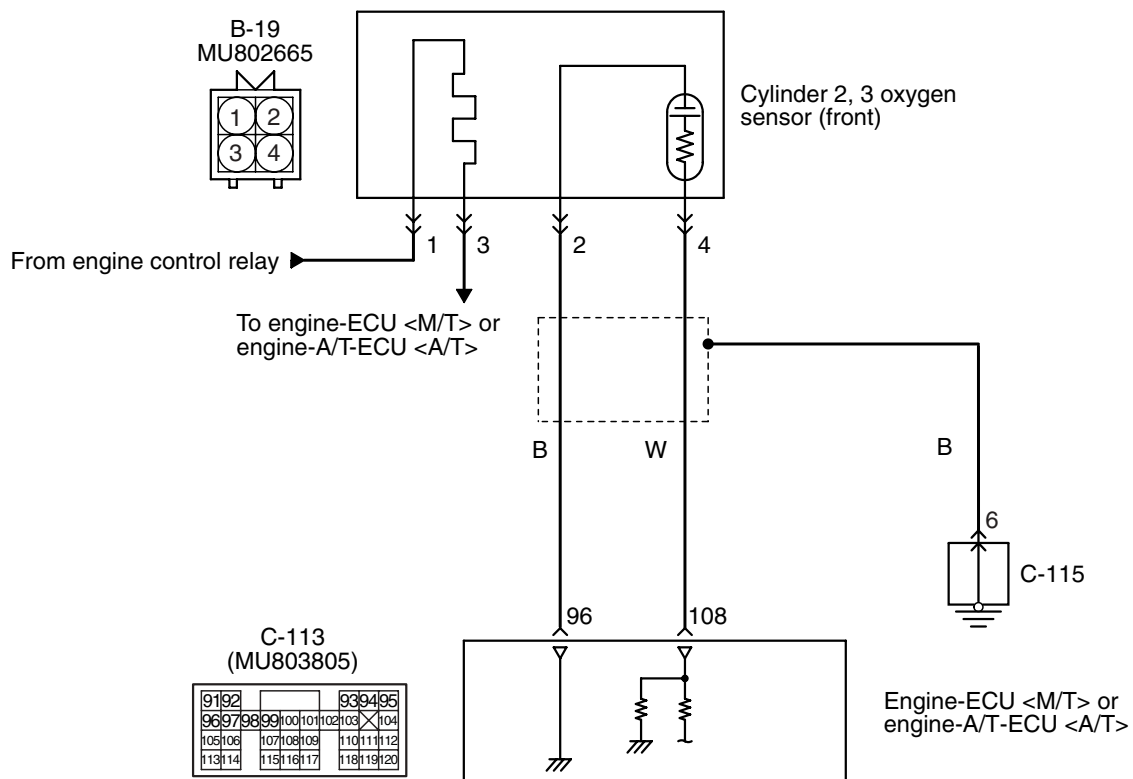
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. Check the trouble symptoms.**Q: Does trouble symptom persist?****YES :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).**Code No. P0150: Cylinder 2, 3 Oxygen Sensor (Front) System**

Cylinder 2, 3 oxygen sensor (front) 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

AK305555AB

OPERATION

- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 108) from the cylinder 2, 3 oxygen sensor (front) output terminal (terminal No. 4).
- The front cylinder 2, 3 oxygen sensor (front) (terminal No. 2) is earthed with engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96).

FUNCTION

- The cylinder 2, 3 oxygen sensor (front) converts the concentration of oxygen in the exhaust emission into a voltage and inputs the signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the cylinder 2, 3 oxygen sensor (front) 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 <M/T> or engine-A/T-ECU <A/T> 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 approx. 82°C or higher.
- The engine speed is 1200 r/min or more.
- The monitoring time is 5 seconds.

Judgment Criteria

- When the cylinder 2, 3 oxygen sensor (front) output voltage is 0.2 V or less and a power voltage of 5 V is applied to the cylinder 2, 3 oxygen sensor (front) in the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the sensor output voltage is 4.5 V or more.
- To be monitored once per driving cycle.

Check Conditions

- The engine speed is 1200 – 3000 r/min.
- The engine coolant temperature is approx. 60°C or higher.
- Volumetric efficiency is 20 – 60 %.
- During the air-fuel ratio feedback control.

Judgment Criterion

- When the cylinder 2, 3 oxygen sensor (front) output frequency is 6 or less for 10 seconds on the average

PROBABLE CAUSE

- Failed cylinder 2, 3 oxygen sensor (front)
- Open/short circuit in cylinder 2, 3 oxygen sensor (front) circuit or loose connector contact
- Failed engine-ECU <M/T>

- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

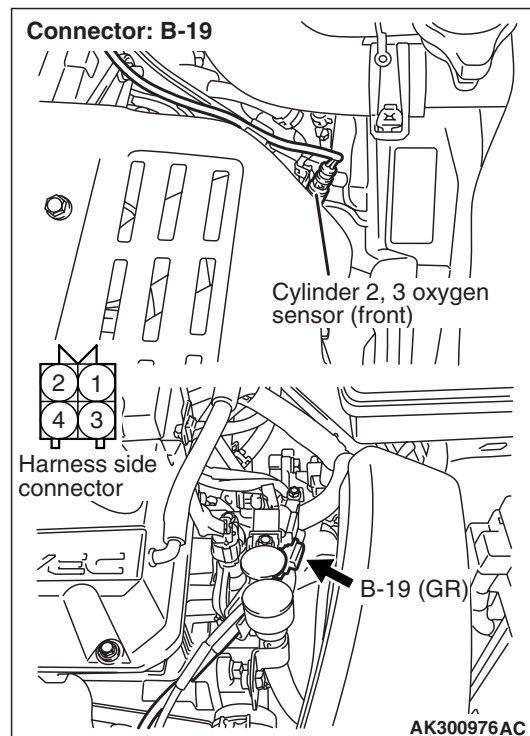
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 39: Cylinder 2, 3 oxygen sensor (front)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-19 cylinder 2, 3 oxygen sensor (front) connector

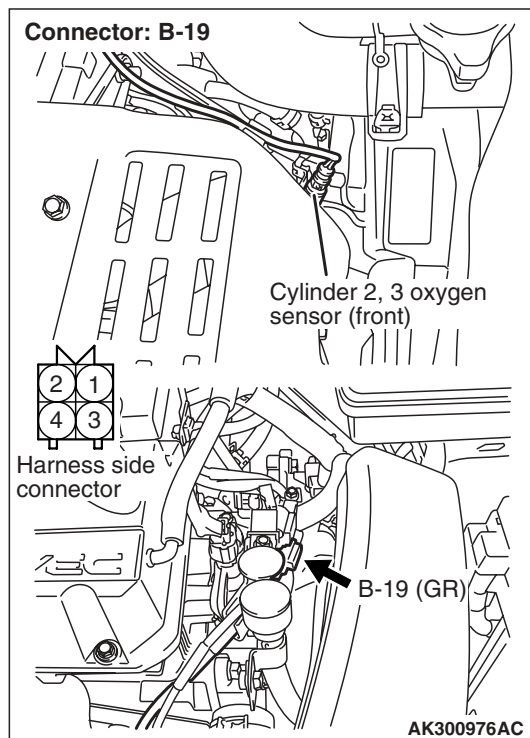


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at B-19 cylinder 2, 3 oxygen sensor (front) connector.



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

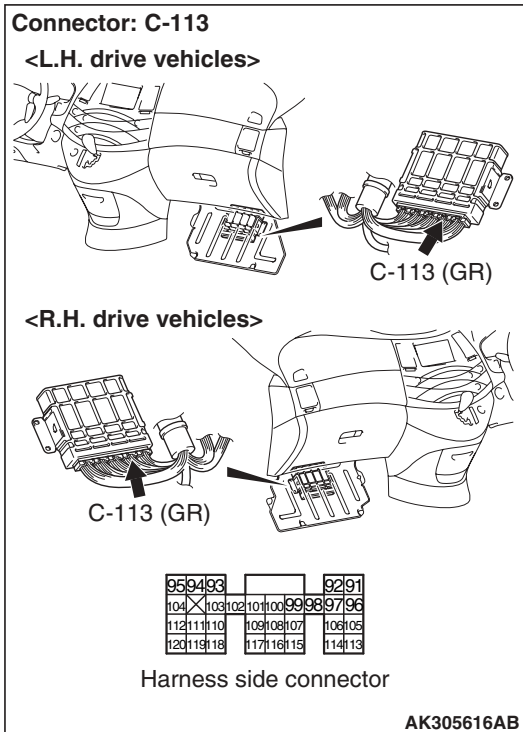
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

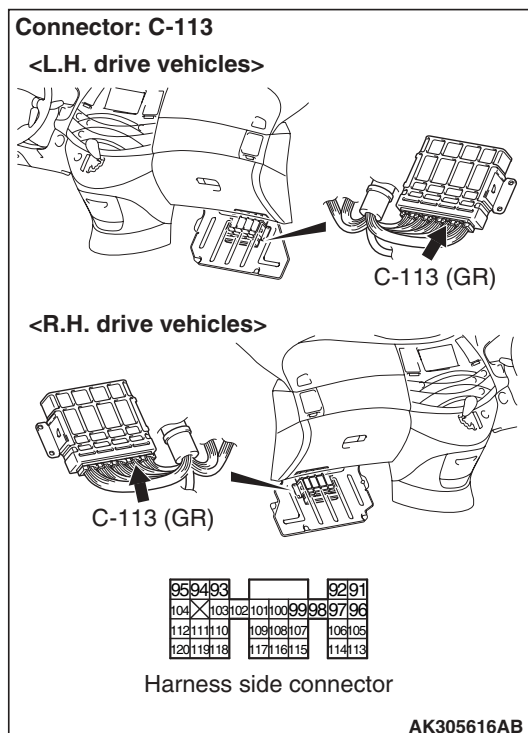
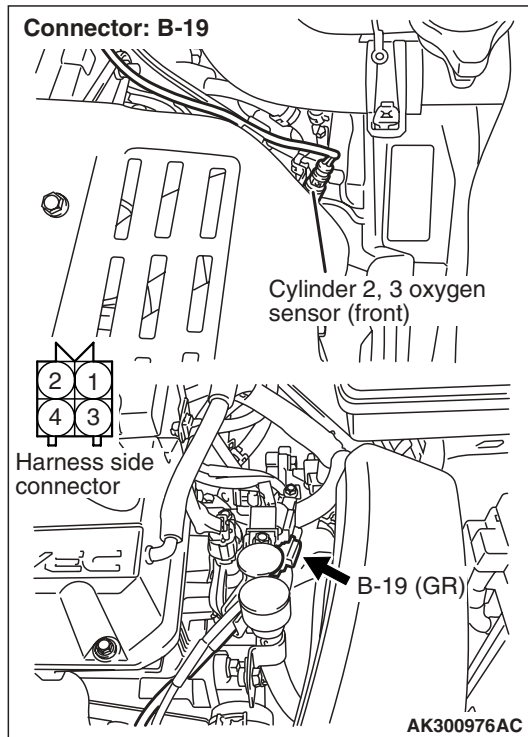


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-19 (terminal No. 2) cylinder 2, 3 oxygen sensor (front) connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. MUT-III data list

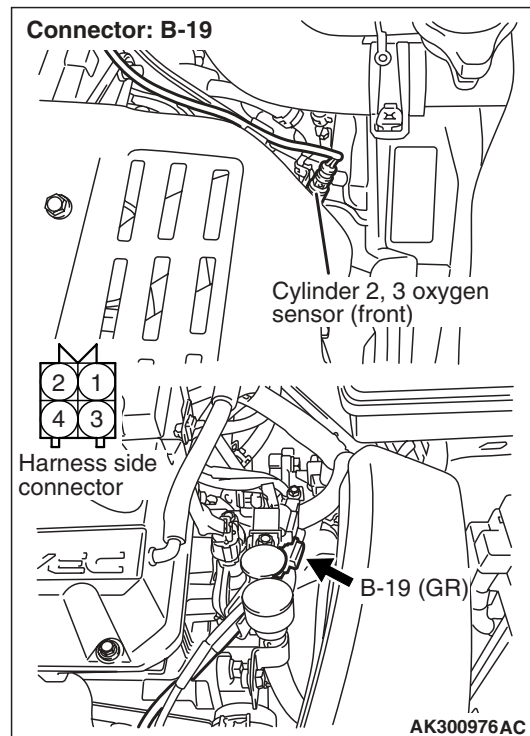
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 39: Cylinder 2, 3 oxygen sensor (front)

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Perform voltage measurement at B-19 cylinder 2, 3 oxygen sensor (front) connector.



- Use special tool test harness (MB991316) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Transmission: Neutral <M/T> or P range <A/T>
- Voltage between terminal No. 4 and earth.

OK:

When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 .

STEP 8. Check cylinder 2, 3 oxygen sensor (front) itself

- Check cylinder 2, 3 oxygen sensor (front) itself (Refer to P.13A-391).

Q: Is the check result normal?

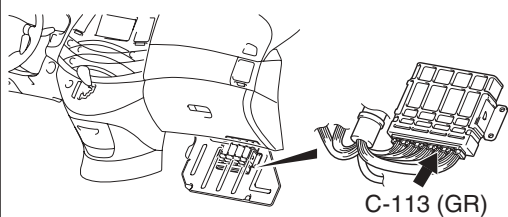
YES : Go to Step 9 .

NO : Replace cylinder 2, 3 oxygen sensor (front).

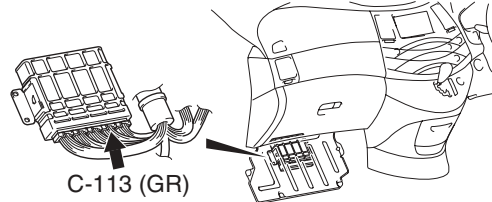
STEP 9. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

Connector: C-113

<L.H. drive vehicles>



<R.H. drive vehicles>

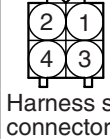
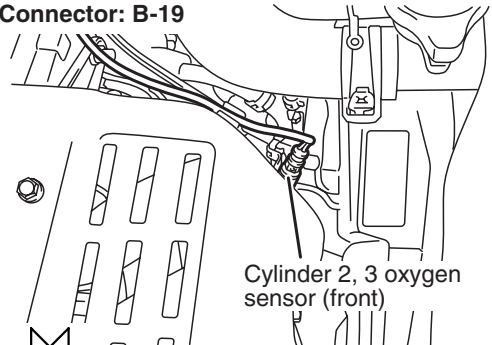


| | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| 95 | 94 | 93 | | | 92 | 91 |
| 104 | X | 103 | 102 | 101 | 100 | 99 |
| 112 | 111 | 110 | 109 | 108 | 107 | 106 |
| 120 | 119 | 118 | 117 | 116 | 115 | 114 |

Harness side connector

AK305616AB

Connector: B-19



AK300976AC

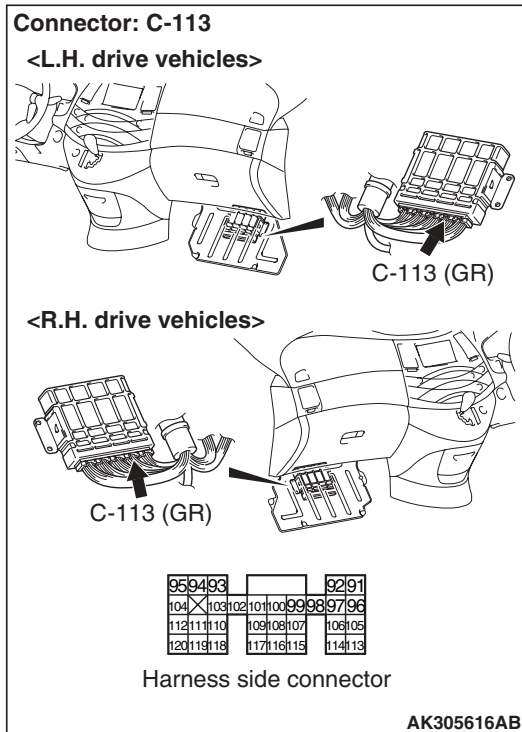
Q: Is the check result normal?

YES : Check and repair harness between B-19 (terminal No. 4) cylinder 2, 3 oxygen sensor (front) connector and C-113 (terminal No. 108) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for damage.

NO : Repair or replace.

STEP 10. Perform voltage measurement at C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Transmission: Neutral <M/T> or P range <A/T>
- Engine: After warm-up
- Voltage between terminal No. 108 and earth.

OK:

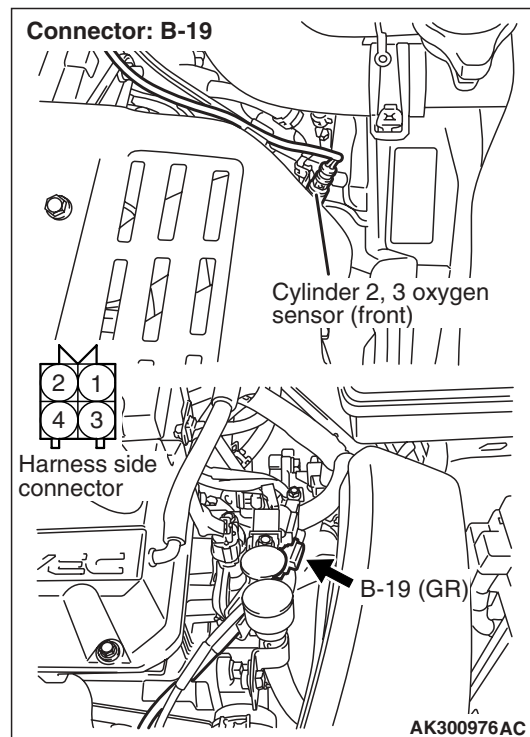
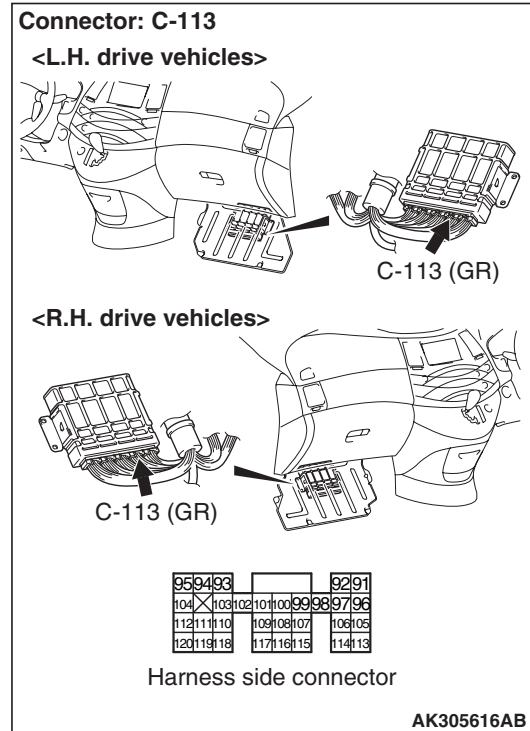
When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .

STEP 11. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



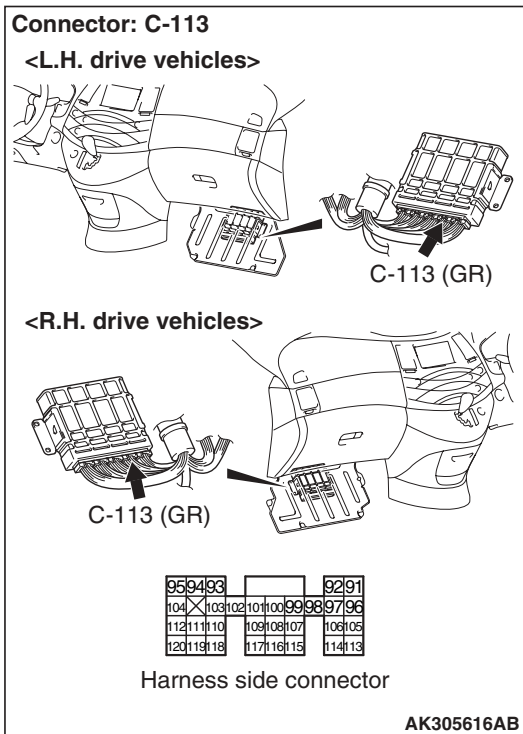
Q: Is the check result normal?

YES : Check and repair harness between B-19 (terminal No. 4) cylinder 2, 3 oxygen sensor (front) connector and C-113 (terminal No. 108) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair or replace.

STEP 12. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



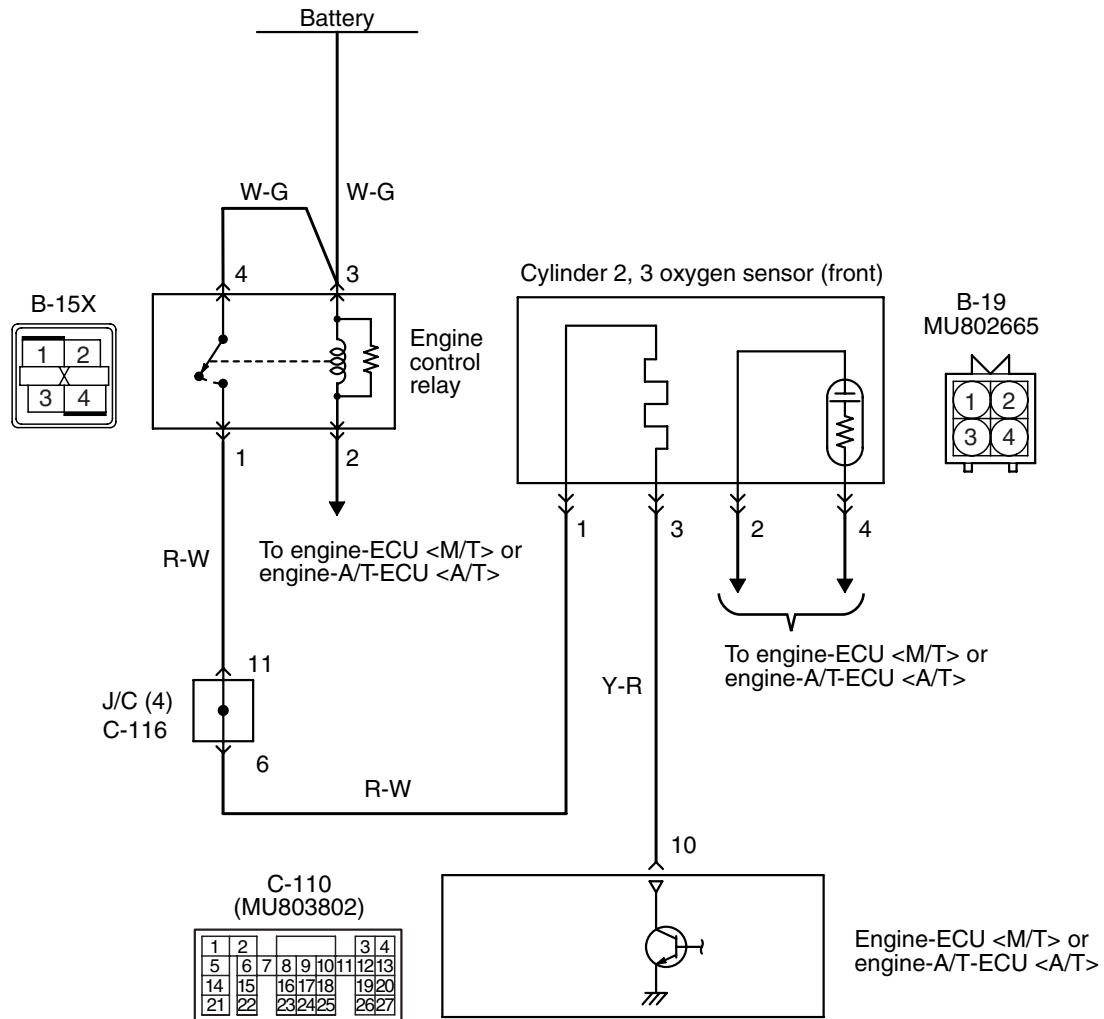
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

Code No. P0155: Cylinder 2, 3 Oxygen Sensor (Front) Heater System

Cylinder 2, 3 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

AK305556AB

OPERATION

- Power is supplied to the heater power terminal (terminal No. 1) of the cylinder 2, 3 oxygen sensor (front) connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 3) of the cylinder 2, 3 oxygen sensor (front) connector is controlled by the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 10).

FUNCTION

- The power supply to the cylinder 2, 3 oxygen sensor (front) heater is controlled by the ON/OFF control of the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- Heating the cylinder 2, 3 oxygen sensor (front) heater enables the cylinder 2, 3 oxygen sensor (front) to provide good response even when the exhaust emission temperature is low.

TROUBLE JUDGMENT**Check Conditions**

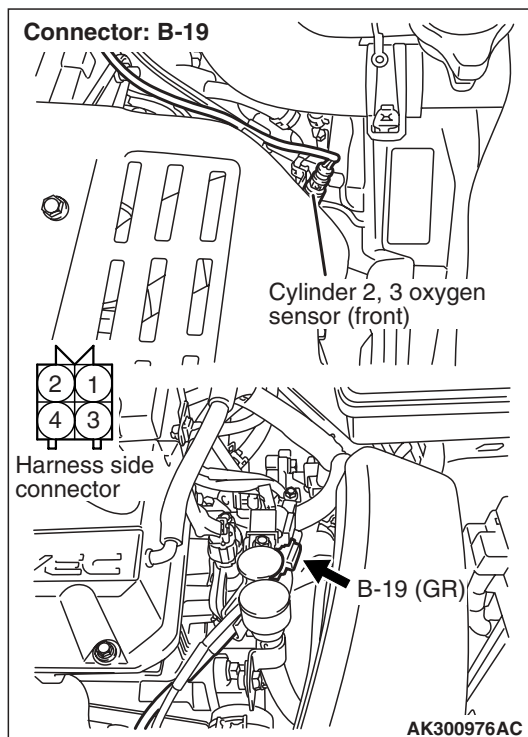
- 60 seconds have elapsed since the previous monitoring started.
- Engine coolant temperature is 20°C or higher.
- While cylinder 2, 3 oxygen sensor (front) heater is on.
- Battery positive voltage is 11 – 16 V.

Judgment Criterion

- Cylinder 2, 3 oxygen sensor (front) heater currents has continued to be 0.16 A or lower, or 7.5 A or higher for 4 seconds.

PROBABLE CAUSE

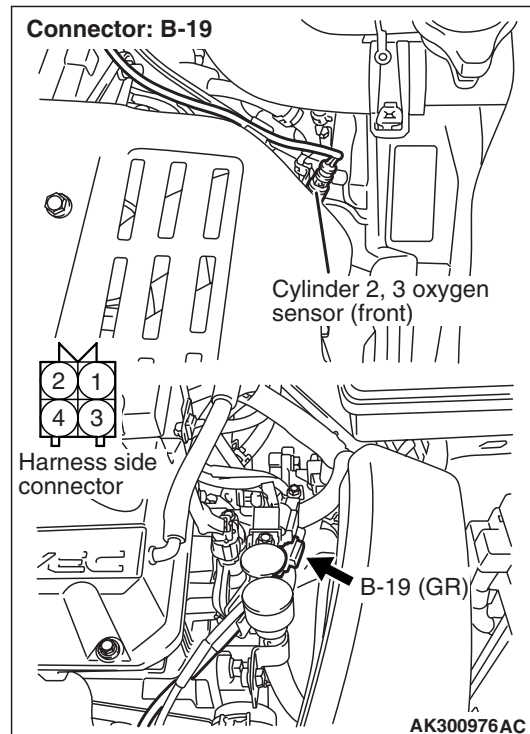
- Failed cylinder oxygen sensor heater
- Open/short circuit in cylinder 2, 3 oxygen sensor (front) heater circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. Connector check: B-19 cylinder 2, 3 oxygen sensor (front) connector**

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-19 cylinder 2, 3 oxygen sensor (front) connector.

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

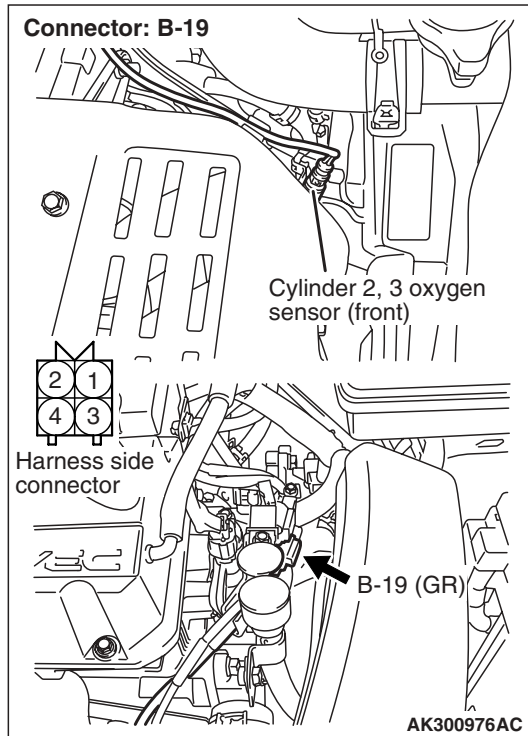
OK: 4.5 – 8.0 Ω

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace cylinder 2, 3 oxygen sensor (front).

STEP 3. Perform voltage measurement at B-19 cylinder 2, 3 oxygen sensor (front) connector.



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

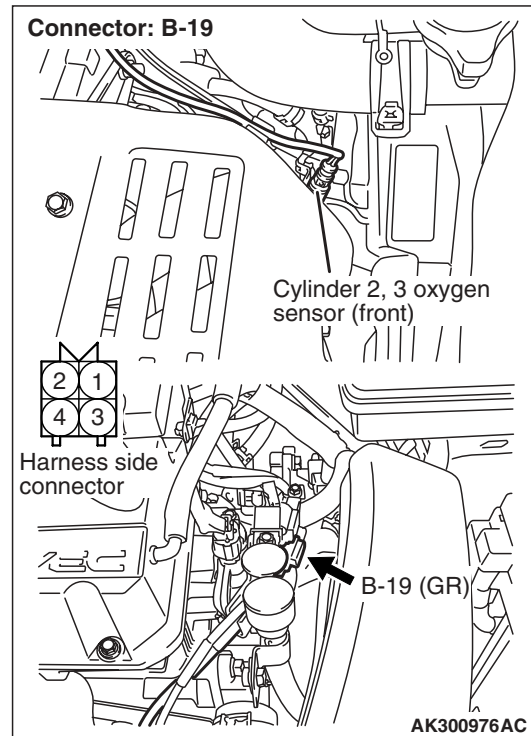
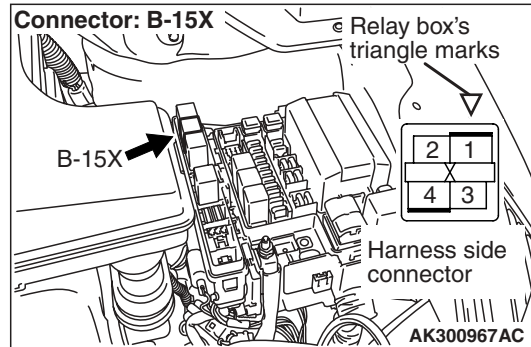
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: B-15X engine control relay connector



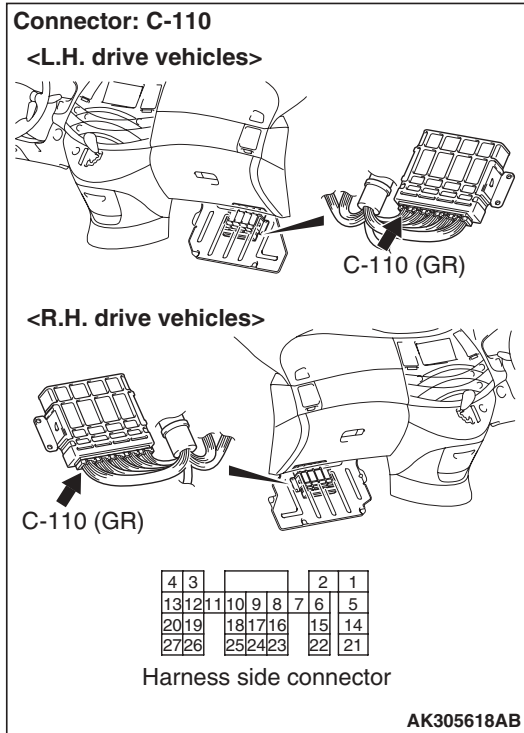
Q: Is the check result normal?

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-19 (terminal No. 1) cylinder 2, 3 oxygen sensor (front) connector and B-15X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 10 and earth.

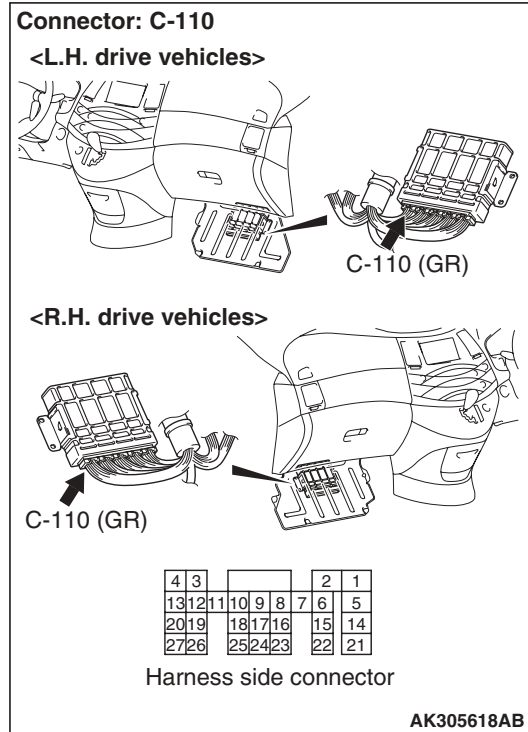
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 6 .

STEP 6. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

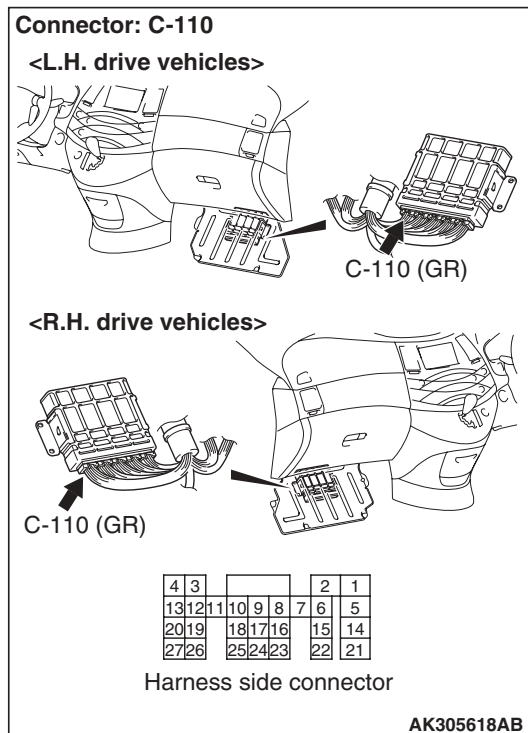
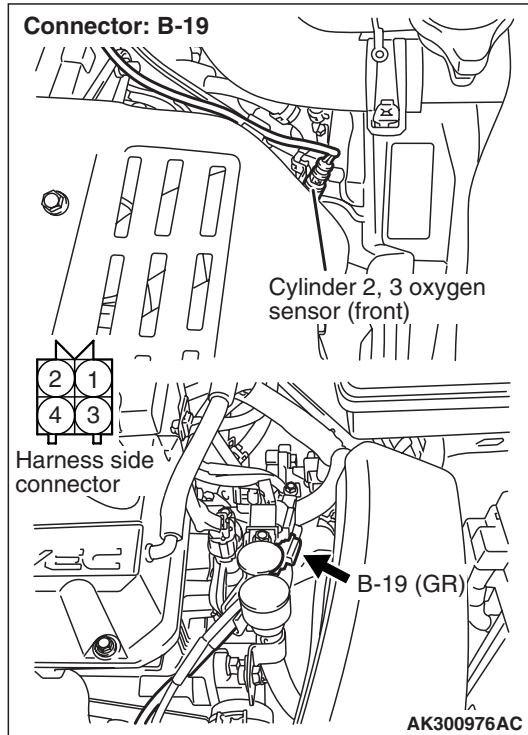


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-19 (terminal No. 3) cylinder 2, 3 oxygen sensor (front) connector and C-110 (terminal No. 10) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

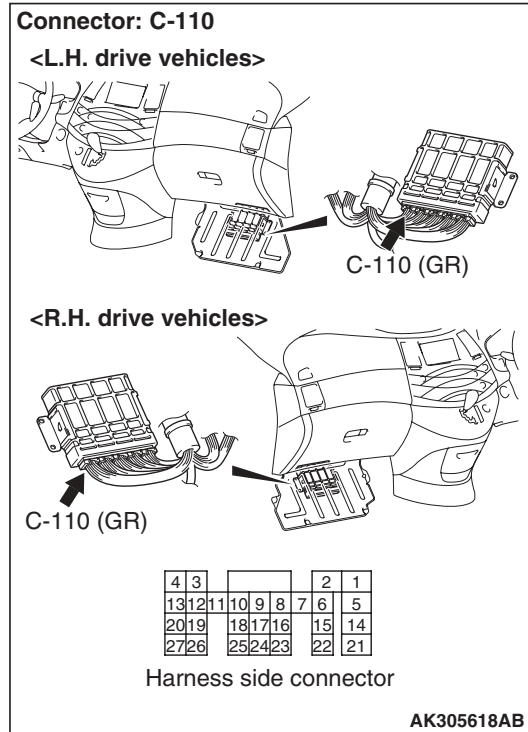


- Check earthing line for open/short circuit.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Repair.

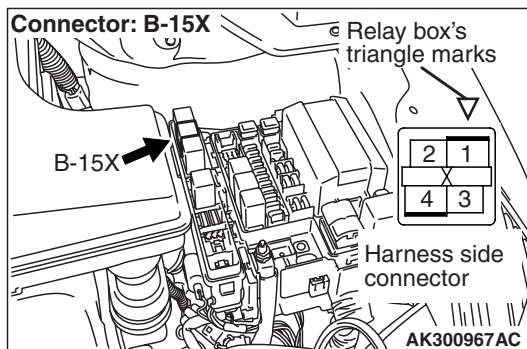
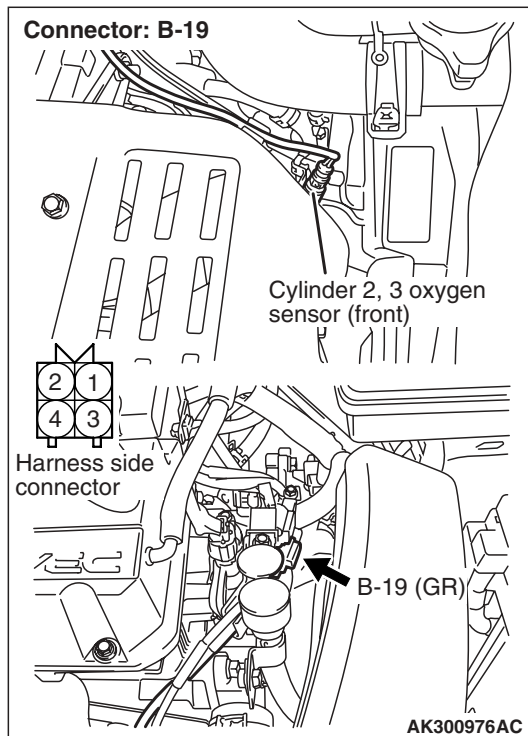
STEP 8. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

YES : Go to Step 9 .
NO : Repair or replace.

STEP 9. Check harness between B-19 (terminal No. 1) cylinder 2, 3 oxygen sensor (front) connector and B-15X (terminal No. 1) engine control relay connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

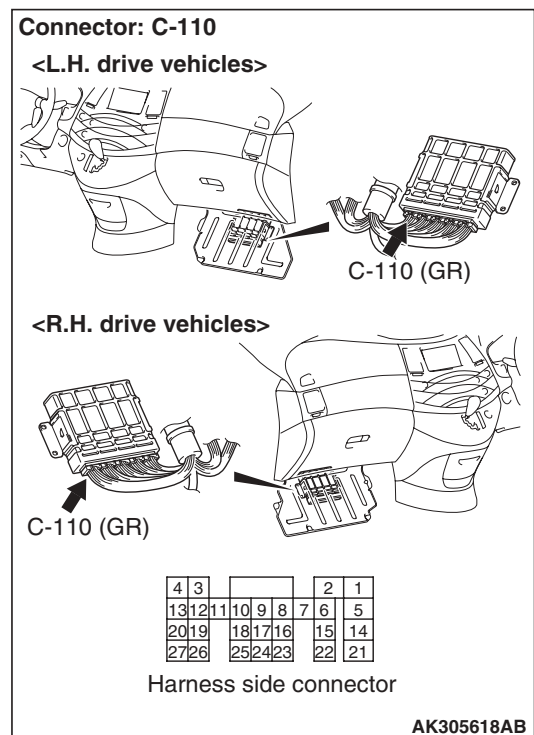
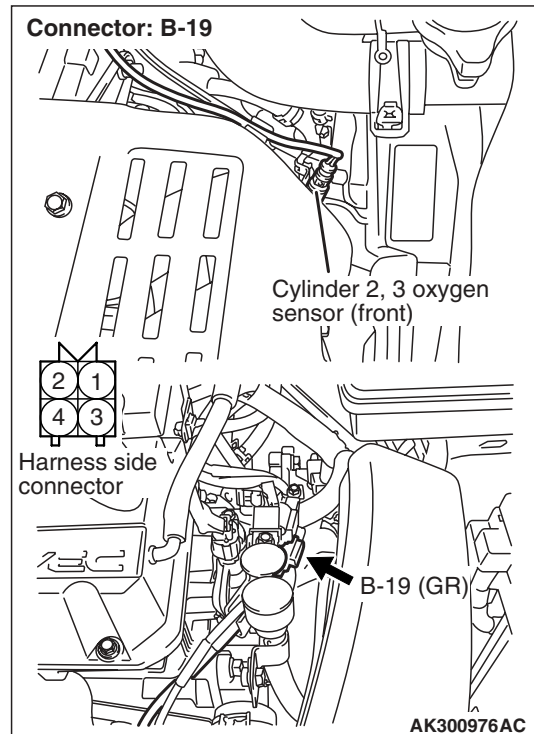
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Check harness between B-19 (terminal No. 3) cylinder 2, 3 oxygen sensor (front) connector and C-110 (terminal No. 10) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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.

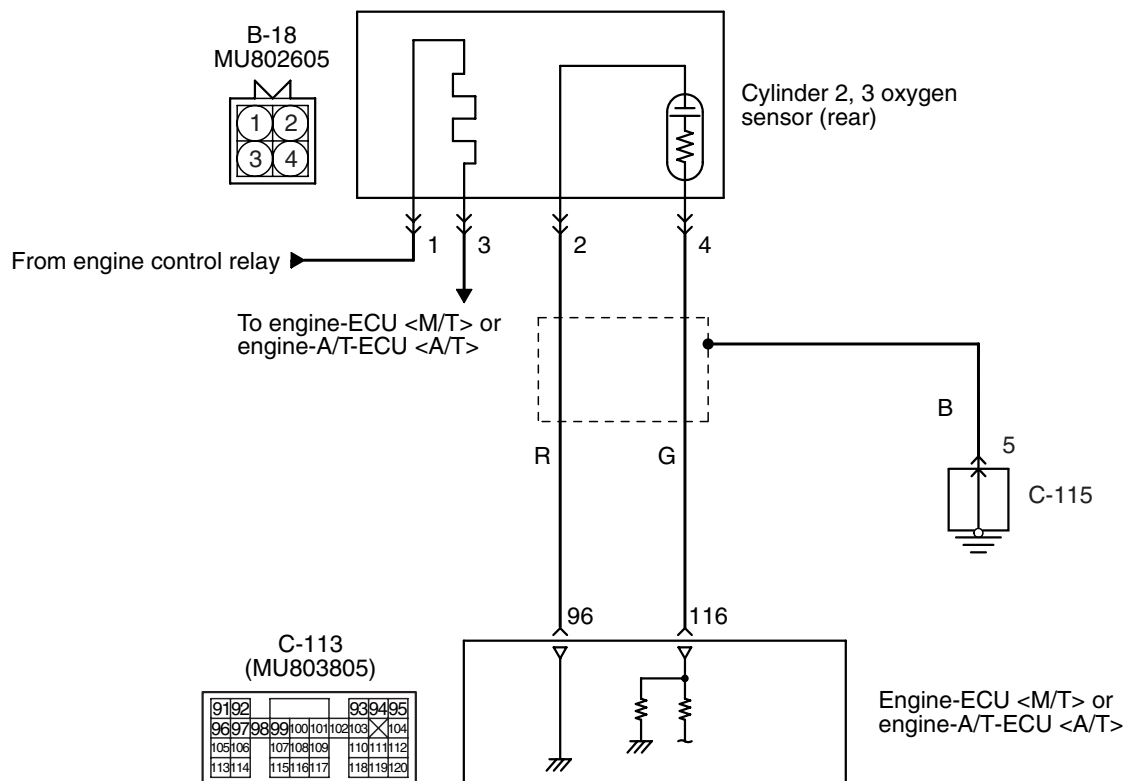
Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P0156: Cylinder 2, 3 Oxygen Sensor (Rear) System

Cylinder 2, 3 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

AK305557AB

OPERATION

- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 116) from the cylinder 2, 3 oxygen sensor (rear) output terminal (terminal No. 4).
- The cylinder 2, 3 oxygen sensor (rear) (terminal No. 2) is earthed with engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96).

FUNCTION

- The cylinder 2, 3 oxygen sensor (rear) converts the concentration of oxygen in the exhaust emission into a voltage and inputs the signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the cylinder 2, 3 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.
- Based on this signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> corrects the deviation in the signal that is output by the cylinder 2, 3 oxygen sensor (front).

TROUBLE JUDGMENT

Check Conditions

- Above 3 minutes later after the engine has started up.
- The engine coolant temperature is approx. 82°C or higher.
- The engine speed is 1200 r/min or more.
- The monitoring time is 5 seconds.

Judgment Criteria

- When the cylinder 2, 3 oxygen sensor (rear) output voltage is 0.2 V or less and a power voltage of 5 V is applied to the cylinder 2, 3 oxygen sensor (rear) in the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the sensor output voltage is 4.5 V or more.
- To be monitored once per driving cycle.

Check Conditions

- 2 seconds later after lack of circuit continuity is detected.
- When the cylinder 2, 3 oxygen sensor (rear) is normally operated.

Judgment Criteria

- When the air-fuel ratio is rich, the cylinder 2, 3 oxygen sensor (rear) output voltage is 0.5 V or more.
- The cylinder 2, 3 oxygen sensor (rear) output voltage is less than 0.1 V.
- The maximum and maximum of the cylinder 2, 3 oxygen sensor (rear) output is 0.078 V or less.

PROBABLE CAUSE

- Failed cylinder 2, 3 oxygen sensor (rear)

- Open/short circuit in cylinder 2, 3 oxygen sensor (rear) circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

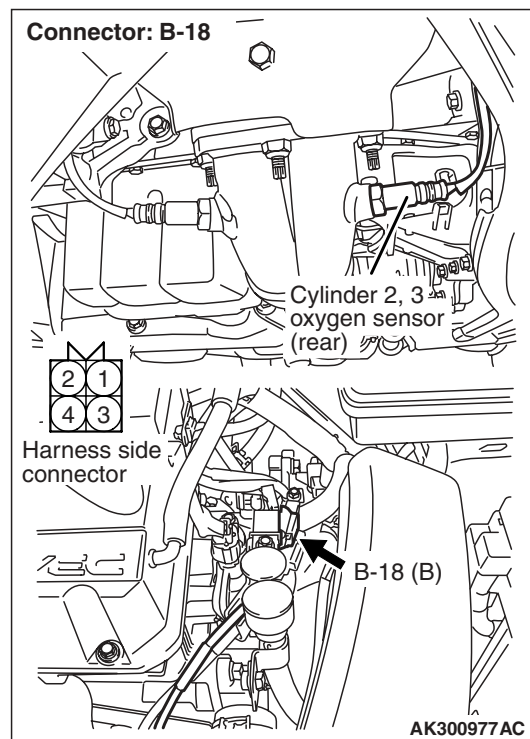
- Refer to Data List Reference Table [P.13A-363](#).
 - Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-18 cylinder 2, 3 oxygen sensor (rear) connector

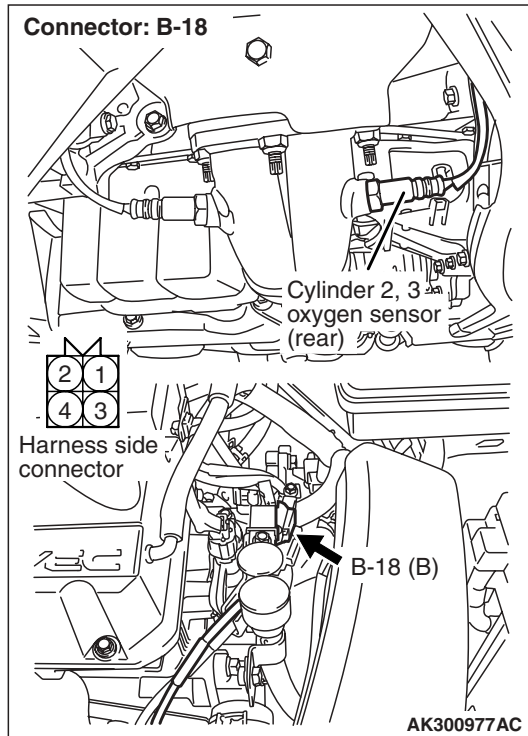


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at B-18 cylinder 2, 3 oxygen sensor (rear) connector.



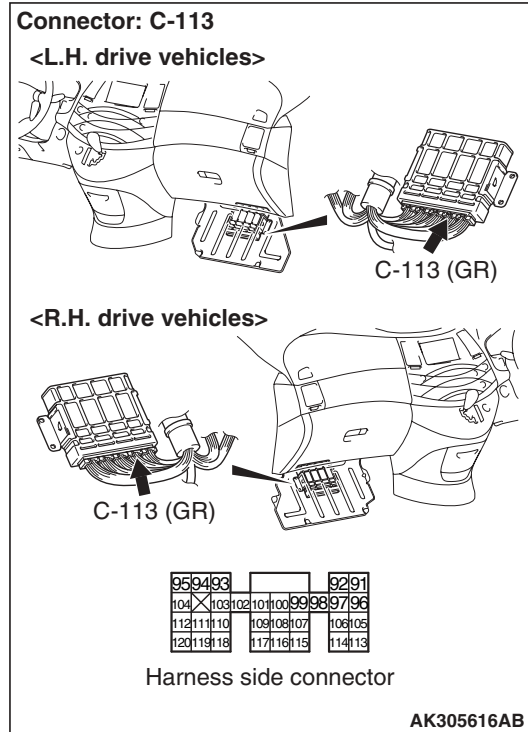
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

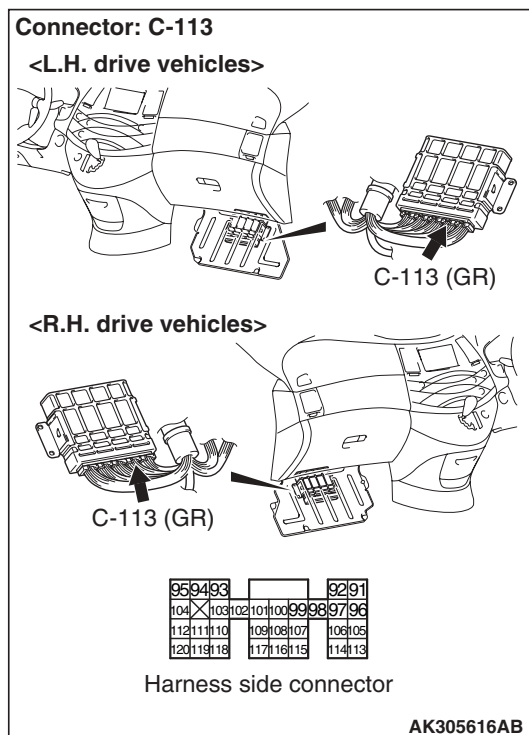
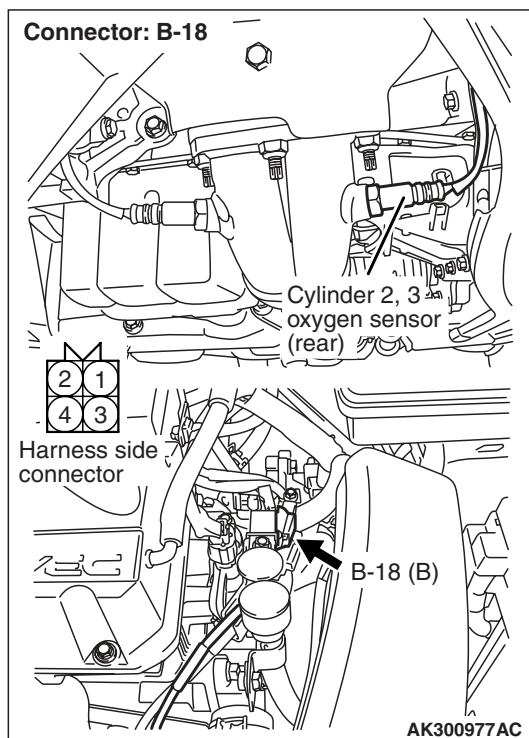


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-18 (terminal No. 2) cylinder 2, 3 oxygen sensor (rear) connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Repair.

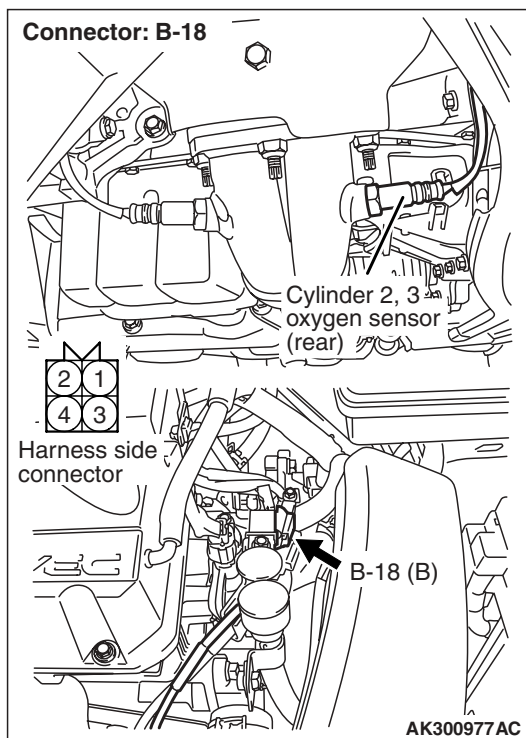
STEP 6. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
a. Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Is the check result normal?

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

STEP 7. Perform voltage measurement at B-18 cylinder 2, 3 oxygen sensor (rear) connector.



- Use special tool test harness (MD998464) to connect connector, and measure at pick-up harness.
- Transmission: Neutral <M/T> or P range <A/T>
- Engine: After warm-up
- Voltage between terminal No. 4 and earth.

OK:

When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Go to Step 8 .

STEP 8. Check cylinder 2, 3 oxygen sensor (rear) itself

- Check cylinder 2, 3 oxygen sensor (rear) itself (Refer to [P.13A-391](#)).

Q: Is the check result normal?

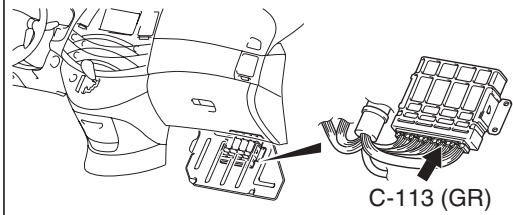
YES : Go to Step 9 .

NO : Replace cylinder 2, 3 oxygen sensor (rear).

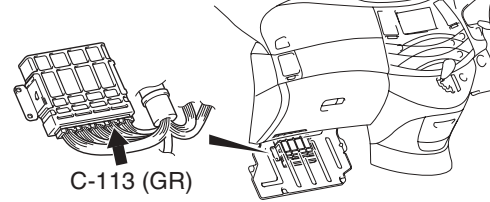
STEP 9. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

Connector: C-113

<L.H. drive vehicles>



<R.H. drive vehicles>

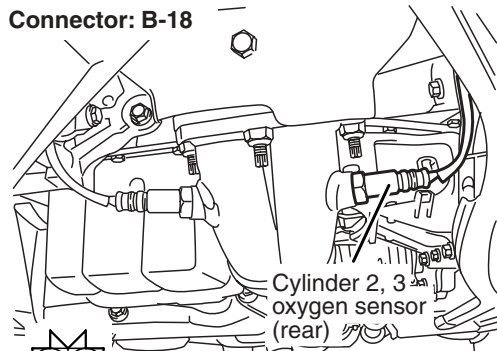


| | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| 95 | 94 | 93 | | | 92 | 91 |
| 104 | X | 103 | 102 | 101 | 100 | 99 |
| 112 | 111 | 110 | 109 | 108 | 107 | 106 |
| 120 | 119 | 118 | 117 | 116 | 115 | 114 |

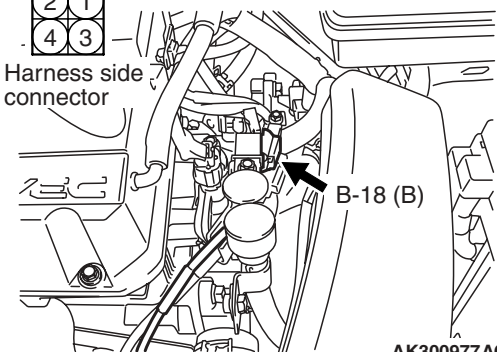
Harness side connector

AK305616AB

Connector: B-18



Harness side connector



AK300977AC

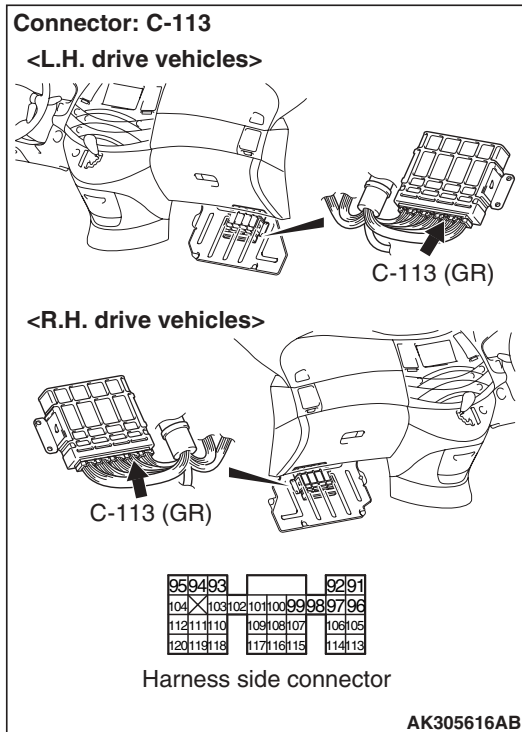
Q: Is the check result normal?

YES : Check and repair harness between B-18 (terminal No. 4) cylinder 2, 3 oxygen sensor (rear) connector and C-113 (terminal No. 116) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for damage.

NO : Repair or replace.

STEP 10. Perform voltage measurement at C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Transmission: Neutral <M/T> or P range <A/T>
- Engine: After warm-up
- Voltage between terminal No. 116 and earth.

OK:

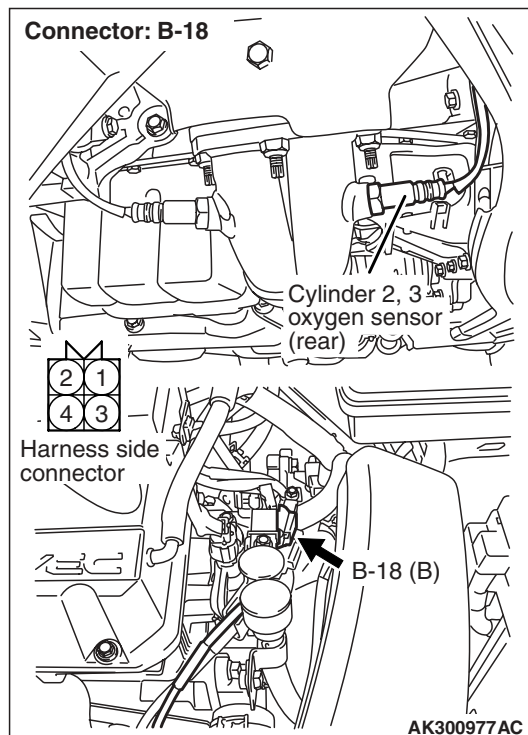
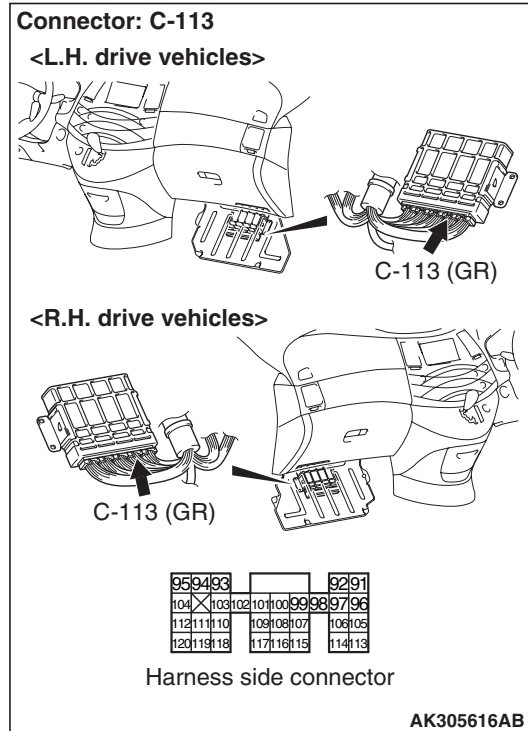
When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .

STEP 11. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



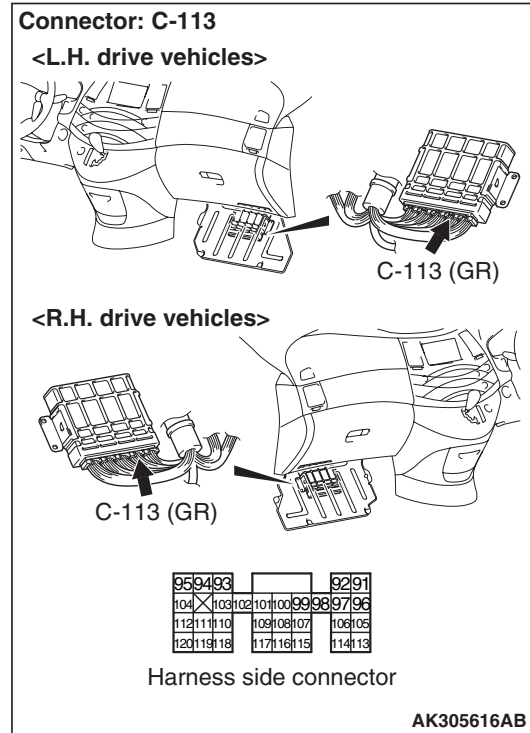
Q: Is the check result normal?

YES : Check and repair harness between B-18 (terminal No. 4) cylinder 2, 3 oxygen sensor (rear) connector and C-113 (terminal No. 116) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair or replace.

STEP 12. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



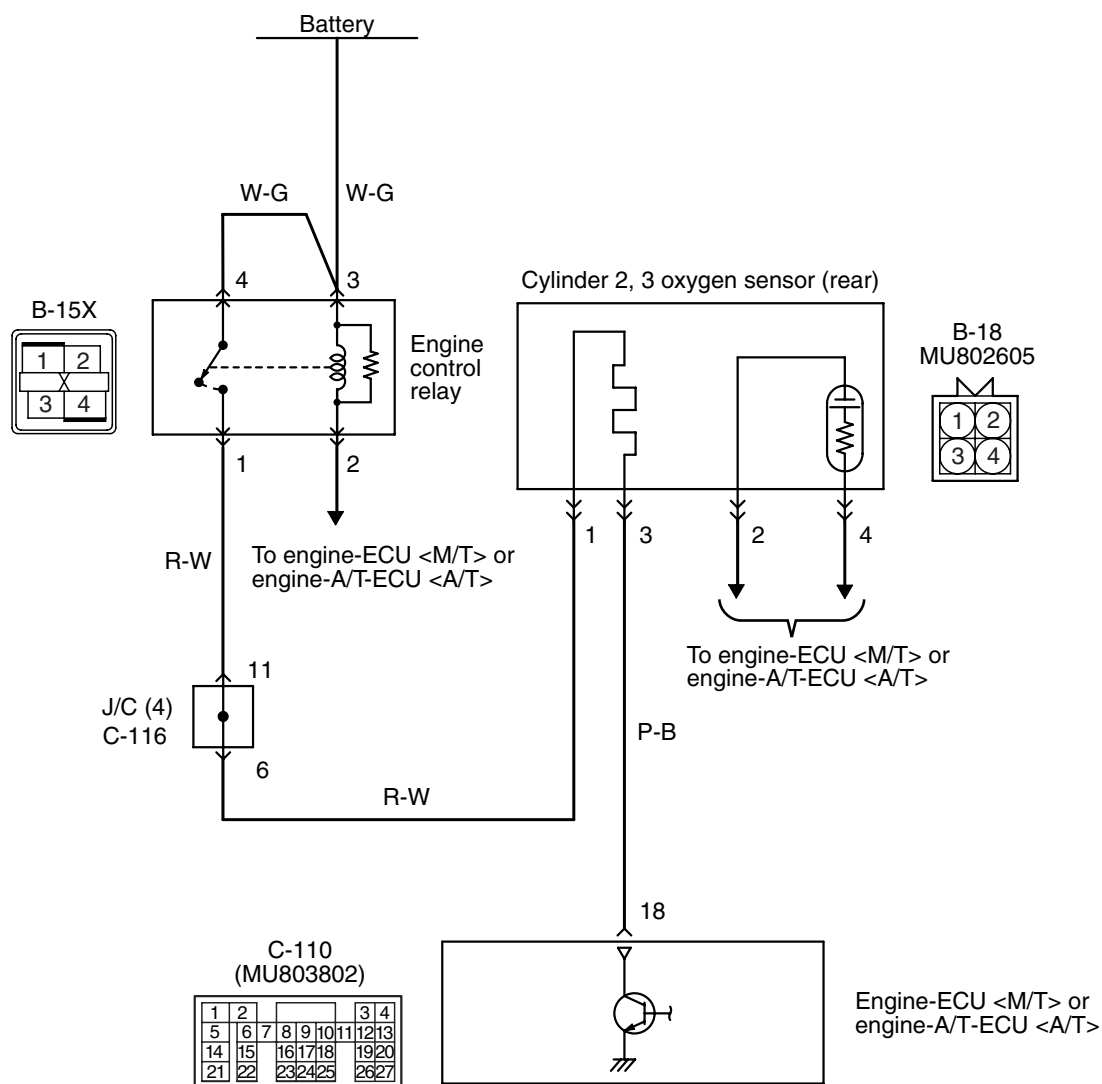
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

Code No. P0161: Cylinder 2, 3 Oxygen Sensor (Rear) Heater System

Cylinder 2, 3 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

AK305558AB

OPERATION

- Power is supplied to the heater power terminal (terminal No. 1) of the cylinder 2, 3 oxygen sensor (rear) connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 3) of the cylinder 2, 3 oxygen sensor (rear) connector is controlled by the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 18).

FUNCTION

- The power supply to the cylinder 2, 3 oxygen sensor (rear) heater is controlled by the ON/OFF control of the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- Heating the cylinder 2, 3 oxygen sensor (rear) heater enables the cylinder 2, 3 oxygen sensor (rear) to provide good response even when the exhaust emission temperature is low.

TROUBLE JUDGMENT

Check Conditions

- 60 seconds have elapsed since the previous monitoring started.
- Engine coolant temperature is 20°C or higher.
- While cylinder 2, 3 oxygen sensor (rear) heater is on.
- Battery positive voltage is 11 – 16 V.

Judgment Criterion

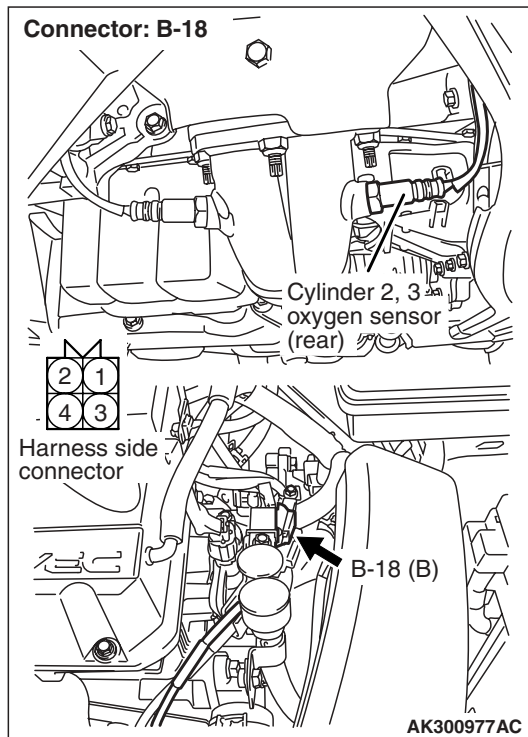
- Cylinder 2, 3 oxygen sensor (rear) heater currents have continued to be 0.16 A or lower, or 5.0 A or higher for 4 seconds.

PROBABLE CAUSE

- Failed cylinder 2, 3 oxygen sensor (rear) heater
- Open/short circuit in cylinder 2, 3 oxygen sensor (rear) heater circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-18 cylinder 2, 3 oxygen sensor (rear) connector

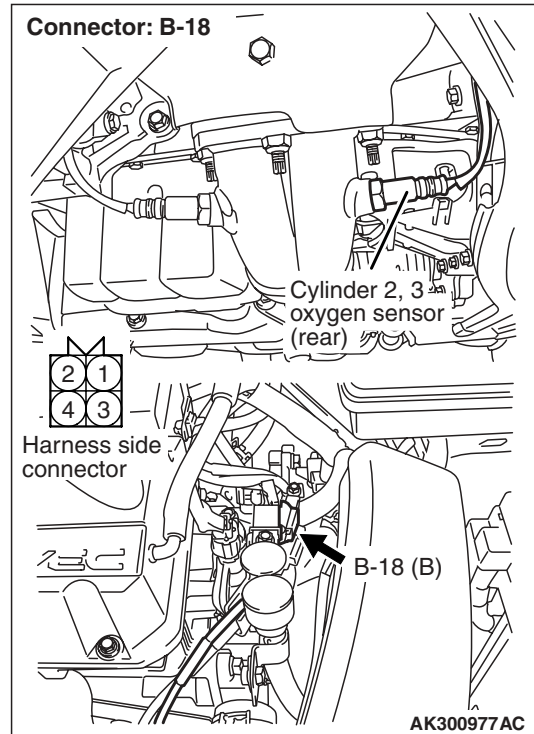


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-18 cylinder 2, 3 oxygen sensor (rear) connector.



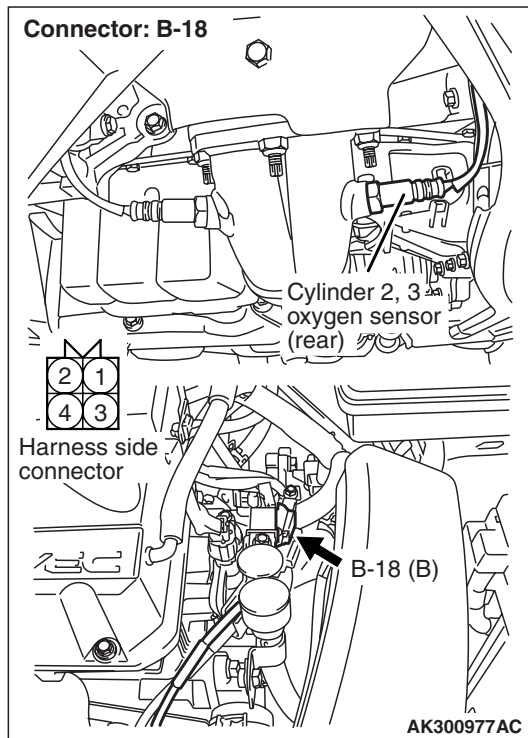
- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 3.

OK: 11 – 18 Ω

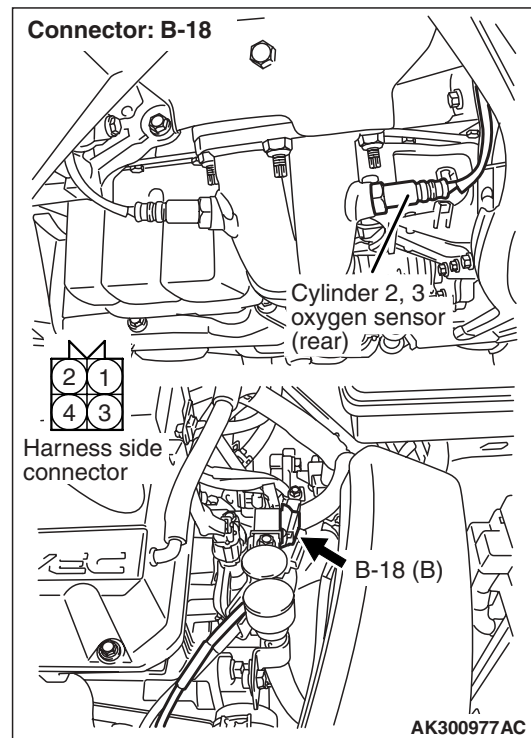
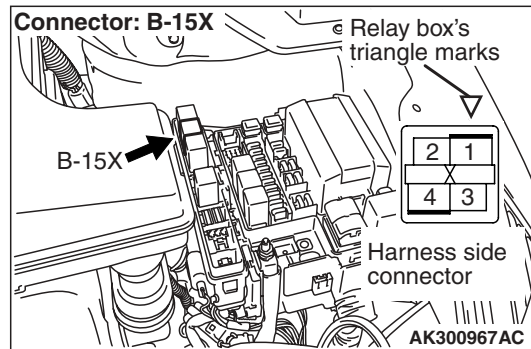
Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace cylinder 2, 3 oxygen sensor (rear).

STEP 3. Perform voltage measurement at B-18 cylinder 2, 3 oxygen sensor (rear) 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-15X engine control relay connector****Q: Is the check result normal?**

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-18 (terminal No. 1) cylinder 2, 3 oxygen sensor (rear) connector and B-15X (terminal No. 1) engine control relay connector.

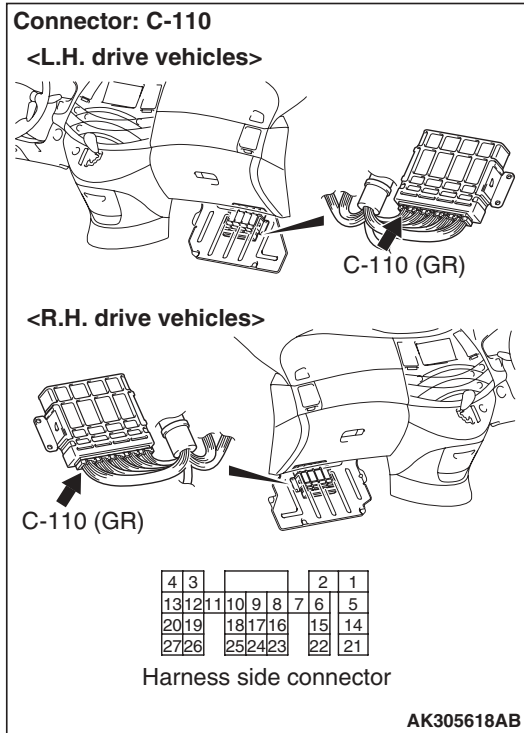
- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T>.

YES : Go to Step 8 .

NO : Go to Step 6 .

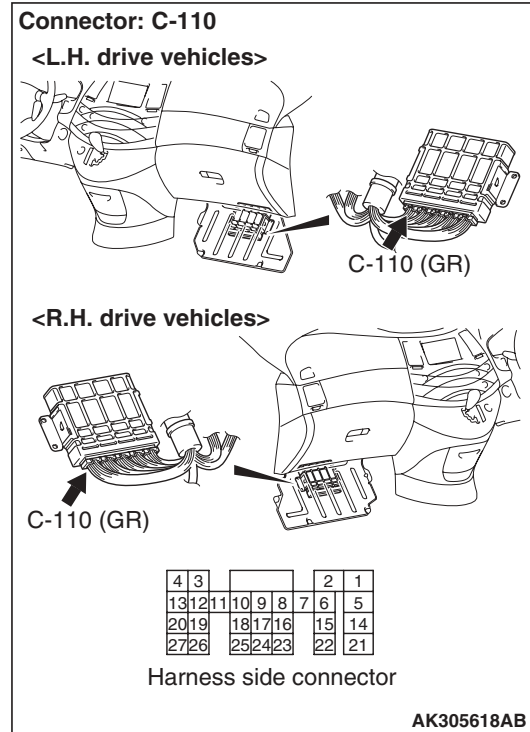


- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 18 and earth.

OK: System voltage

Q: Is the check result normal?

STEP 6. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

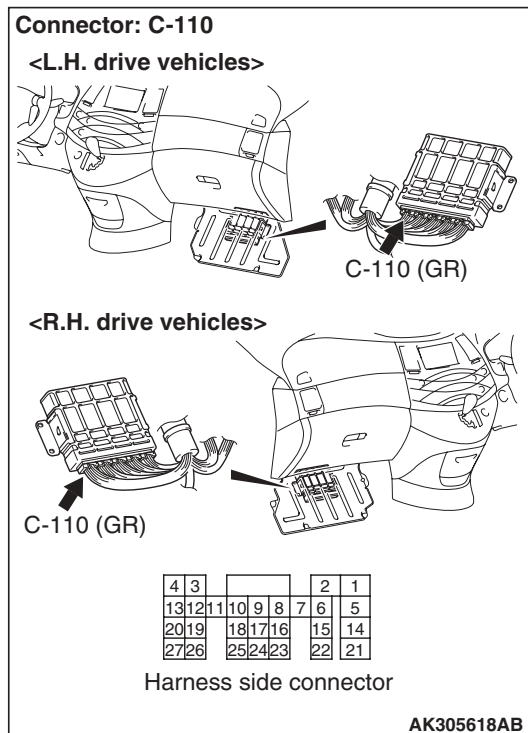
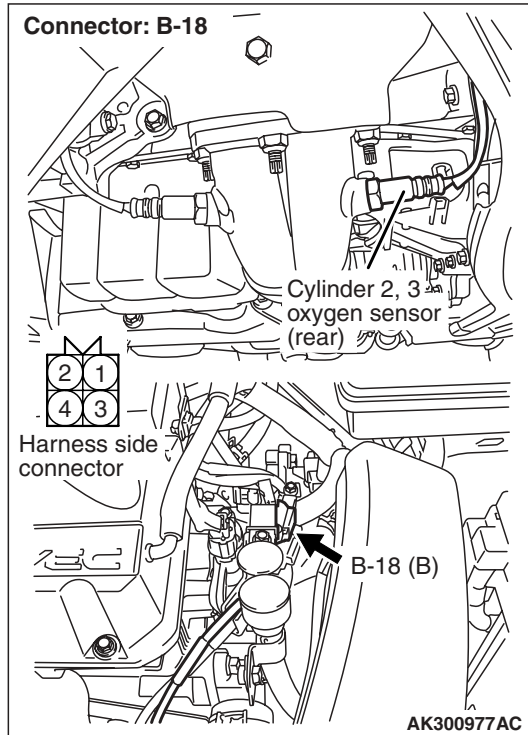


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-18 (terminal No. 3) cylinder 2, 3 oxygen sensor (rear) connector and C-110 (terminal No. 18) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



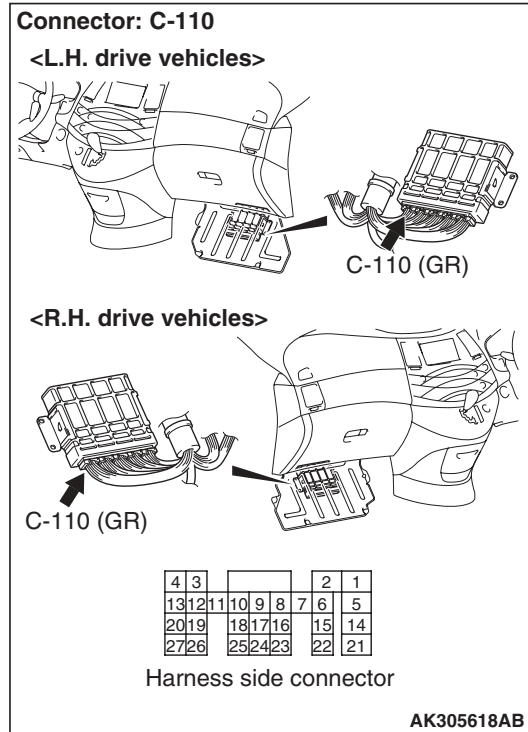
- Check earthing line for open/short circuit.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Repair.

STEP 8. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

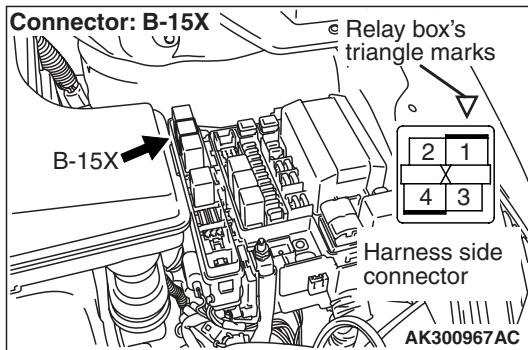
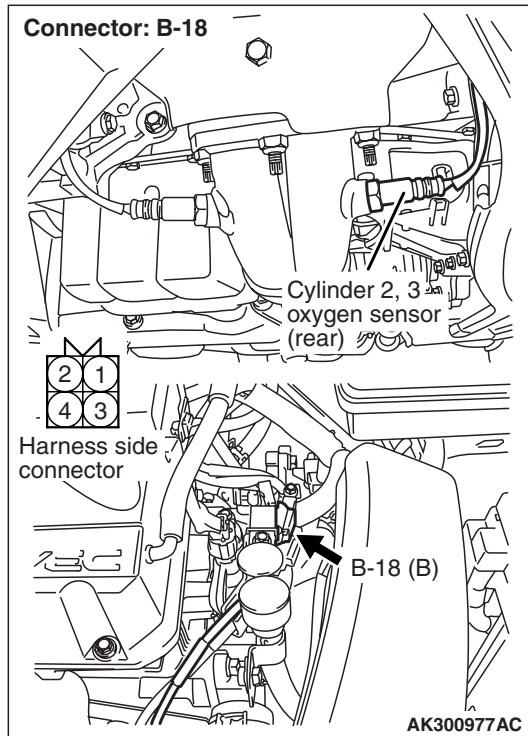


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check harness between B-18 (terminal No. 1) cylinder 2, 3 oxygen sensor (rear) connector and B-15X (terminal No. 1) engine control relay connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

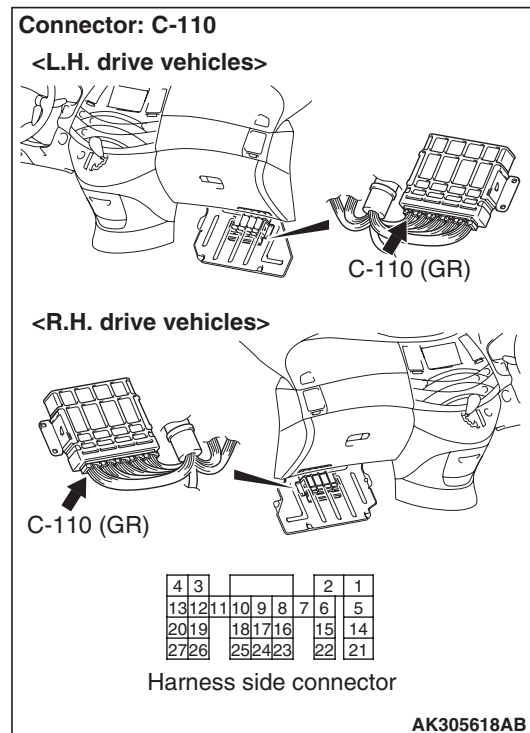
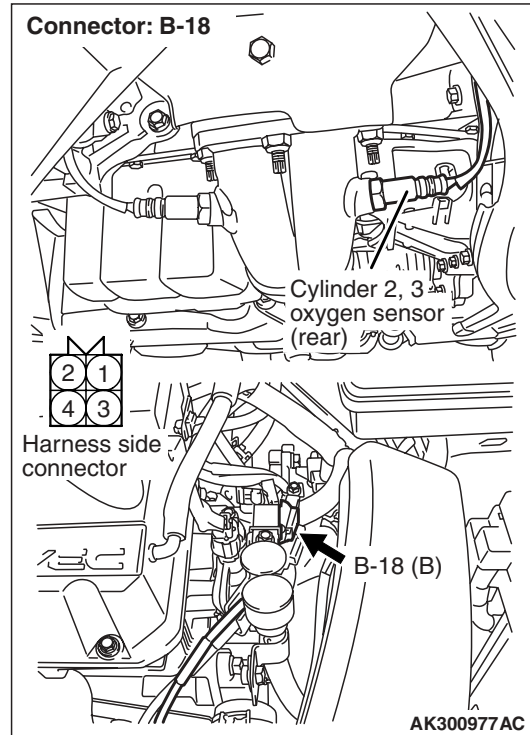
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Check harness between B-18 (terminal No. 3) cylinder 2, 3 oxygen sensor (rear) connector and C-110 (terminal No. 18) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T>.**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).**Code No. P0170: Abnormal Fuel System (Cylinder 1, 4)****OPERATION**

- Refer to Code No. P0201: No. 1 Injector System [P.13A-115](#).
- Refer to Code No. P0204: No. 4 Injector System [P.13A-130](#).

FUNCTION

- If the fuel system goes out of order, the fuel correction value will become larger.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the fuel trim value is within a specified range.

TROUBLE JUDGMENT**Check Condition**

- In learning the air-fuel ratio

Judgment Criteria

- Long-term fuel trim has continued to be +12.5 % or higher for 10 seconds.

or

- Long-term fuel trim has continued to be -12.5 % or lower for 10 seconds.

PROBABLE CAUSE

- Failed intake air temperature sensor
- Failed air flow sensor
- Failed purge control solenoid valve
- Failed injector
- Air drawn in from gaps in gasket, seals, etc.
- Failed engine coolant temperature sensor
- Failed barometric pressure sensor
- Exhaust leak
- Incorrect fuel pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. MUT-III diagnosis code****Q: Is any other diagnosis code than P0170 output?****YES :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.**NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).**YES :** Inspection chart for diagnosis code (Refer to [P.13A-20](#)).**NO :** Go to Step 2 .**STEP 2. MUT-III data list**

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 12: Air flow sensor
 - Item 13: Intake air temperature sensor
 - Item 21: Engine coolant temperature 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 Code [P.13A-20](#)).**STEP 3: MUT-III data list**

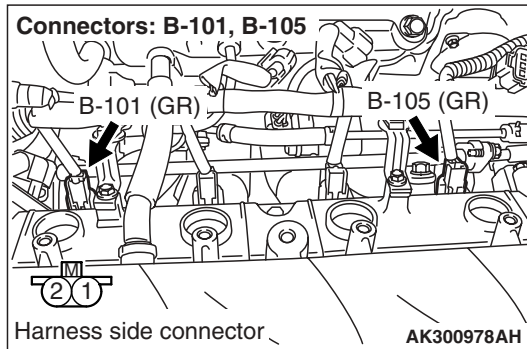
- Refer to Data List Reference Table [P.13A-363](#).
 - Item 25: Barometric pressure sensor

Q: Is the check result normal?**YES :** Go to Step 4 .**NO :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.**STEP 4. Check throttle body (throttle valve portion) for contamination.****Q: Is the check result normal?****YES :** Go to Step 5 .**NO :** Clean throttle body (throttle valve portion) (Refer to [P.13A-383](#)).**STEP 5. Check for intake of air from intake hose and inlet manifold.****Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Repair.**STEP 6. Check for leakage of exhaust emission from exhaust manifold.****Q: Is the check result normal?**

YES : Go to Step 7 .

NO : Repair.

STEP 7. Connector Check: Injector connector



a. B-101 (No. 1 injector connector).

b. B-105 (No. 4 injector connector).

Q: Are the check results normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Check No.1 and No.4 injector itself.

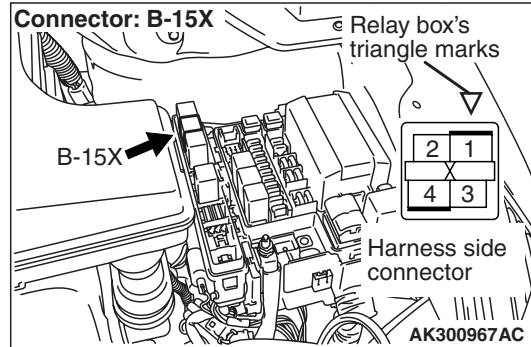
- Check No.1 and No.4 Injector itself (Refer to [P.13A-393](#)).

Q: Is the check result normal?

YES : Go to Step 9 .

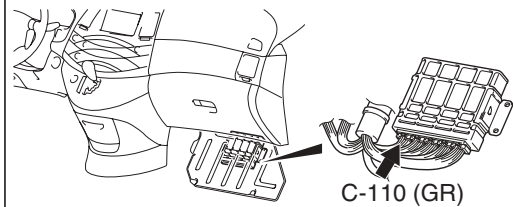
NO : Replace injector.

STEP 9. Connector check: B-15X engine control relay connector and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

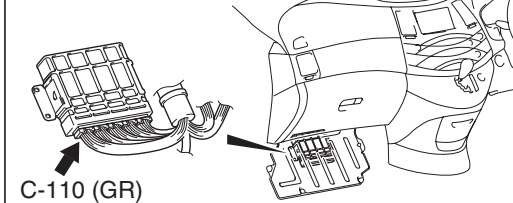


Connector: C-110

<L.H. drive vehicles>



<R.H. drive vehicles>



| | | | | | |
|----|----|----|----|----|----|
| 4 | 3 | | | 2 | 1 |
| 13 | 12 | 11 | 10 | 9 | 8 |
| 20 | 19 | 18 | 17 | 16 | 15 |
| 27 | 26 | 25 | 24 | 23 | 22 |

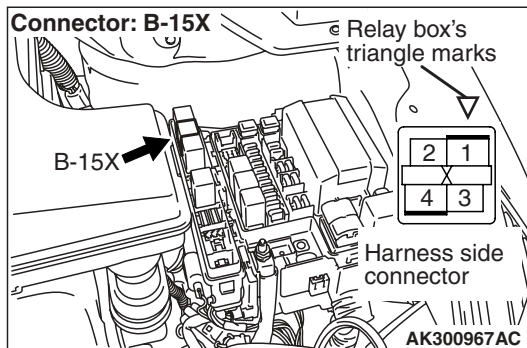
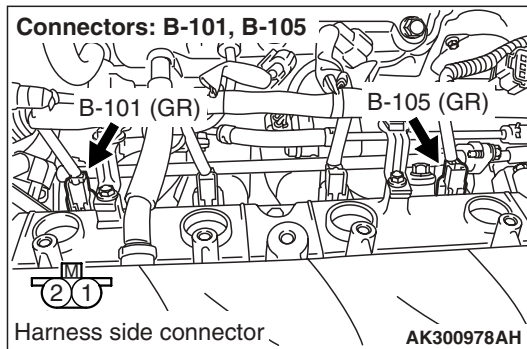
Harness side connector

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Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

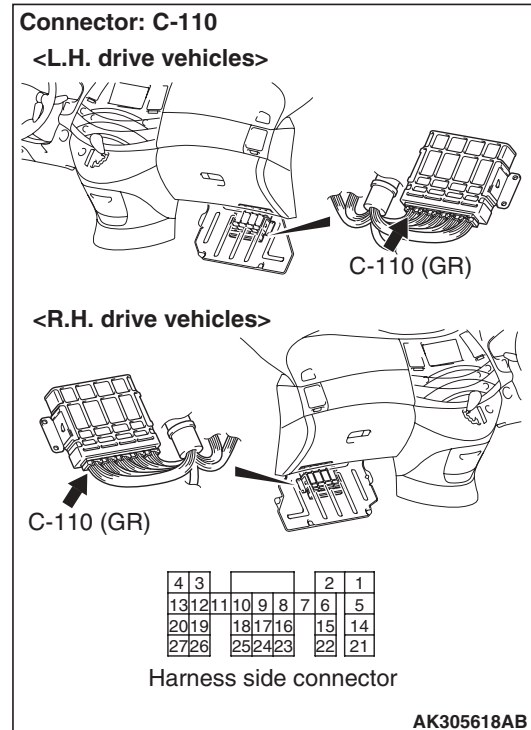
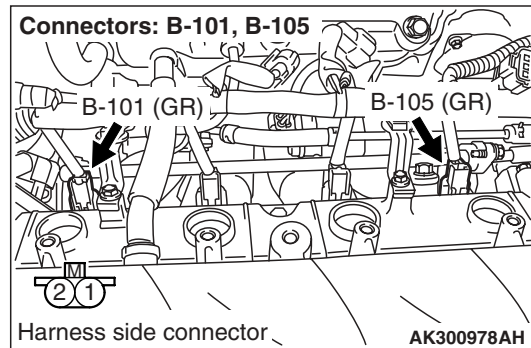
STEP 10. Check harness between B-15X engine control relay connector and injector connector.

- Check harness between B-15X (terminal No. 1) engine control relay connector and B-101 (terminal No. 1) No. 1 injector connector.
- Check harness between B-15X (terminal No. 1) engine control relay connector and B-105 (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 : Repair or replace.

STEP 11. Check harness between injector connector and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check harness between B-101 (terminal No. 2) No. 1 injector connector and C-110 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check harness between B-105 (terminal No. 2) No. 4 injector connector and C-110 (terminal No. 21) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
 - Check power supply line for damage.

Q: Are the check results normal?

YES : Go to Step 12 .

NO : Repair.

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– Purge Control Solenoid Valve [P.17-62](#)).

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 Fuel Pressure Test [P.13A-383](#)).

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Repair.

Code No. P0173: Abnormal Fuel System (cylinder 2, 3)

OPERATION

- Refer to Code No. P0202 No. 2 Injector System [P.13A-120](#).
- Refer to Code No. P0203 No. 3 Injector System [P.13A-125](#).

FUNCTION

- If the fuel system goes out of order, the fuel correction value will become larger.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the fuel trim value is within a specified range.

TROUBLE JUDGMENT

Check Condition

- In learning the air-fuel ratio

Judgment Criteria

- Long-term fuel trim has continued to be +12.5 % or higher for 10 seconds.

Or

- Long-term fuel trim has continued to be -12.5 % or lower for 10 seconds.

PROBABLE CAUSE

- Failed intake air temperature sensor
- Failed air flow sensor
- Failed purge control solenoid valve
- Failed injector
- Air drawn in from gaps in gasket, seals, etc.
- Failed engine coolant temperature sensor
- Failed barometric pressure sensor
- Exhaust leak
- Incorrect fuel pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Is any other diagnosis code than P0173 output?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 12: Air flow sensor
 - Item 13: Intake air temperature sensor
 - Item 21: Engine coolant temperature 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 Code [P.13A-20](#)).

STEP 3: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 25: Barometric pressure sensor

Q: Is the check result normal?

YES : Go to Step 4 .

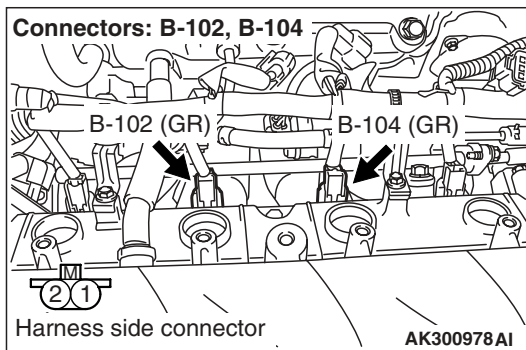
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 4. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-383](#)).

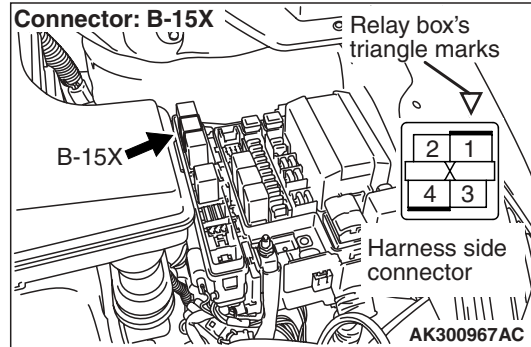
STEP 5. Check for intake of air from intake hose and inlet manifold.**Q: Is the check result normal?****YES :** Go to Step 6 .**NO :** Repair.**STEP 6. Check for leakage of exhaust emission from exhaust manifold.****Q: Is the check result normal?****YES :** Go to Step 7 .**NO :** Repair.**STEP 7. Connector Check: Injector connector**

a. B-102 (No. 2 injector connector).

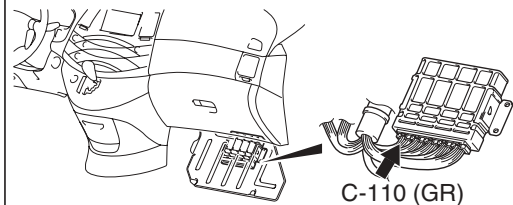
b. B-104 (No. 3 injector connector).

Q: Are the check results normal?**YES :** Go to Step 8 .**NO :** Repair or replace.**STEP 8. Check No.2 and No.3 injector itself.**

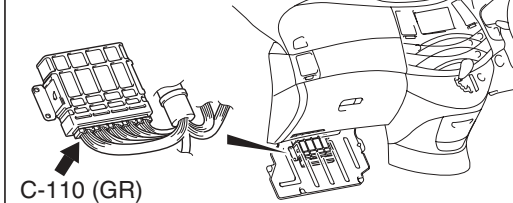
- Check No.2 and No.3 Injector itself (Refer to [P.13A-393](#)).

Q: Is the check result normal?**YES :** Go to Step 9 .**NO :** Replace injector.**STEP 9. Connector check: B-15X engine control relay connector and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector****Connector: C-110**

<L.H. drive vehicles>



<R.H. drive vehicles>



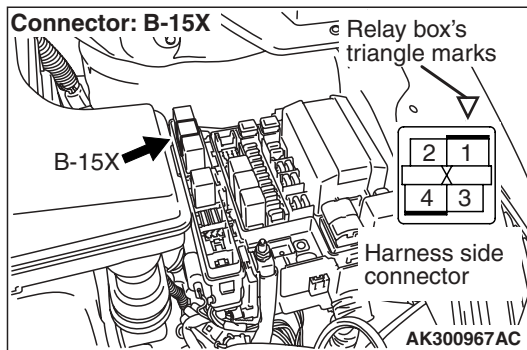
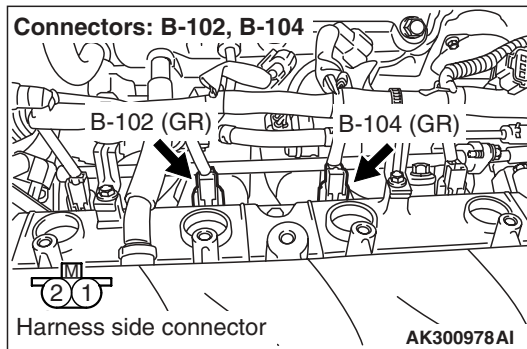
| | | | | | |
|----|----|----|----|----|----|
| 4 | 3 | | | 2 | 1 |
| 13 | 12 | 11 | 10 | 9 | 8 |
| 20 | 19 | 18 | 17 | 16 | 15 |
| 27 | 26 | 25 | 24 | 23 | 22 |

Harness side connector

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

STEP 10. Check harness between B-15X engine control relay connector and injector connector.



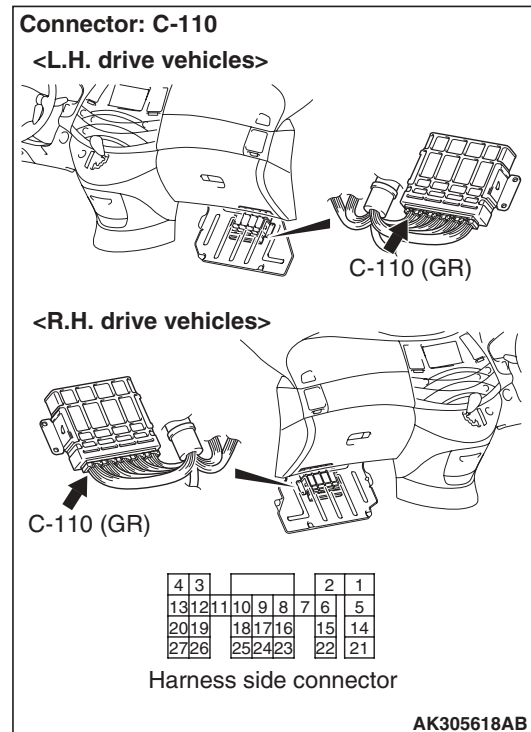
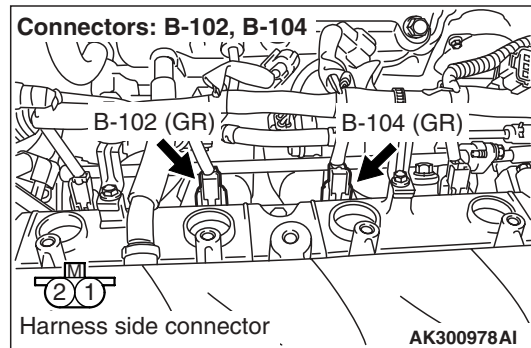
- a. Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check harness between B-15X (terminal No. 1) engine control relay connector and B-102 (terminal No. 1) No. 2 injector connector.
- b. Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check harness between B-15X (terminal No. 1) engine control relay connector and B-104 (terminal No. 1) No. 3 injector connector.
 - Check power supply line for damage.

Q: Are the check results normal?

YES : Go to Step 11 .

NO : Repair or replace.

STEP 11. Check harness between injector connector and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- a. Check harness between B-102 (terminal No. 2) No. 2 injector connector and C-110 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- b. Check harness between B-104 (terminal No. 2) No. 3 injector connector and C-110 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Q: Are the check results normal?

YES : Go to Step 12 .

NO : Repair.

STEP 12. Check purge control solenoid valve itself.

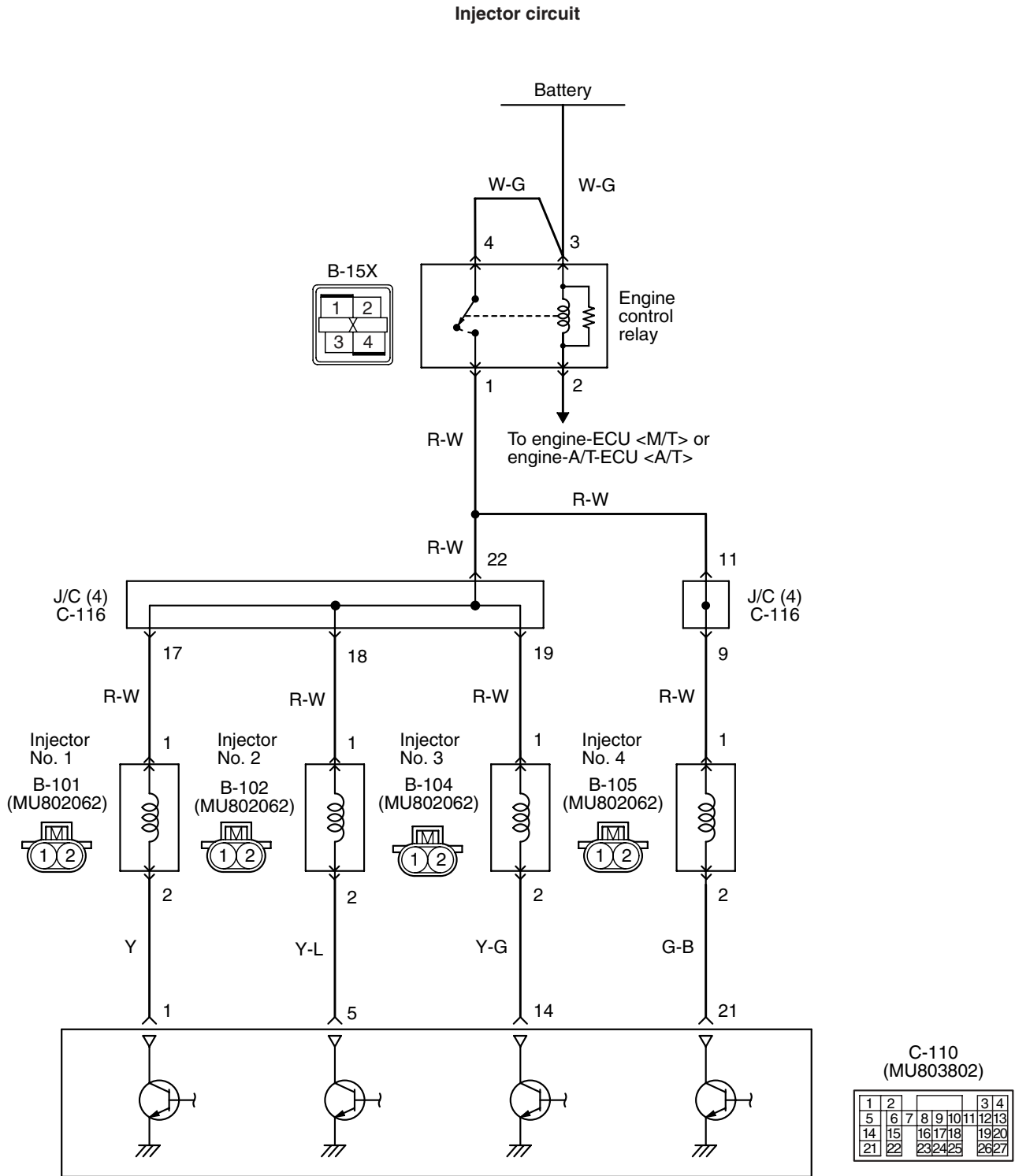
- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System – Purge Control Solenoid Valve [P.17-62](#)).

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 Fuel Pressure Test [P.13A-383](#)).

Q: Is the check result normal?**YES :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.**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

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (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 <M/T> or engine-A/T-ECU <A/T> controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT**Check Condition**

- While engine is running.

Judgment Criterion

- Injector coil surge voltage (battery positive voltage + 2 V) has not been detected for 2 seconds.

PROBABLE CAUSE

- Failed No. 1 injector
- Open/short circuit in injector circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. MUT-III actuator test**

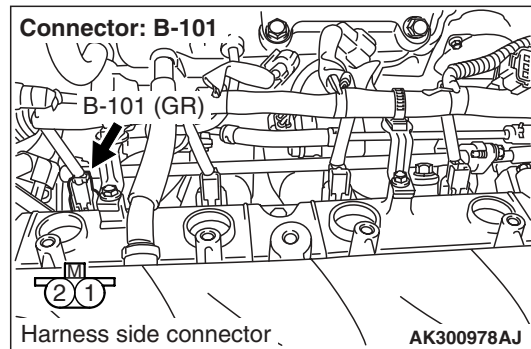
- Item 01: No. 1 injector

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.00-5).

NO : Go to Step 2 .

STEP 2. Connector check: B-101 No. 1 injector connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair or replace.

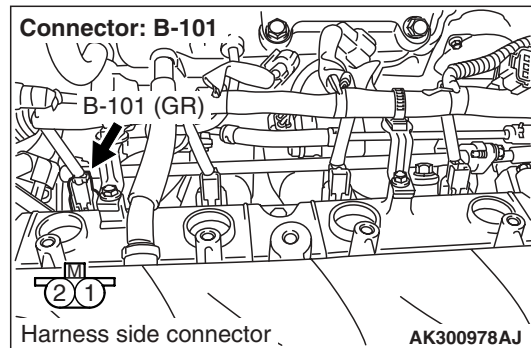
STEP 3. Check No. 1 injector itself.

- Check No. 1 Injector itself (Refer to P.13A-393).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 1 injector.

STEP 4. Perform voltage measurement at B-101 No. 1 injector connector.

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

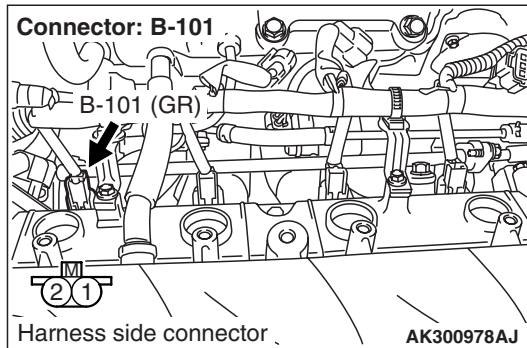
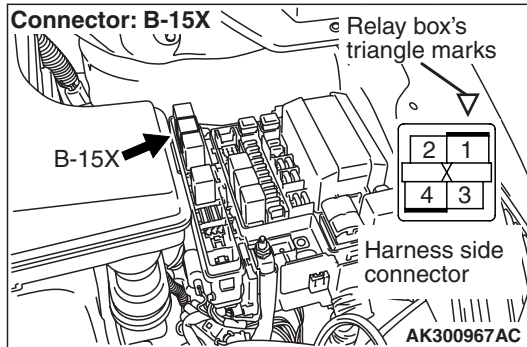
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-15X engine control relay connector



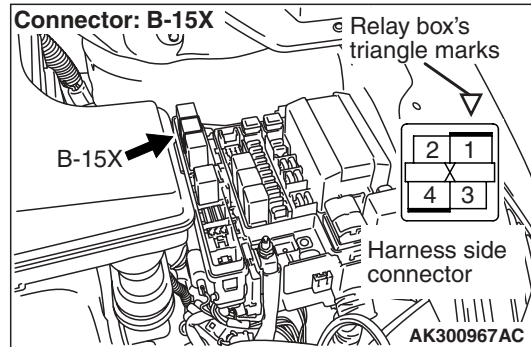
Q: Is the check result normal?

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-15X (terminal No. 1) engine control relay connector and B-101 (terminal No. 1) No. 1 injector connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 6. Connector check: B-15X engine control relay connector

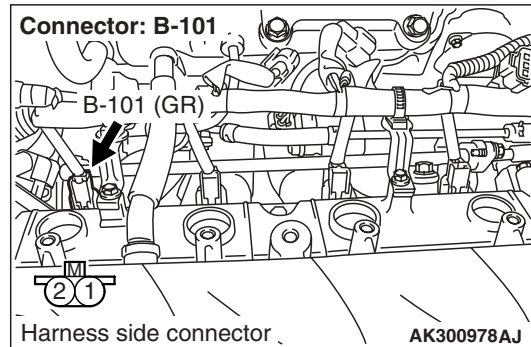
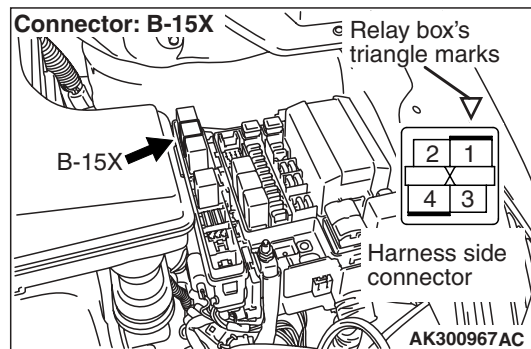


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-15X (terminal No. 1) engine control relay connector and B-101 (terminal No. 1) No. 1 injector connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

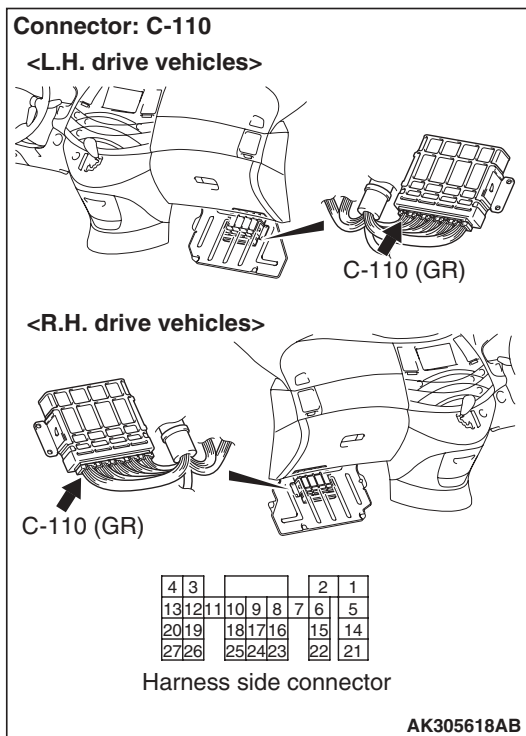
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

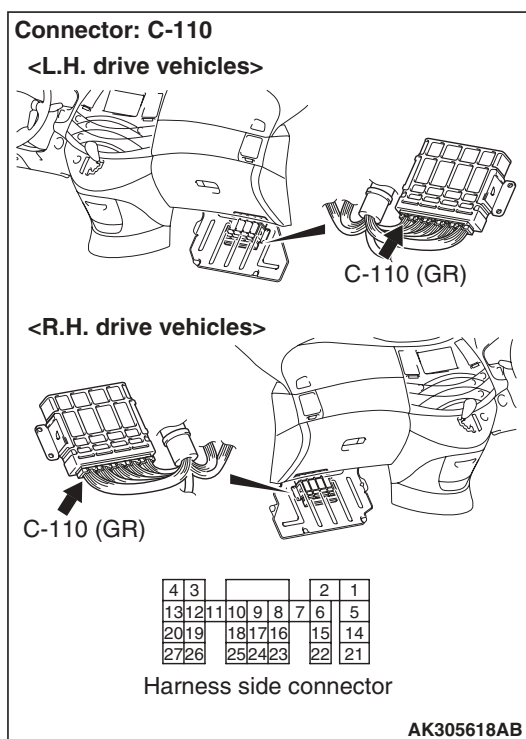
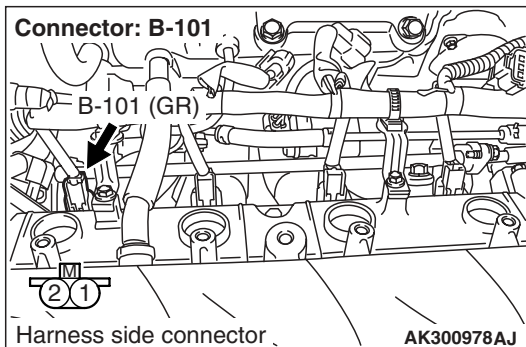


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check harness between B-101 (terminal No. 2) No. 1 injector connector and C-110 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



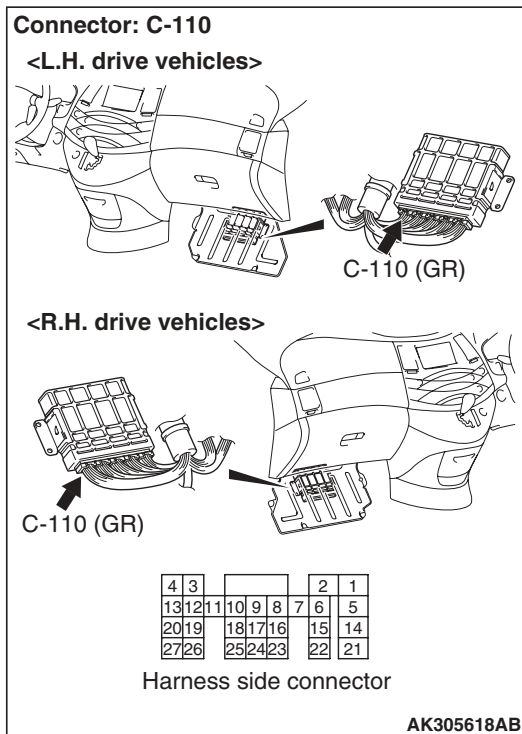
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Perform signal wave pattern measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector (Using an oscilloscope).



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

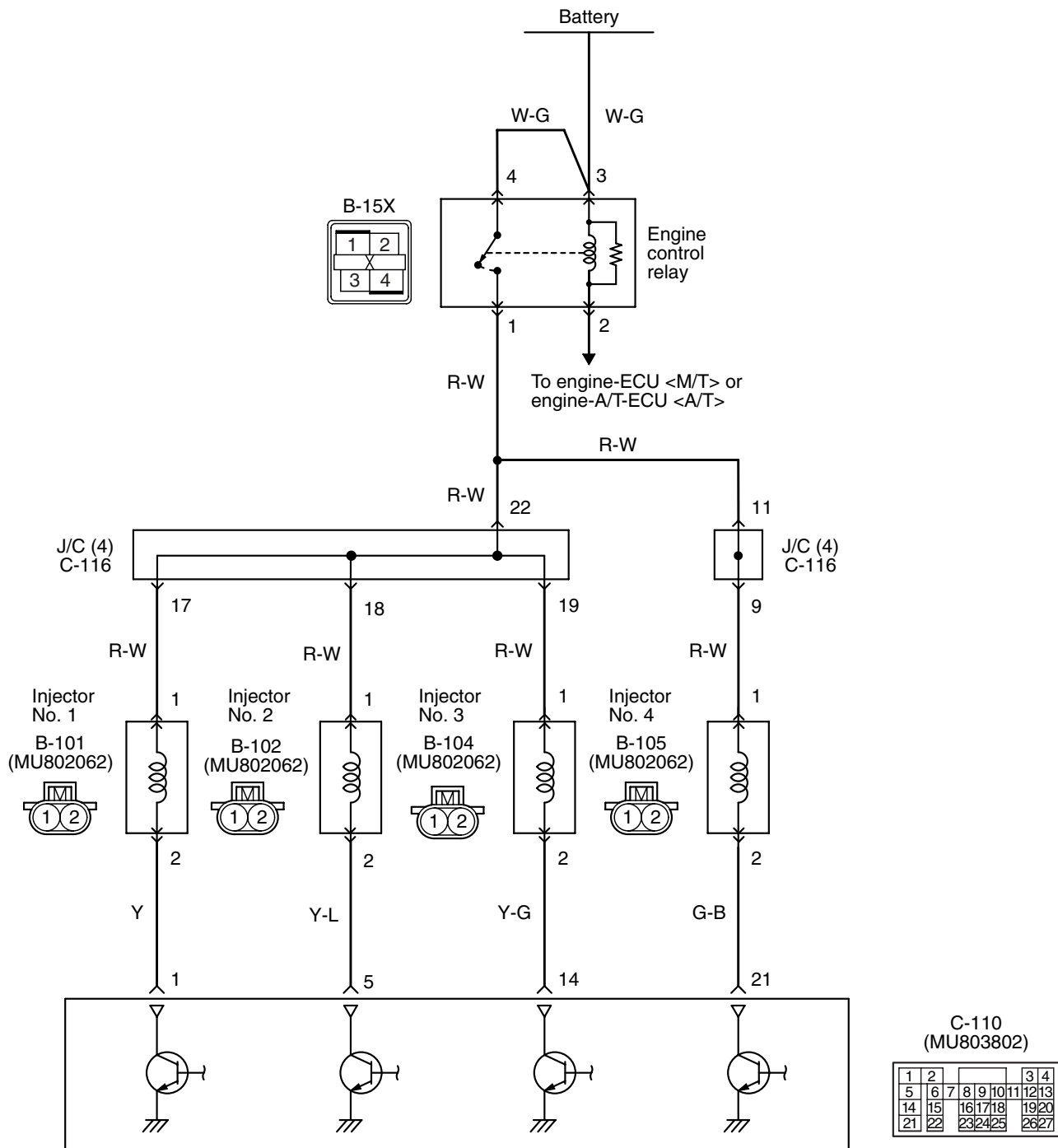
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
- Voltage between terminal No. 1 and earth.

OK: Waveforms should be display on Inspection procedure using an oscilloscope (Refer to [P.13A-378](#)).

Q: Is the check result normal?

Injector circuit



Wire colour code

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 <M/T> or engine-A/T-ECU <A/T> connector (terminal No. 5) 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 <M/T> or engine-A/T-ECU <A/T> controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT

Check Condition

- While engine is running.

Judgment Criterion

- Injector coil surge voltage (battery positive voltage + 2 V) has not been 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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III actuator test

- Item 02: No. 2 injector

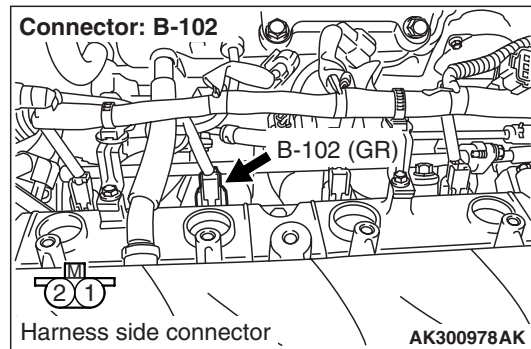
OK: Idling state varies.

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-102 No. 2 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Check No. 2 injector itself.

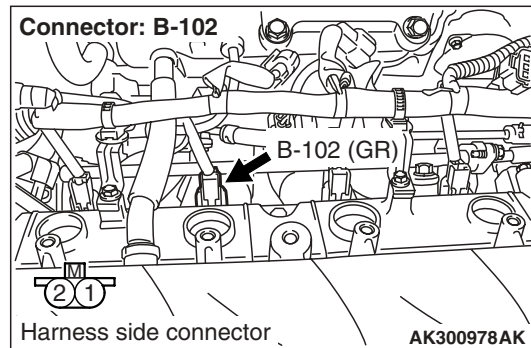
- Check No. 2 Injector itself (Refer to P.13A-393).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 2 injector.

STEP 4. Perform voltage measurement at B-102 No. 2 injector connector.



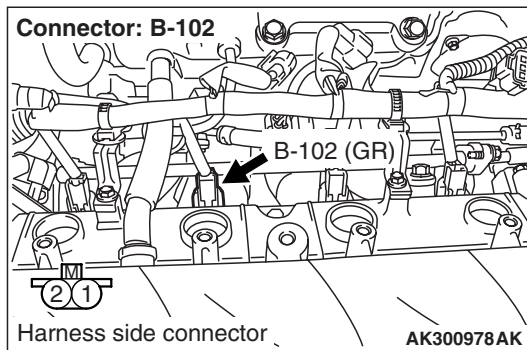
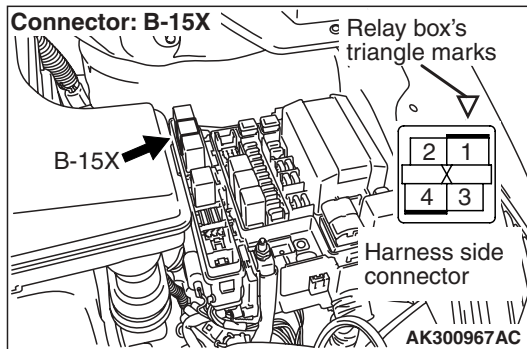
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

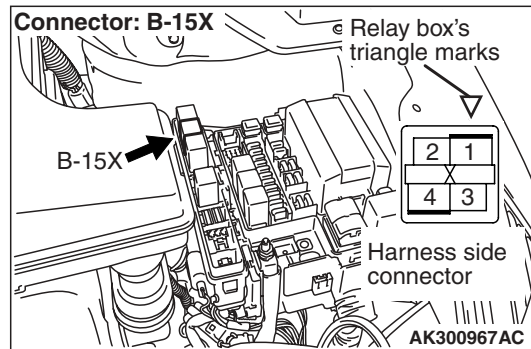
NO : Go to Step 5 .

STEP 5. Connector check: B-15X engine control relay connector**Q: Is the check result normal?**

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-15X (terminal No. 1) engine control relay connector and B-102 (terminal No. 1) No. 2 injector connector.

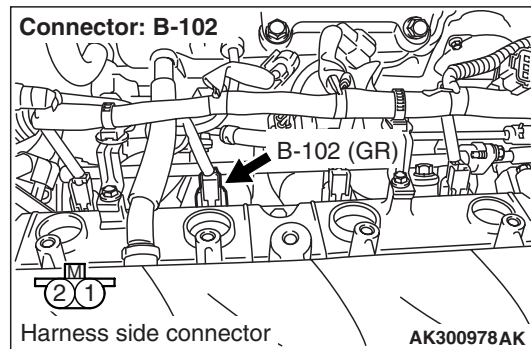
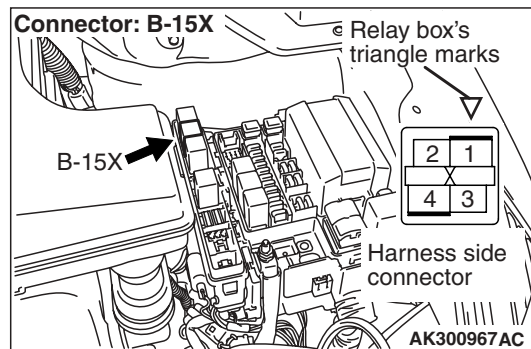
- Check power supply line for open/short circuit and damage.

NO : Repair or replace.

STEP 6. Connector check: B-15X engine control relay connector**Q: Is the check result normal?**

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-15X (terminal No. 1) engine control relay connector and B-102 (terminal No. 1) No. 2 injector connector.

NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

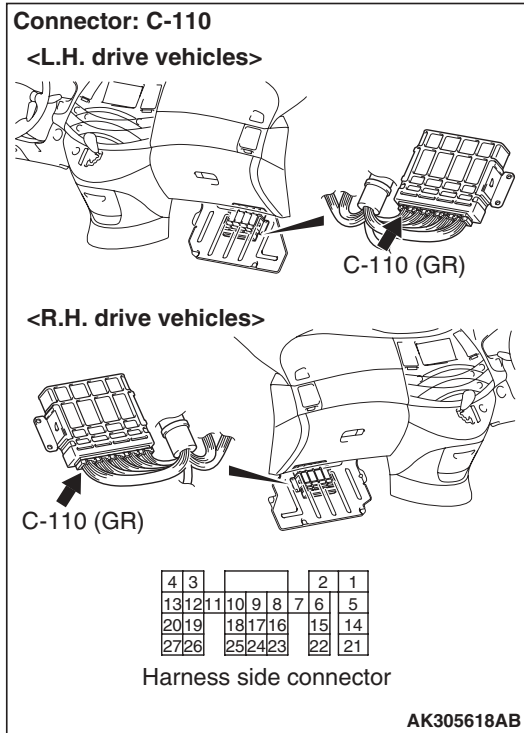
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

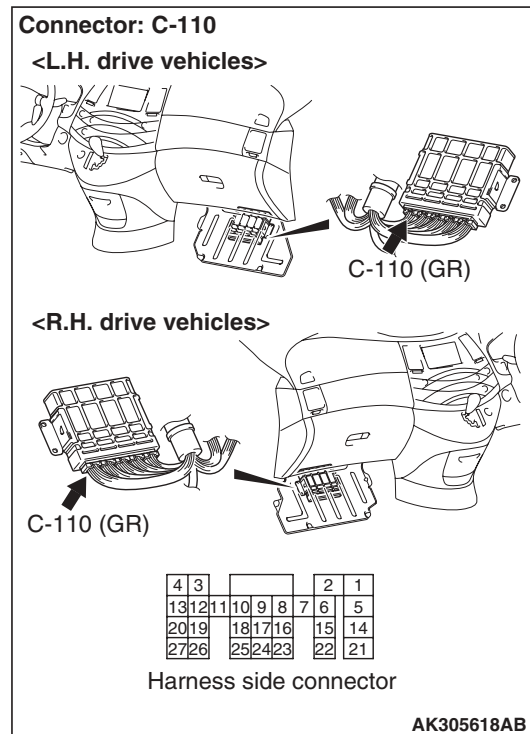
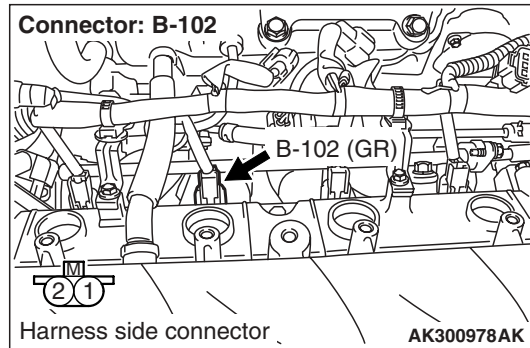
NO : Repair.

STEP 8. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

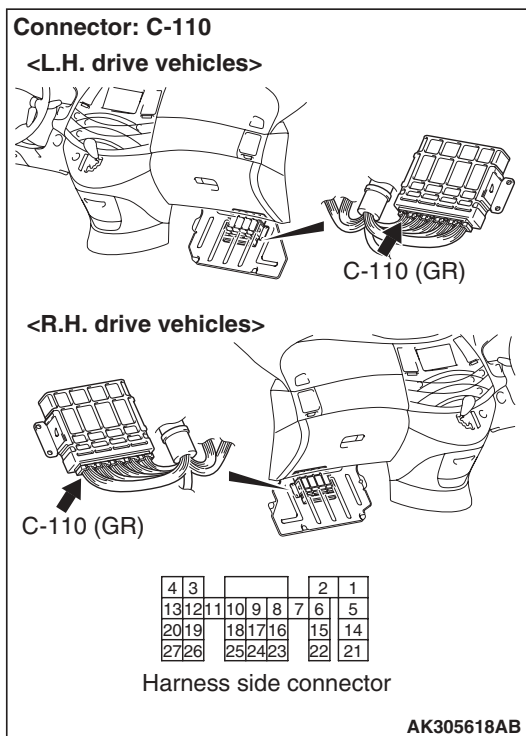
STEP 9. Check harness between B-102 (terminal No. 2) No. 2 injector connector and C-110 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- 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-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector (Using an oscilloscope).



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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
- Voltage between terminal No. 5 and earth.

OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to [P.13A-378](#)).

Q: Is the check result normal?

Injector circuit

Battery

W-G

W-G

B-15X

Engine control relay

To engine-ECU <M/T> or engine-A/T-ECU <A/T>

R-W

R-W

R-W

J/C (4) C-116

Injector No. 1 B-101 (MU802062)

Injector No. 2 B-102 (MU802062)

Injector No. 3 B-104 (MU802062)

Injector No. 4 B-105 (MU802062)

Y

Y-L

Y-G

G-B

Ground

AK305559 AB

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (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 <M/T> or engine-A/T-ECU <A/T> controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT**Check Condition**

- While engine is running.

Judgment Criterion

- Injector coil surge voltage (battery positive voltage + 2 V) has not been 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<M/T>
- Failed engine-A/T-ECU<A/T>

DIAGNOSIS PROCEDURE**STEP 1. MUT-III actuator test**

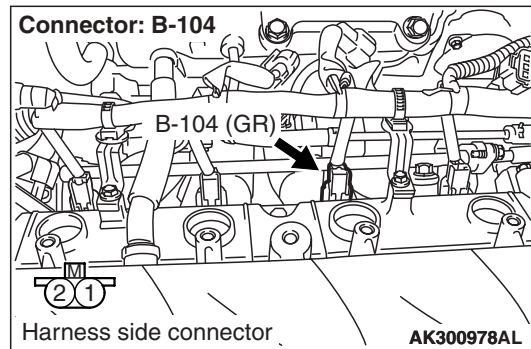
- Item 03: No. 3 injector

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.00-5).

NO : Go to Step 2 .

STEP 2. Connector check: B-104 No. 3 injector connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair or replace.

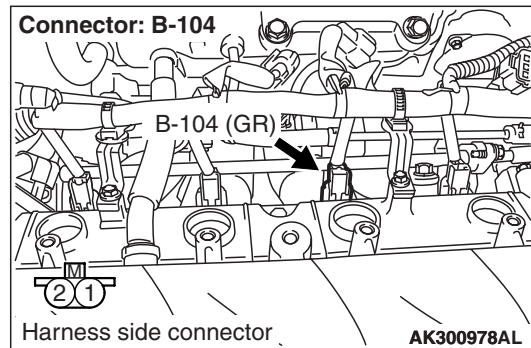
STEP 3. Check No. 3 injector itself.

- Check No. 3 Injector itself (Refer to P.13A-393).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 3 injector.

STEP 4. Perform voltage measurement at B-104 No. 3 injector connector.

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

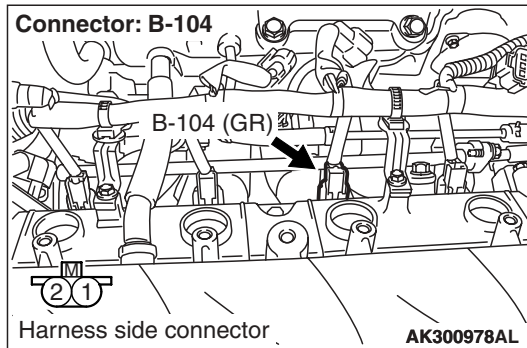
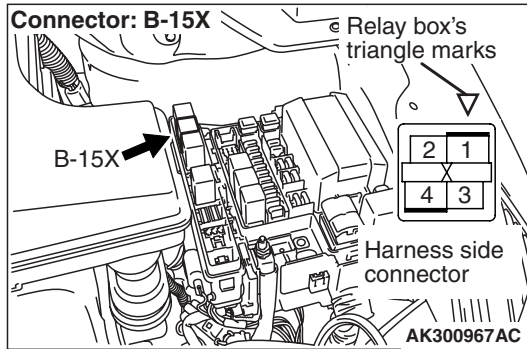
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-15X engine control relay connector



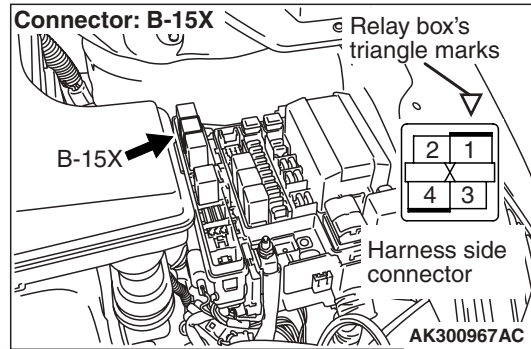
Q: Is the check result normal?

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-15X (terminal No. 1) engine control relay connector and B-104 (terminal No. 1) No. 3 injector connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 6. Connector check: B-15X engine control relay connector

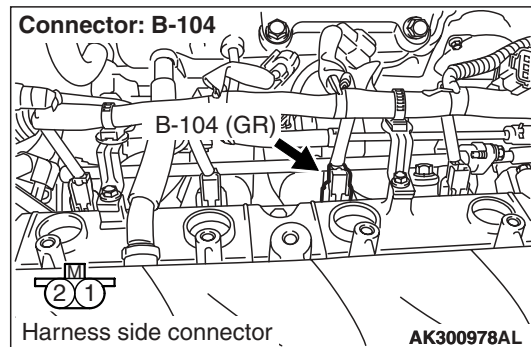
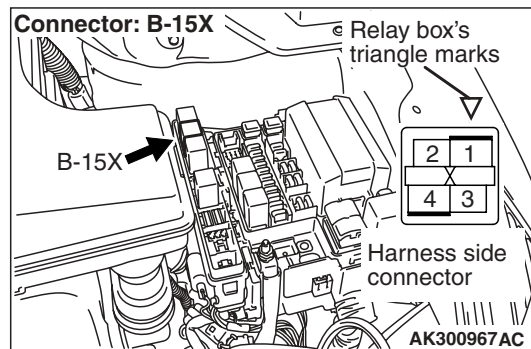


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-15X (terminal No. 1) engine control relay connector and B-104 (terminal No. 1) No. 3 injector connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

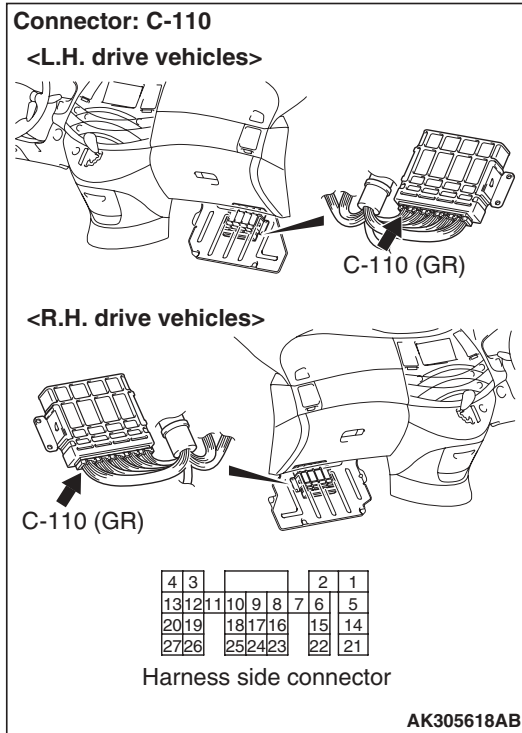
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

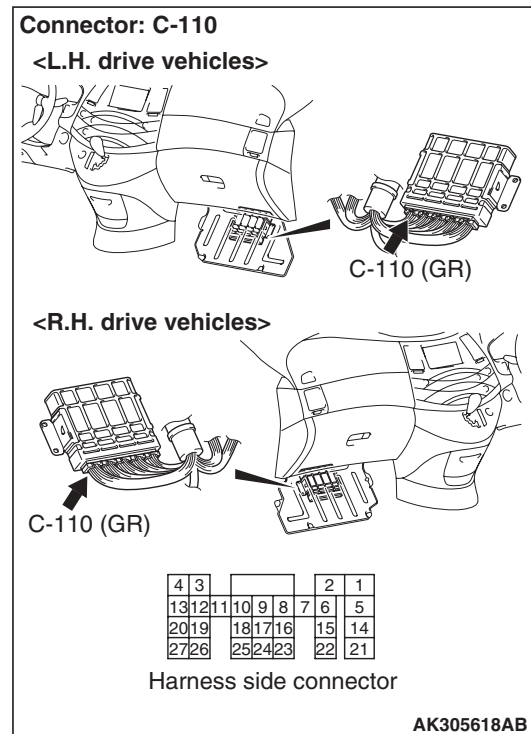
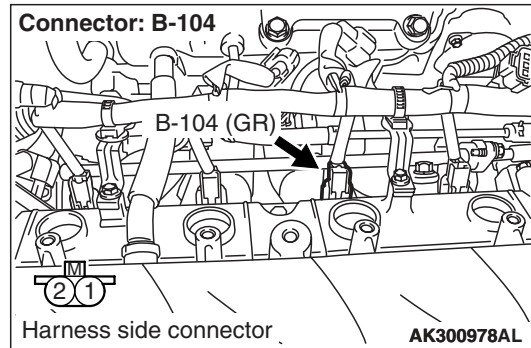


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check harness between B-104 (terminal No. 2) No. 3 injector connector and C-110 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



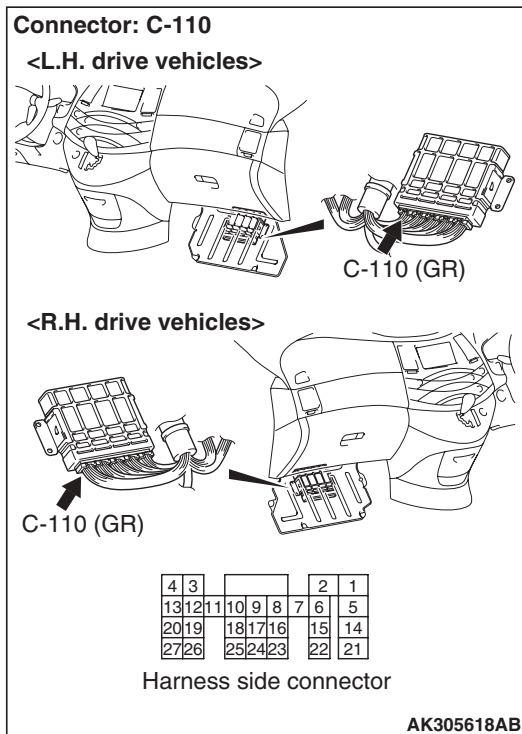
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Perform signal wave pattern measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector (Using on oscilloscope).



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

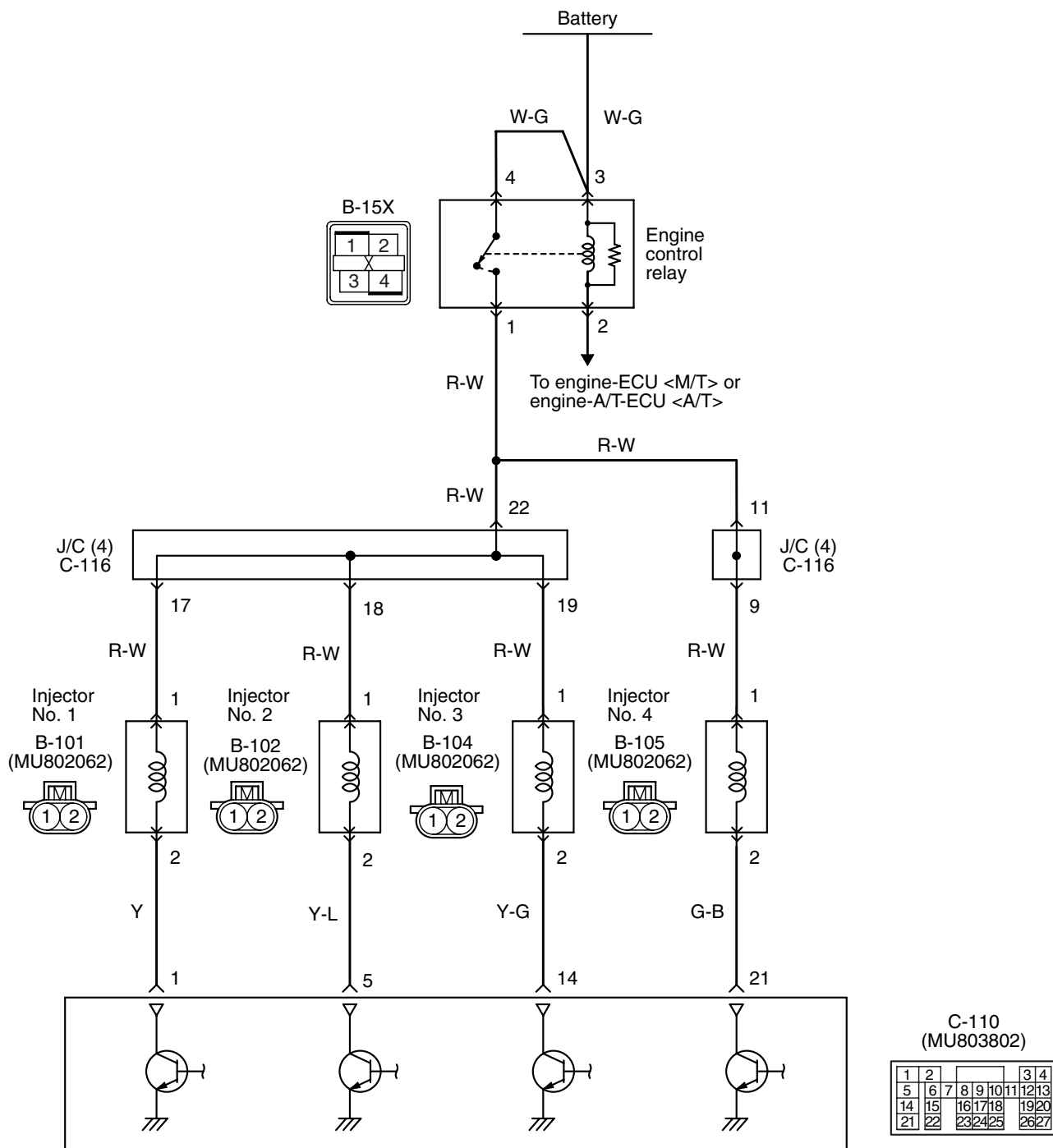
- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
- Voltage between terminal No. 14 and earth.

OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to [P.13A-378](#)).

Q: Is the check result normal?

Code No. P0204: No. 4 Injector System

Injector circuit

Engine-ECU <M/T> or
engine-A/T-ECU <A/T>

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 <M/T> or engine-A/T-ECU <A/T> (terminal No. 21) 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 <M/T> or engine-A/T-ECU <A/T> connector controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT

Check Condition

- While engine is running.

Judgment Criterion

- Injector coil surge voltage (battery positive voltage + 2 V) has not been 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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III actuator test

- Item 04: No. 4 injector

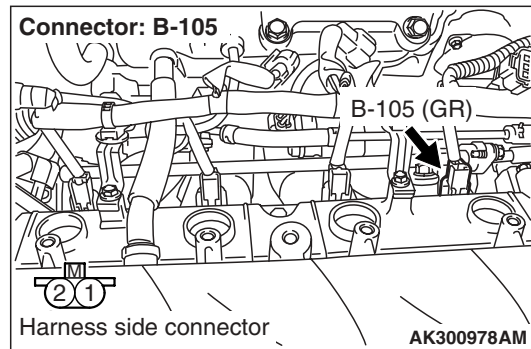
OK: Idling state varies.

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-105 No. 4 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Check No. 4 injector itself.

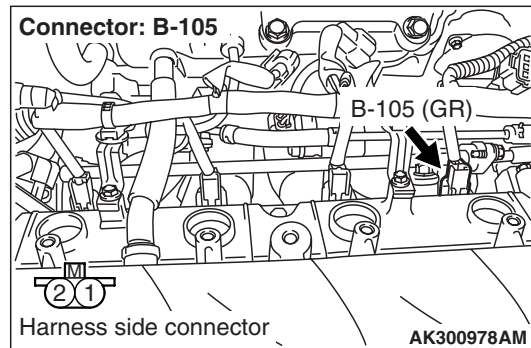
- Check No. 4 Injector (Refer to [P.13A-393](#)) itself.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 4 injector.

STEP 4. Perform voltage measurement at B-105 No. 4 injector connector.



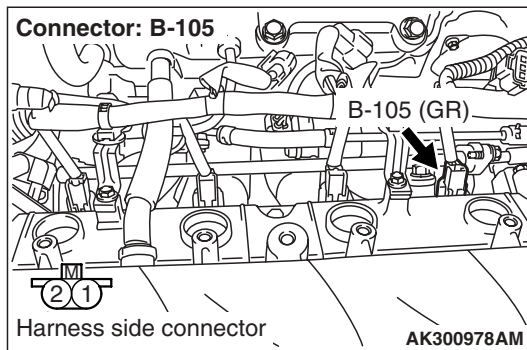
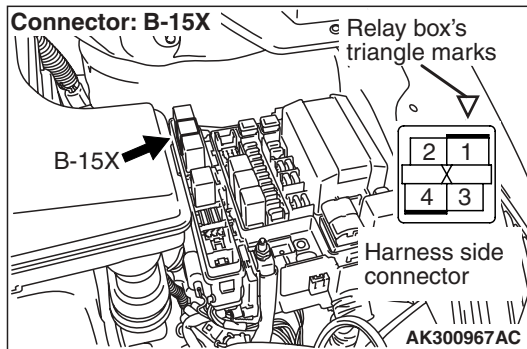
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

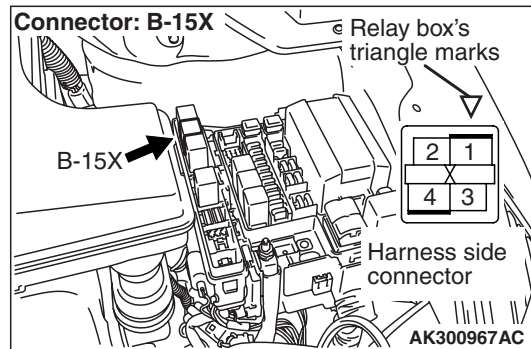
NO : Go to Step 5 .

STEP 5. Connector check: B-15X engine control relay connector**Q: Is the check result normal?**

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-15X (terminal No. 1) engine control relay connector and B-105 (terminal No. 1) No. 4 injector connector.

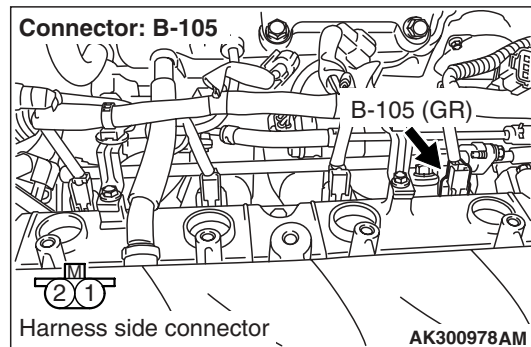
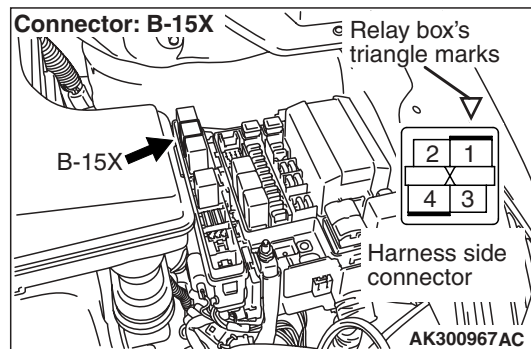
- Check power supply line for open/short circuit and damage.

NO : Repair or replace.

STEP 6. Connector check: B-15X engine control relay connector**Q: Is the check result normal?**

YES : Go to Step 7.

NO : Repair or replace.

STEP 7. Check harness between B-15X (terminal No. 1) engine control relay connector and B-105 (terminal No. 1) No. 4 injector connector.

NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

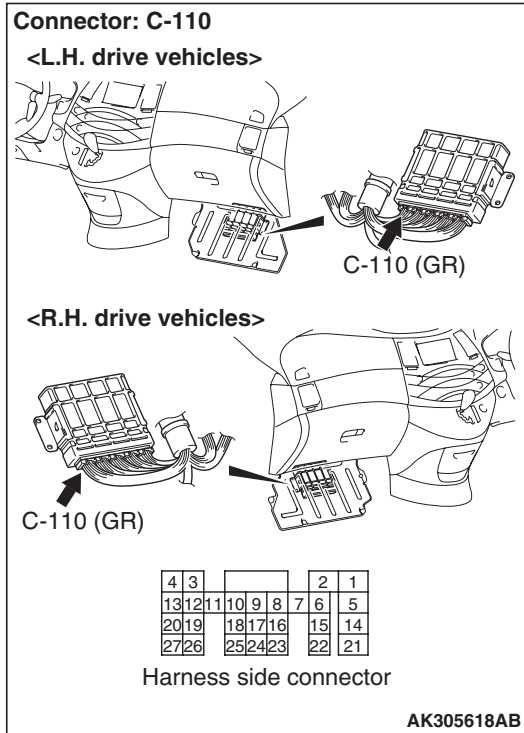
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

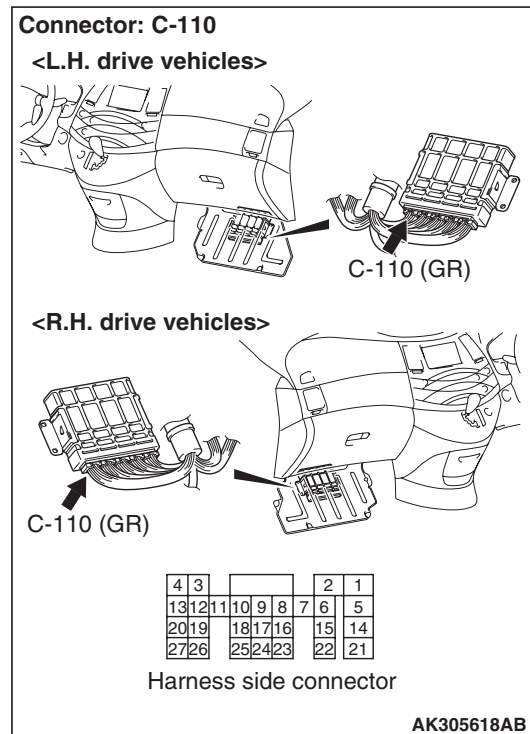
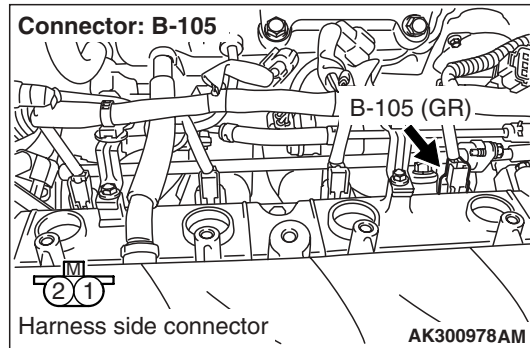
NO : Repair.

STEP 8. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

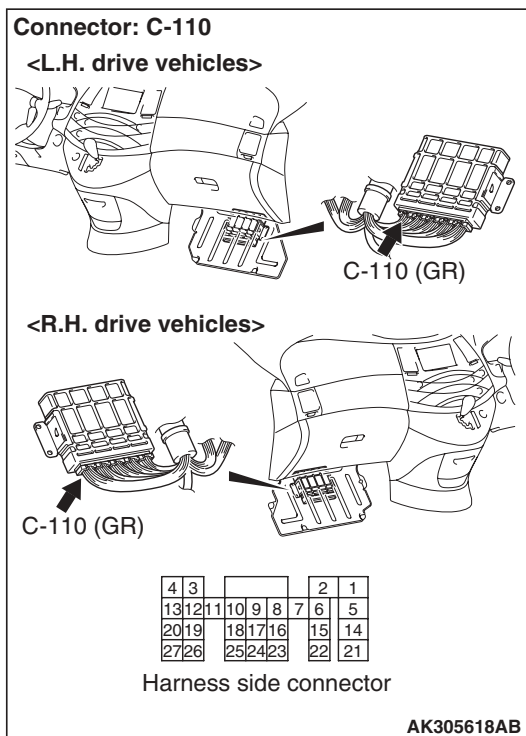
STEP 9. Check harness between B-105 (terminal No. 2) No. 4 injector connector and C-110 (terminal No. 21) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- 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-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector (Using an oscilloscope).



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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

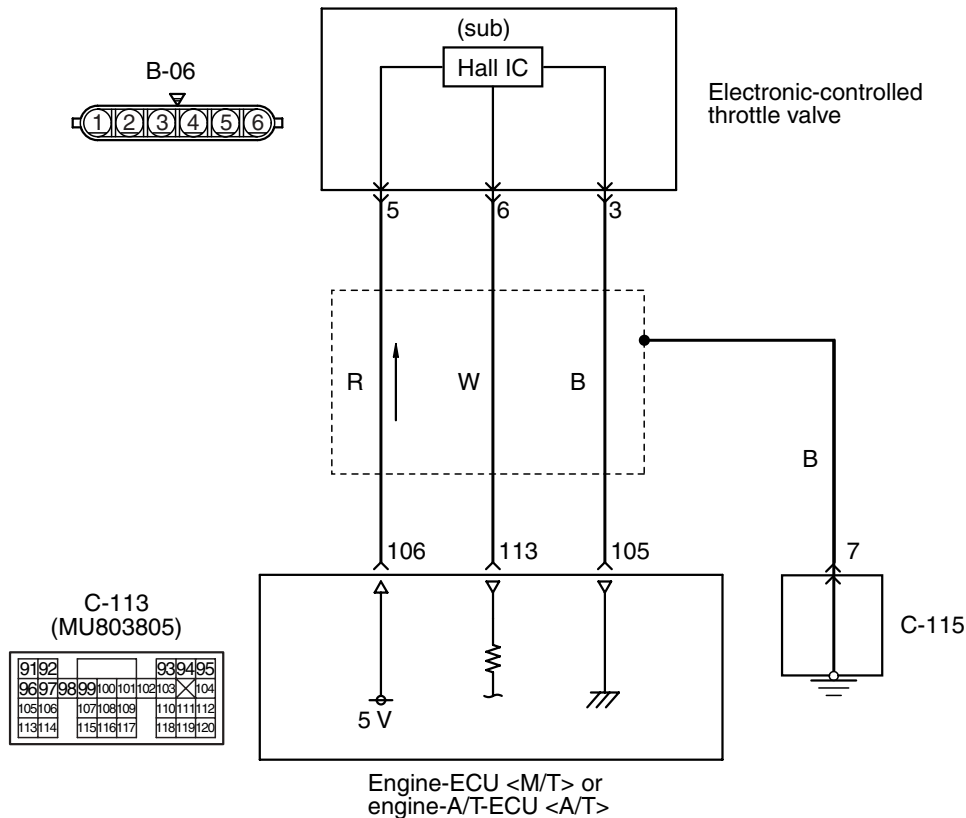
- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
- Voltage between terminal No. 21 and earth.

OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to [P.13A-378](#)).

Q: Is the check result normal?

Code No. P0222: Throttle Position Sensor (Sub) Circuit Low Input

Throttle position sensor (sub) 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

AK305560 AB

OPERATION

- A power voltage of 5 V is applied to the electronic-controlled throttle valve (terminal No. 5) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 106).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 105) from the electronic-controlled throttle valve (terminal No. 3).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 113) from the electronic-controlled throttle valve output terminal (terminal No. 6).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the throttle valve position.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in ON position.

Judgment Criterion

- Throttle position sensor (sub) output voltage is 2.25 V or less for 0.5 second.

PROBABLE CAUSE

- Failed throttle position sensor (sub)

- Open/short circuit in throttle position sensor (sub) circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

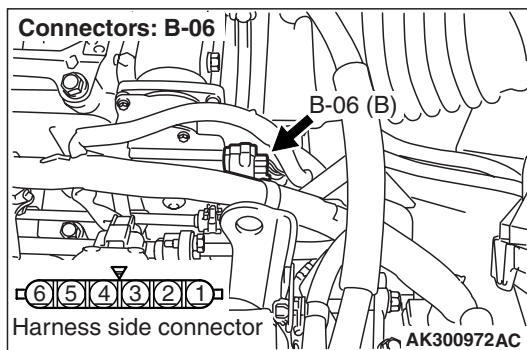
- Refer to Data List Reference Table [P.13A-363](#).
a. Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-06 electronic-controlled throttle valve connector

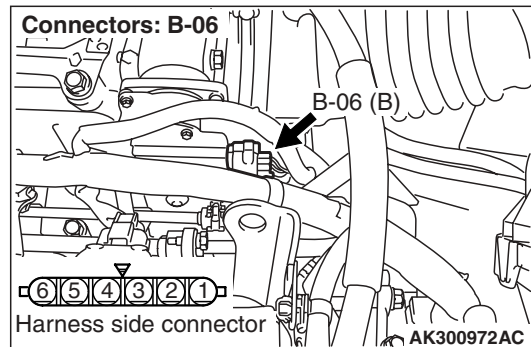


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform voltage measurement at B-06 electronic-controlled throttle valve connector.



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

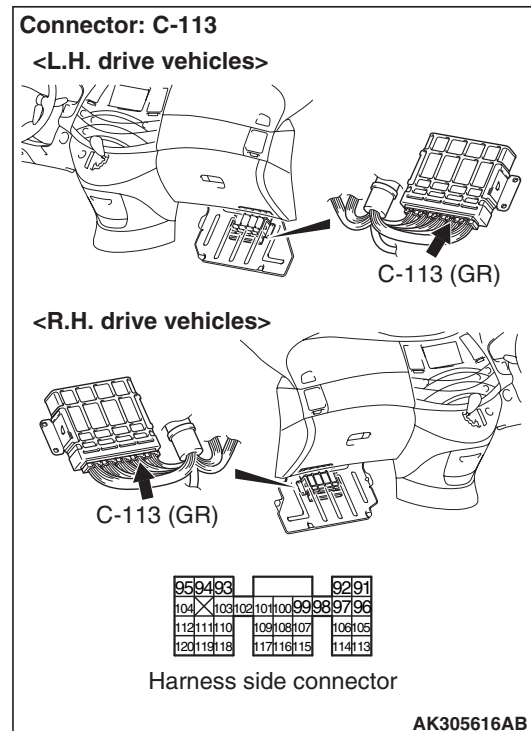
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

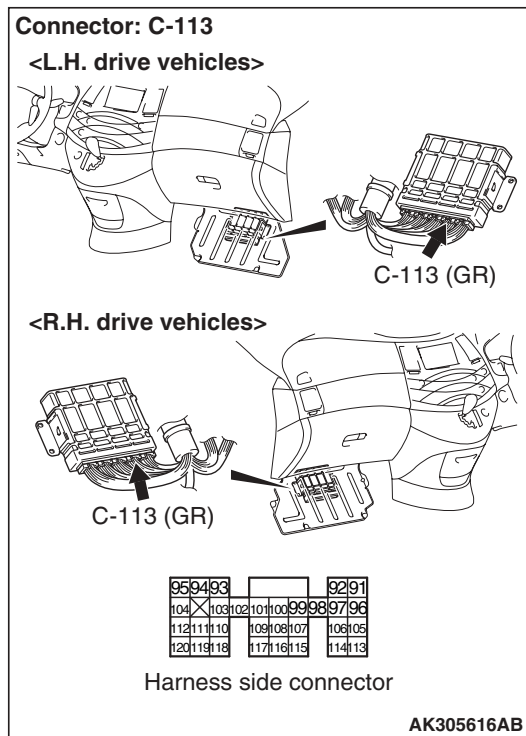
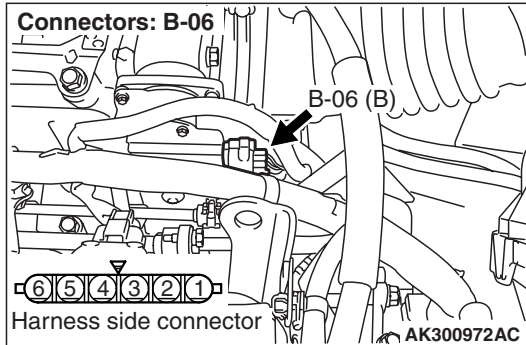


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-06 (terminal No. 5) electronic-controlled throttle valve connector and C-113 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. MUT-III data list

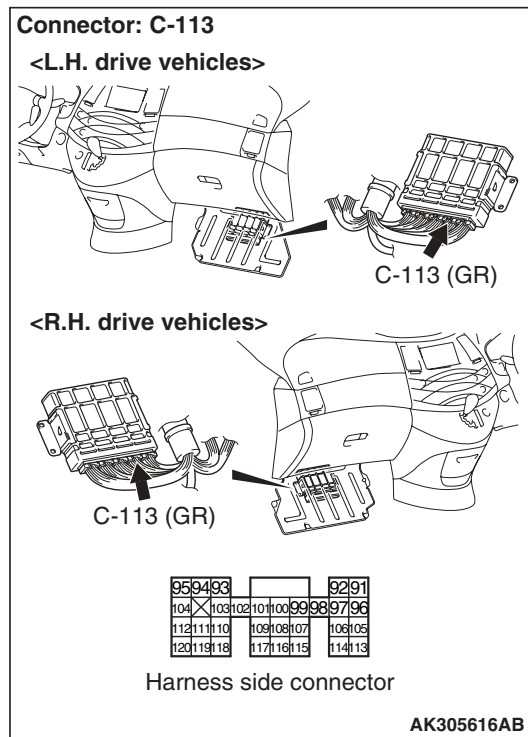
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

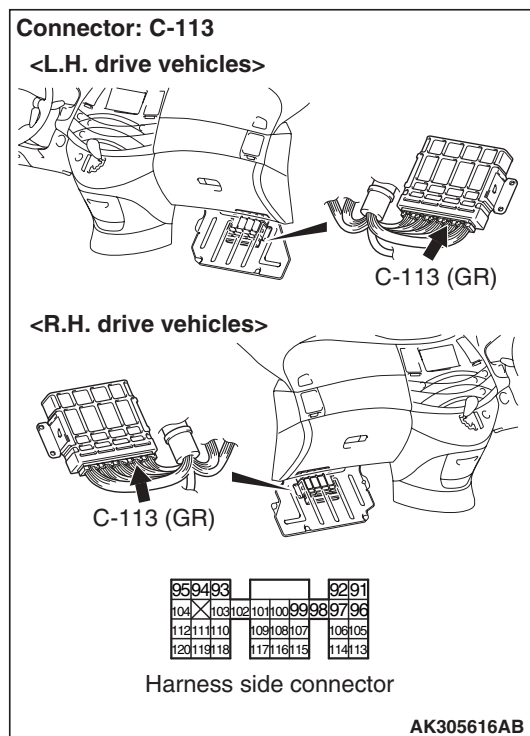
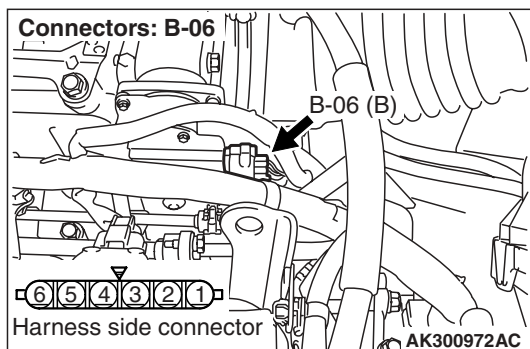


Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Check harness between B-06 (terminal No. 5) electronic-controlled throttle valve connector and C-113 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



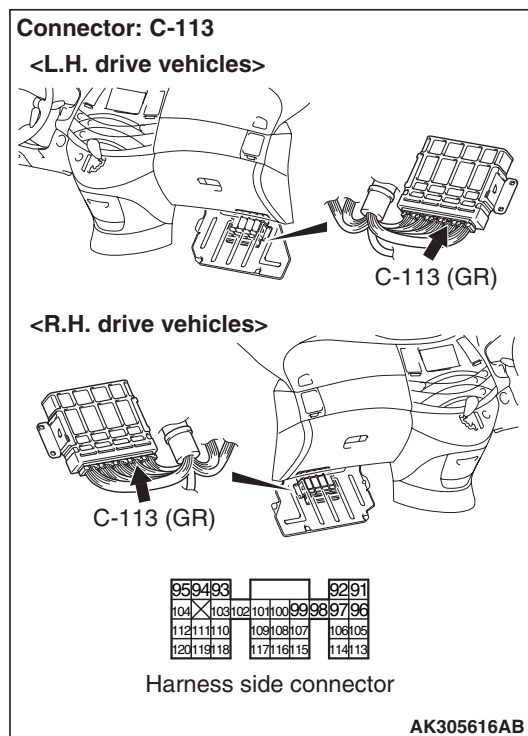
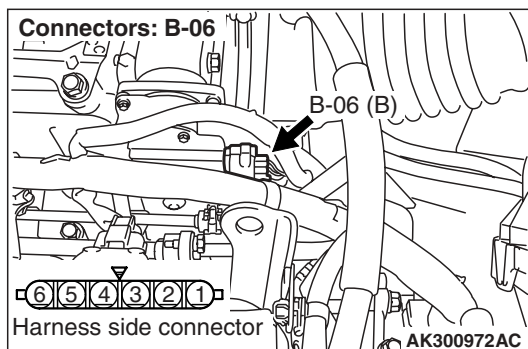
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check harness between B-06 (terminal No. 6) electronic-controlled throttle valve connector and C-113 (terminal No. 113) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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. Replace the electronic-controlled throttle valve

- After replacing the electronic-controlled throttle valve, re-check the trouble symptoms.

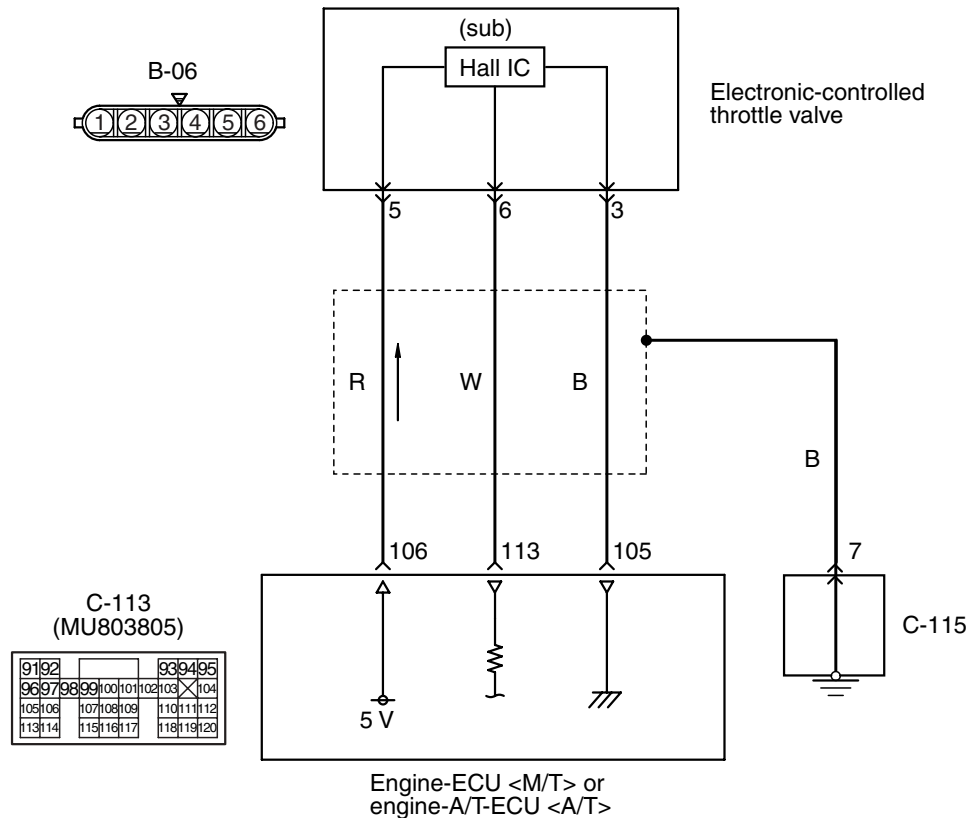
Q: Is the check result normal?

YES : Check end.

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Code No. P0223: Throttle Position Sensor (Sub) Circuit High Input

Throttle position sensor (sub) 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

- A power voltage of 5 V is applied to the electronic-controlled throttle valve (terminal No. 5) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 106).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 105) from the electronic-controlled throttle valve (terminal No. 3).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 113) from the electronic-controlled throttle valve output terminal (terminal No. 6).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the throttle valve position.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

- Throttle position sensor (sub) output voltage is 4.8 V or more for 0.5 second.

PROBABLE CAUSE

- Failed throttle position sensor (sub)

- Open/short circuit in throttle position sensor (sub) circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

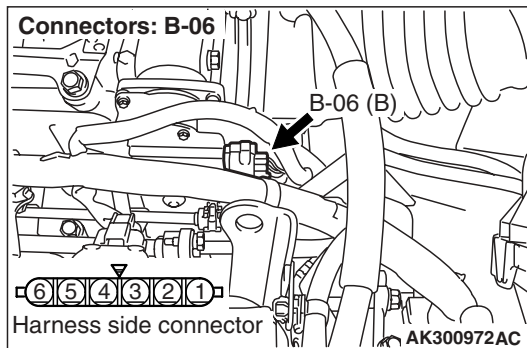
- Refer to Data List Reference Table [P.13A-363](#).
 - Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-06 electronic-controlled throttle valve connector

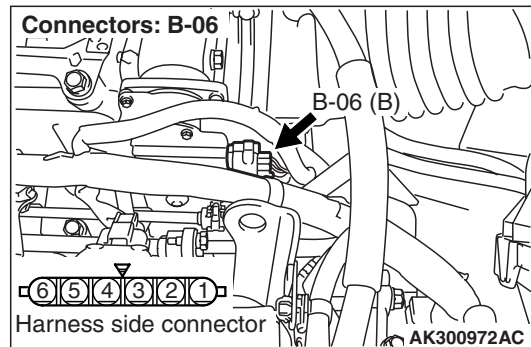


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at B-06 electronic-controlled throttle valve connector.



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

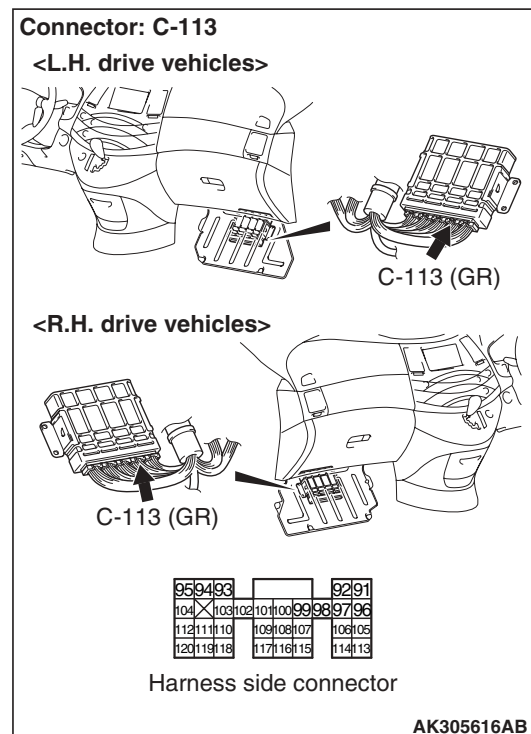
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

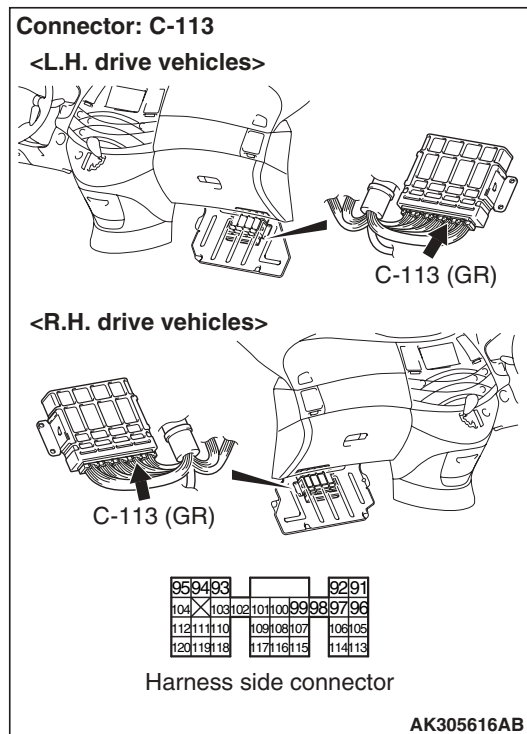
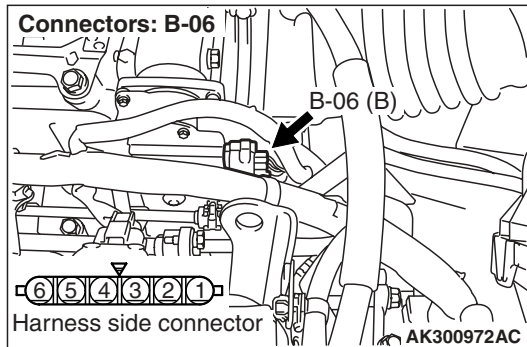


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-06 (terminal No. 3) electronic-controlled throttle valve connector and C-113 (terminal No. 105) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Repair.

STEP 6. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
a. Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

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

STEP 7. Replace the electronic-controlled throttle valve

- After replacing the electronic-controlled throttle valve, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Check end.
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Code No. P0300: Random/Multiple Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0201: No. 1 injector system [P.13A-115](#).
- Refer to Code No. P0202: No. 2 injector system [P.13A-120](#).
- Refer to Code No. P0203: No. 3 injector system [P.13A-125](#).

- Refer to Code No. P0204: No. 4 injector system [P.13A-130](#).

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks for such changes in engine speed.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 6,500 r/min.
- Engine coolant temperature is -10°C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55 %.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is -0.06 V/10 ms to $+0.06$ V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).

Or

- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. MUT-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-157](#)).

STEP 2. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 21: Engine coolant temperature sensor
 - Item 81: Long-term fuel compensation
 - 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 Code [P.13A-20](#)).

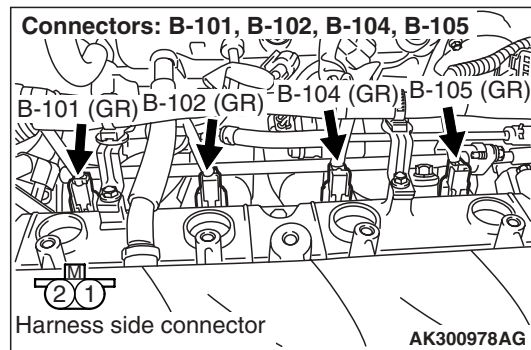
STEP 3. Check ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

STEP 4. Connector check: Injector connector



- B-101 (No. 1 injector connector)
- B-102 (No. 2 injector connector)
- B-104 (No. 3 injector connector)
- B-105 (No. 4 injector connector)

Q: Are the check results normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check injector itself.

- Check Injector itself (Refer to [P.13A-393](#)).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace injector.

STEP 6. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-383](#))

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Check for intake of air from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Check for skipped timing belt teeth.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check [P.17-65](#)].

Q: Is the check result normal?

YES : Go to Step 10.

NO : Replace EGR valve (stepper motor)

STEP 10. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P0301: No. 1 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0201: No. 1 Injector System [P.13A-115](#).

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks for such changes in engine speed.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 6,500 r/min.
- Engine coolant temperature is –10°C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55 %.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).
- or
- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSE

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

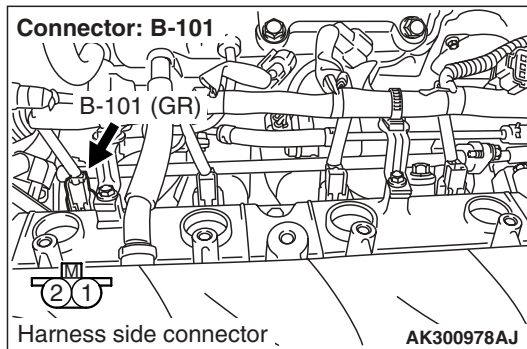
DIAGNOSIS PROCEDURE

STEP 1. Check ignition coil spark.

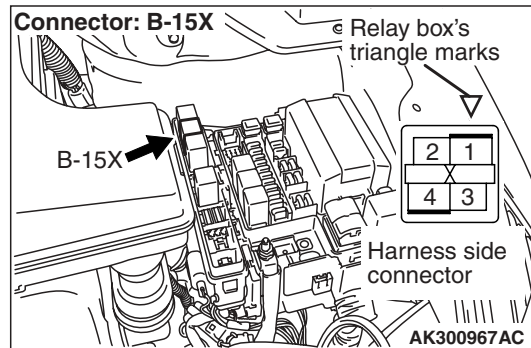
Q: Is the check result normal?

YES : Go to Step 2 .

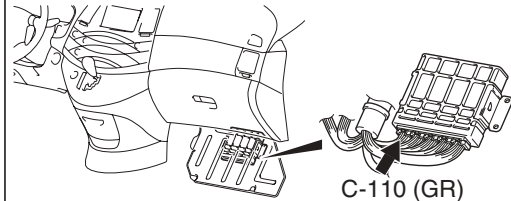
NO : Check ignition circuit system (Refer to Inspection procedure 26 [P.13A-355](#))

STEP 2. Connector check: B-101 No. 1 injector connector**Q: Is the check result normal?****YES :** Go to Step 3 .**NO :** Repair or replace.**STEP 3. Check No. 1 injector itself.**

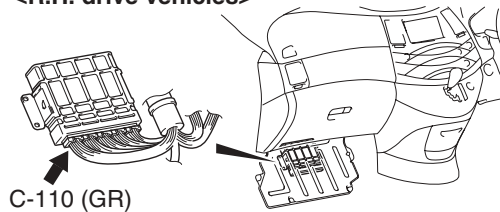
- Check Injector itself (Refer to [P.13A-393](#)).

Q: Is the check result normal?**YES :** Go to Step 4 .**NO :** Replace No. 1 injector.**STEP 4. Connector check: B-15X engine control relay connector and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector****Connector: C-110**

<L.H. drive vehicles>



<R.H. drive vehicles>



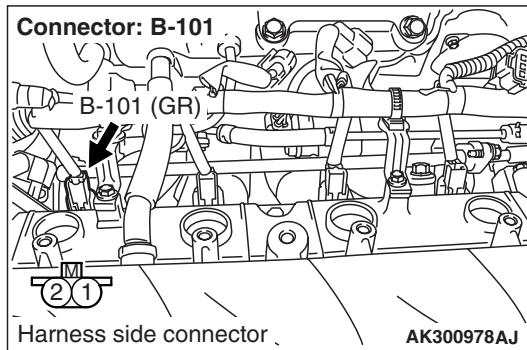
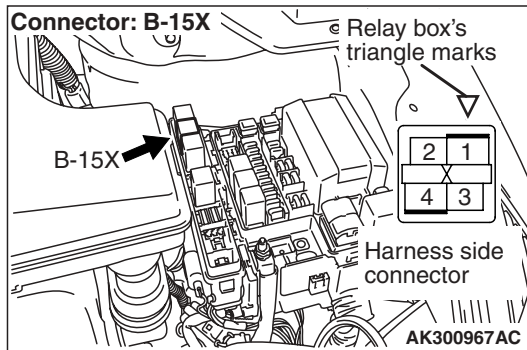
| | | | | | |
|----|----|----|----|----|----|
| 4 | 3 | | | 2 | 1 |
| 13 | 12 | 11 | 10 | 9 | 8 |
| 20 | 19 | 18 | 17 | 16 | 15 |
| 27 | 26 | 25 | 24 | 23 | 22 |

Harness side connector

AK305618AB

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

STEP 5. Check harness between B-15X (terminal No. 1) engine control relay connector and B-101 (terminal No. 1) No. 1 injector connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

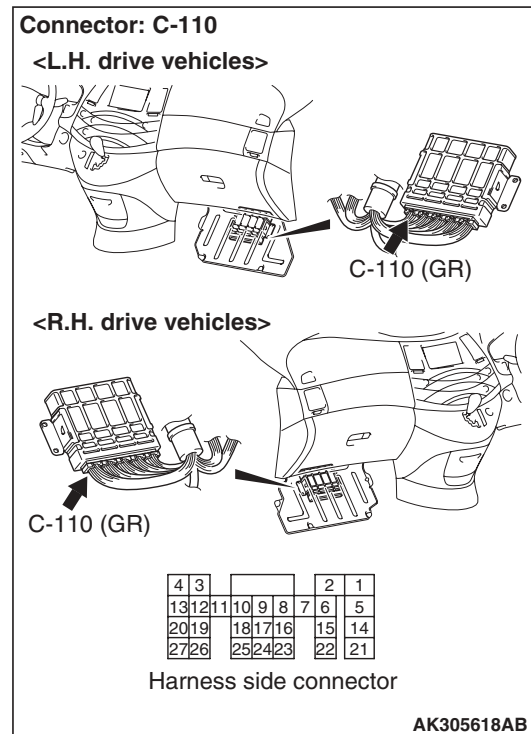
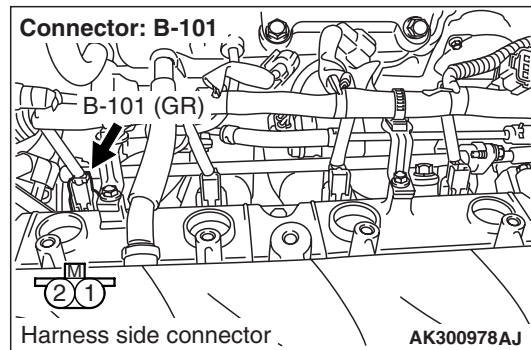
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-101 (terminal No. 2) No. 1 injector connector and C-110 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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-383](#)).

Q: Is the check result normal?

YES : Go to Step 8

NO : Repair.

STEP 8. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

Code No. P0302: No. 2 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0202 No. 2 Injector System P.13A-120.

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks for such changes in engine speed.

TROUBLE JUDGMENT**Check Conditions**

- Engine speed is 500 – 6,500 r/min.
- Engine coolant temperature is –10°C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55 %.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).

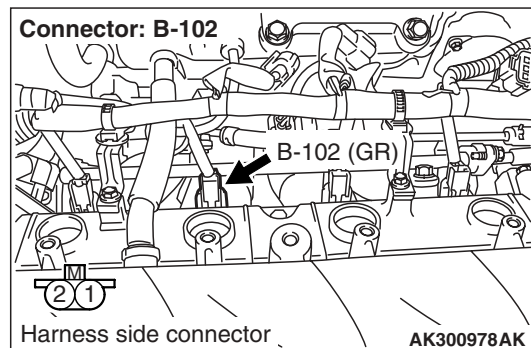
Or

- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSE

- Ignition system related part(s) failed

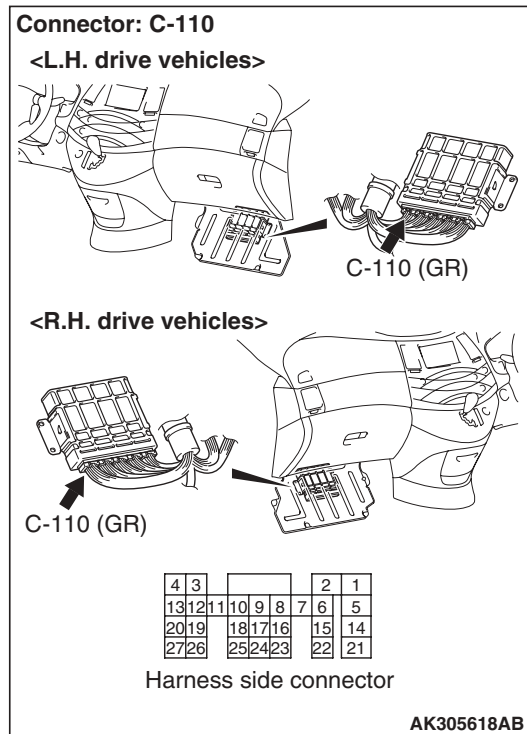
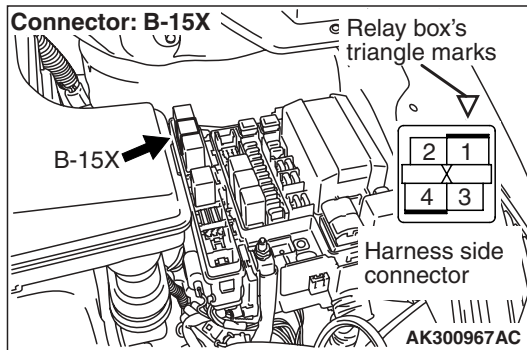
- Low compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. Check ignition coil spark.****Q: Is the check result normal?****YES** : Go to Step 2 .**NO** : Check ignition circuit system (Refer to Inspection Procedure 26 P.13A-355).**STEP 2. Check connector: B-102 No. 2 injector connector****Q: Is the check result normal?****YES** : Go to Step 3 .**NO** : Repair or replace.**STEP 3. Check No. 2 injector itself.**

- Check Injector itself (Refer to P.13A-393).

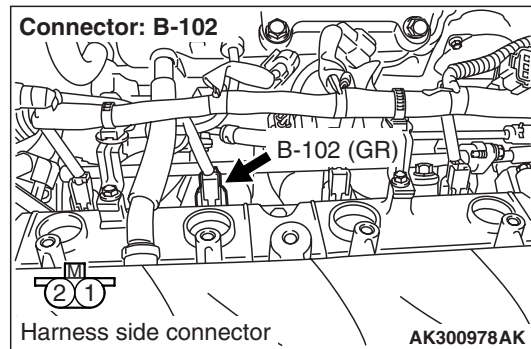
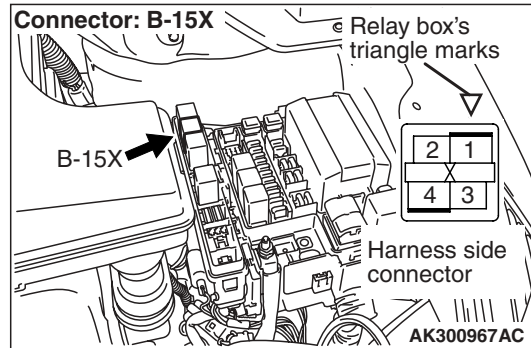
Q: Is the check result normal?**YES** : Go to Step 4 .**NO** : Replace No. 2 injector.

STEP 4. Connector check: B-15X engine control relay connector and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



YES : Go to Step 5 .
NO : Repair or replace.

STEP 5. Check harness between B-15X (terminal No. 1) engine control relay connector and B-102 (terminal No. 1) No. 2 injector connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

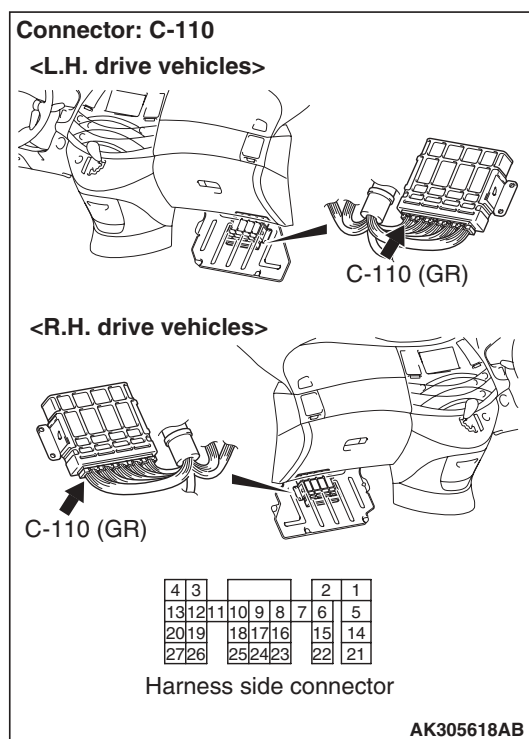
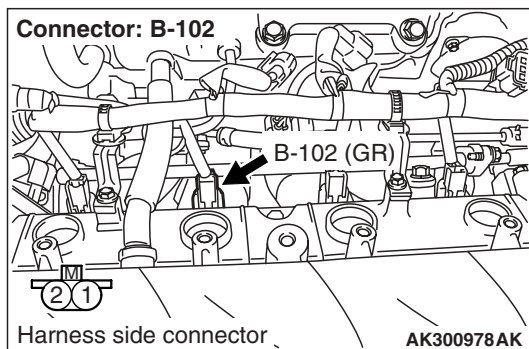
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Repair.

Q: Is the check result normal?

STEP 6. Check harness between B-102 (terminal No. 2) No. 2 injector connector and C-110 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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-383](#))

Q: Is the check result normal?

YES : Go to Step 8 .
NO : Repair.

STEP 8. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

Code No. P0303: No. 3 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0203 No. 3 Injector System [P.13A-125](#).

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks for such changes in engine speed.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 6,500 r/min.
- Engine coolant temperature is –10°C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55 %.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.

- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is -0.06 V/10 ms to $+0.06$ V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).
- or
- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSE

- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

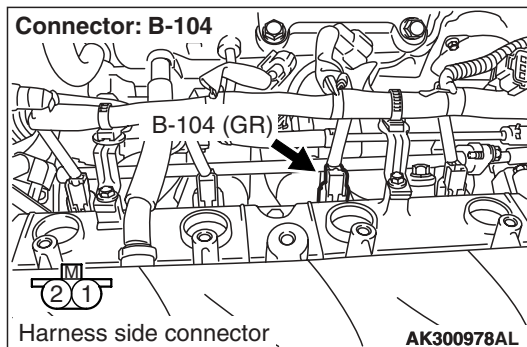
STEP 1. Check ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

STEP 2. Connector check: B-104 No. 3 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Check No. 3 injector itself.

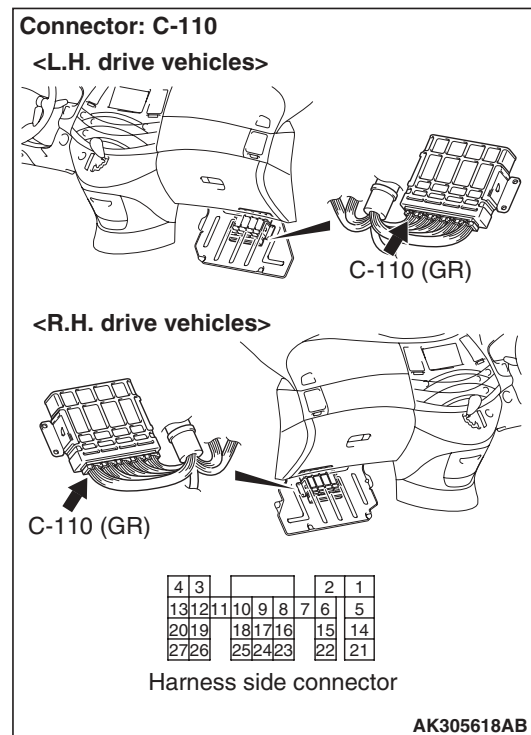
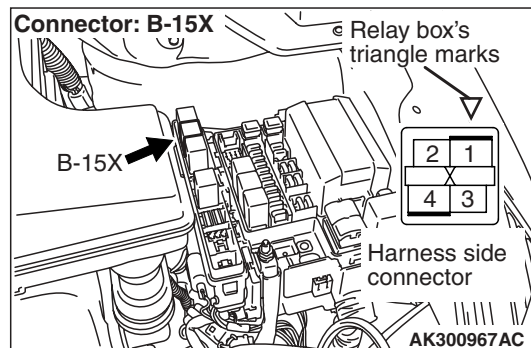
- Check Injector itself (Refer to [P.13A-393](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 3 injector.

STEP 4. Connector check: B-15X engine control relay connector and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

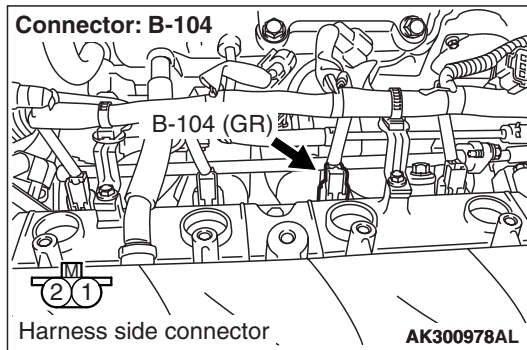
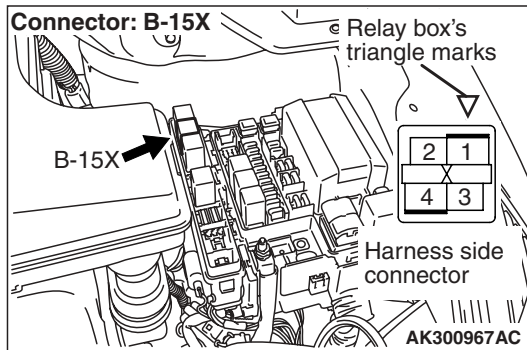


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-15X (terminal No. 1) engine control relay connector and B-104 (terminal No. 1) No. 3 injector connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

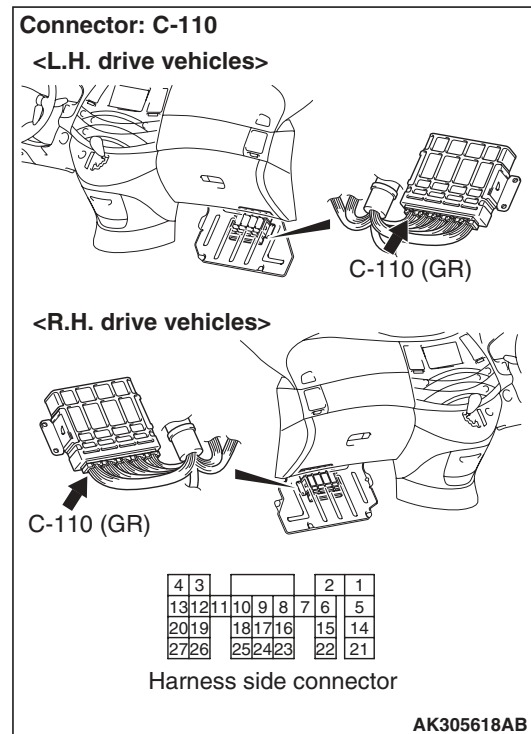
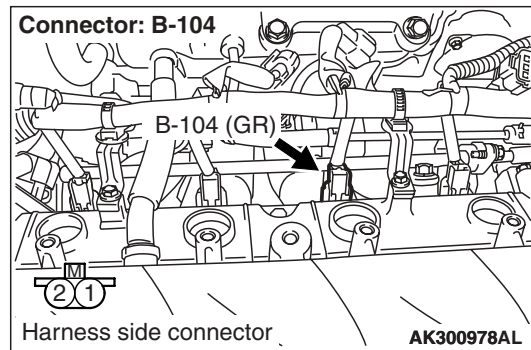
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-104 (terminal No. 2) No. 3 injector connector and C-110 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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-383](#))

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

Code No. P0304: No. 4 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0204 No. 4 Injector System [P.13A-130](#).

FUNCTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks for such changes in engine speed.

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 6,500 r/min.
- Engine coolant temperature is –10°C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55 %.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to +0.06 V/10 ms.

Judgment Criteria (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than the limit during the last 200 revolutions (when the catalyst temperature has been 950°C or higher).
- or
- Misfire has occurred 15 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSE

- Ignition system related part(s) failed

- Low compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

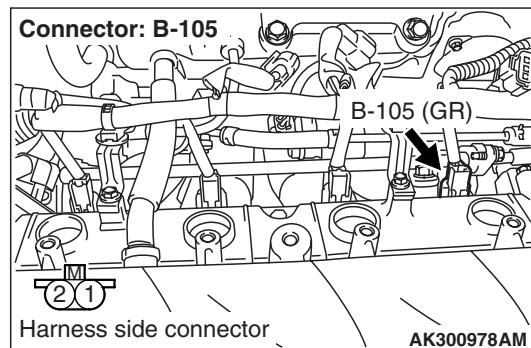
STEP 1. Check the ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition Circuit System (Refer to Inspection Procedure 26 [P.13A-355](#)).

STEP 2. Connector check: B-105 No. 4 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

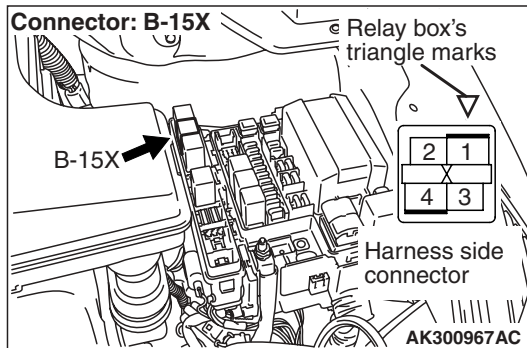
STEP 3. Check No. 4 injector itself.

- Check Injector itself (Refer to [P.13A-393](#)).

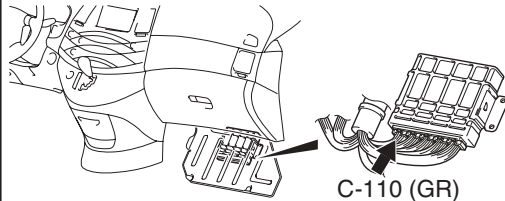
Q: Is the check result normal?

YES : Go to Step 4 .

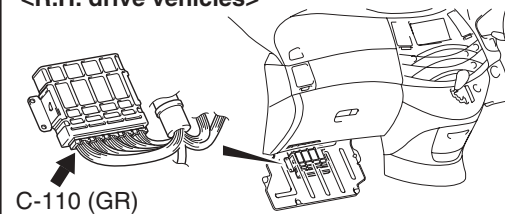
NO : Replace No. 4 injector.

STEP 4. Connector check: B-15X engine control relay connector and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**Connector: C-110**

<L.H. drive vehicles>



<R.H. drive vehicles>



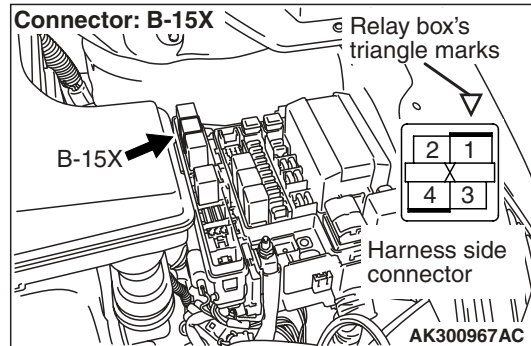
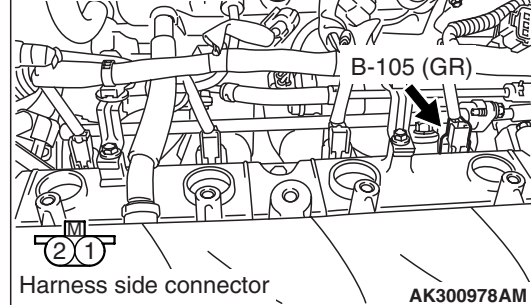
| | | | | | |
|----|----|----|----|----|----|
| 4 | 3 | | | 2 | 1 |
| 13 | 12 | 11 | 10 | 9 | 8 |
| 20 | 19 | 18 | 17 | 16 | 15 |
| 27 | 26 | 25 | 24 | 23 | 22 |

Harness side connector

AK305618AB

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-15X (terminal No. 1) engine control relay connector and B-105 (terminal No. 1) No. 4 injector connector.**Connector: B-105****NOTE:** Before checking harness, check intermediate connector C-116, and repair if necessary.

- Check power supply line for damage.

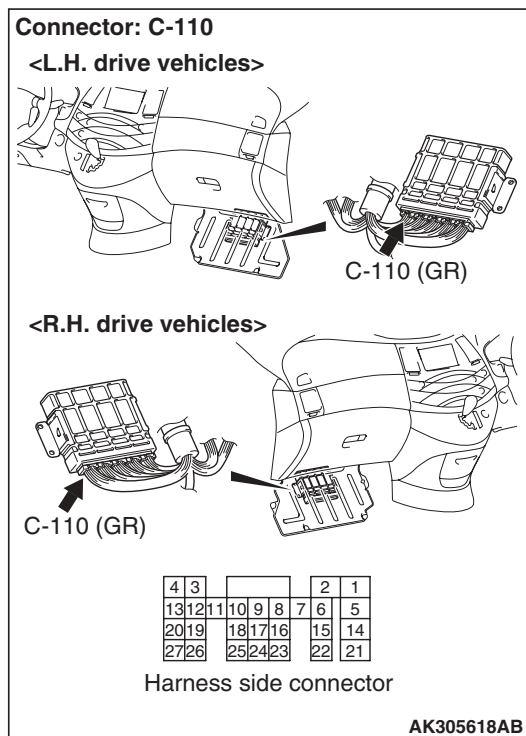
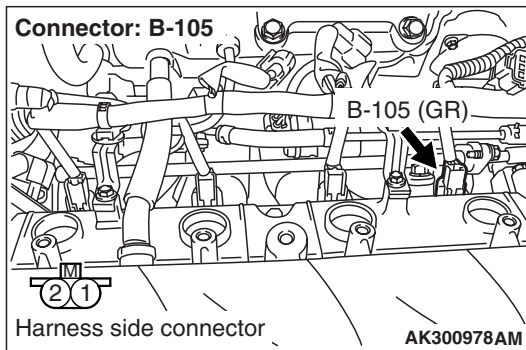
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

Q: Is the check result normal?

STEP 6. Check harness between B-105 (terminal No. 2) No. 4 injector connector and C-110 (terminal No. 21) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> 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-383](#))

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Check the trouble symptoms.

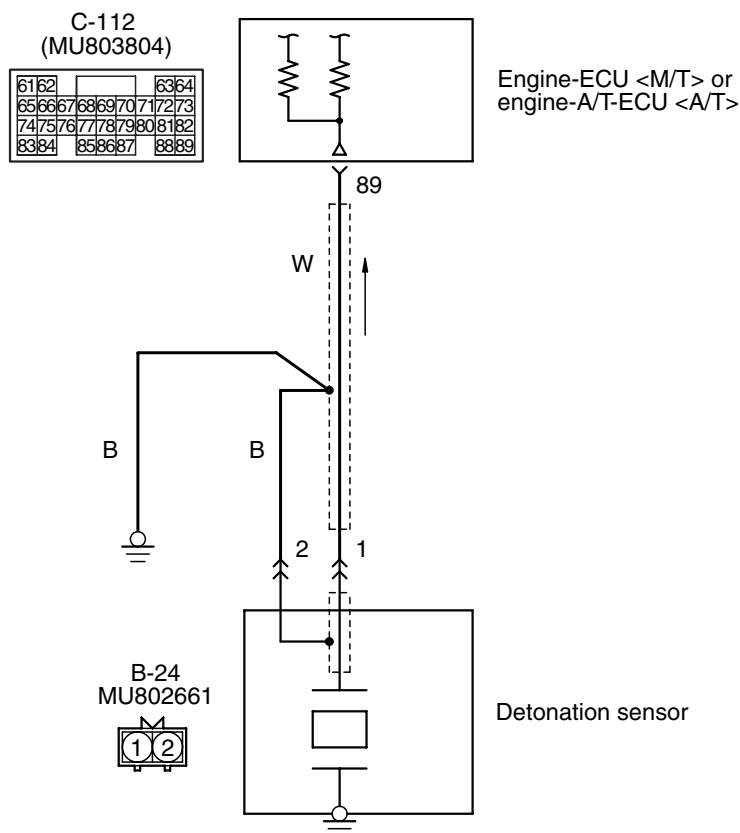
Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

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

AK305600AB

OPERATION

- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 89) 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 <M/T> or engine-A/T-ECU <A/T>.
- In response to the signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> provides controls to retard the ignition timing when the detonation occurs.

TROUBLE JUDGMENT

Check Conditions

- After 2 seconds have passed since the engine starting sequence was completed.
- Engine speed is 2,500 r/min or higher.

Judgment Criterion

- Change of detonation sensor output voltage (detonation sensor peak voltage in each 1/2 turn of the crankshaft) has not been 0.06 V or more in the last consecutive 200 periods.

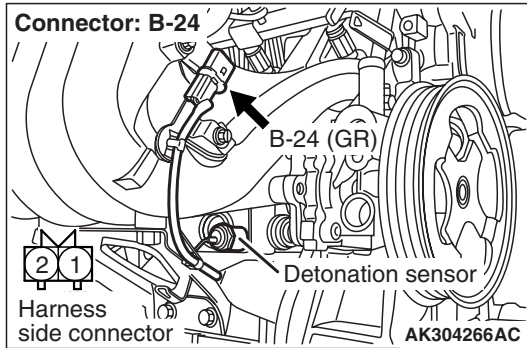
PROBABLE CAUSE

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

- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-24 detonation sensor connector

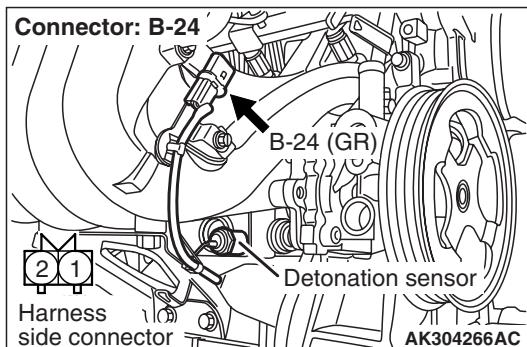


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-24 detonation sensor connector.



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

OK: 2 Ω or less

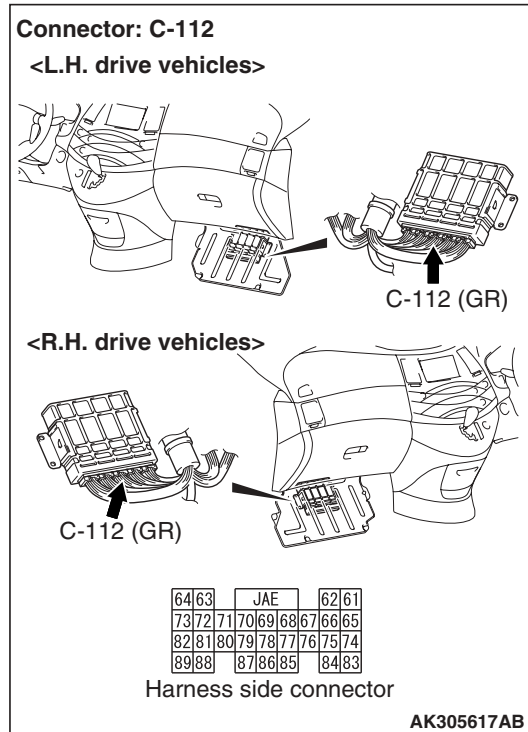
Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check and repair harness between B-24 (terminal No. 2) detonation sensor connector and body earth.

- Check earthing line for open circuit and damage.

STEP 3. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

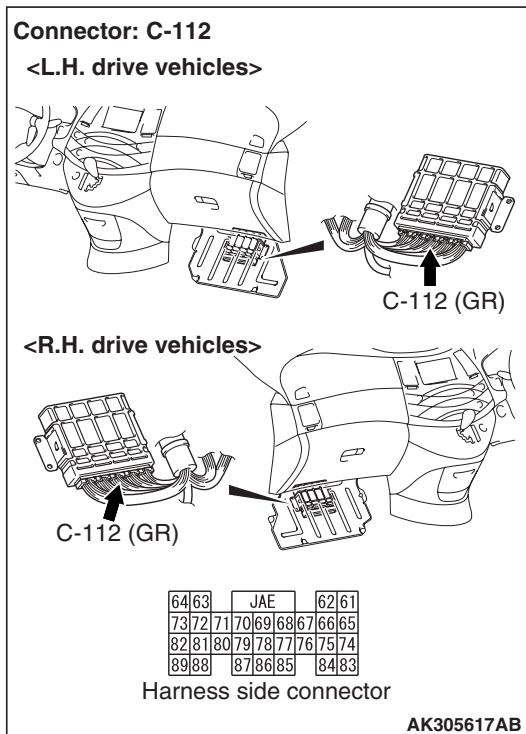
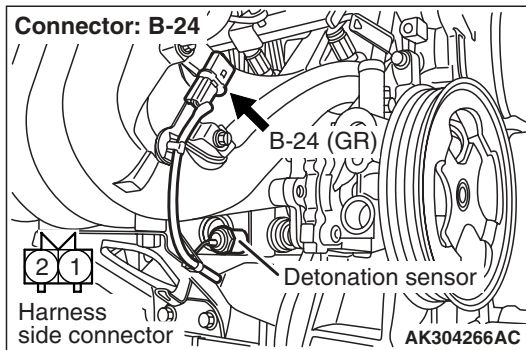


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between B-24 (terminal No. 1) detonation sensor connector and C-112 (terminal No. 89) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Go to Step 6 .

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

STEP 6. Replace detonation sensor.

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

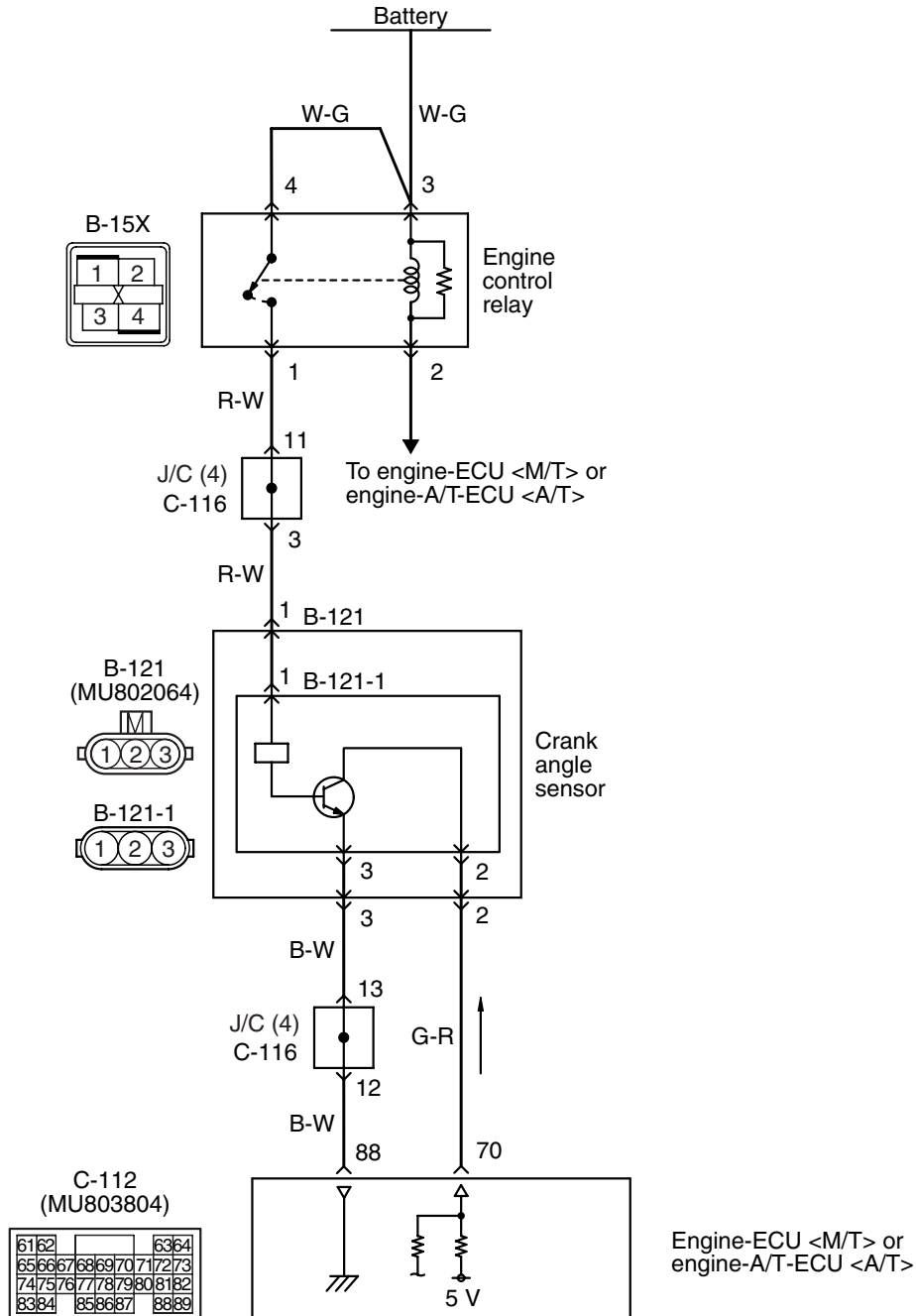
Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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. 1) from the engine control relay (terminal No. 1) and is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 88) from the crank angle sensor (terminal No. 3).
- A power voltage of 5 V is applied to the crank angle sensor output terminal (terminal No. 2) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 70).

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

- While engine is cranking.

Judgment Criteria

- Crank angle sensor output voltage has not been changed (no pulse signal has been input) for 2 seconds.

PROBABLE CAUSE

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

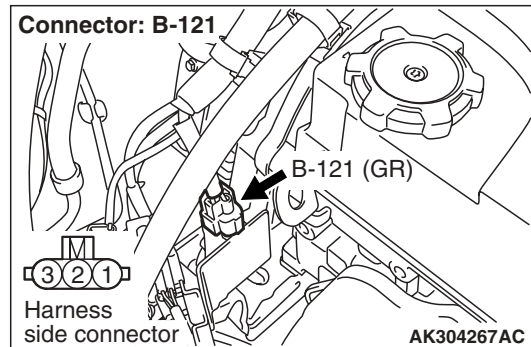
DIAGNOSIS PROCEDURE**STEP 1. MUT-III data list**

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 22: Crank angle sensor

Q: Is the check result normal?

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

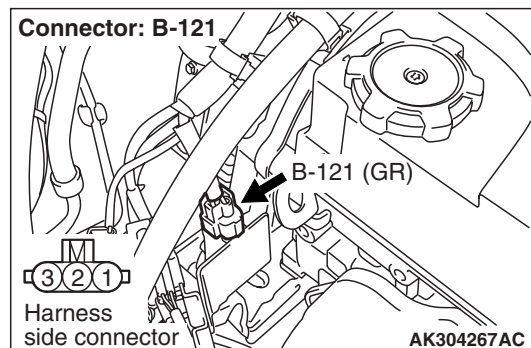
NO : Go to Step 2 .

STEP 2. Connector check: B-121 crank angle sensor intermediate connector

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform voltage measurement at B-121 crank angle sensor intermediate connector.

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

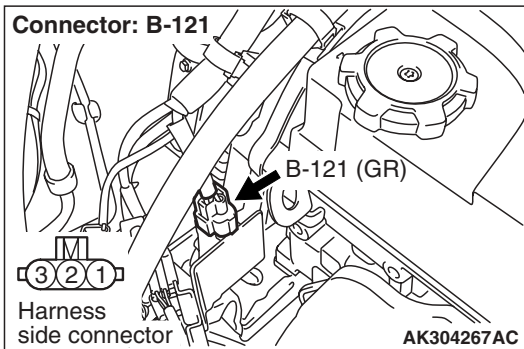
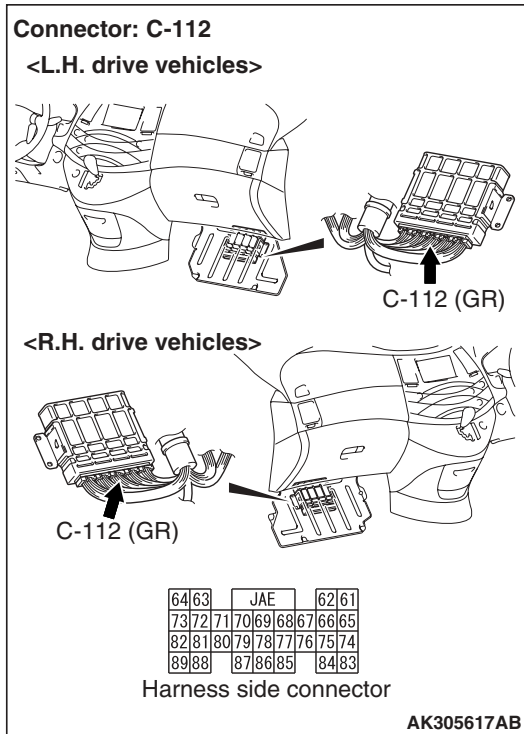
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 4 .

STEP 4. Perform voltage measurement at C-112 engine-ECU connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Disconnect B-121 crank angle sensor intermediate connector.
- Ignition switch: ON
- Voltage between terminal No. 70 and earth.

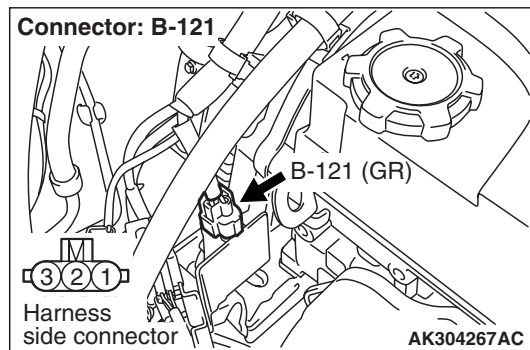
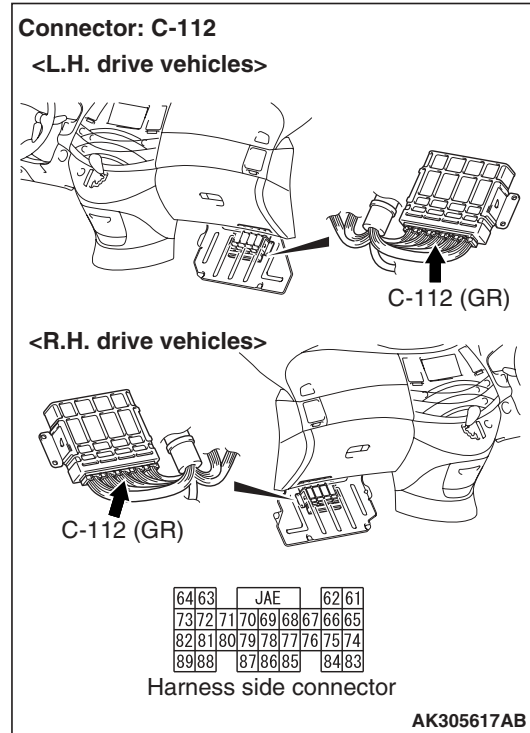
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

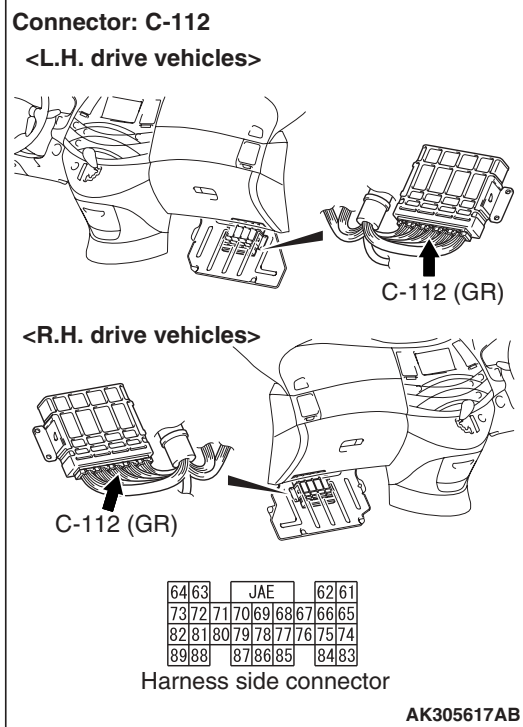
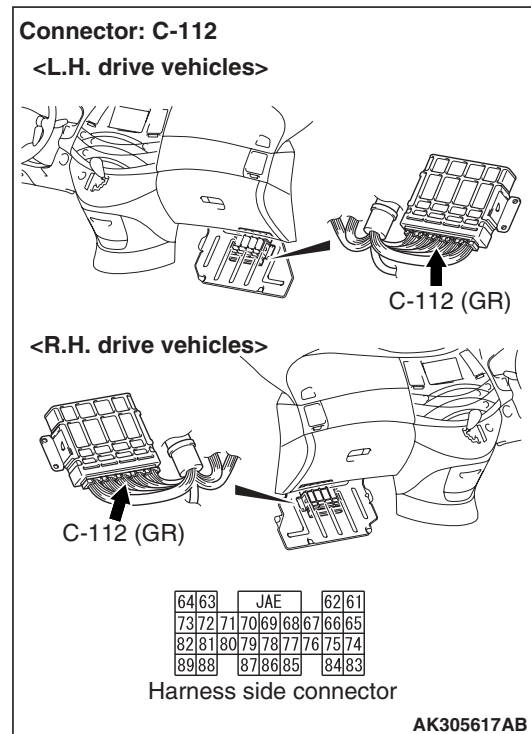
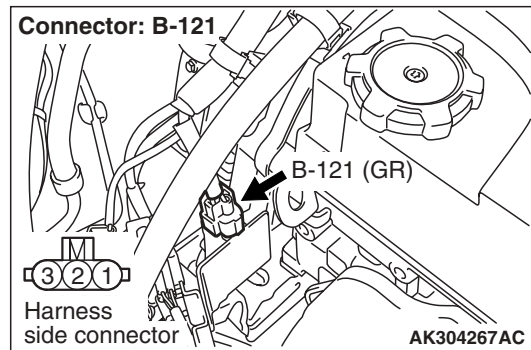


Q: Is the check result normal?

YES : Check and repair harness between B-121 (terminal No. 2) crank angle sensor intermediate connector and C-112 (terminal No. 70) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair or replace.

STEP 6. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**Q: Is the check result normal?****YES :** Go to Step 7 .**NO :** Repair or replace.**STEP 7. Check harness between B-121 (terminal No. 2) crank angle sensor intermediate connector and C-112 (terminal No. 70) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.**

- Check output line for short circuit.

Q: Is the check result normal?**YES :** Go to Step 8 .**NO :** Repair.**STEP 8. MUT-III data list**

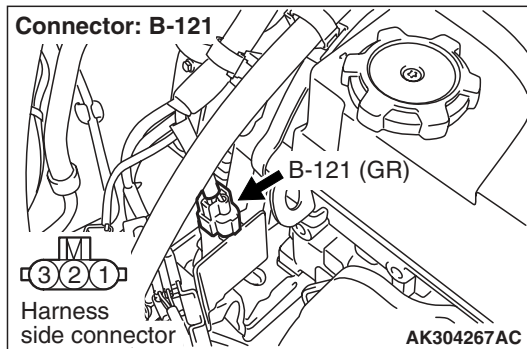
- Refer to Data List Reference Table [P.13A-363](#).
 - Item 22: Crank angle sensor

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 9. Perform voltage measurement at B-121 crank angle sensor intermediate connector.



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

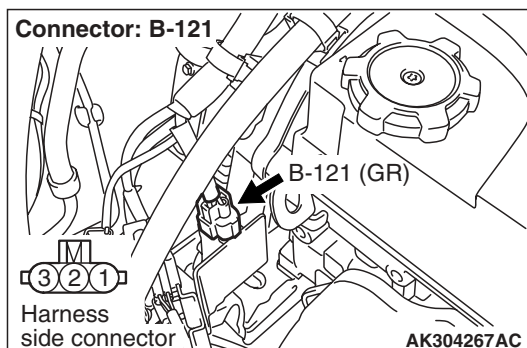
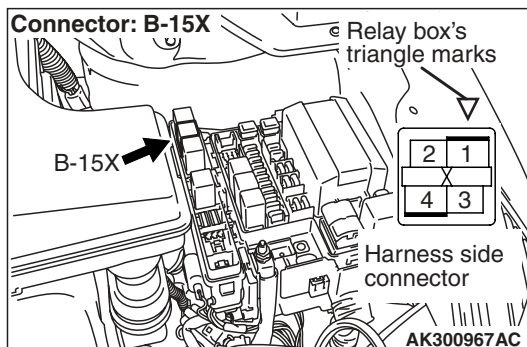
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 10 .

STEP 10. Connector check: B-15X engine control relay connector



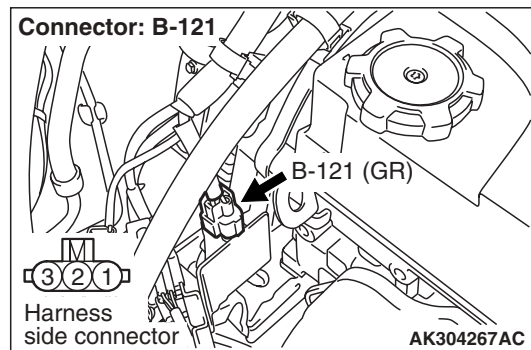
Q: Is the check result normal?

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-121 (terminal No. 1) crank angle sensor intermediate connector and B-15X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 11. Perform resistance measurement at B-121 crank angle sensor intermediate connector.



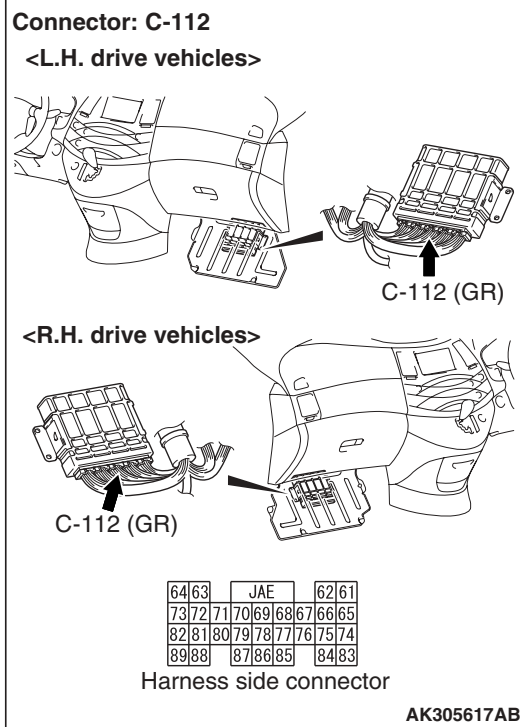
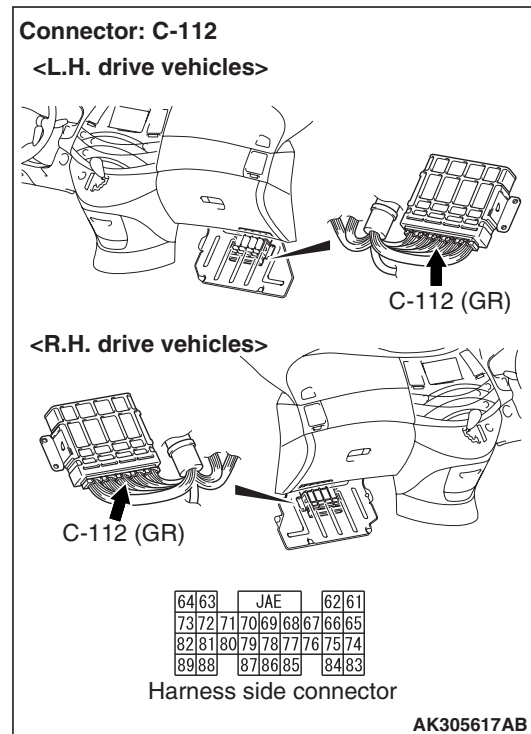
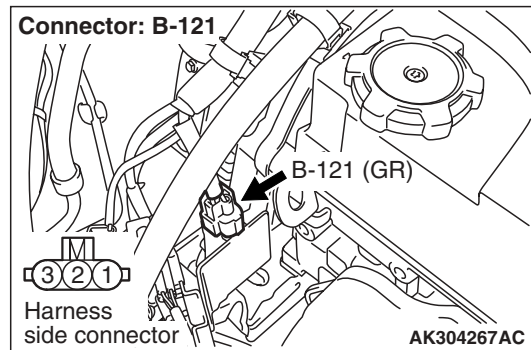
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 3 and earth.

OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 14 .

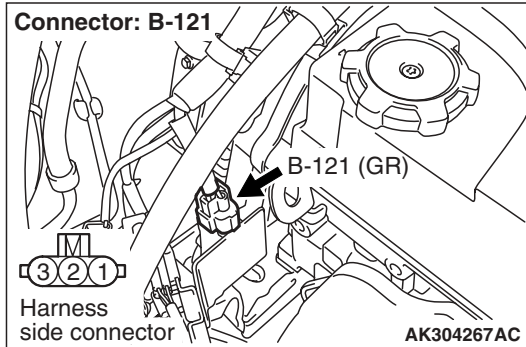
NO : Go to Step 12 .

STEP 12. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**Q: Is the check result normal?****YES :** Go to Step 13 .**NO :** Repair or replace.**STEP 13. Check harness between B-121 (terminal No. 3) crank angle sensor intermediate connector and C-112 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.****NOTE:** Before checking harness, check intermediate connector C-116, and repair if necessary.

- Check earthing line for open circuit and damage.

Q: Is the check result normal?**YES :** Go to Step 8 .**NO :** Repair.

STEP 14. Perform output wave pattern measurement at B-121 crank angle sensor intermediate connector (Using an oscilloscope).



- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
- Voltage between terminal No. 2 and earth.

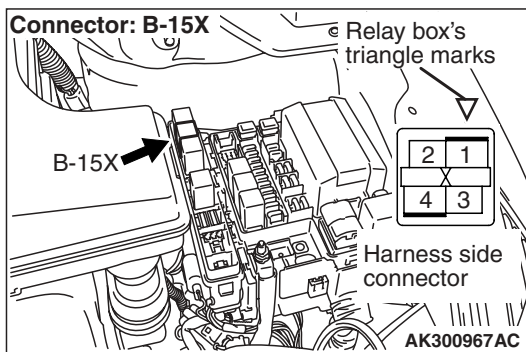
OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-378), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 15 .

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

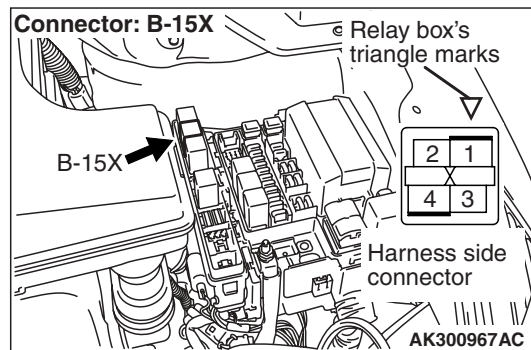
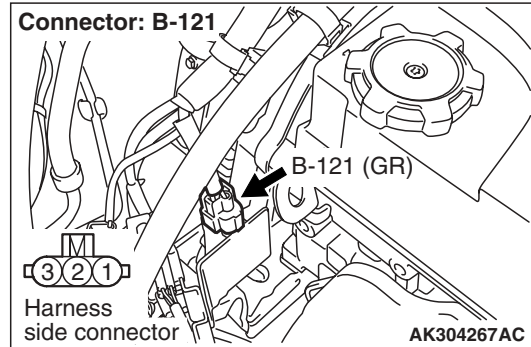


Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair or replace.

STEP 16. Check harness between B-121 (terminal No. 1) crank angle sensor intermediate connector and B-15X (terminal No. 1) engine control relay connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

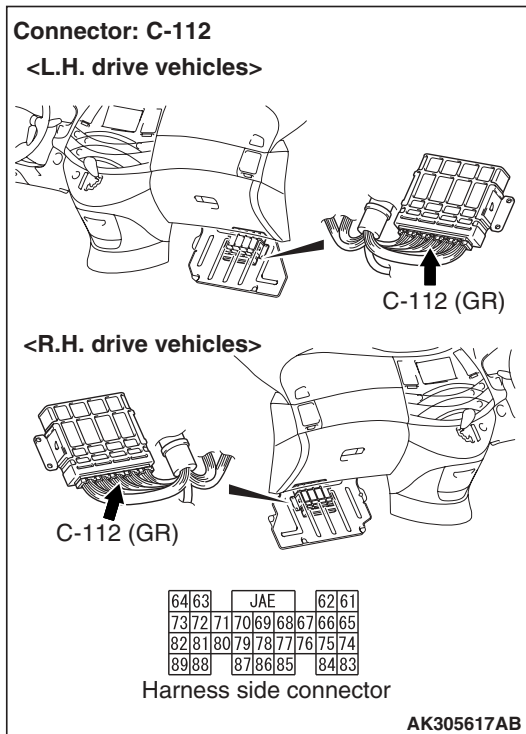
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

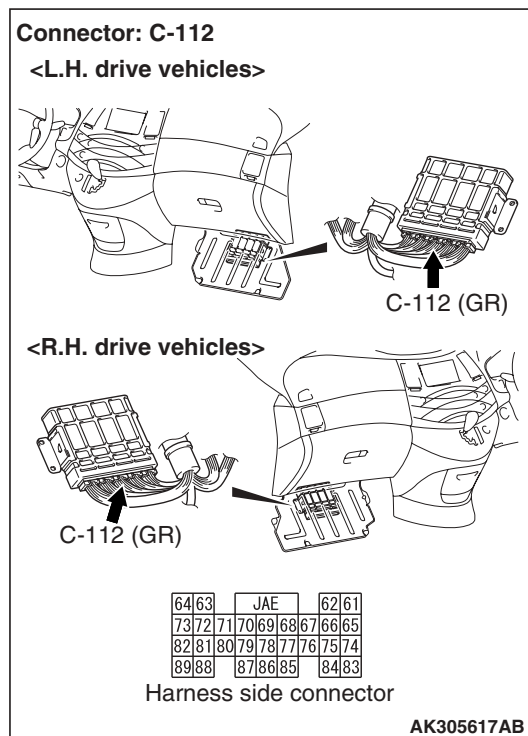
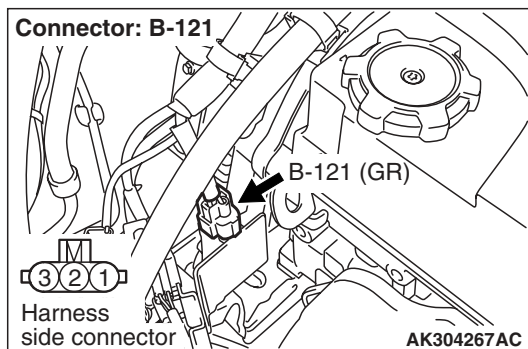


Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair or replace.

STEP 18. Check harness between B-121 (terminal No. 2) crank angle sensor intermediate connector and C-112 (terminal No. 70) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



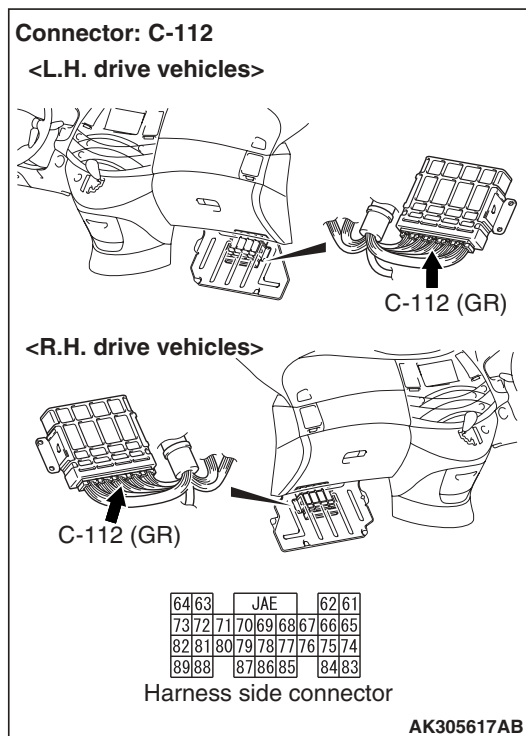
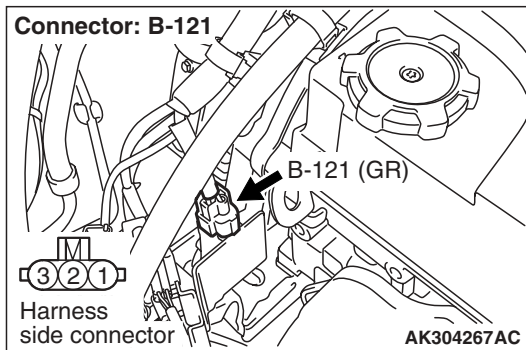
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Repair.

STEP 19. Check harness between B-121 (terminal No. 3) crank angle sensor intermediate connector and C-112 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

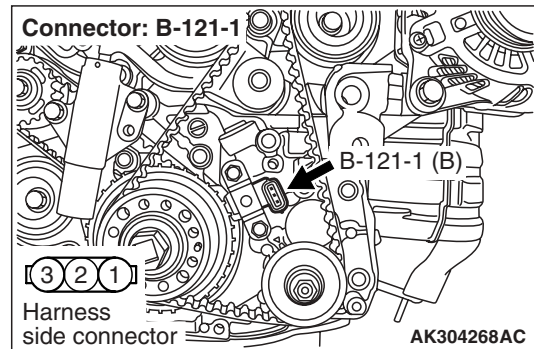
- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair.

STEP 20. Connector check: B-121-1 crank angle sensor connector

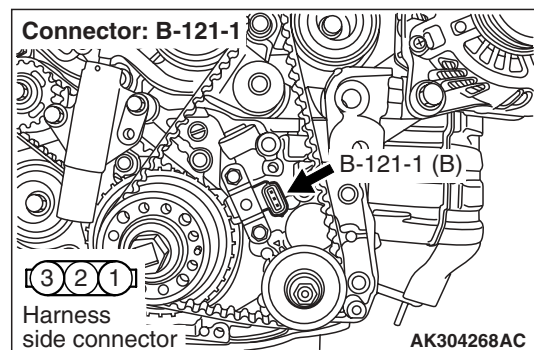
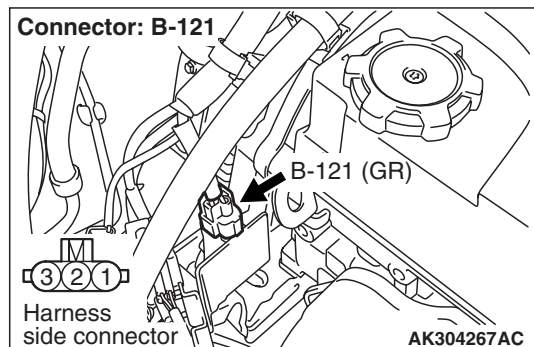


Q: Is the check result normal?

YES : Go to Step 21 .

NO : Repair or replace.

STEP 21. Check harness between B-121 crank angle sensor intermediate connector and B-121-1 crank angle sensor connector.



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

Q: Is the check result normal?

YES : Go to Step 22 .

NO : Replace the timing belt cover.

STEP 22. Check the crankshaft sensing blade.**Q: Is the check result normal?****YES :** Go to Step 23 .**NO :** Replace the crankshaft sensing blade.

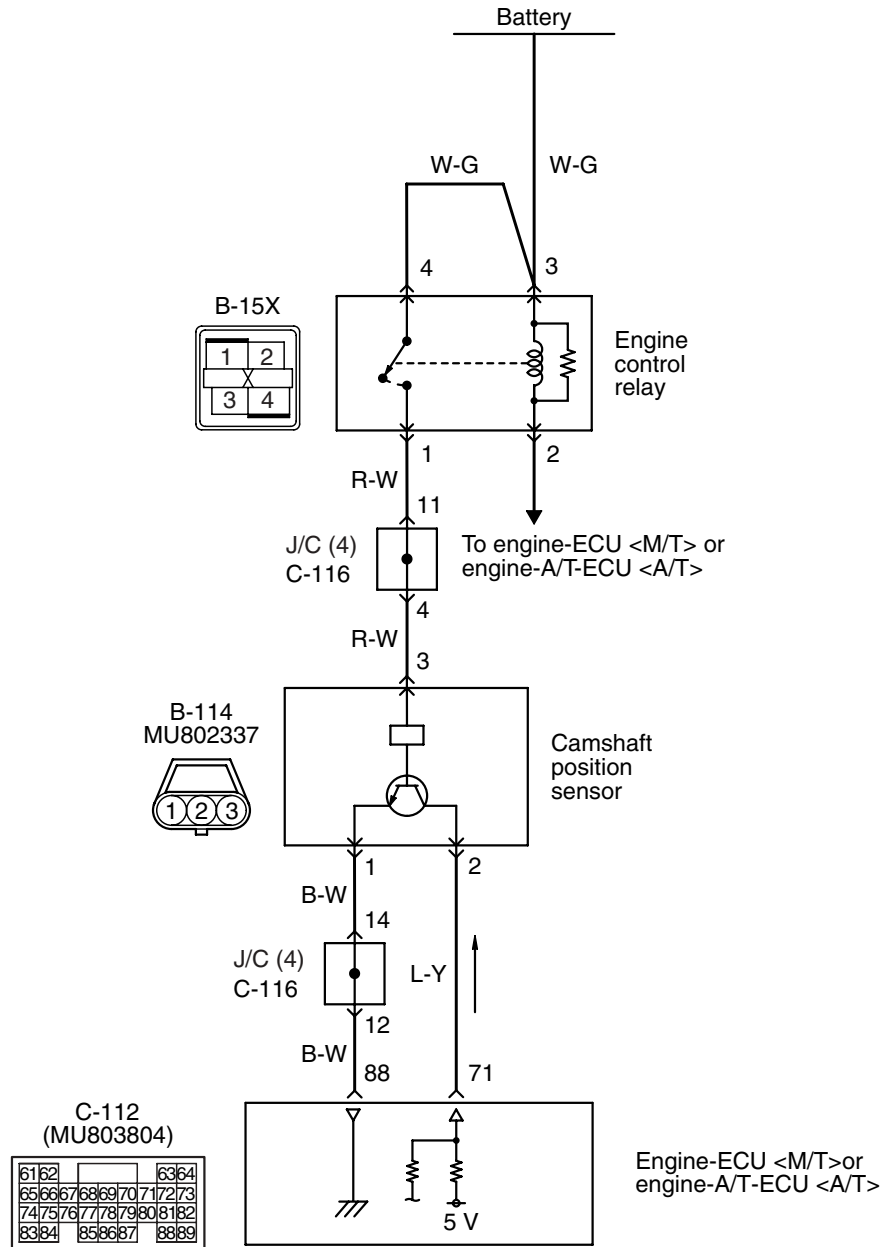
STEP 23: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 22: Crank angle sensor

Q: Is the check result normal?**YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).**NO :** Replace crank angle sensor.

Code No. 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

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 <M/T> or engine-A/T-ECU <A/T> (terminal No. 88) 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 <M/T> or engine-A/T-ECU <A/T> (terminal No. 71).

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 <M/T> or engine-A/T-ECU <A/T>.

TROUBLE JUDGMENT**Check Condition**

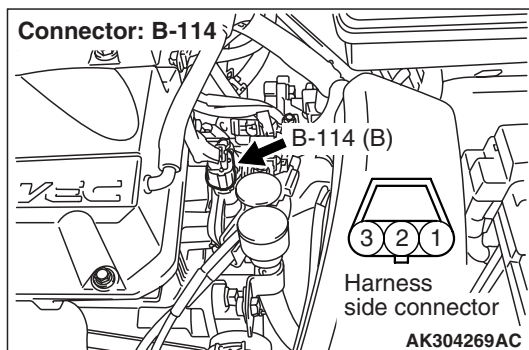
- Engine speed is 50 r/min or higher.

Judgment Criterion

- Camshaft position sensor output voltage has not been changed (no pulse signal is has been input) for 2 seconds.

PROBABLE CAUSE

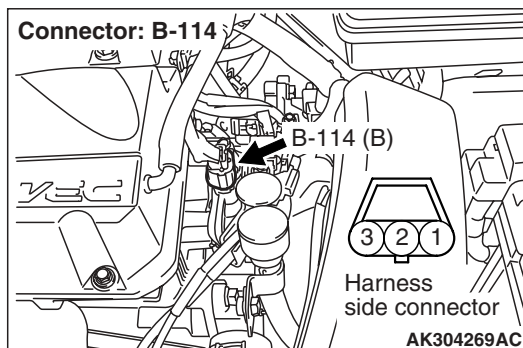
- Failed camshaft position sensor
- Open/short circuit in camshaft position sensor circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. Connector check: B-114 camshaft position sensor connector**

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform voltage measurement at B-114 camshaft position sensor connector.

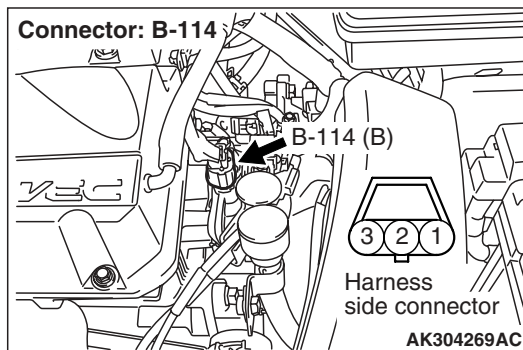
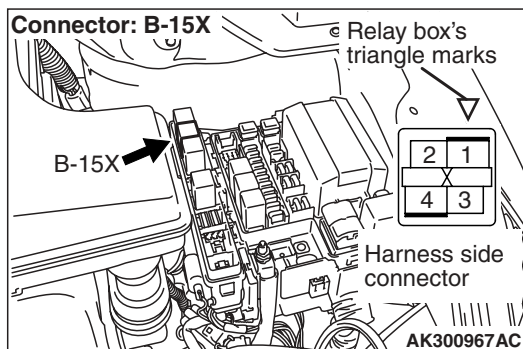
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Go to Step 3 .

STEP 3. Connector check: B-15X engine control relay connector

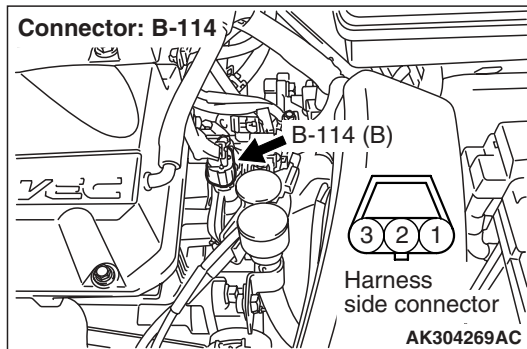
Q: Is the check result normal?

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-114 (terminal No. 3) camshaft position sensor connector and B-15X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 4. Perform voltage measurement at B-114 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?

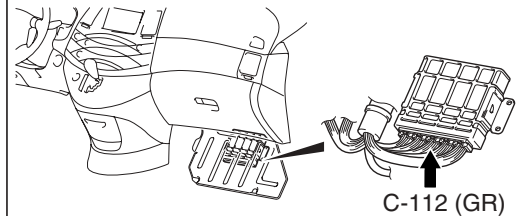
YES : Go to Step 10 .

NO : Go to Step 5 .

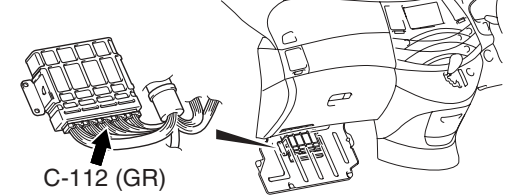
STEP 5. Perform voltage measurement at C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Connector: C-112

<L.H. drive vehicles>



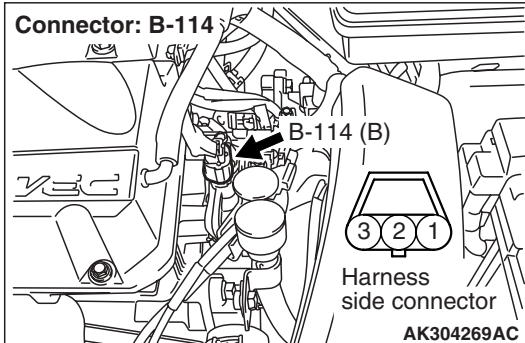
<R.H. drive vehicles>



| | | | | |
|----|----|-----|----|----|
| 64 | 63 | JAE | 62 | 61 |
| 73 | 72 | 71 | 70 | 69 |
| 82 | 81 | 80 | 79 | 78 |
| 89 | 88 | 87 | 86 | 85 |

Harness side connector

AK305617AB



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Disconnect B-114 camshaft position sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 71 and earth.

OK: 4.9 – 5.1 V

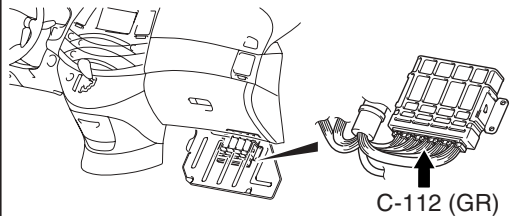
Q: Is the check result normal?

YES : Go to Step 6 .

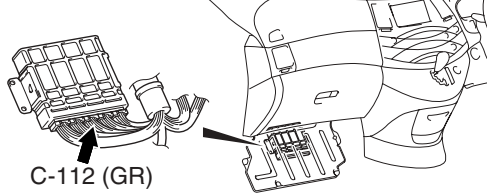
NO : Go to Step 7 .

**STEP 6. Connector check: C-112 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**

Connector: C-112
<L.H. drive vehicles>



<R.H. drive vehicles>

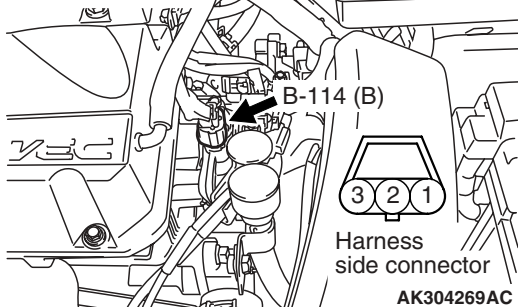


| | | | | |
|----|----|-----|----|----|
| 64 | 63 | JAE | 62 | 61 |
| 73 | 72 | 71 | 70 | 69 |
| 82 | 81 | 80 | 79 | 78 |
| 89 | 88 | 87 | 86 | 85 |

Harness side connector

AK305617AB

Connector: B-114



Harness
side connector

AK304269AC

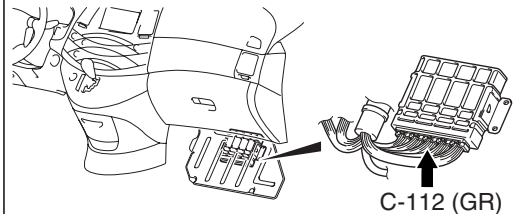
YES : Check and repair harness between B-114 (terminal No. 2) camshaft position sensor connector and C-112 (terminal No. 71) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

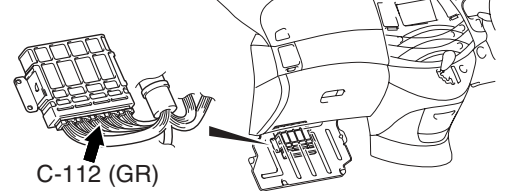
NO : Repair or replace.

**STEP 7. Connector check: C-112 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**

Connector: C-112
<L.H. drive vehicles>



<R.H. drive vehicles>



| | | | | |
|----|----|-----|----|----|
| 64 | 63 | JAE | 62 | 61 |
| 73 | 72 | 71 | 70 | 69 |
| 82 | 81 | 80 | 79 | 78 |
| 89 | 88 | 87 | 86 | 85 |

Harness side connector

AK305617AB

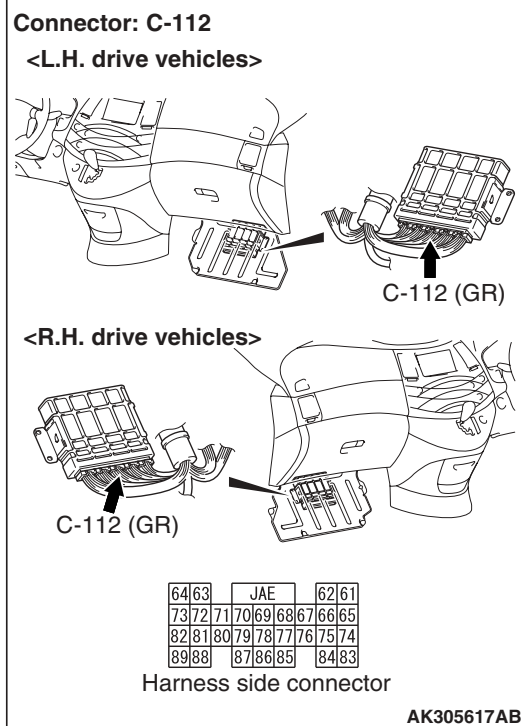
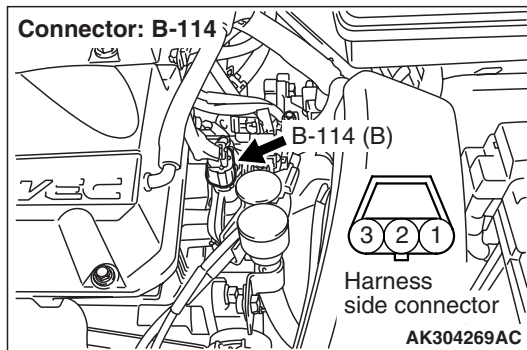
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

Q: Is the check result normal?

STEP 8. Check harness between B-114 (terminal No. 2) camshaft position sensor connector and C-112 (terminal No. 71) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit.

Q: Is the check result normal?

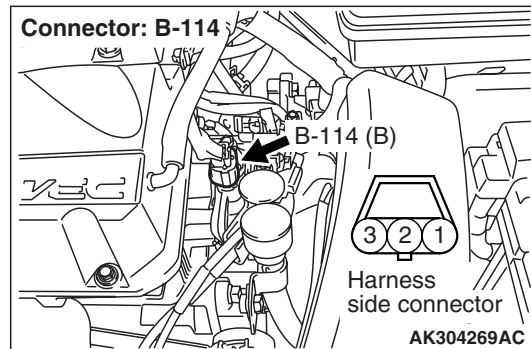
YES : Go to Step 9 .
NO : Repair.

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

STEP 10. Perform resistance measurement at B-114 camshaft position sensor connector.

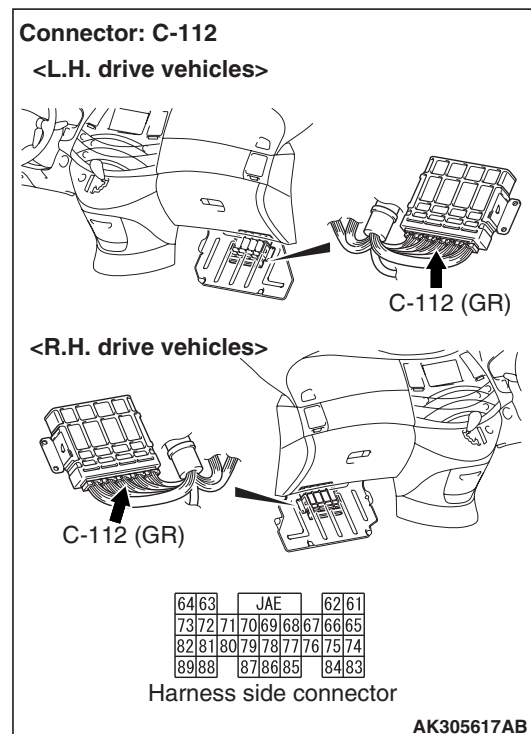


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 13 .
NO : Go to Step 11 .

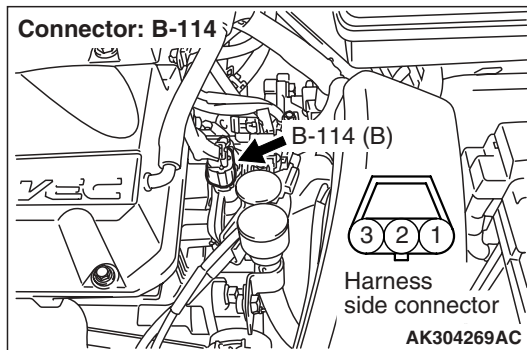
STEP 11. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



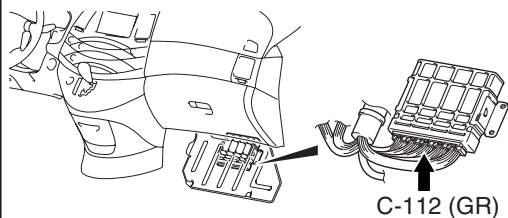
Q: Is the check result normal?

YES : Go to Step 12 .
NO : Repair or replace.

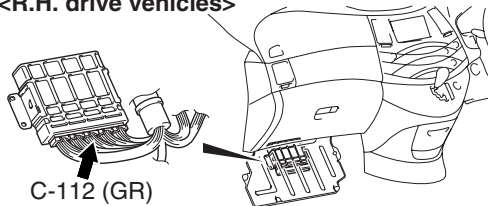
STEP 12. Check harness between B-114 (terminal No. 1) camshaft position sensor connector and C-112 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



Connector: C-112
<L.H. drive vehicles>



<R.H. drive vehicles>



| | | | | |
|----|----|-----|----|----|
| 64 | 63 | JAE | 62 | 61 |
| 73 | 72 | 71 | 70 | 69 |
| 82 | 81 | 80 | 79 | 78 |
| 89 | 88 | 87 | 86 | 85 |

Harness side connector

AK305617AB

NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

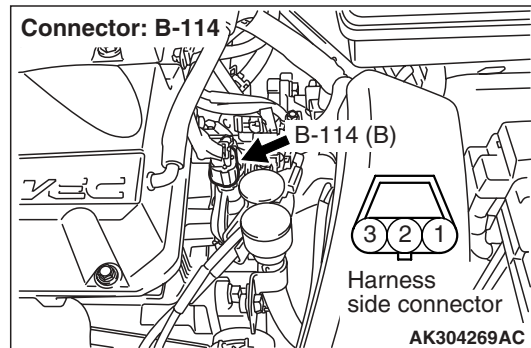
- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 13. Perform output wave pattern measurement at B-114 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 <M/T> or P range <A/T>
- Voltage between terminal No. 2 and earth.

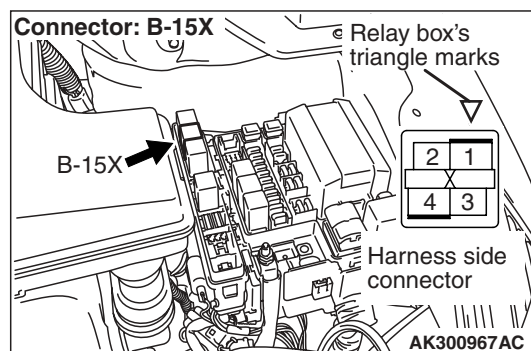
OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-378), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 14 .

STEP 14. Connector check: B-15X engine control relay connector.

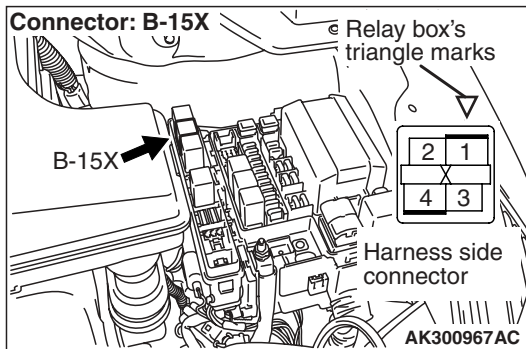
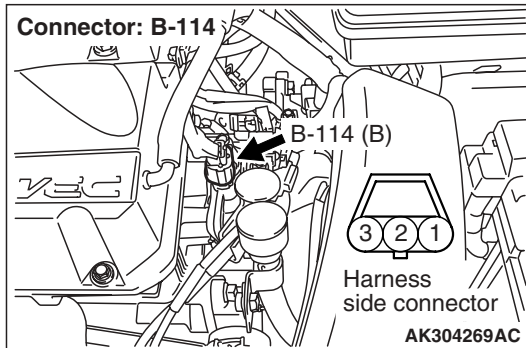


Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair or replace.

STEP 15. Check harness between B-114 (terminal No. 3) camshaft position sensor connector and B-15X (terminal No. 1) engine control relay connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

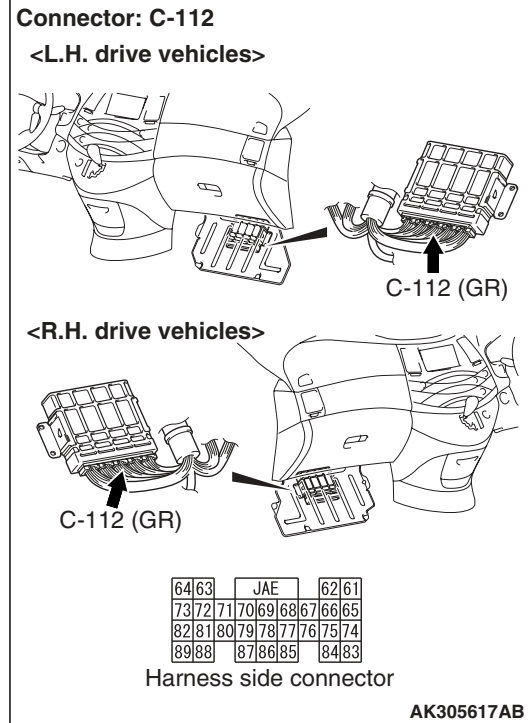
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair.

STEP 16. Connector check: C-112 engine-ECU <M/T> connectors or engine-A/T-ECU <A/T> connector

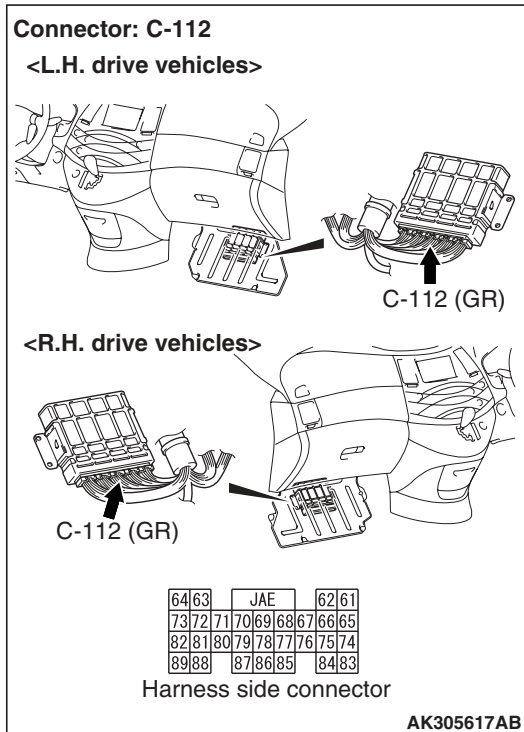
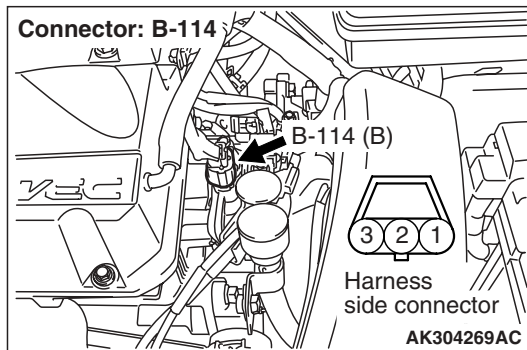


Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair or replace.

STEP 17. Check harness between B-114 (terminal No. 2) camshaft position sensor connector and C-112 (terminal No. 71) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



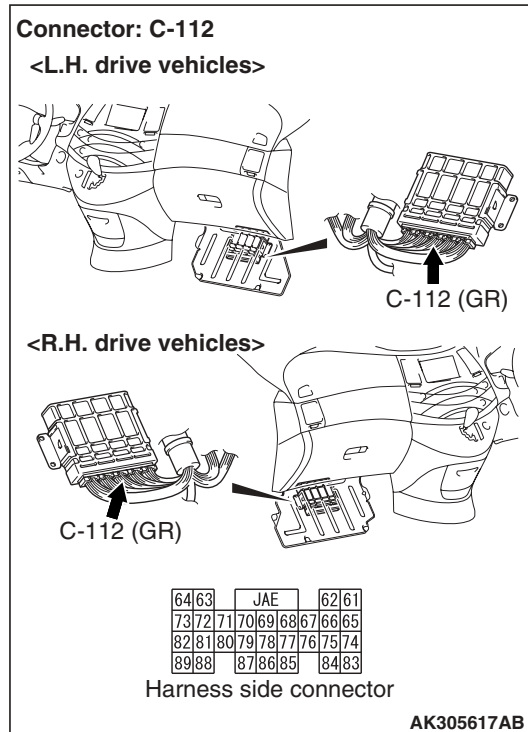
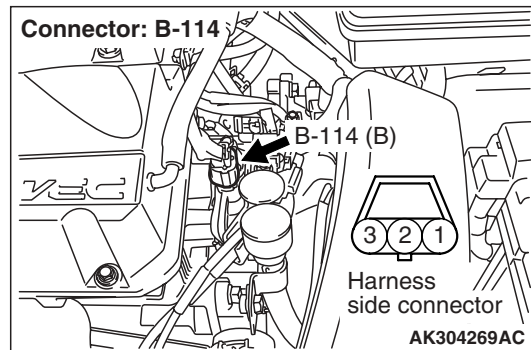
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair.

STEP 18. Check harness between B-114 (terminal No. 1) camshaft position sensor connector and C-112 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Repair.

STEP 19. Check camshaft position sensing cylinder.

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Replace camshaft position sensing cylinder.

STEP 20. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace camshaft position sensor.

NO : Intermittent malfunction (Refer to GROUP

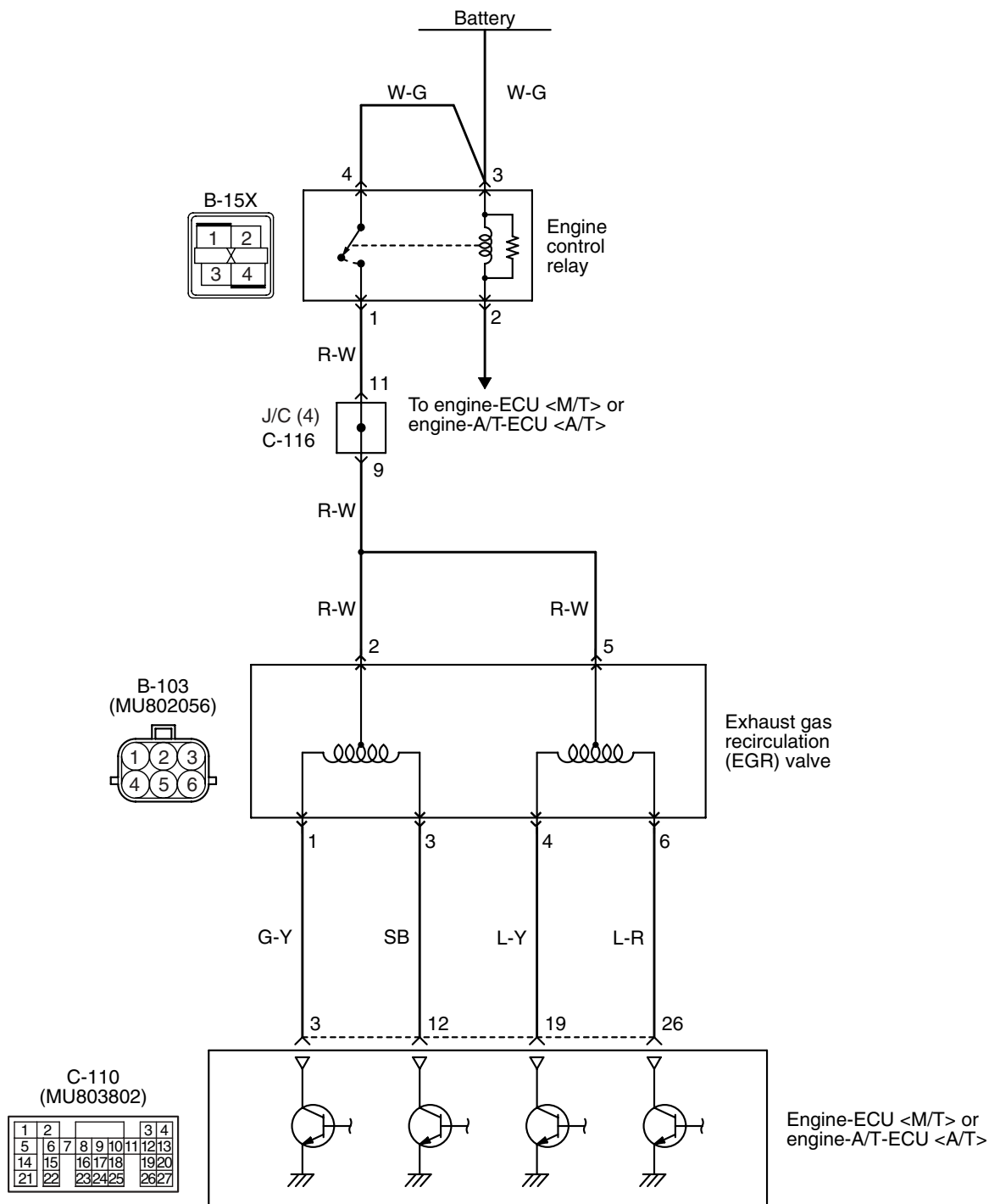
00 – How to Use

Troubleshooting/Inspection Service Points

[P.00-5](#)).

Code No. P0403: Exhaust Gas Recirculation Control System

EGR valve circuit



OPERATION

- Power is supplied to the EGR valve (terminal No. 2 and No. 5) from the engine control relay (terminal No. 1).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 3, No. 12, No. 19 and No. 26) makes the power transistor in the unit be in "ON", and that makes currents go on the EGR valve (terminal No. 1, No. 3, No. 4 and No. 6).

FUNCTION

- Based on the signal from engine-ECU <M/T> or engine-A/T-ECU <A/T>, the EGR valve (stepper motor) controls the EGR rate.

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 10.3 V or higher.

Judgment Criterion

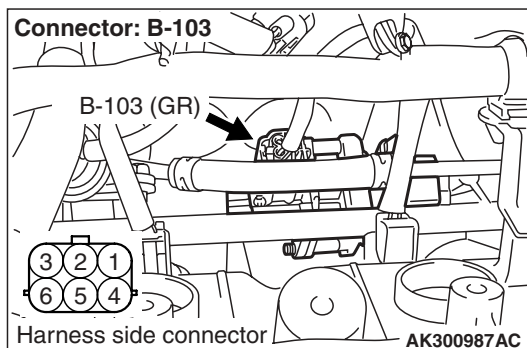
- The EGR valve motor coil surge voltage (battery positive voltage +2 V) is not detected for 3 seconds.

PROBABLE CAUSE

- Failed EGR valve
- Open/short circuit in EGR valve circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-103 EGR valve connector



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Check EGR valve itself.

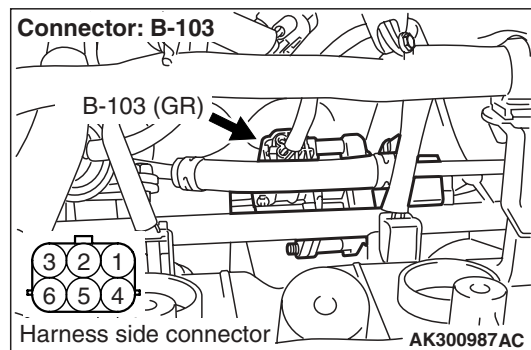
- Check EGR control solenoid valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (stepper motor) Check <4G69>P.17-65 .

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace EGR valve (stepper motor).

STEP 3. Perform voltage measurement at B-103 EGR valve connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2, No. 5 and earth.

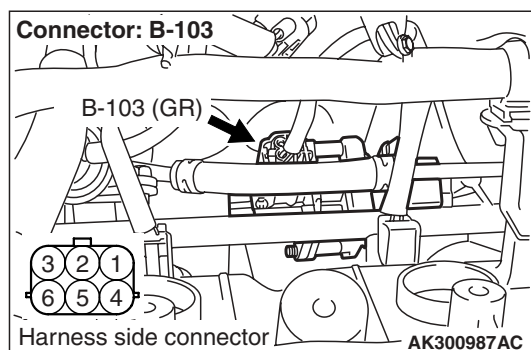
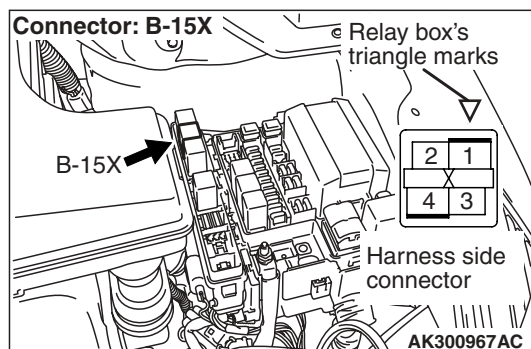
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: B-15X engine control relay connector



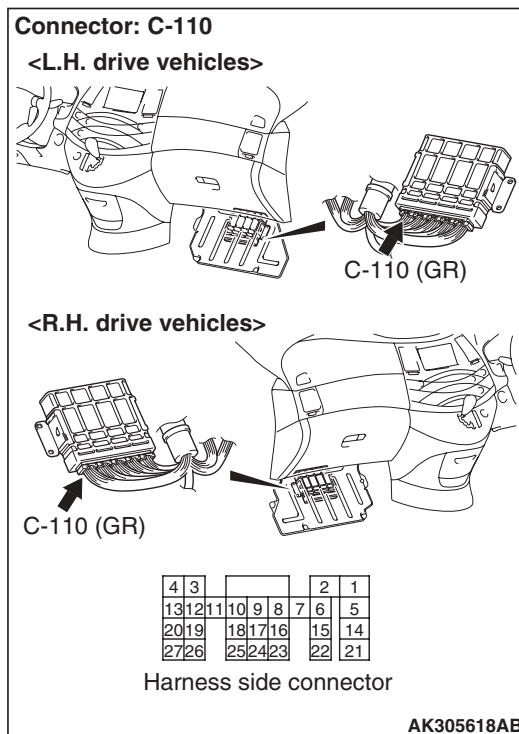
Q: Is the check result normal?

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-103 (terminal No. 2, No. 5) EGR valve connector and B-15X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at C-110 engine-ECU connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3, No. 12, No. 19, No. 26 and earth.

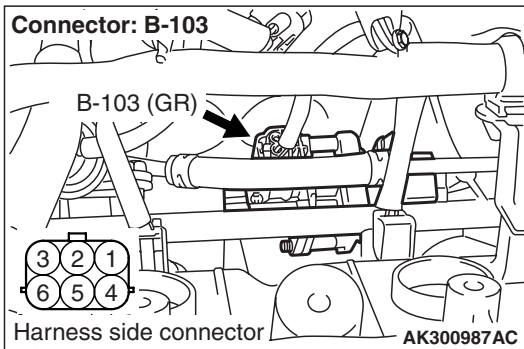
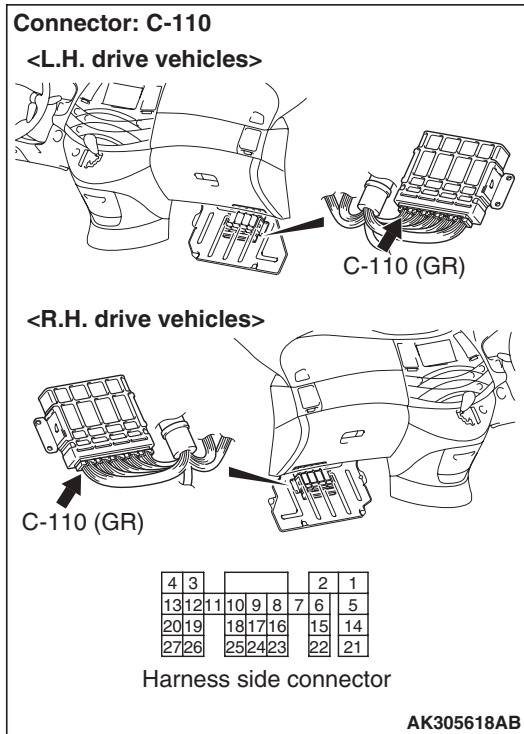
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 6 .

**STEP 6. Connector check: C-110 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>**

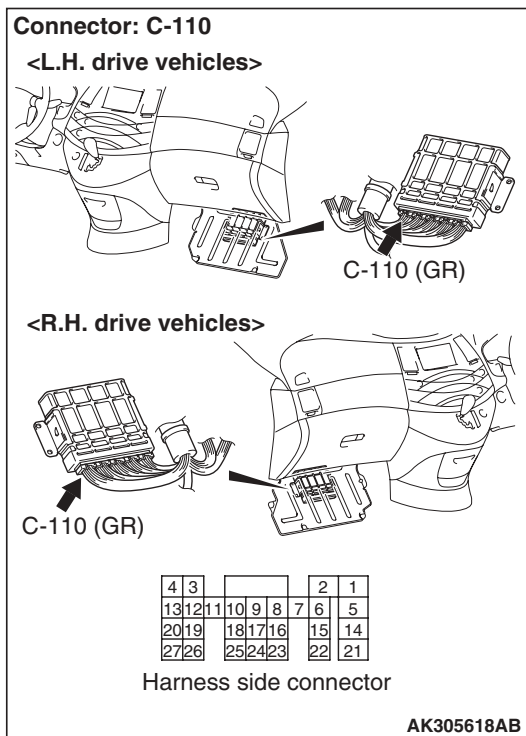


YES : Check and repair harness between B-103 EGR valve and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

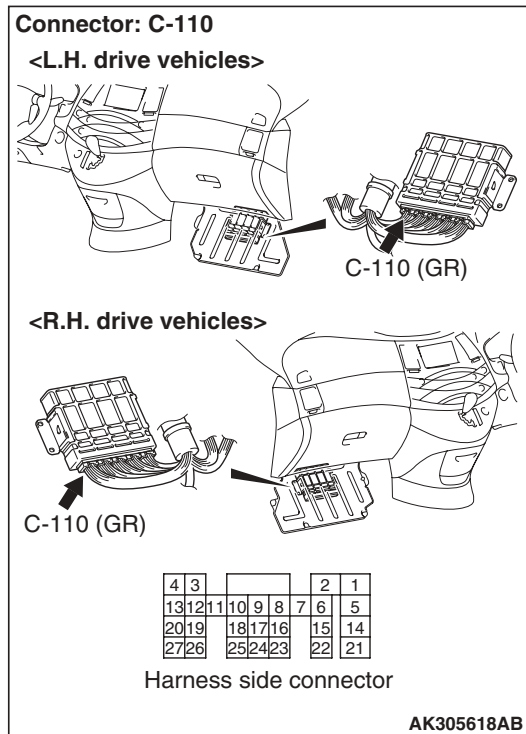
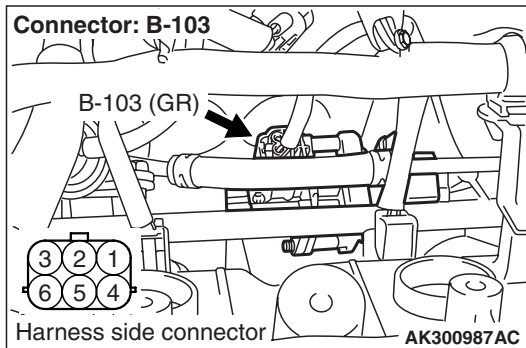
- Check harness between B-103 (terminal No. 1) EGR valve and C-110 (terminal No. 3) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check harness between B-103 (terminal No. 3) EGR valve and C-110 (terminal No. 12) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check harness between B-103 (terminal No. 4) EGR valve and C-110 (terminal No. 19) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check harness between B-103 (terminal No. 6) EGR valve and C-110 (terminal No. 26) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
- Check power supply line for open/short circuit.

NO : Repair or replace.

Q: Is the check result normal?

**STEP 7. Connector check: C-110 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector****YES** : Go to Step 8 .**NO** : Repair or replace.**Q: Is the check result normal?**

STEP 8. Check harness between B-103 EGR valve and C-110 engine-ECU <M/T> or engine-A/T-ECU <A/T>.

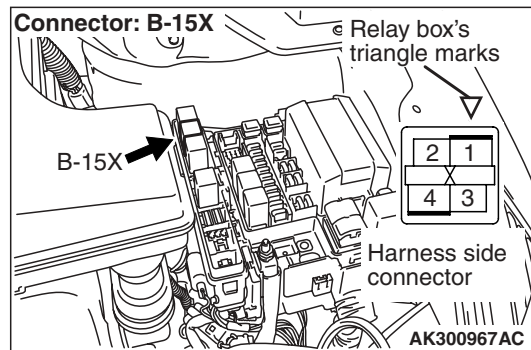
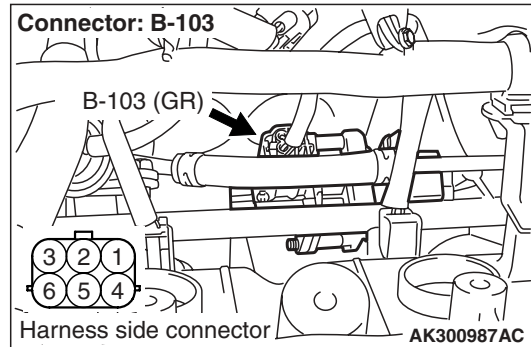


Q: Are the check results normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check harness between B-103 (terminal No. 2, No. 5) EGR valve connector and B-15X (terminal No. 1) engine control relay connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Repair.

- Check harness between B-103 (terminal No. 1) EGR valve and C-110 (terminal No. 3) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check harness between B-103 (terminal No. 3) EGR valve and C-110 (terminal No. 12) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check harness between B-103 (terminal No. 4) EGR valve and C-110 (terminal No. 19) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check harness between B-103 (terminal No. 6) EGR valve and C-110 (terminal No. 26) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
- Check output line for damage.

Code No. P0421: Warm Up Catalyst Malfunction (cylinder 1, 4)

FUNCTION

- The signal from the cylinder 1, 4 oxygen sensor (rear) differs from the cylinder 1, 4 oxygen sensor (front). That is because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the cylinder 1, 4 oxygen sensor (front) becomes similar to the cylinder 1, 4 oxygen sensor (rear).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> compares the output of the cylinder 1, 4 oxygen sensor signals (front and rear).

TROUBLE JUDGMENT**Check Conditions**

- Engine speed is 3,000 r/min or lower.
- The accelerator pedal is open.
- Air flow sensor output is 8 gm/s or higher.
- 3 seconds or more elapsed after the abovementioned conditions were satisfied.
- Intake air temperature is -10°C or higher after the engine is started.
- Barometric pressure is 76 kPa or higher.
- Under the closed loop air/fuel ratio control.
- Vehicle speed is 1.5 km/h or higher.
- For 10 seconds per cycle, the engine-ECU <M/T> or engine-A/T-ECU <A/T> monitors 7 cycles of this condition during the drive cycle.
- Short-term fuel trim is between -25 % or higher and +25 % or lower.
- The cumulative air flow sensor output is 2,931 g or higher.

Judgment Criterion

- The cylinder 1, 4 oxygen sensor (rear) signal frequency divided by cylinder 1, 4 oxygen sensor (front) signal frequency is 0.8 or more.

PROBABLE CAUSE

- Catalytic converter deteriorated
- Failed cylinder 1, 4 oxygen sensor (front)
- Failed cylinder 1, 4 oxygen sensor (rear)
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor (front)
 - b. Item 59: Cylinder 1, 4 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 Code [P.13A-20](#)).

STEP 3. MUT-III data list

- Item 11: Cylinder 1, 4 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 cylinder 1, 4 oxygen sensor (front).

STEP 4. Replace the cylinder 1, 4 oxygen sensor (rear).

- After replacing the cylinder 1, 4 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 (cylinder 1, 4).

- After replacing the catalytic converter (cylinder 1, 4), re-check the trouble symptoms.

Q: Is the check result normal?**YES :** Replacing engine-ECU <M/T> or engine-A/T-ECU <A/T>.**NO :** Check end.

Code No. P0431: Warm Up Catalyst Malfunction (Cylinder 2, 3)

FUNCTION

- The signal from the cylinder 2, 3 oxygen sensor (rear) differs from the cylinder 2, 3 oxygen sensor (front). That is because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the cylinder 2, 3 oxygen sensor (front) becomes similar to the cylinder 2, 3 oxygen sensor (rear).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> compares the output of the cylinder 2, 3 oxygen sensor signals (front and rear).

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 3,000 r/min or lower.
- The accelerator pedal is open.
- Air flow sensor output is 8 gm/s or higher.
- 3 seconds or more elapsed after the abovementioned conditions were satisfied.
- Intake air temperature is -10°C or higher after the engine is started.
- Barometric pressure is 76 kPa or higher.
- Under the closed loop air/fuel ratio control.
- Vehicle speed is 1.5 km/h or higher.
- For 10 seconds per cycle, the engine-ECU <M/T> engine-A/T-ECU <A/T> monitors 7 cycles of this condition during the drive cycle.
- Short-term fuel trim is between -25 % or higher and +25 % or lower.
- The cumulative air flow sensor output is 2,931 g or higher.

Judgment Criterion

- The cylinder 2, 3 oxygen sensor (rear) signal frequency divided by cylinder 2, 3 oxygen sensor (front) signal frequency is 0.8 or more.

PROBABLE CAUSE

- Catalytic converter deteriorated
- Failed cylinder 2, 3 oxygen sensor (front)
- Failed cylinder 2, 3 oxygen sensor (rear)
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 39: Cylinder 2, 3 oxygen sensor (front)
 - b. Item 69: Cylinder 2, 3 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 Code [P.13A-20](#)).

STEP 3. MUT-III data list

- Item 39: Cylinder 2, 3 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 cylinder 2, 3 oxygen sensor (front).

STEP 4. Replace the cylinder 2, 3 oxygen sensor (rear).

- After replacing the cylinder 2, 3 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 (cylinder 2, 3).

- After replacing the catalytic converter (cylinder 2, 3), re-check the trouble symptoms.

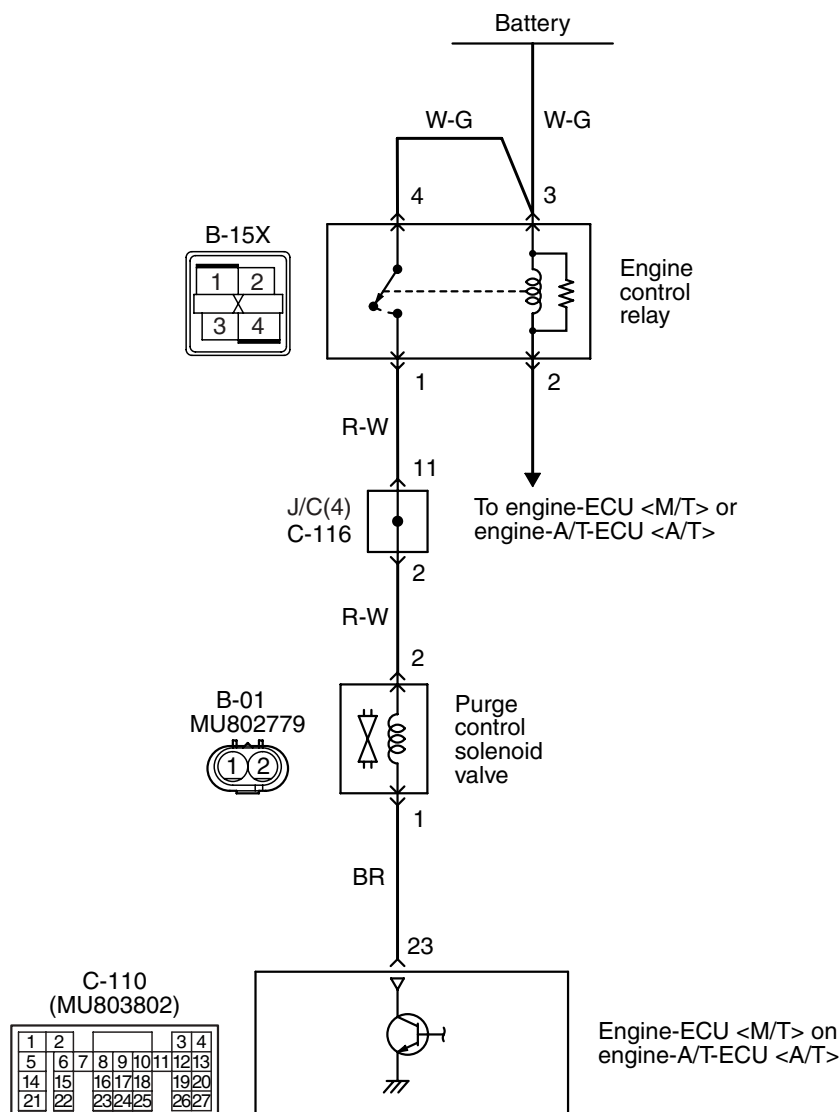
Q: Is the check result normal?

YES : Replacing engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

AK305564AB

OPERATION

- Power is supplied to the purge control solenoid valve (terminal No. 2) from the engine control relay (terminal No. 1).

- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 23) 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 <M/T> or engine-A/T-ECU <A/T>, 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 is in ON position.
- Battery positive voltage is 10 V or higher.

Judgment Criterion

- 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.

PROBABLE CAUSE

- Failed purge control solenoid valve
- Open/short circuit in purge control solenoid valve circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III actuator test

- Item 08: Purge control solenoid valve

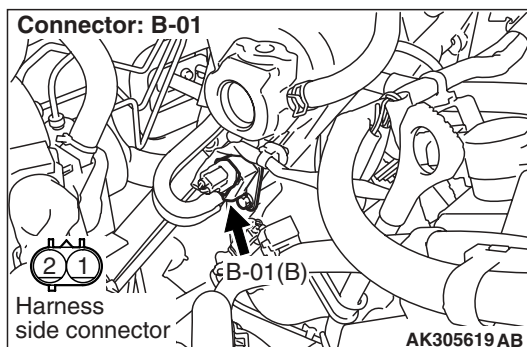
OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-01 purge control solenoid valve connector

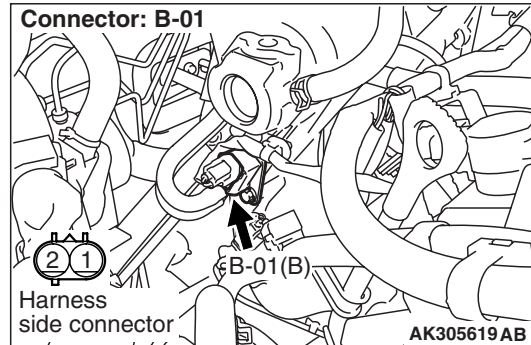


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3: Perform resistance measurement at B-01 purge control solenoid valve connector.



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

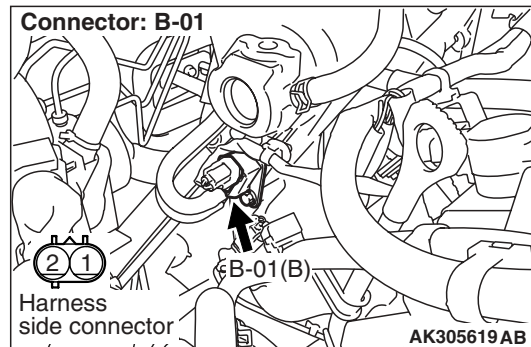
OK: 30 – 34 Ω (at 20°C)

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace purge control solenoid valve.

STEP 4. Perform voltage measurement at B-01 purge control solenoid valve connector.



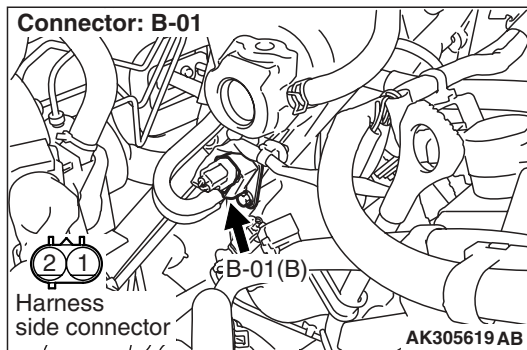
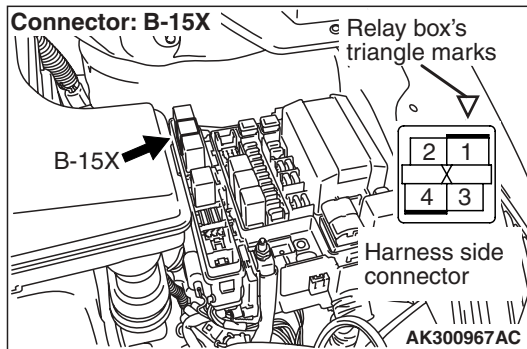
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

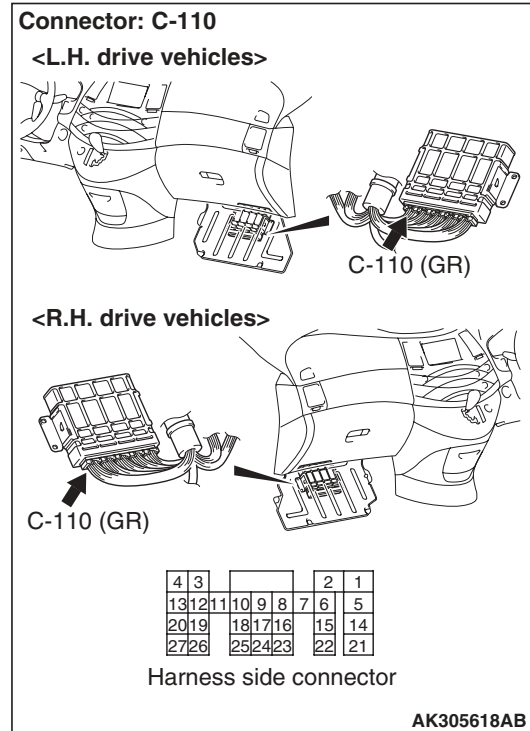
NO : Go to Step 5 .

STEP 5. Connector check: B-15X engine control relay connector**Q: Is the check result normal?**

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-01 (terminal No. 2) purge control solenoid valve connector and B-15X (terminal No. 1) engine control relay connector.

- Check power line for open/short circuit.

NO : Repair or replace.

STEP 6. Perform voltage measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

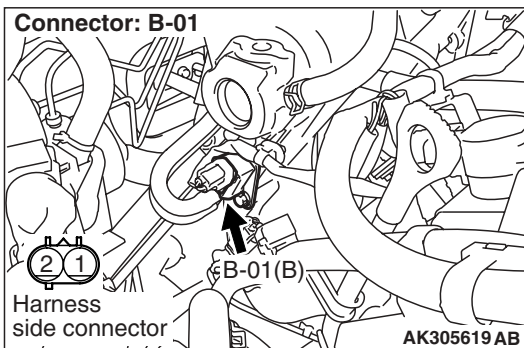
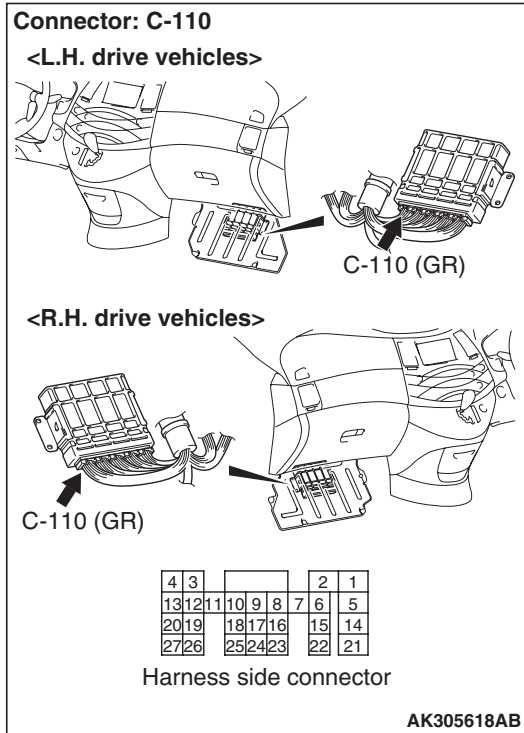
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 23 and earth.

OK: System voltage**Q: Is the check result normal?**

YES : Go to Step 8 .

NO : Go to Step 7 .

**STEP 7. Connector check: C-110 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



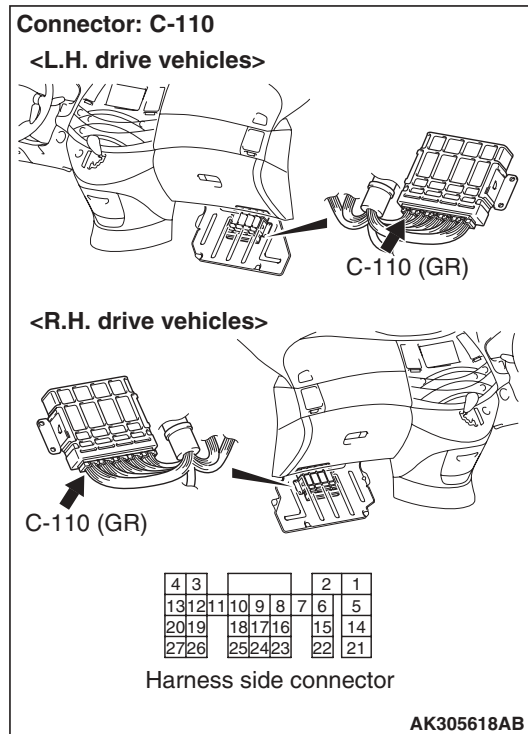
Q: Is the check result normal?

YES : Check and repair harness between B-01 (terminal No. 1) purge control solenoid valve connector and C-110 (terminal No. 23) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open/short circuit.

NO : Repair or replace.

**STEP 8. Connector check: C-110 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**

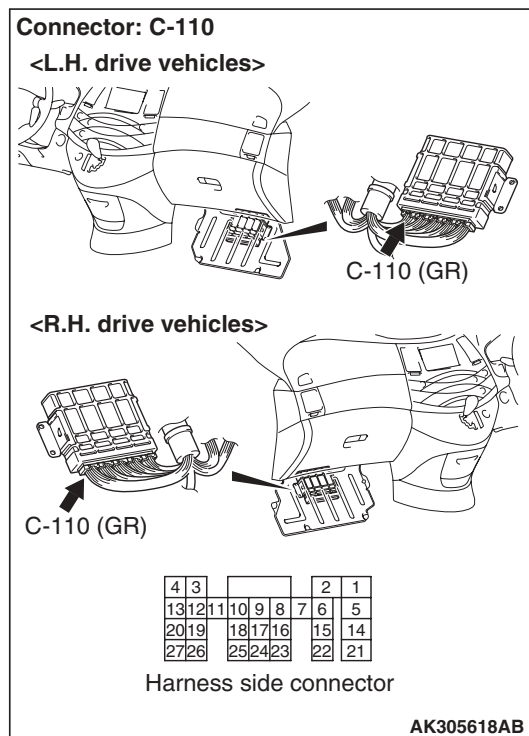
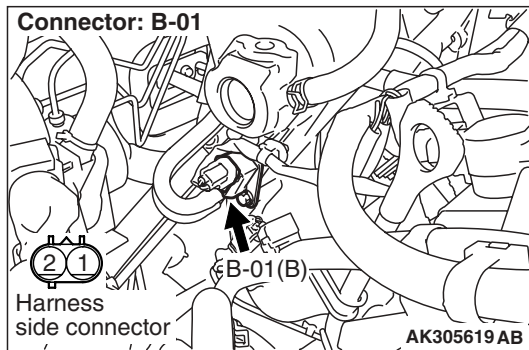


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check harness between B-01 (terminal No. 1) purge control solenoid valve connector and C-110 (terminal No. 23) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



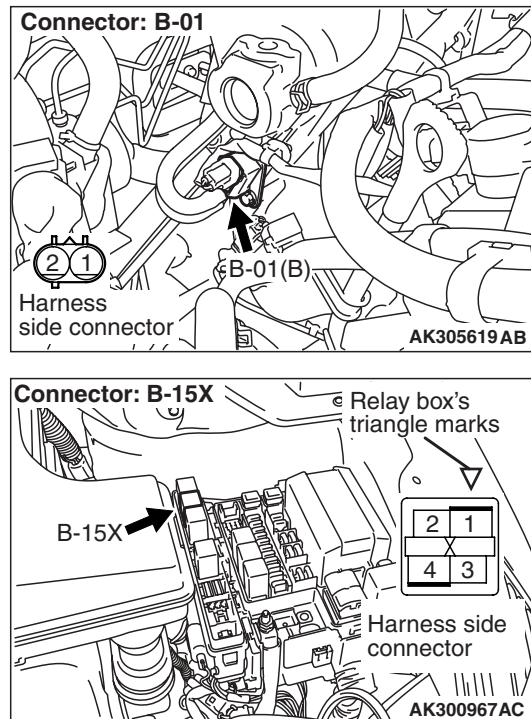
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Check harness between B-01 (terminal No. 2) purge control solenoid valve connector and B-15X (terminal No. 1) engine control relay connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

- Check power line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. MUT-III actuator test

- Item 08: purge control solenoid valve

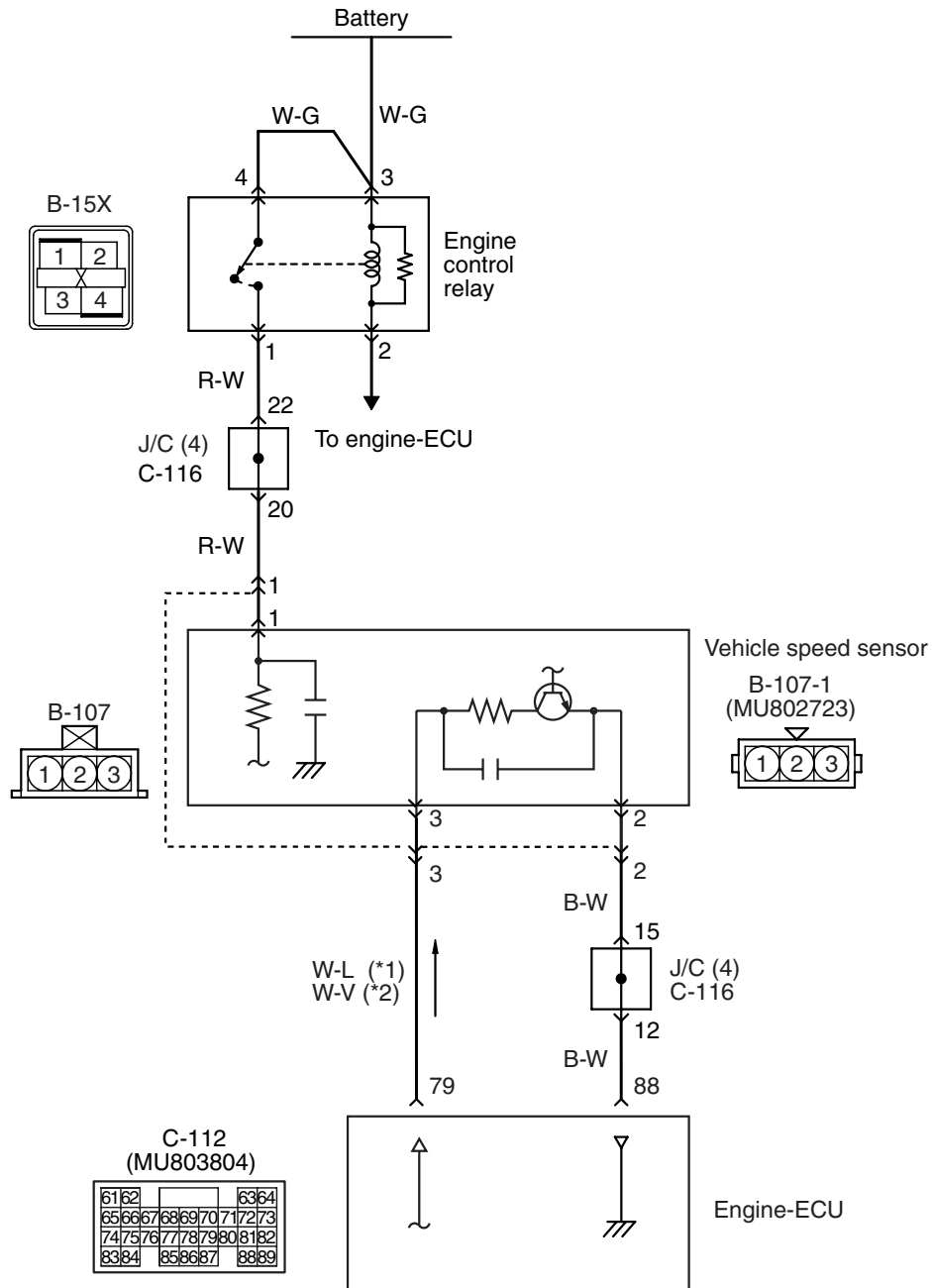
OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Vehicle speed sensor circuit



NOTE

- *1: L.H. drive vehicles
*2: R.H. drive vehicles

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

AK305565 AB

OPERATION

- A power voltage of 5 V is applied to the vehicle speed sensor (terminal No. 3) from the

engine-ECU (terminal No. 79).

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: 2,500 r/min or more.
- Under the high load operation.

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

YES : Go to Step 2 .

NO : Check the speed meter (Refer to GROUP 54A –Combination Meter Assembly – On-vehicle Service – Speedmeter Check P.54A-81).

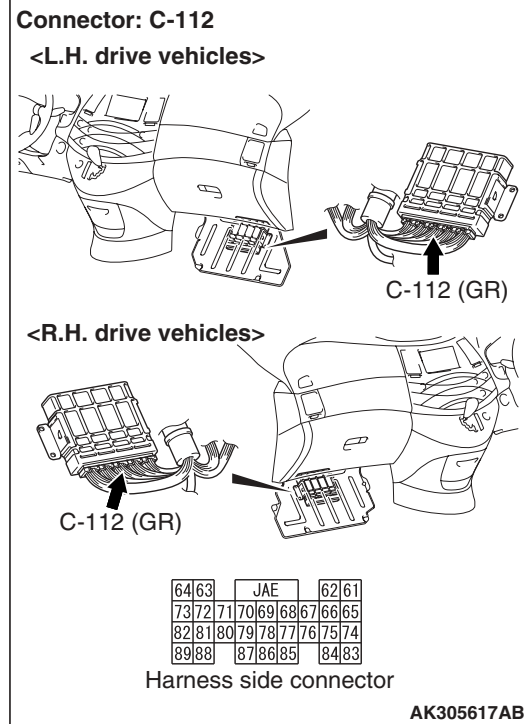
STEP 2. MUT-III data list

- Refer to Data list reference table P.13A-363.
 - 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.00-5).

STEP 3. Check connector: C-112 engine-ECU connector**Q: Is the check result normal?**

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between C-112 (terminal No. 79) engine-ECU connector and B-107-1 (terminal No. 3) Vehicle speed sensor connector.

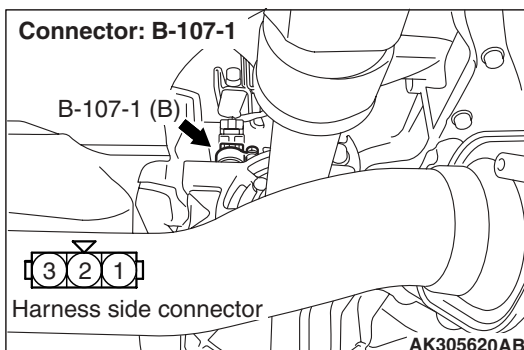
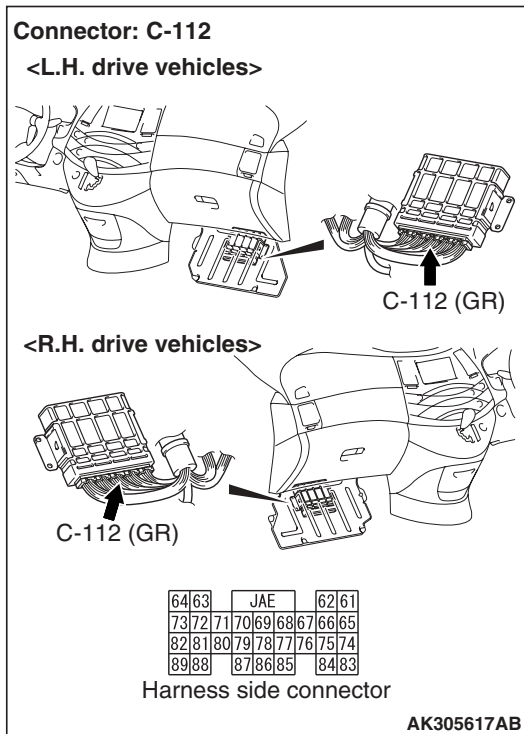
YES : Go to Step 5 .
NO : Repair.

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.00-5](#)).



NOTE: Before checking harness, check intermediate connector B-107, and repair if necessary.

- Check output line for open circuit and damage.

Q: Is the check result normal?

Code No. P0500: Vehicle Speed Signal System <A/T>

FUNCTION

- Receives the signal from the secondary speed sensor used for the A/T control and converts it to the vehicle speed signal, and then inputs it to the engine control system and the speedometer.

TROUBLE JUDGMENT

Check Conditions

- After 2 seconds pass from when the engine has completed the starting.
- The engine rpm is 2500 – 4000 r/min.
- Under the high load operation.

Judgment Criterion

- The sensor output voltage does not vary for 4 seconds. (The pulse signal is not input.)

YES : A/T system check (Refer to GROUP 23-DIAGNOSIS CODE CLASSIFIED TABLE [P.23A-17.](#))

NO : Go to STEP 2.

PROBABLE CAUSE

- Malfunction in the secondary speed sensor
- Open circuit, short or damage in the secondary speed sensor circuits or connection failure of the connector
- Malfunction in engine-A/T-ECU

DIAGNOSIS PROCEDURE**STEP 1. MUT-III other system diagnosis codes**

Q: Is the diagnosis code output for A/T system?

STEP 2. MUT-III diagnosis code

- Reconfirmation of the diagnosis code.

Q: Is the diagnosis code output?

YES : Replacement of Engine-A/T-ECU.

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

Code No. P0505: Idle Speed Control (ISC) System**FUNCTION**

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the difference between the actual engine speed and the target engine speed.

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 Criterion

- 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 approx. 77°C or higher.
- The battery voltage is 10 V or more.
- The intake air temperature is -10°C or higher.

Judgment Criterion

- 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 approx. 77°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 Criterion

- The actual idle speed is lower than the target idle speed by 100 r/min or more for 10 seconds.

PROBABLE CAUSE

- Throttle valve area is dirty.
- Intake system vacuum leak.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

STEP 1: MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20.](#))

NO : Go to Step 2 .

STEP 2: Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-383.](#))

STEP 3. Check air intake from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

STEP 4. Check the trouble symptoms.

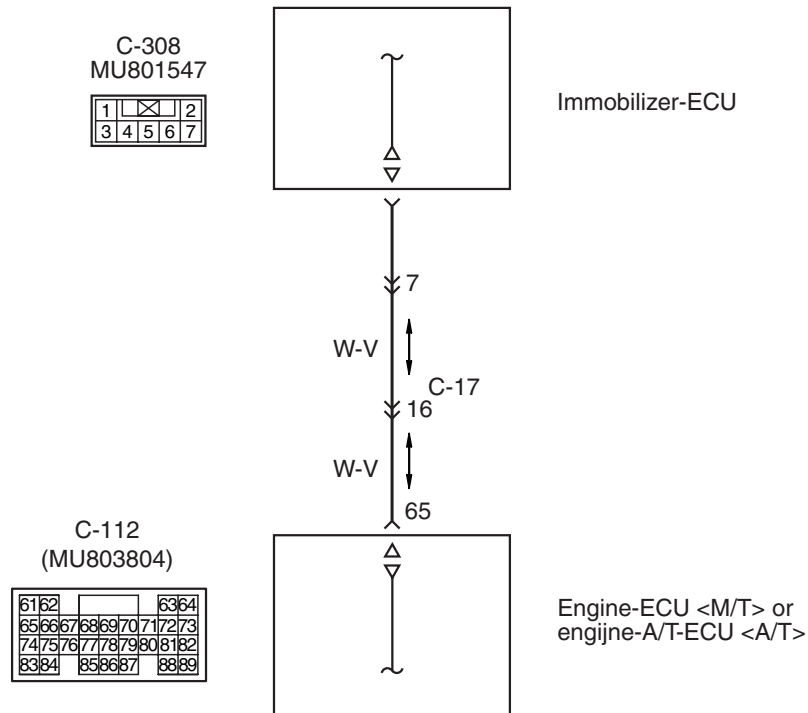
Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P0513: Immobilizer Malfunction

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

AK305566AB

OPERATION

- The signals are sent and received between engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 65) and immobilizer-ECU (terminal No. 7).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 is in "ON" position.

Judgment Criterion

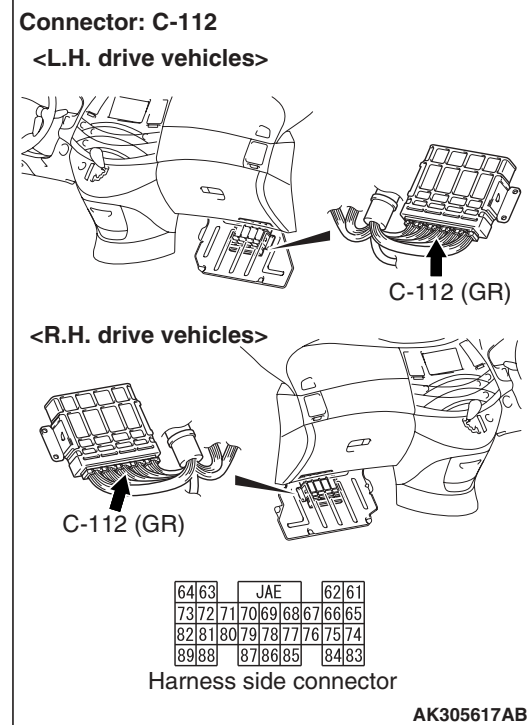
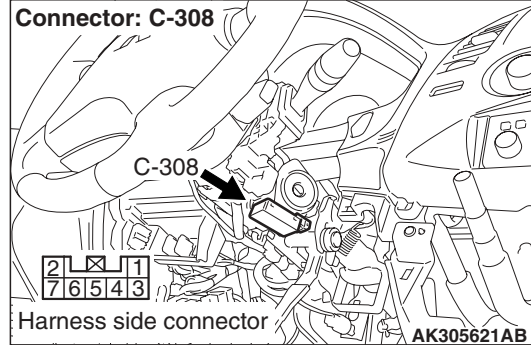
- When the communication error between engine-ECU <M/T> or engine-A/T-ECU <A/T> and the immobilizer-ECU continues for 2 seconds or more.

PROBABLE CAUSE

- Open/short circuit in immobilizer system circuit or loose connector contact
- Failed immobilizer-ECU
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-308
immobilizer-ECU connector and C-112
engine-ECU <M/T> connector or engine-A/T-ECU
<A/T> connector.

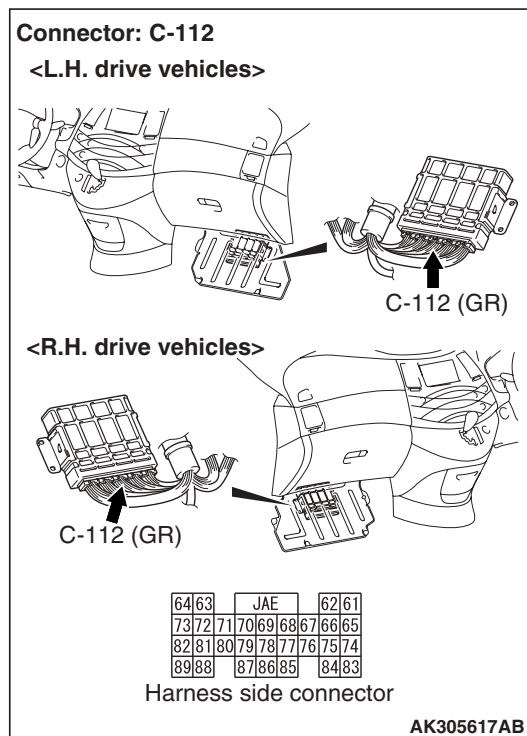
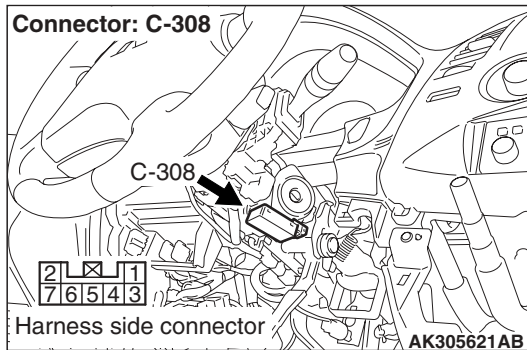


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Check harness between C-308 (terminal No. 7) immobilizer-ECU connector and C-112 (terminal No. 65) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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.00-5](#)).

STEP 4. After replacing the immobilizer-ECU, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Check end.

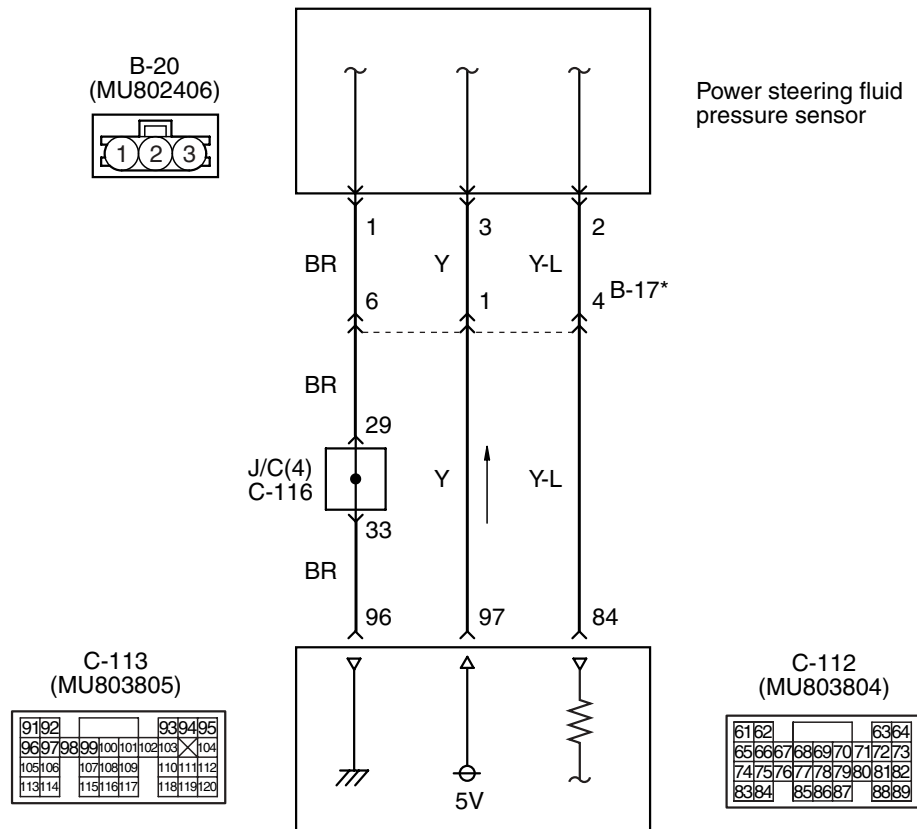
NOTE: Before checking harness, check intermediate connector C-17, and repair if necessary.

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

Q: Is the check result normal?

Code No. P0551: Power Steering Fluid Pressure Sensor System

Power steering fluid pressure sensor circuit



AK305567 AB

CONDITION

- A power voltage of 5 V is applied to power steering fluid pressure sensor (terminal No. 3) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 97).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96) from the power steering fluid pressure sensor (terminal No. 1).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 84) from power steering fluid pressure sensor output terminal (terminal No. 2).

FUNCTION

- Detect the power steering oil pump load caused by the steering and input it into engine-ECU <M/T> or engine-A/T-ECU <A/T>. engine-ECU <M/T> or engine-A/T-ECU <A/T> determines the power steering oil pump load through power steering fluid pressure sensor to perform the idle up control depending on the load.

TROUBLE JUDGMENT

Check Condition

- All the time after the microcomputer start.

Judgment Criteria

- Power steering fluid pressure sensor output voltage has continued to be 4.8 V or more for 5 seconds.

or

- Power steering fluid pressure sensor output voltage has continued to be 0.2 V or less for 5 seconds.

PROBABLE CAUSE

- Failed power steering fluid pressure sensor
- Failed power steering
- Open/short circuit in power steering fluid pressure sensor circuit or loose contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#)
 - a. Item B4: Power steering fluid pressure sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#))

NO : Go to Step 2 .

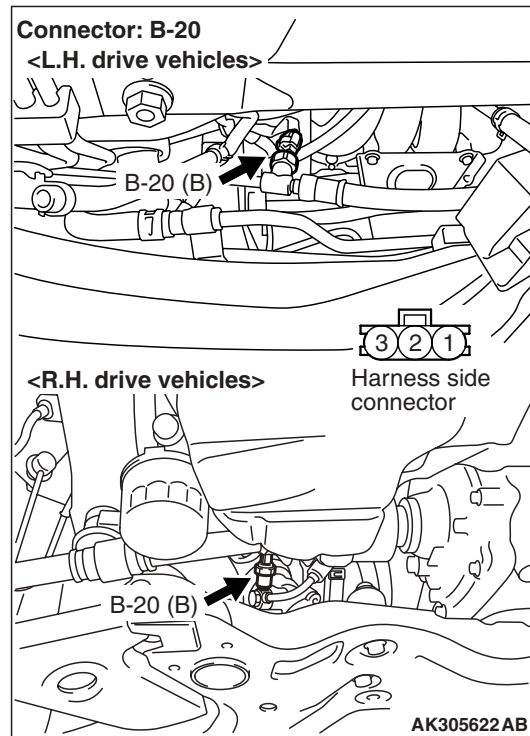
STEP 2. Check for stationary steering effort (Refer to [P.37-10](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Connector check: B-20 power steering fluid pressure sensor connector

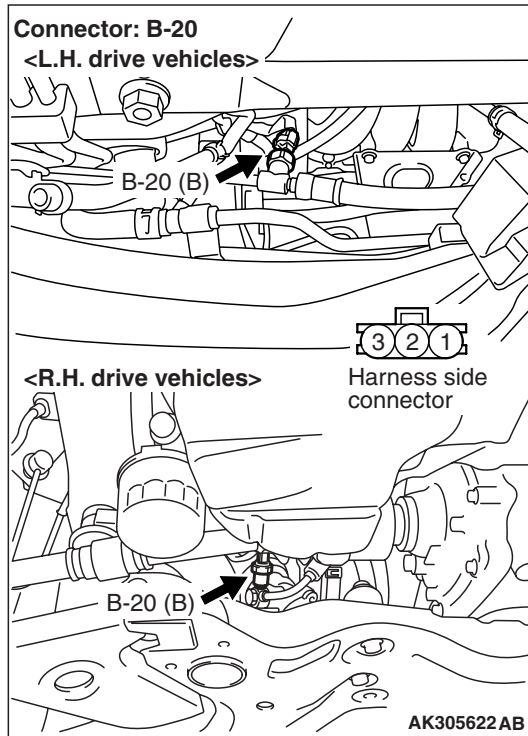


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Perform voltage measurement at B-20 power steering fluid pressure sensor connector.



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

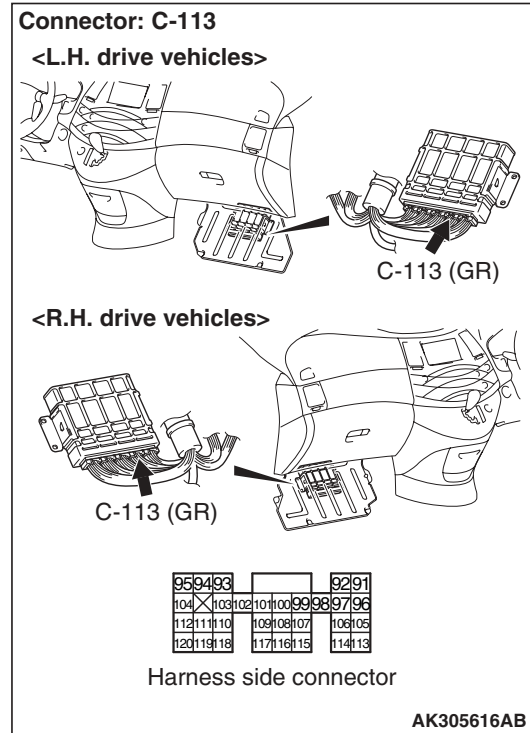
OK: 4.9 – 5.1V

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 5 .

STEP 5. Perform voltage measurement at C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> connector or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No.97 and earth.

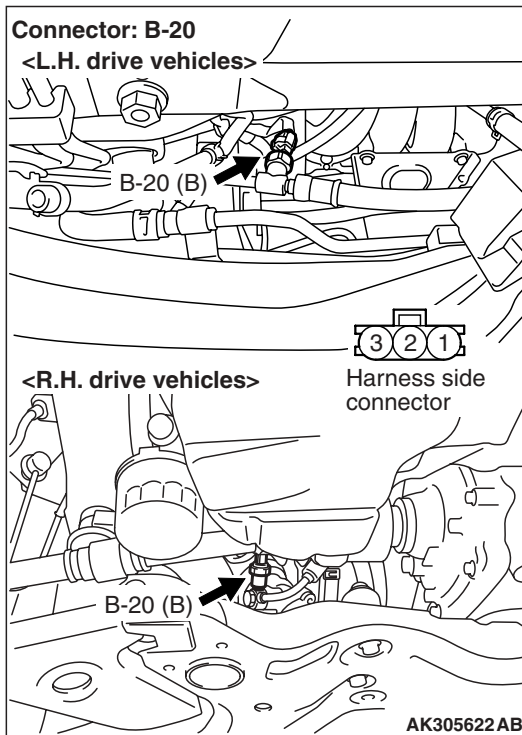
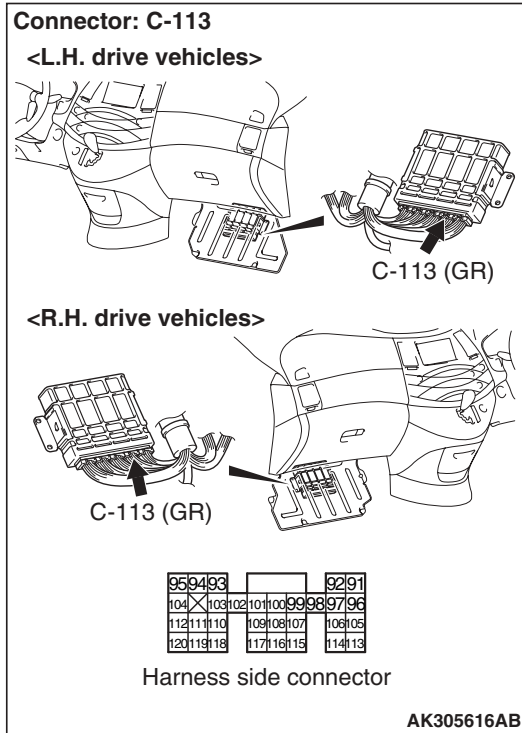
OK: 4.9 – 5.1V

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 7

**STEP 6. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**

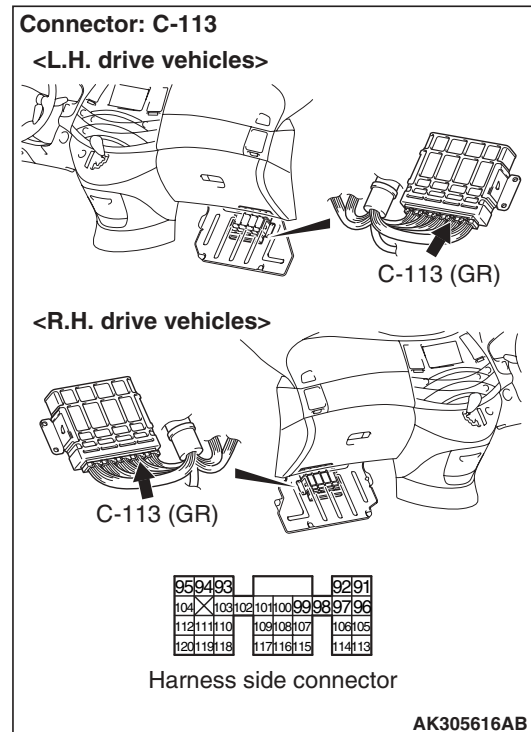


YES : Check intermediate connector B-17, and repair if necessary (R. H. drive vehicles). If intermediate connector is normal, check and repair harness between B-20 (terminal No. 3) power steering pressure sensor connector and C-113 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check power supply line for damage.

NO : Repair or replace.

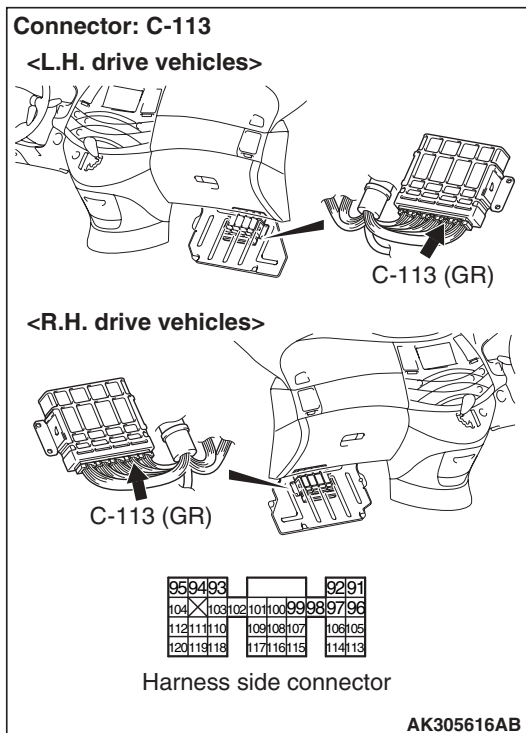
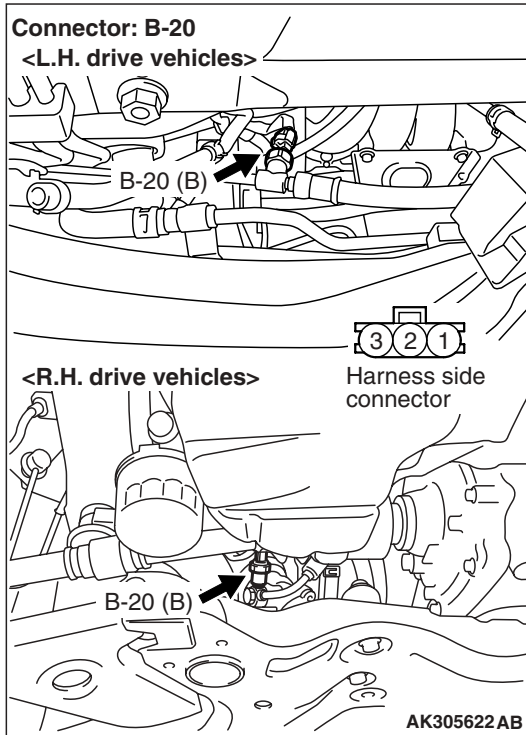
**STEP 7. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair or replace.

Q: Is the check result normal?

STEP 8. Check harness between B-20 (terminal No. 3) power steering fluid pressure sensor connector and C-113 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector B-17, and repair if necessary (R. H. drive vehicles).

- Check power supply line for short circuit.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. MUT-III data list

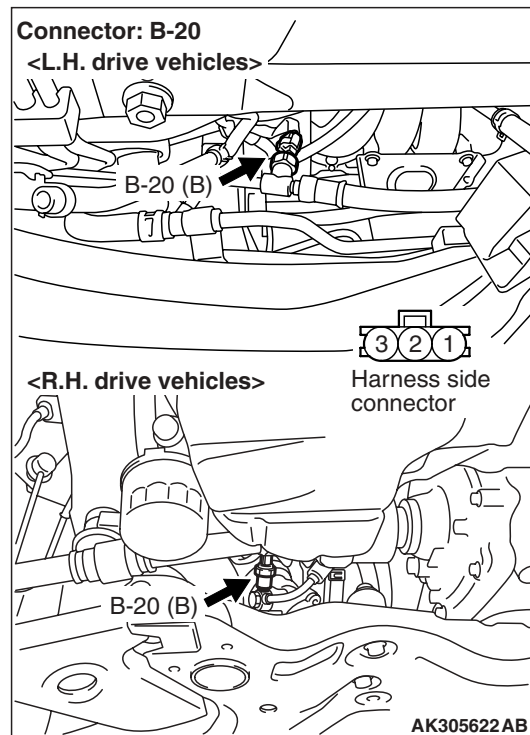
- Refer to Data List Reference Table [P.13A-363](#)
 - a. Item B4: Power steering fluid pressure sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 10. Perform resistance measurement at B-20 power steering fluid pressure sensor



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

OK: 2 Ω or less

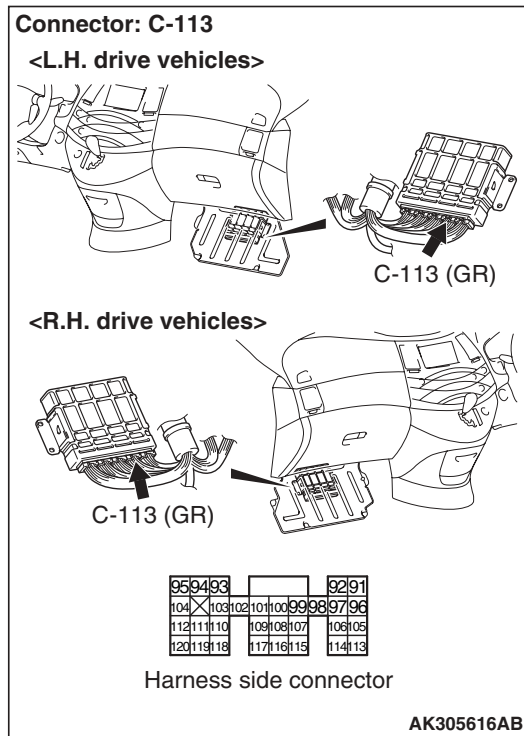
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 11.

**STEP 11. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**

YES : Go to Step 12 .
NO : Repair or replace.

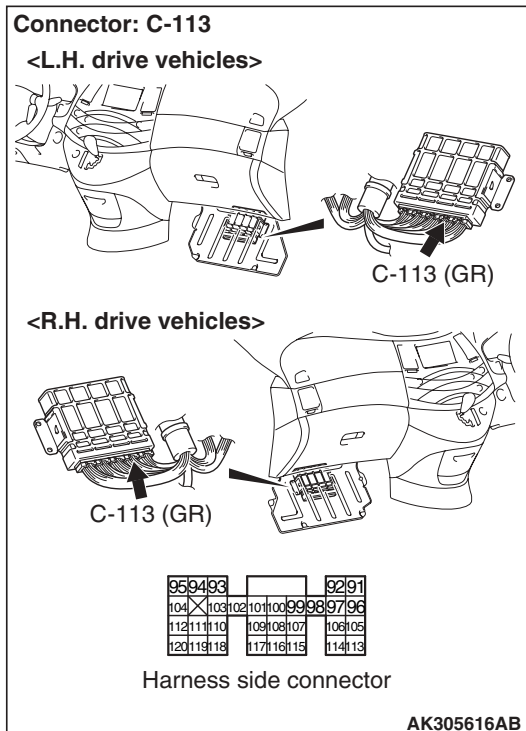
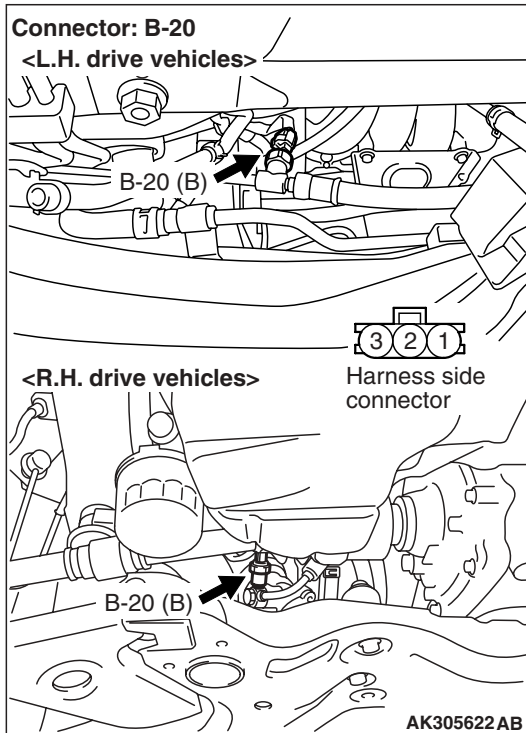


Q: Is the check result normal?

STEP 12. Check harness between B-20 (terminal No. 1) power steering fluid pressure sensor connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

NOTE: Before checking harness, check intermediate connector B-17 (R. H. drive vehicles) and C-116, and repair if necessary.

- Check earthing line for open circuit and damage.



Q: Is the check result normal?

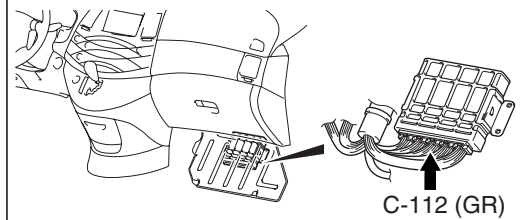
YES : Go to Step 9 .

NO : Repair.

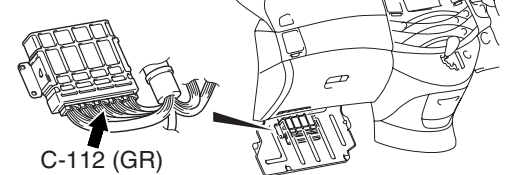
STEP 13. Perform voltage measurement at C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Connector: C-112

<L.H. drive vehicles>



<R.H. drive vehicles>



| | | | | |
|----|----|-----|----|----|
| 64 | 63 | JAE | 62 | 61 |
| 73 | 72 | 71 | 70 | 69 |
| 82 | 81 | 80 | 79 | 78 |
| 89 | 88 | 87 | 86 | 85 |

Harness side connector

AK305617AB

- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 84 and earth.

OK: 1V or less (Steering wheel: Not operated)

Voltage rises (Steering wheel: Operated)

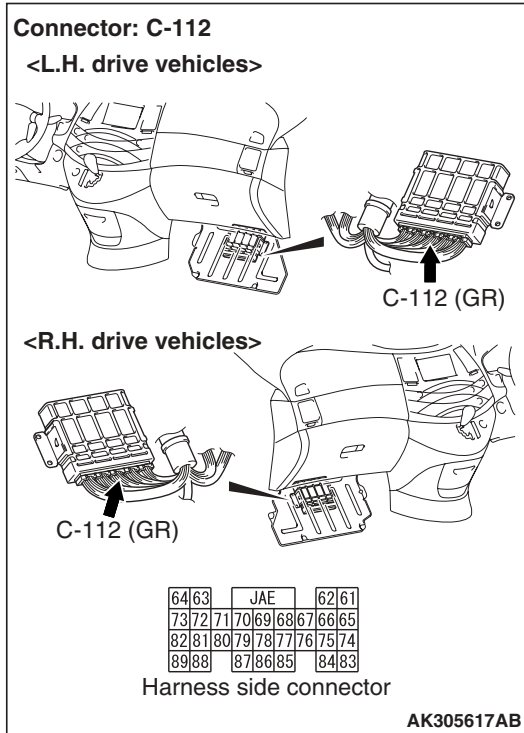
Q: Is the check result normal?

YES : Go to Step 17 .

NO : Go to Step 14 .

**STEP 14. Connector check: C-112 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**

YES : Go to Step 15 .
NO : Repair or replace.



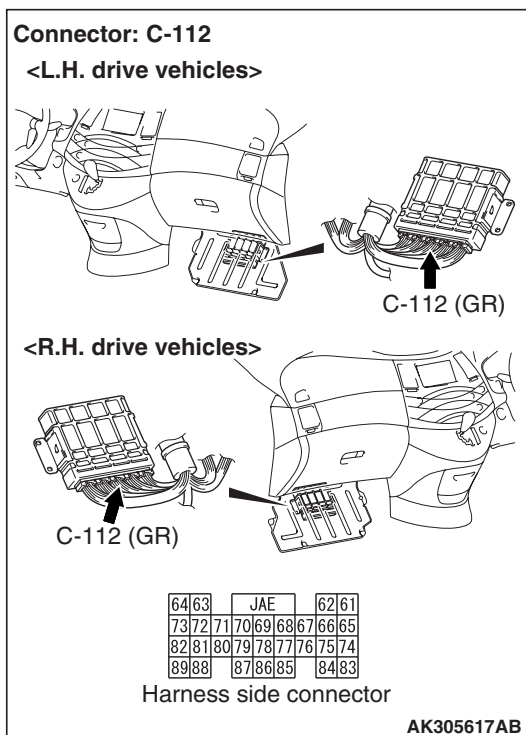
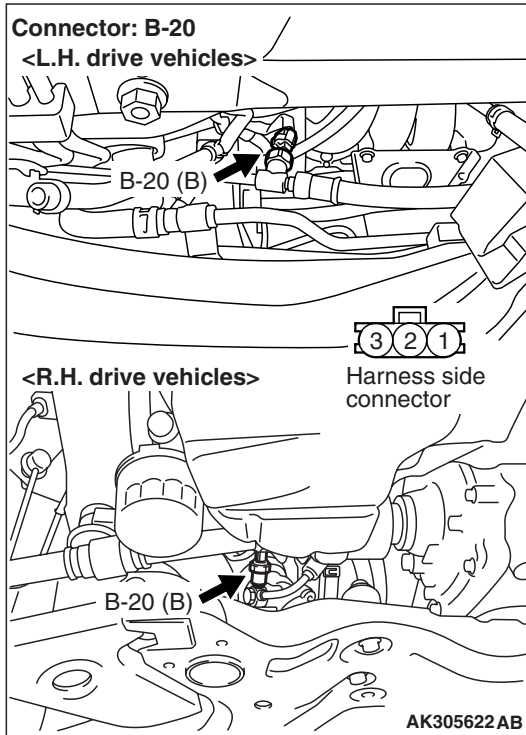
Q: Is the check result normal?

STEP 15. Check harness between B-20 (terminal No. 2) (terminal No. 1) power steering fluid pressure sensor connector and C-112 (terminal No. 84) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Q: Is the check result normal?

YES : Go to Step 16 .

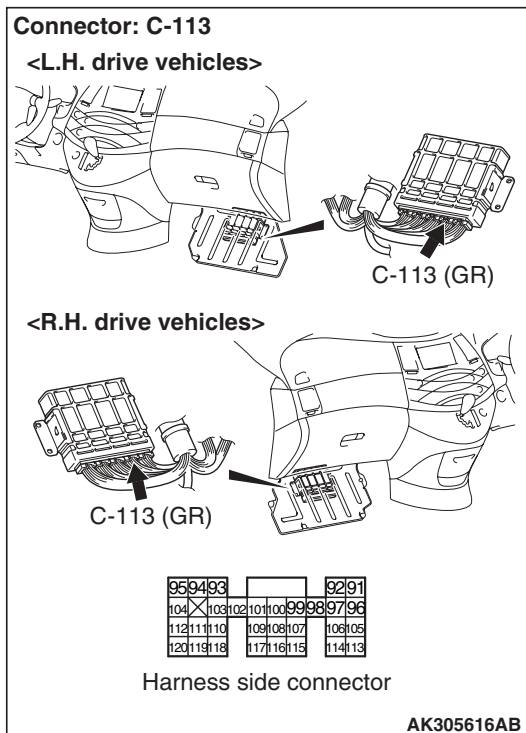
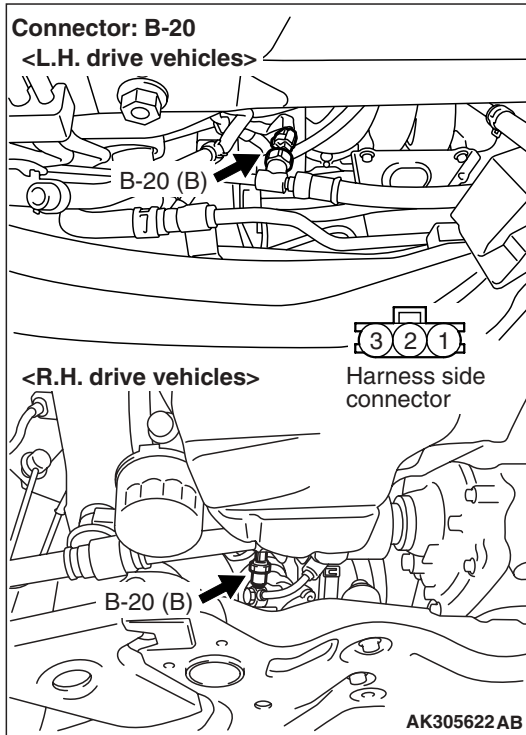
NO : Repair.



NOTE: Before checking harness, check intermediate connector B-17 (R. H. drive vehicles), and repair if necessary.

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

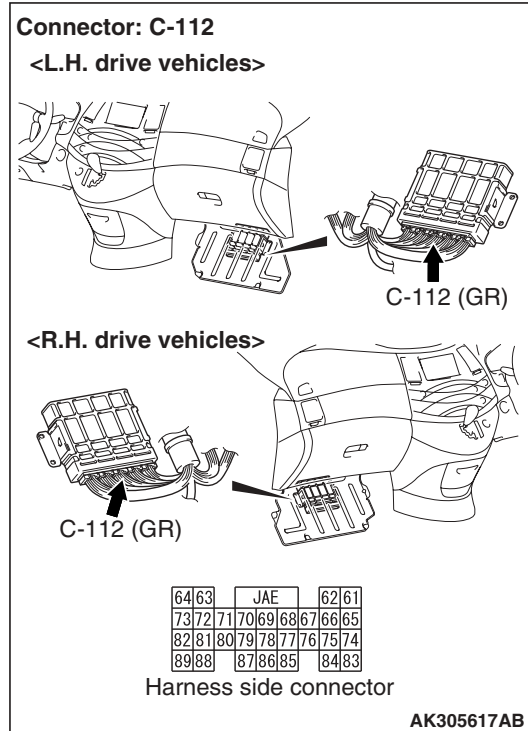
STEP 16. Check harness between B-20 (terminal No. 3) power steering fluid pressure sensor connector and C-113 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



Q: Is the check result normal?

YES : Replace power steering pressure sensor.
NO : Repair.

STEP 17. Connector check: C-112 engine-ECU <M/T> connectors or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

YES : Go to Step 9 .
NO : Repair or replace.

NOTE: Before checking harness, check intermediate connector B-17, and repair if necessary (R. H. drive vehicles).

- Check power supply line for damage.

Code No. P0603: EEP ROM MALFUNCTION

FUNCTION

- To check whether the information such as the idle learned value and so on is stored in the memory of engine-ECU <M/T> or engine-A/T-ECU <A/T>.

TROUBLE JUDGMENT**Check Conditions**

- Ignition switch is in ON position

Judgement Criterion

- The latest learned data that was flashed while the ignition switch was in OFF position are not stored correctly

PROBABLE CAUSE

- Failed the engine-ECU <M/T>
- Failed the engine-A/T-ECU <A/T>

DIAGNOSIS

STEP 1. Reconfirmation of diagnosis codes.**Q: Is the check result normal?**

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P0606: Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Main Processor Malfunction

FUNCTION

- System LSI checks the engine-ECU <M/T> or engine-A/T-ECU <A/T> for abnormal conditions.

TROUBLE JUDGMENT**Check Conditions**

- Ignition switch is ON position.

Judgement Criteria

- No surveillance pulse signals is input for 0.5 second.

PROBABLE CAUSE

- Failed the engine-ECU <M/T>

- Failed the engine-A/T-ECU <A/T>

DIAGNOSIS

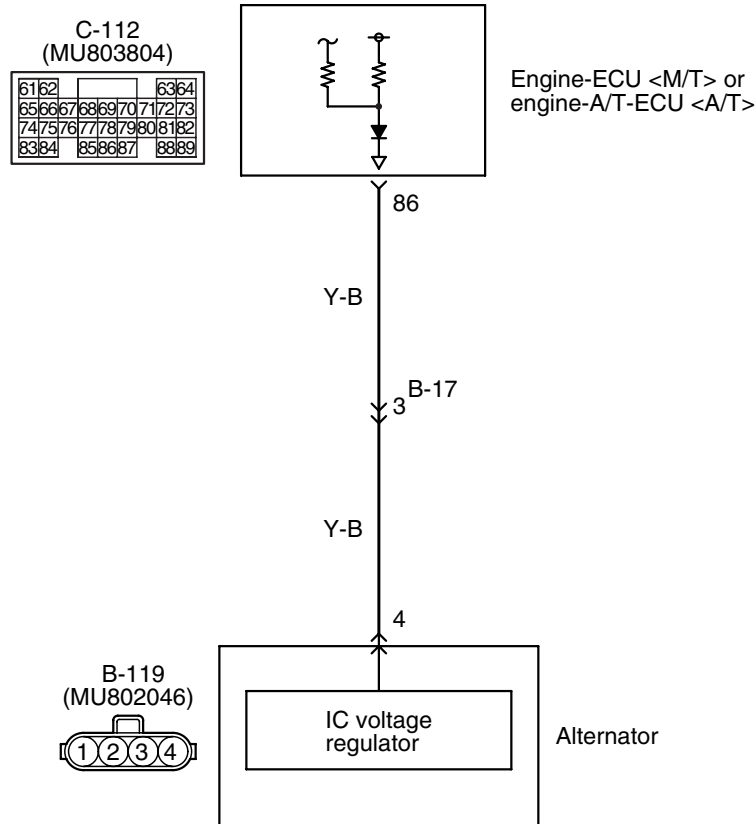
STEP 1. Check the trouble symptoms.**Q: Does trouble symptom persist?**

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P0622: Alternator FR Terminal System

Alternator 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

AK305598AB

OPERATION

- The energized state of the alternator field coil is inputted from the alternator (terminal No. 4) to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 86).

FUNCTION

- A signal of the power supply duty ratio for the alternator field coil is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- In response to the signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 higher.

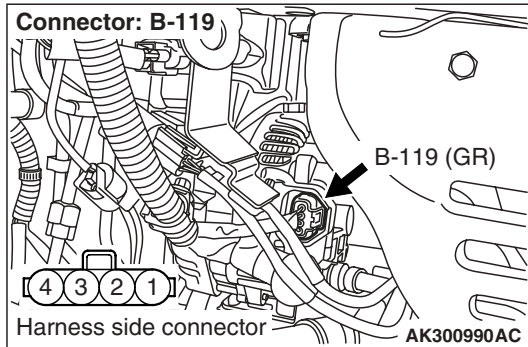
Judgment Criterion

- Input voltage from the alternator FR terminal has continued to be approximately battery positive voltage for 20 seconds.

PROBABLE CAUSE

- Failed alternator
- Open/short circuit in alternator FR terminal circuit or loose connector
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

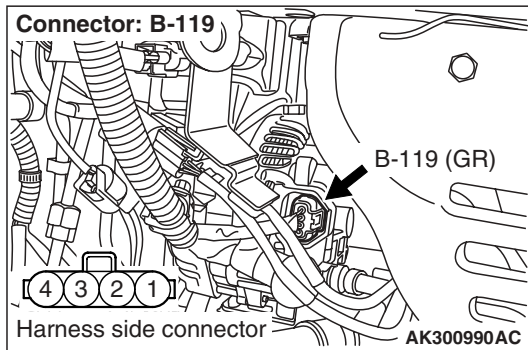
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-119 alternator connector

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform voltage measurement at B-119 alternator connector.

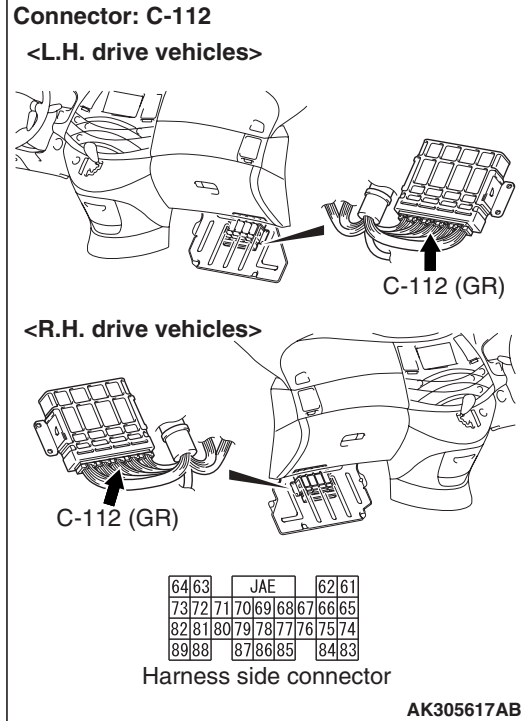
- Disconnect connector, and measure at male connector side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 3 .

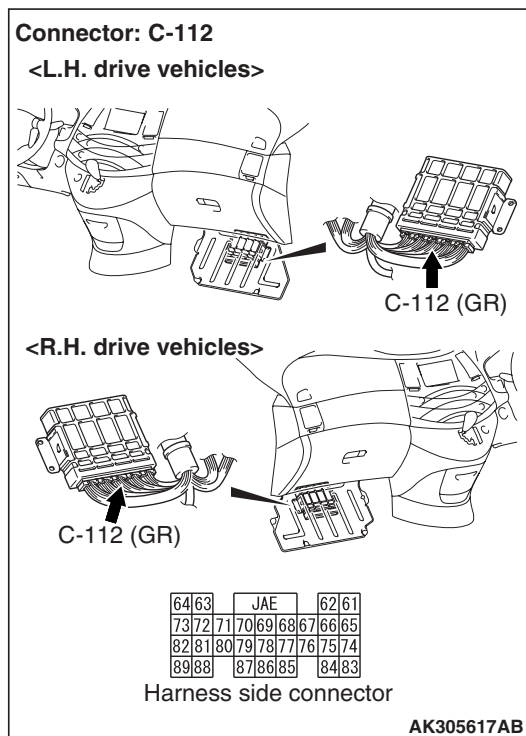
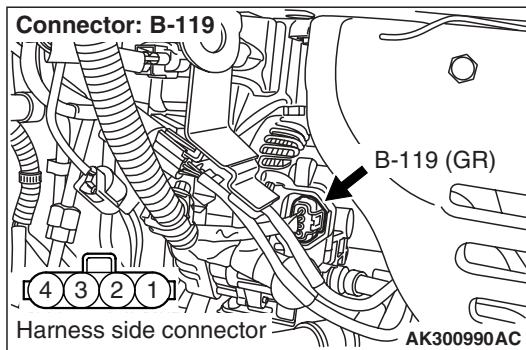
STEP 3. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between B-119 (terminal No. 4) alternator connector and C-112 (terminal No. 86) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

- Check output line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

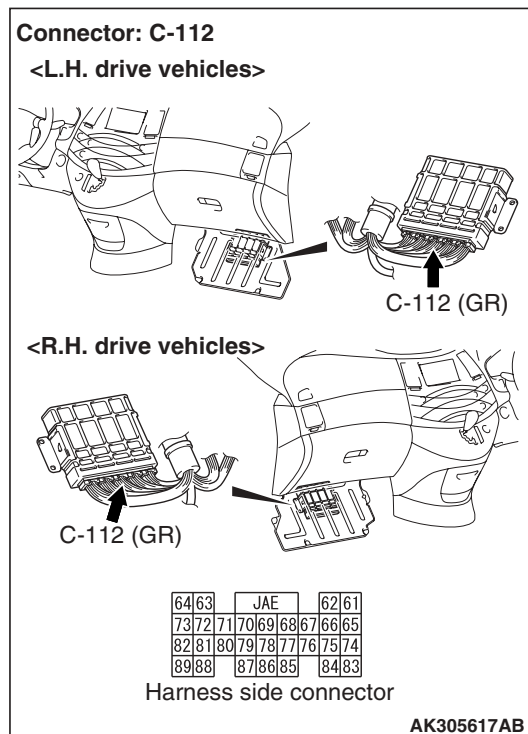
STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

STEP 6. Perform voltage measurement at C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Engine: Idle after warm-up
- Transmission: Neutral <M/T> or P range <A/T>
- Radiator fan: Inactive
- Voltage between terminal No. 86 and earth.

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

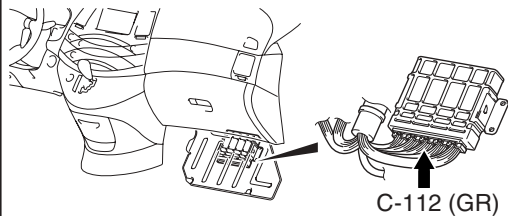
Q: Is the check result normal?

YES : Go to Step 7 .

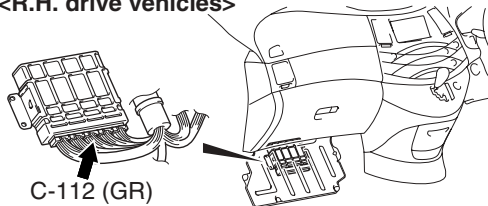
NO : Go to Step 5 .

STEP 7. Check harness between B-119 (terminal No. 4) alternator connector and C-112 (terminal No. 86) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Connector: C-112
<L.H. drive vehicles>



<R.H. drive vehicles>

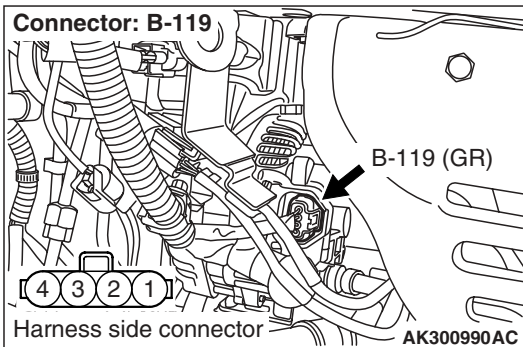


| | | | | |
|----|----|-----|----|----|
| 64 | 63 | JAE | 62 | 61 |
| 73 | 72 | 71 | 70 | 69 |
| 68 | 67 | 66 | 65 | |
| 82 | 81 | 80 | 79 | 78 |
| 77 | 76 | 75 | 74 | |
| 89 | 88 | 87 | 86 | 85 |
| 84 | 83 | | | |

Harness side connector

AK305617AB

Connector: B-119



Harness side connector

AK300990AC

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

- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. 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.00-5](#)).

Code No. P0638: Throttle Valve Control Servo Circuit Range/Performance Problem

OPERATION

- Refer to P0657 – Throttle valve control servo circuit [P.13A-218](#).
- Refer to P2101 – Throttle valve control servo circuit [P.13A-239](#).

FUNCTION

- engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the electronic controlled throttle system for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Battery positive voltage is 8.3 V or higher.
- Throttle position sensor (main) output voltage is 0.35 – 4.8 V.
- Drop of throttle position sensor (main) output voltage per 100 milliseconds is 0.04 V or more.

Judgement Criterion

- Throttle position sensor (main) output voltage has continued to be above 0.5 V higher than the target throttle position sensor (main) voltage for 0.5 second.

Check Conditions

- Battery positive voltage is 8.3 V or higher.
- Throttle position sensor (main) output voltage is 0.35 – 4.8 V.

Judgement Criterion

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is 1 V or higher for 4 seconds.

PROBABLE CAUSE

- Failed throttle valve return spring.
- Failed throttle valve operation.
- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo connector contact.
- Failed engine-ECU <M/T>.
- Failed engine-A/T-ECU <A/T>.

DIAGNOSIS

STEP 1. MUT-III data list

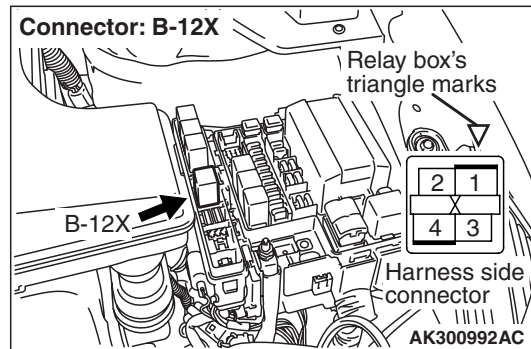
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 9A: Throttle position sensor (main) mid opening learning value

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Replace throttle body assembly.

STEP 2. Connector check: B-12X throttle valve control servo relay connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Check throttle valve control servo relay itself.

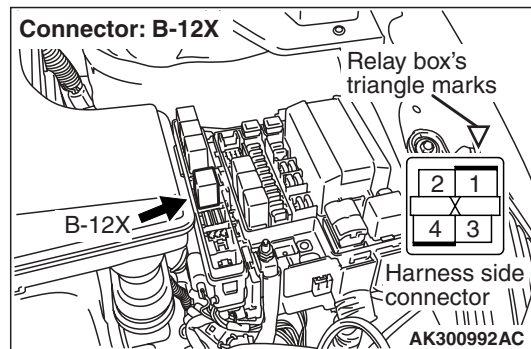
- Check throttle valve control servo relay (Refer to [P.13A-394](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

STEP 4. Perform voltage measurement at B-12X throttle valve control servo relay connector.



- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth.

OK: System voltage

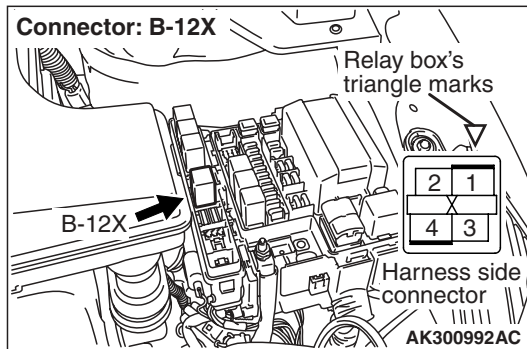
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check and repair harness between B-12X (terminal No. 4) throttle valve control servo relay connector and battery.

- Check power supply line for open/short circuit.

STEP 5. Perform voltage measurement at B-12X throttle valve control servo relay connector.



- Remove relay, and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

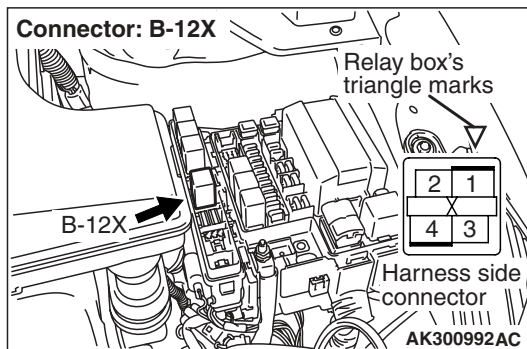
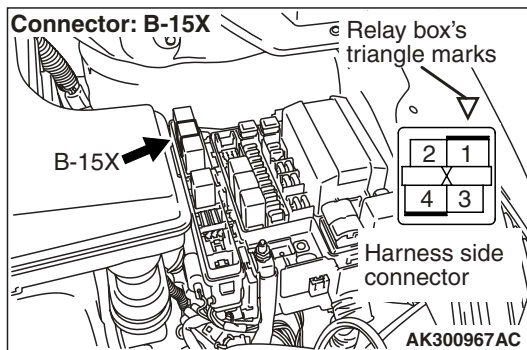
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 6 .

STEP 6. Connector check: B-15X engine control relay connector



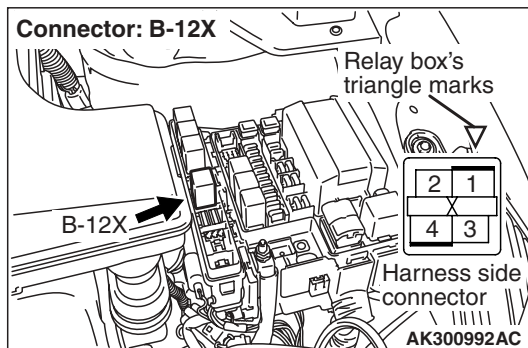
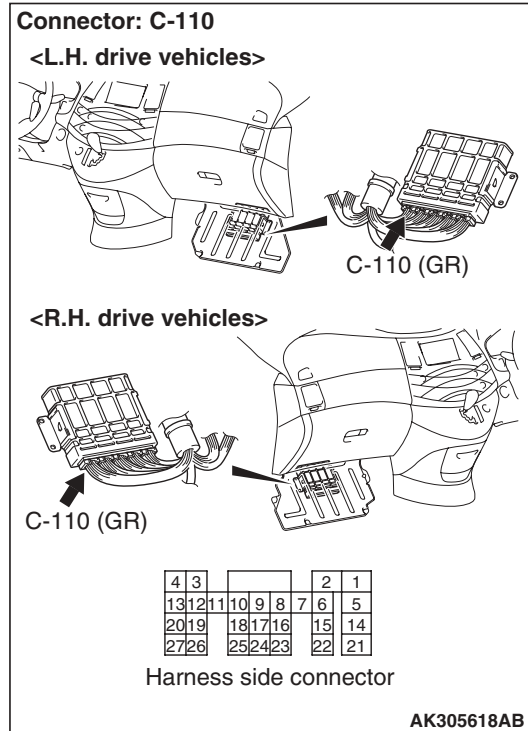
Q: Is the check result normal?

YES : Check and repair harness between B-15X (terminal No. 1) engine control relay connector and B-12X (terminal No. 3) throttle valve control servo relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 7. Perform voltage measurement at C-110 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 15 and earth.

OK: System voltage

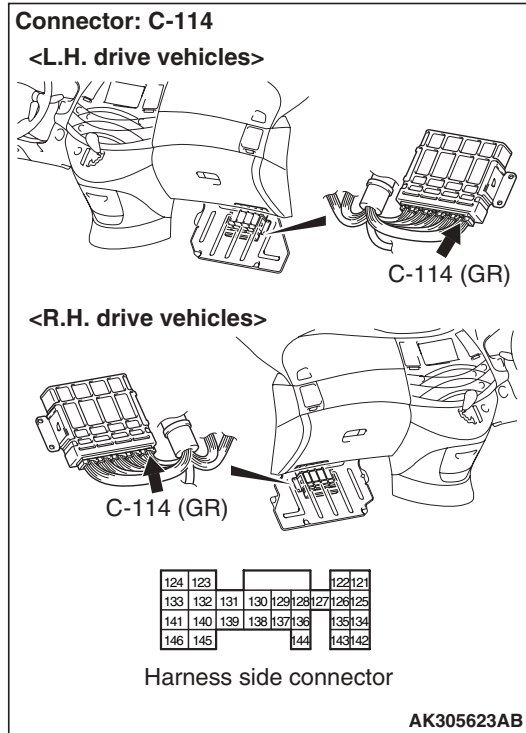
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Check and repair harness between B-12X (terminal No. 2) throttle valve control servo relay connector and C-110 (terminal No. 15) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

STEP 8. Perform voltage measurement at C-114 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 132 and earth.

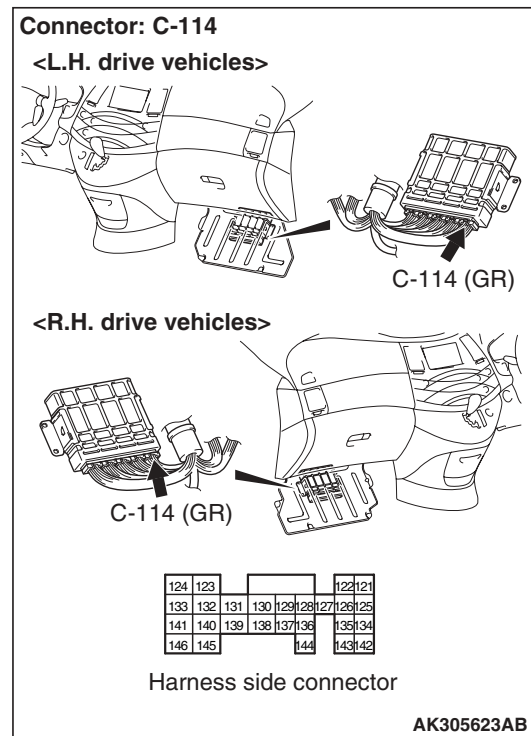
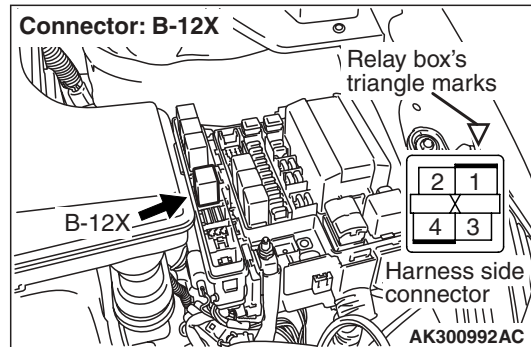
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 9 .

STEP 9. Check harness between B-12X (terminal No. 1) throttle valve control servo relay connector and C-114 (terminal No. 132) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



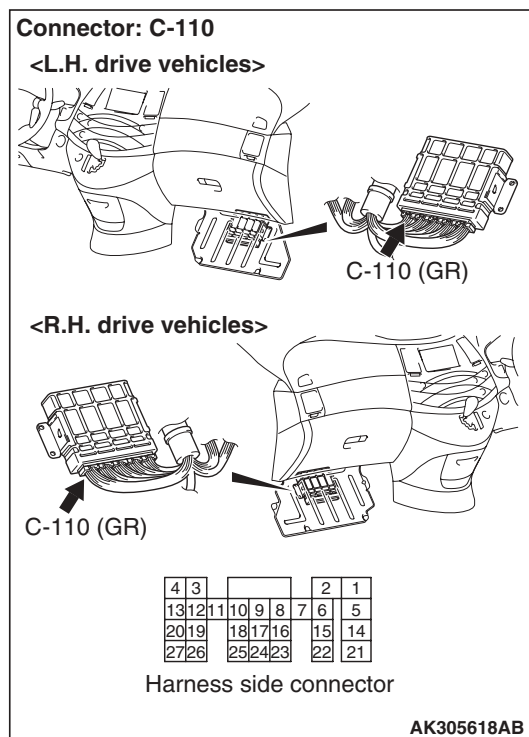
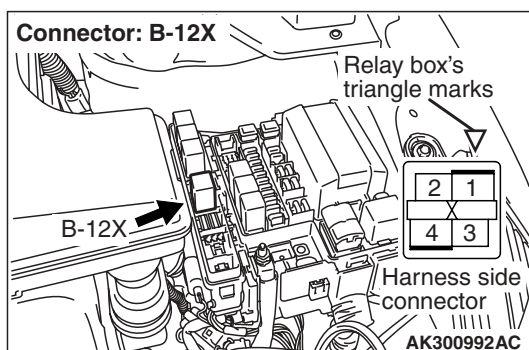
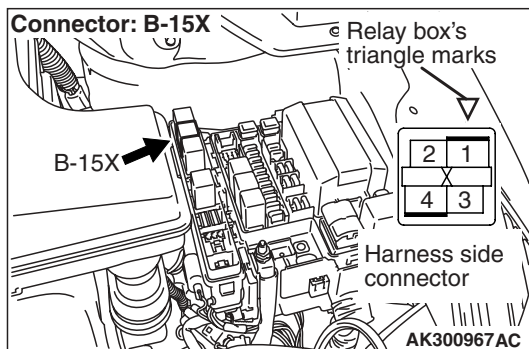
- Check output line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Check harness between B-15X (terminal No. 1) engine control relay connector and B-12X (terminal No. 3) throttle valve control servo relay connector.



- Check output line for damage.

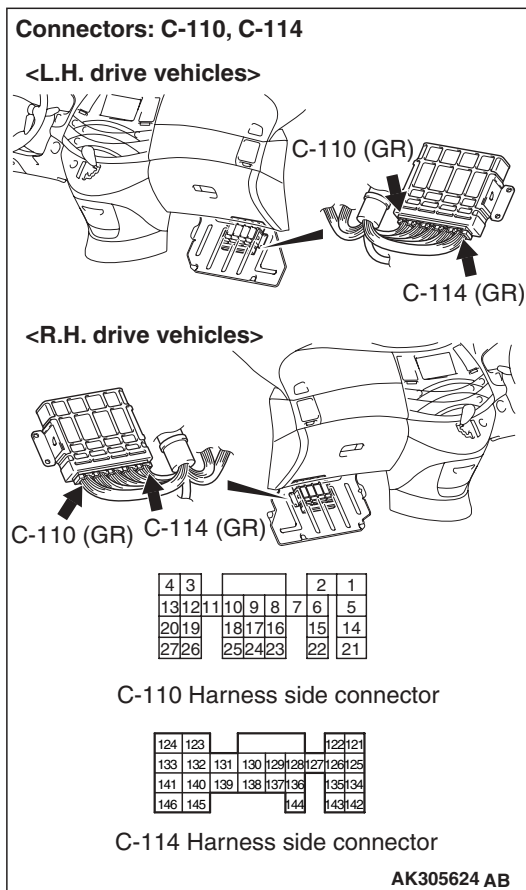
Q: Is the check result normal?

YES : Check and repair harness between B-12X (terminal No. 2) throttle valve control servo relay connector and C-110 (terminal No. 15) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

NO : Repair.

STEP 11. Connector check: C-114 and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

YES : Go to Step 12 .

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

STEP 12. Check the throttle valve control servo itself.

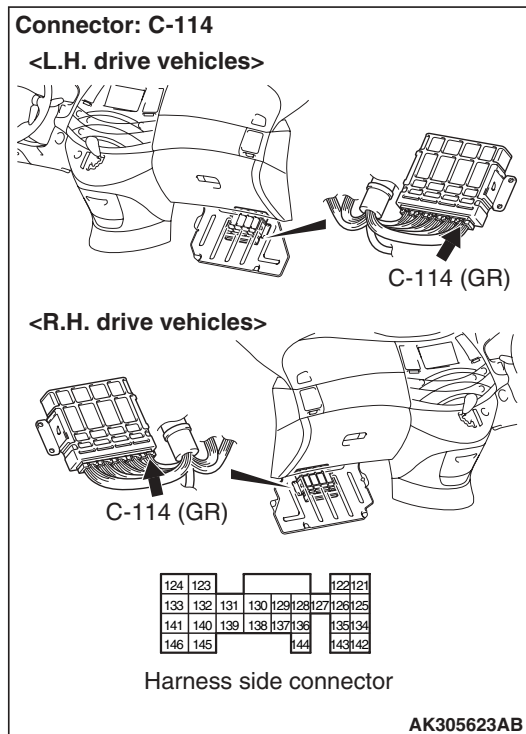
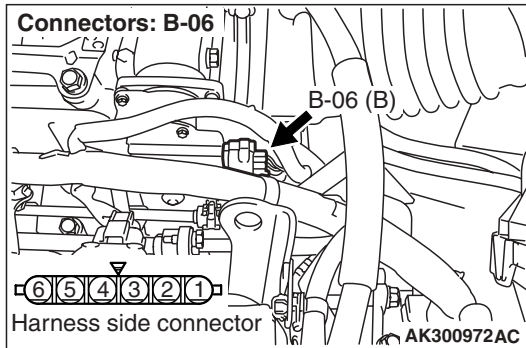
- Check the throttle valve control servo control motor itself (Refer to P.13A-394)

Q: Is the check result normal?

YES : Go to Step 13 .

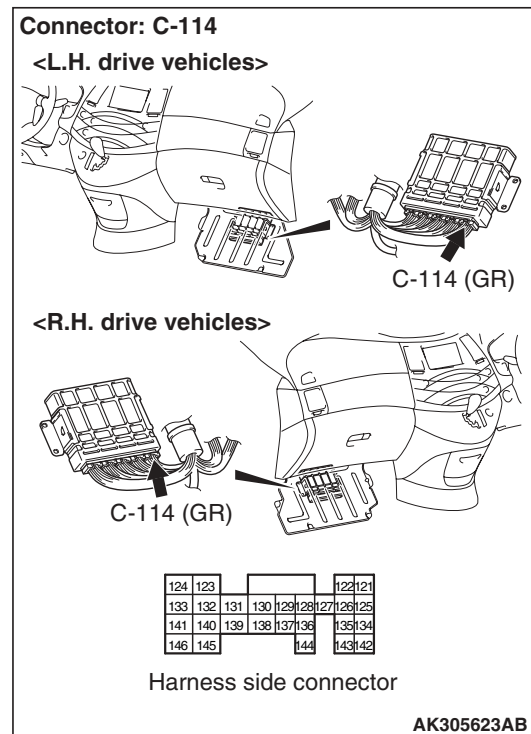
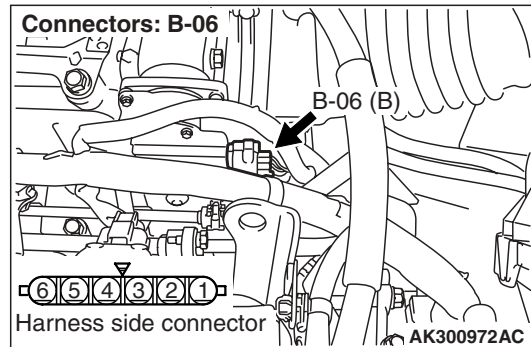
NO : Replace electronic-controlled throttle valve.

STEP 13. Connector check: B-06
electronic-controlled throttle valve connector
and C-114 engine-ECU <M/T> connector or
engine-A/T-ECU <A/T> connector



Q: Is the check result normal?
YES : Go to Step 14 .
NO : Repair or replace.

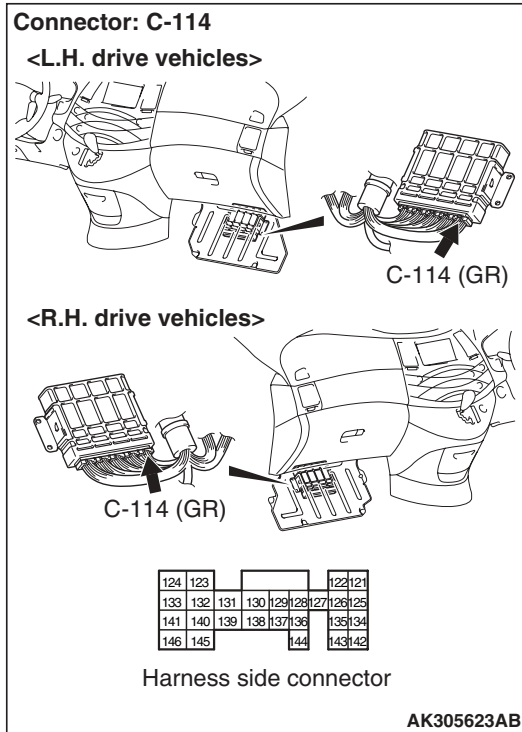
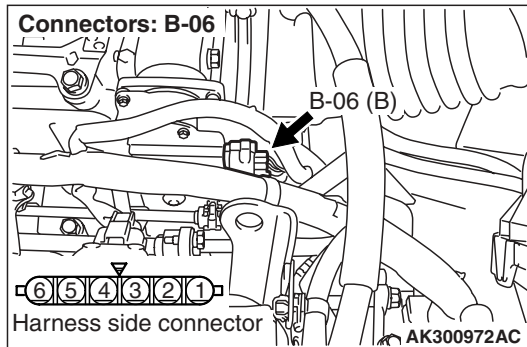
STEP 14. Check harness between B-06 (terminal No. 1) electronic-controlled throttle valve connector and C-114 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit and damage.

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

STEP 15. Check harness between B-06 (terminal No. 2) electronic-controlled throttle valve connector and C-114 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit and damage.

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 <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P0642: Throttle Position Sensor Power Supply

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the throttle position sensor power voltage for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Battery positive voltage is 6.3 V or higher.

Judgement Criteria

- Throttle position sensor power voltage is 4.1 V or less for 0.5 second.

PROBALE CAUSE

- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

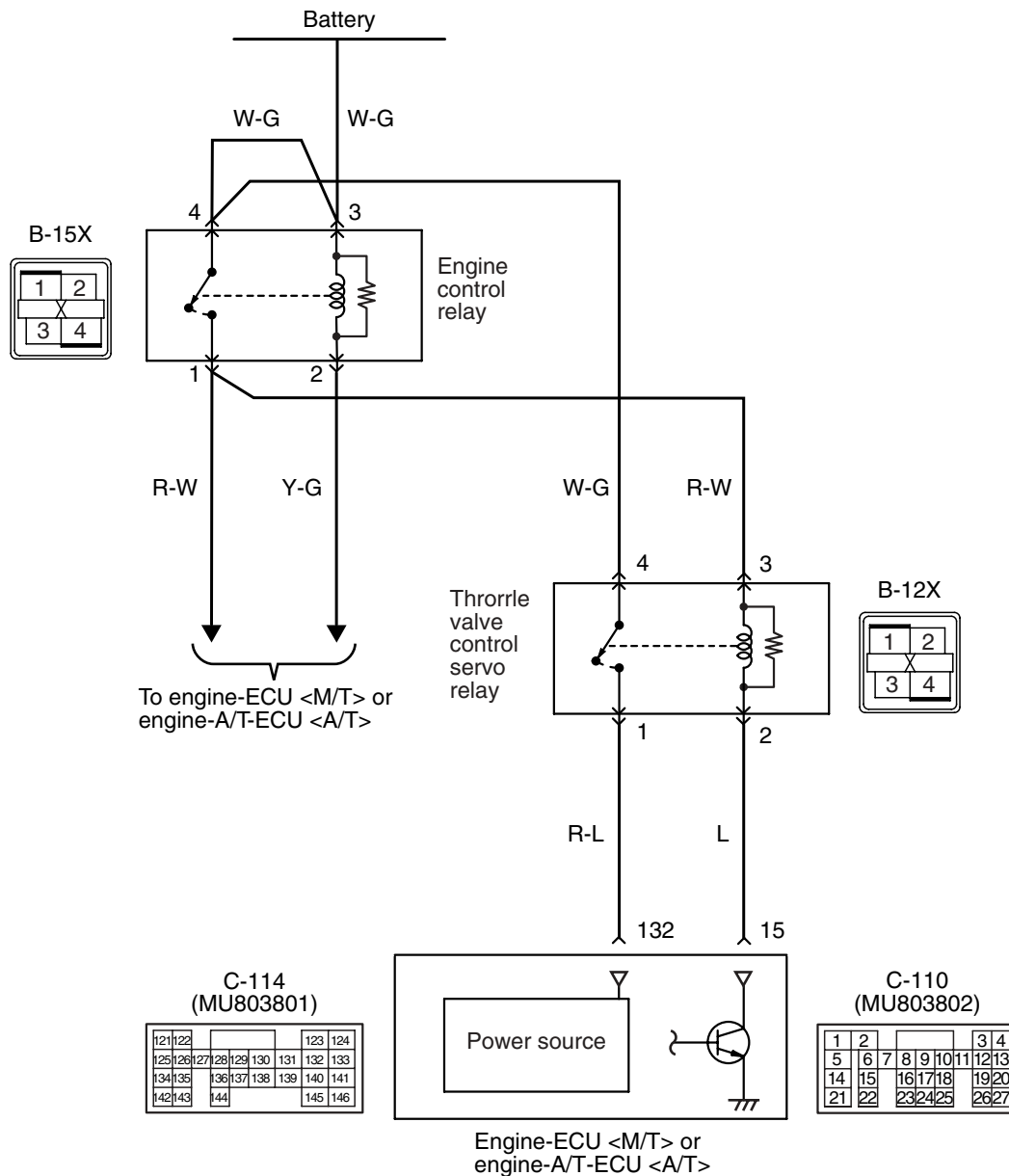
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

STEP 1. Check the trouble symptoms.

Q: Does trouble symptom persist?

Code No. P0657: Throttle Valve Control Servo Relay Circuit Malfunction

Throttle valve control servo relay circuit



AK305568AB

OPERATION

- Battery voltage is applied to the throttle valve control servo relay terminal (terminal No. 4).
- Battery voltage is applied to the throttle valve control servo relay terminal (terminal No. 3) from the engine control relay (terminal No. 1).

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 15) applies current to the throttle valve control servo relay coil by turning ON the power transistor in the unit in order to turn the relay ON.

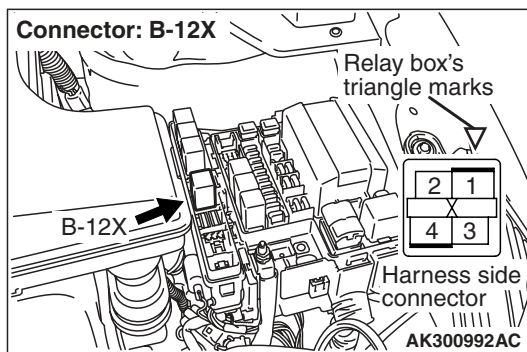
- When the throttle valve control servo relay turns ON, battery voltage is supplied by the throttle valve control servo relay (terminal No. 1) to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 132).

FUNCTION

- When the ignition switch ON signal is input into the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> turns ON the Throttle valve control servo.

DIAGNOSIS

STEP 1. Connector check: B-12X throttle valve control servo relay connector



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Check throttle valve control servo relay itself.

- Check throttle valve control servo relay itself (Refer to [P.13A-389](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in ON position.

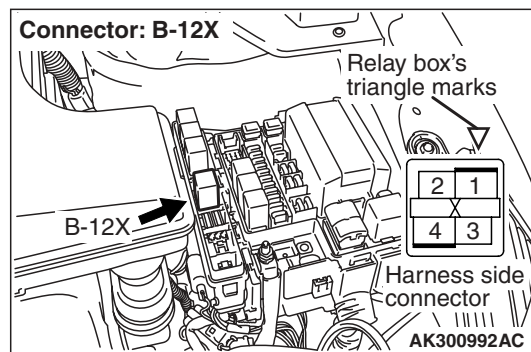
Judgement Criterion

- The power line voltage of the electronic controlled throttle system is 4.0 V or less for 1 second.

PROBABLE CAUSE

- Failed throttle valve return spring
- Open/short circuit in throttle valve control servo circuit or loose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

STEP 3. Perform voltage measurement at B-12X throttle valve control servo relay connector.



- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth.

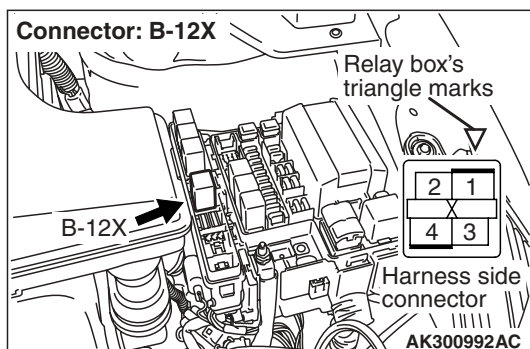
OK: System voltage

Q: Is the check result normal?

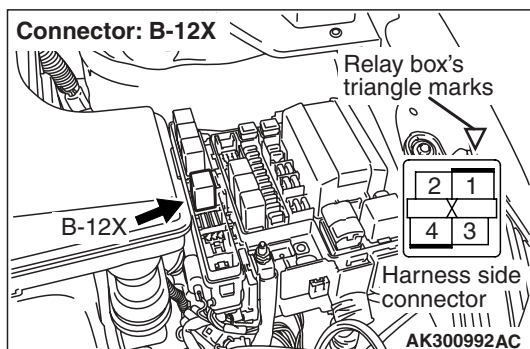
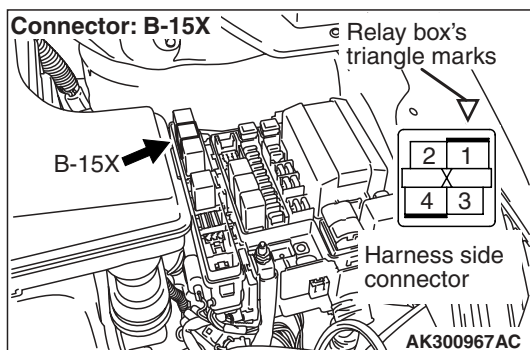
YES : Go to Step 4 .

NO : Check and repair harness between B-12X (terminal No. 4) throttle valve control servo relay connector and battery.

- Check power supply line for open/short circuit.

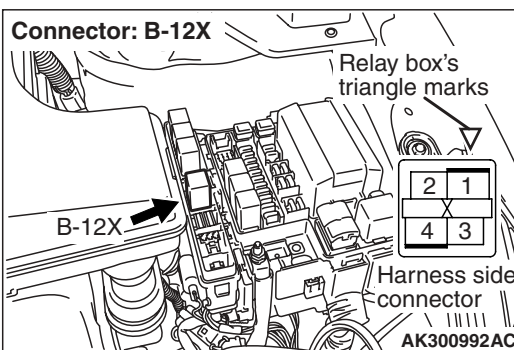
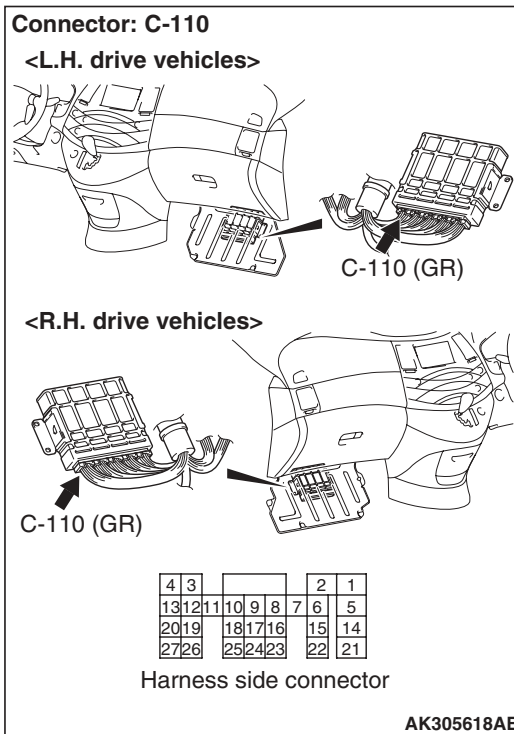
STEP 4. Perform voltage measurement at B-12X throttle valve control servo relay connector.

- 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 6 .**STEP 5. Connector check: B-15X engine control relay connector****Q: Is the check result normal?**

YES : Check and repair harness between B-15X (terminal No. 1) engine control relay connector and B-12X (terminal No. 3) throttle valve control servo relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.**STEP 6. Perform voltage measurement at C-110 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.**

- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 15 and earth.

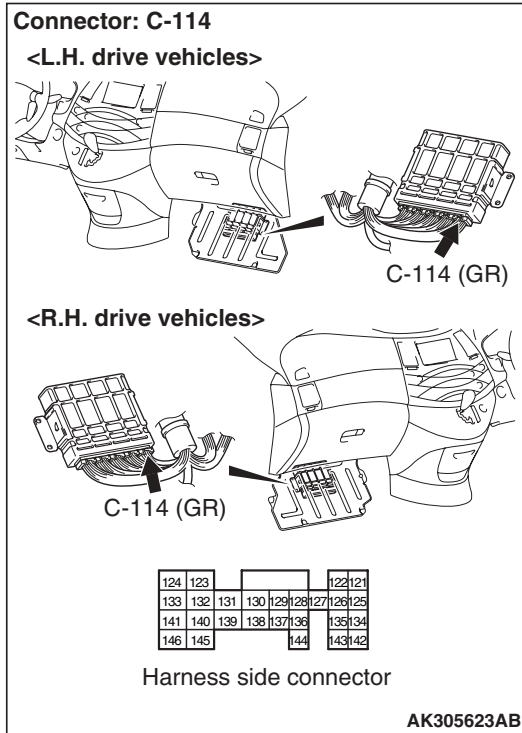
OK: System voltage**Q: Is the check result normal?**

YES : Check and repair harness between B-12X (terminal No. 2) throttle valve control servo relay connector and C-110 (terminal No. 15) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

NO : Go to Step 7 .

STEP 7. Perform voltage measurement at C-114 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 132 and earth.

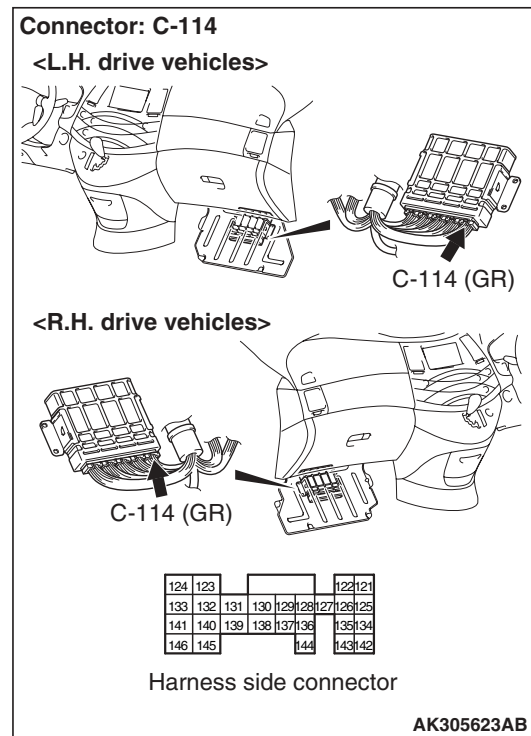
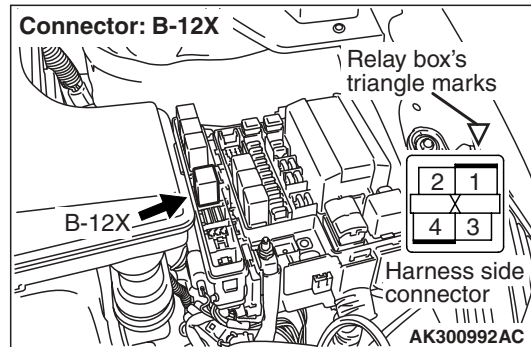
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 .

STEP 8. Check harness between B-12X (terminal No. 1) throttle valve control servo relay connector and C-114 (terminal No. 132) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



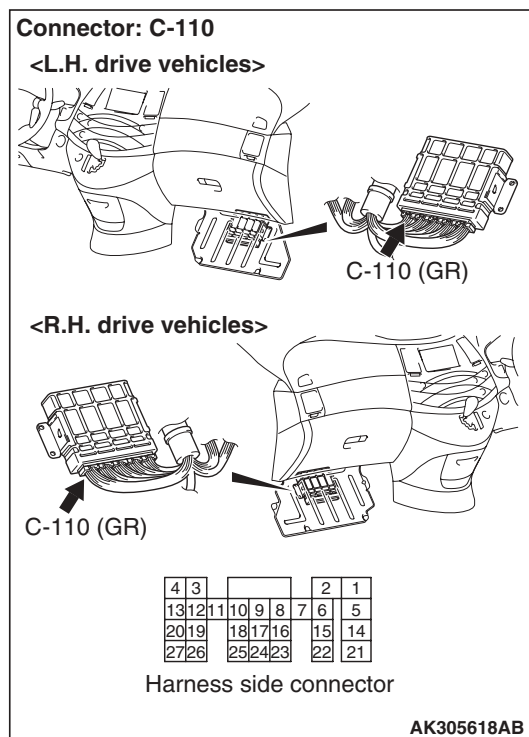
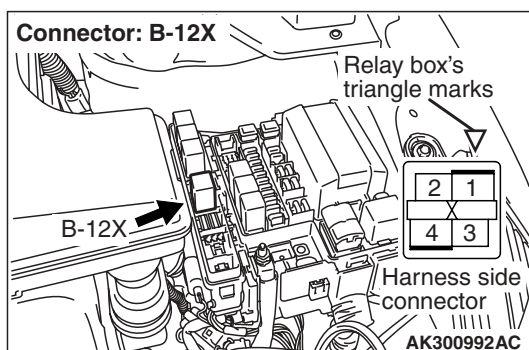
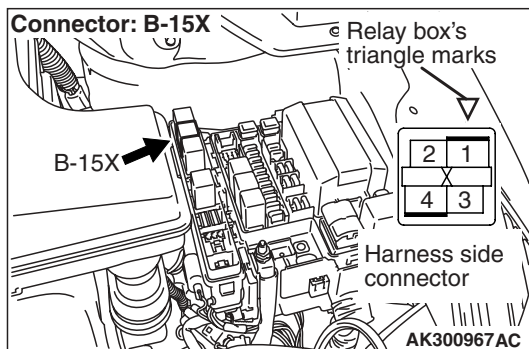
- Check output line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check harness between B-15X (terminal No. 1) engine control relay connector and B-12X (terminal No. 3) throttle valve control servo relay connector.

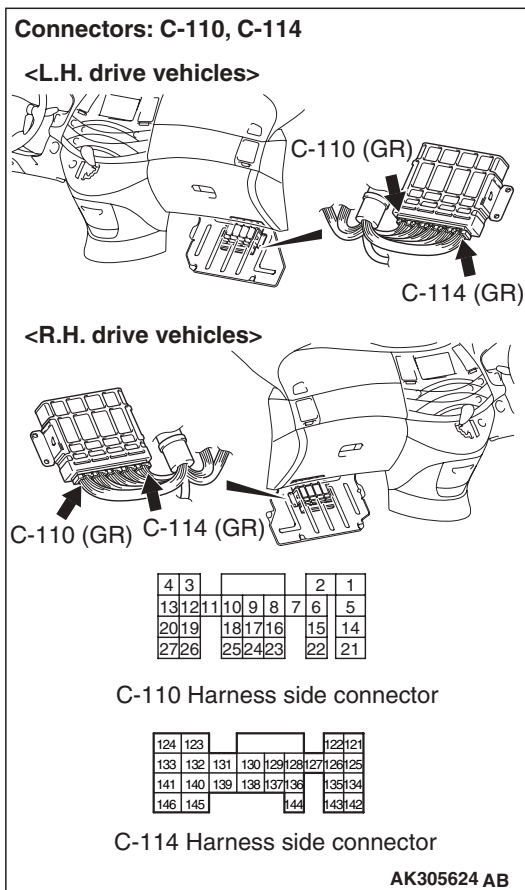


YES : Check and repair harness between B-12X (terminal No. 2) throttle valve control servo relay connector and C-110 (terminal No. 15) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

NO : Repair.

STEP 10. Connector check: C-114 and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

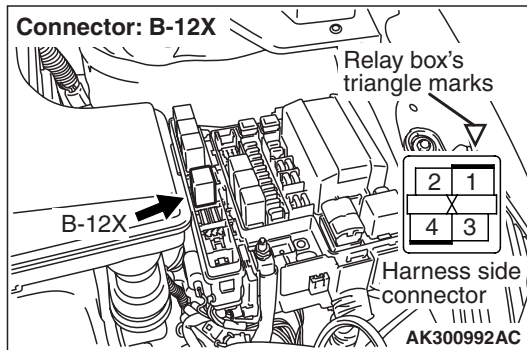
YES : Go to Step 11 .

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

- Check output line for damage.

Q: Is the check result normal?

STEP 11. Check and repair harness between B-12X (terminal No. 4) throttle valve control servo relay connector and battery.



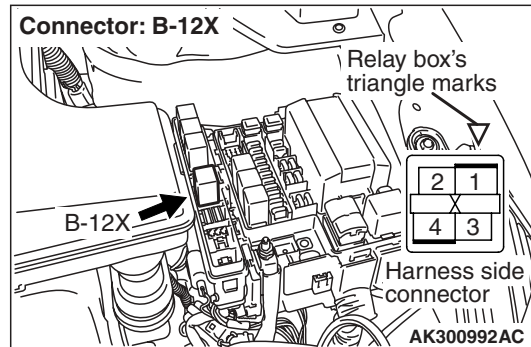
- Check power supply line for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 12 .

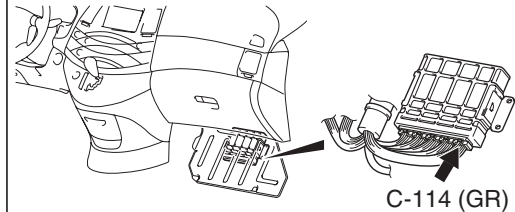
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

STEP 12. Check and repair harness between B-12X (terminal No. 1) throttle valve control servo relay connector and C-114 (terminal No. 132) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

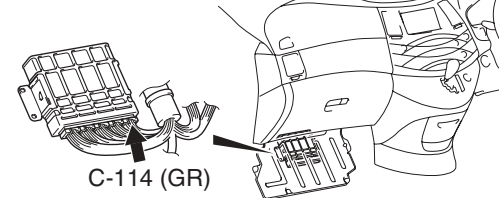


Connector: C-114

<L.H. drive vehicles>



<R.H. drive vehicles>



| | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| 124 | 123 | | | | 122 | 121 |
| 133 | 132 | 131 | 130 | 129 | 128 | 127 |
| 141 | 140 | 139 | 138 | 137 | 136 | 135 |
| 146 | 145 | | | 144 | 143 | 142 |

Harness side connector

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- Check power supply line for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 13 .

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

STEP 13. Check the trouble symptoms.

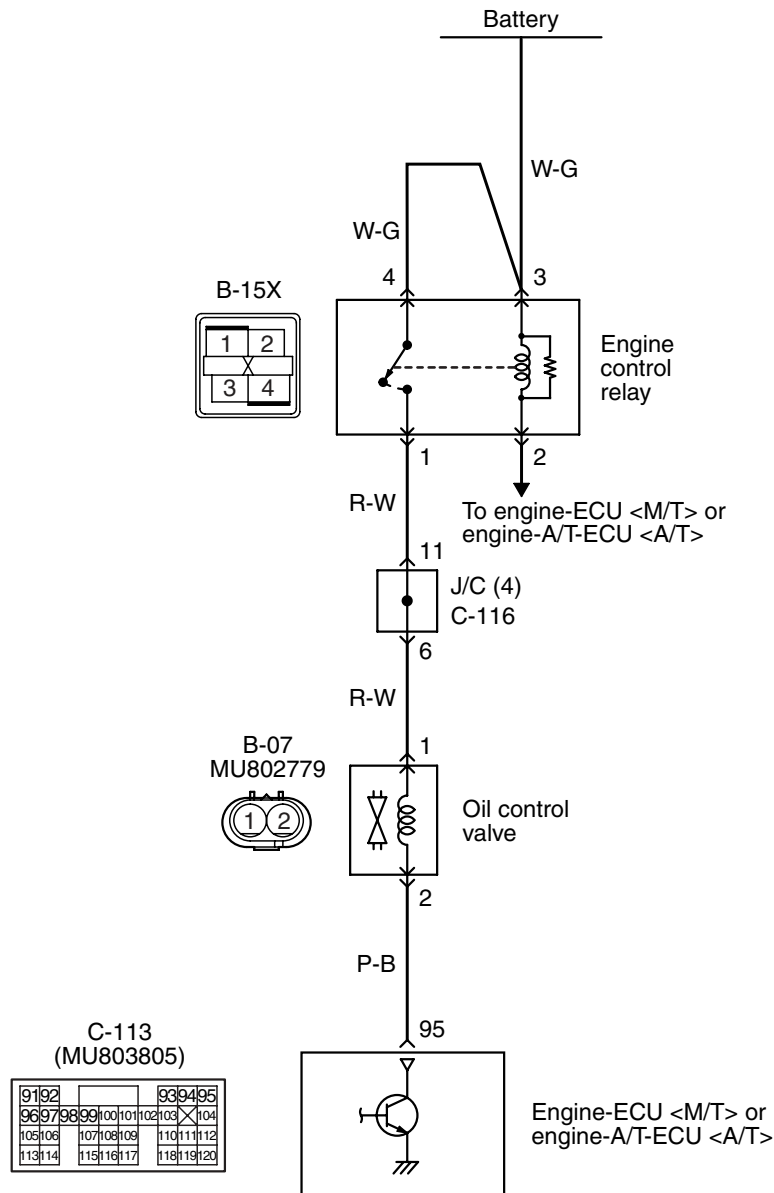
Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or
engine-A/T-ECU <A/T>.

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

Code No. P1021: Oil Control Valve Circuit

Oil control 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

AK305599AB

OPERATION

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

1).

- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 95) makes the power transistor in the unit be in ON position, and that makes currents go on the oil control valve (terminal No. 2).

FUNCTION

- The oil control valve switches the cams to operate the MIVEC in the low-speed or high-speed mode in accordance with the signals from the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is "ON" position
- Battery positive voltage is higher than 10 V.
- MIVEC operating in the low-speed mode.

Judgment Criteria

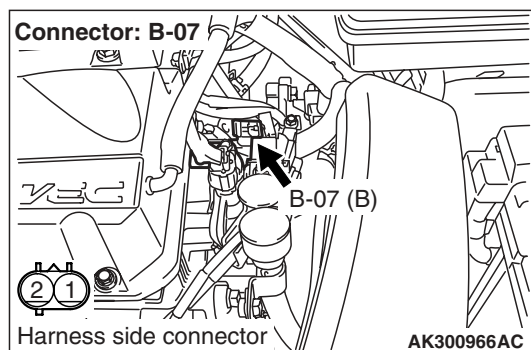
- The engine-ECU terminal voltage of oil control valve circuit is less than 1.5 V for 2 seconds.

PROBABLE CAUSE

- Failed purge oil control valve
- Open/short circuit in oil control valve circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

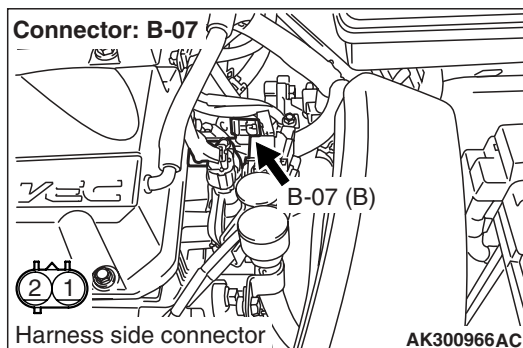
STEP 1. Connector check: B-07 oil control valve connector



Q: Is the check result normal?

YES : Go to Step 2 .
NO : Repair or replace.

STEP 2: Perform resistance measurement at B-07 oil control valve connector.



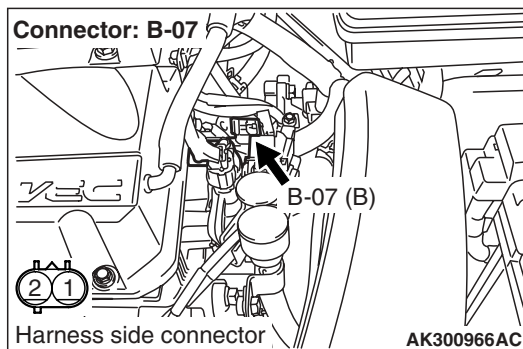
- Disconnect connector, and measure at control valve side.
- Resistance between terminal No. 1 and No. 2.

OK: 6.9 – 7.9 Ω (at 20°C)

Q: Is the check result normal?

YES : Go to Step 3 .
NO : Replace oil control valve.

STEP 3. Perform voltage measurement at B-07 oil control valve connector.



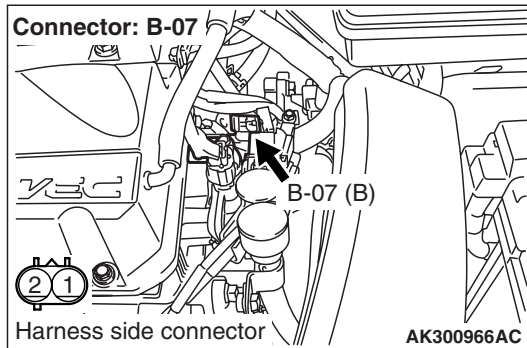
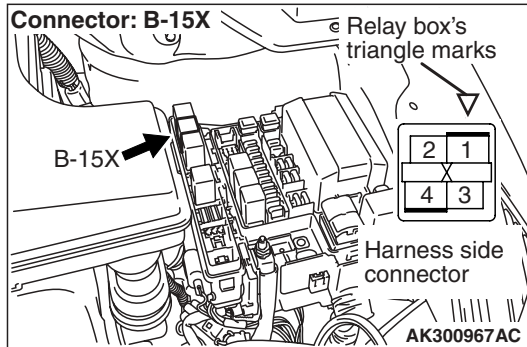
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .
NO : Go to Step 4 .

STEP 4. Connector check: B-15X engine control relay connector



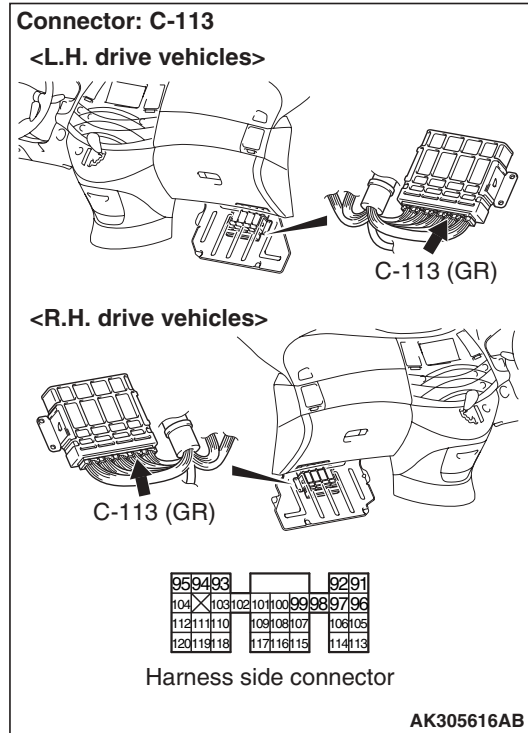
Q: Is the check result normal?

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-07 (terminal No. 1) oil control valve connector and B-15X (terminal No. 1) engine control relay connector.

- Check power line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



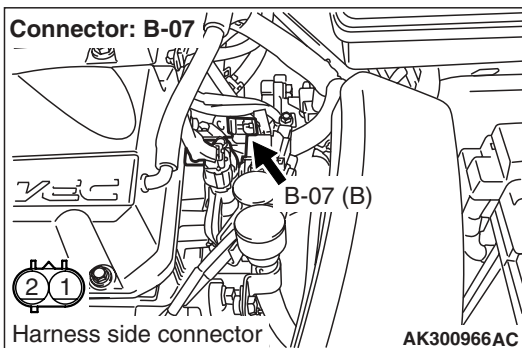
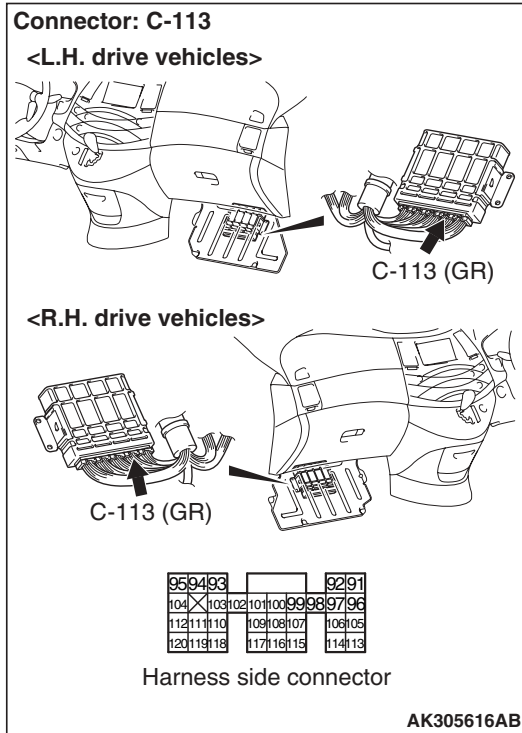
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 95 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

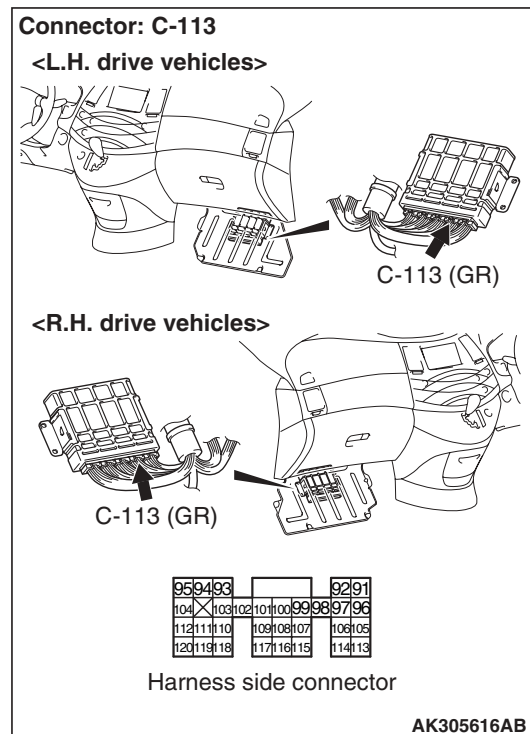
NO : Go to Step 6 .

**STEP 6. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector****Q: Is the check result normal?**

YES : Check and repair harness between B-07 (terminal No. 2) oil control valve connector and C-113 (terminal No. 95) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open/short circuit.

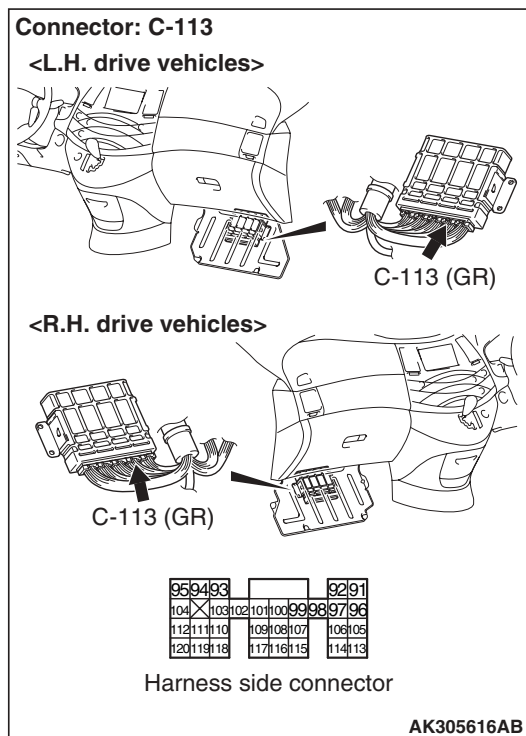
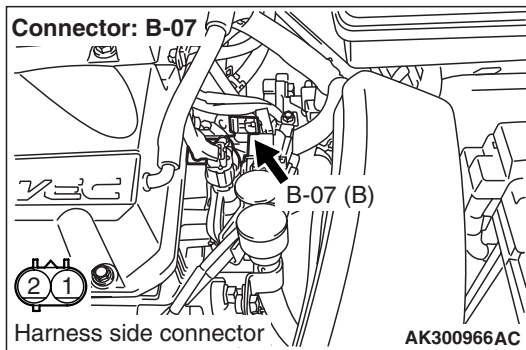
NO : Repair or replace.

**STEP 7. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector****Q: Is the check result normal?**

YES : Go to Step 8 .

NO : Repair or replace.

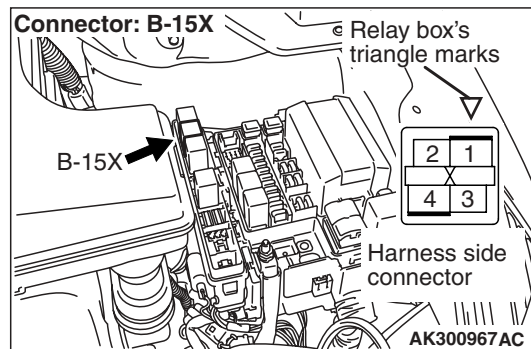
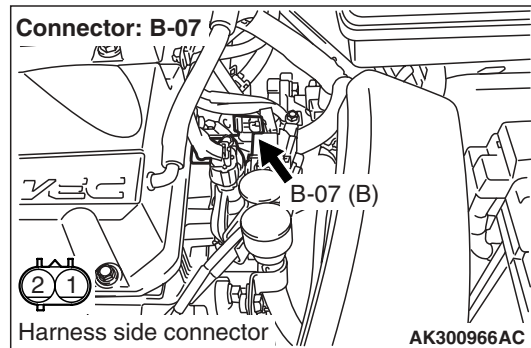
STEP 8. Check harness between B-07 (terminal No. 2) oil control valve connector and C-113 (terminal No. 95) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for damage.

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

STEP 9. Check harness between B-07 (terminal No. 1) oil control valve connector and B-15X (terminal No. 1) engine control relay connector.



NOTE: Before checking harness, check intermediate connector A-16, 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 the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

Code No. P1602: Communication Malfunction (between Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Main Processor and System LSI)

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the communication status for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is ON position.

Judgement Criteria

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> detects an error in communication with the throttle actuator control module for 0.07 second.

PROBABLE CAUSE

- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

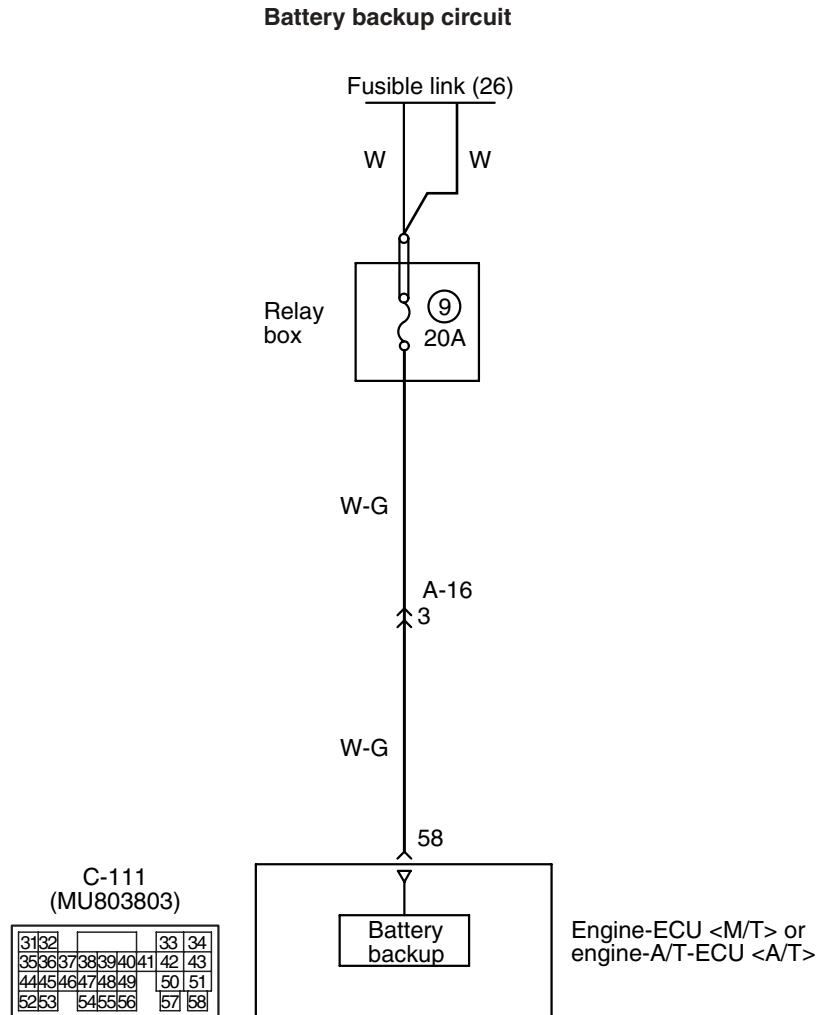
DIAGNOSIS

STEP 1. Check the trouble symptoms.**Q: Does trouble symptom persist?**

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P1603: Battery Backup Circuit Malfunction



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

AK305569AB

OPERATION

- Power is directly supplied to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 58) from the battery.

FUNCTION

- The engine-ECU <M/T> or engine-A/T-ECU <A/T> is check the open circuit of battery backup line.

TROUBLE JUDGMENT

Check Conditions

- After engine starting sequence is completed.
- Battery positive voltage is 10 V or higher.

Judgment Criterion

- Battery backup line voltage is 6 V or lower for 2 seconds.

PROBABLE CAUSE

- Open/short circuit in battery backup line circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

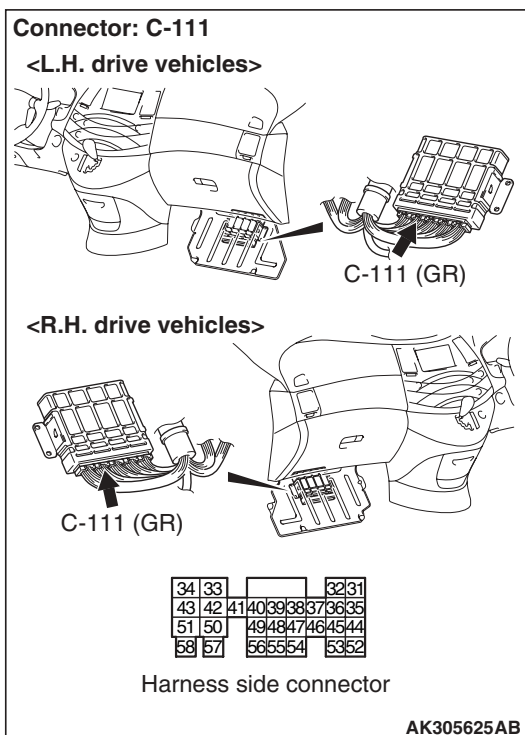
DIAGNOSIS PROCEDURE**STEP 1. MUT-III diagnosis code**

- 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.00-5](#)).

STEP 2. Perform voltage measurement at C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 58 and earth.

OK: System voltage

Q: Is the check result normal?

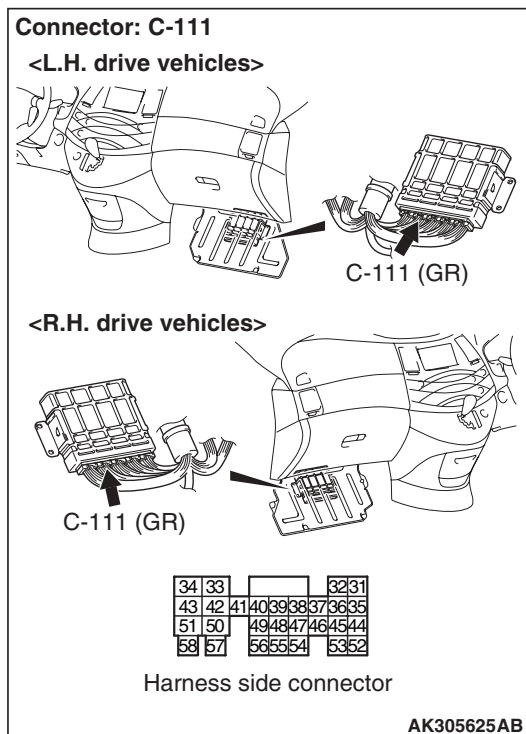
YES : Go to Step 3 .

NO : Check intermediate connector A-16, and repair if necessary. If intermediate connector is normal, check and repair harness between battery and C-111 (terminal No. 58) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check power supply line for open/short circuit.

STEP 3. Check harness between battery and C-111 (terminal No. 58) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

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



- Check earthing line for damage.

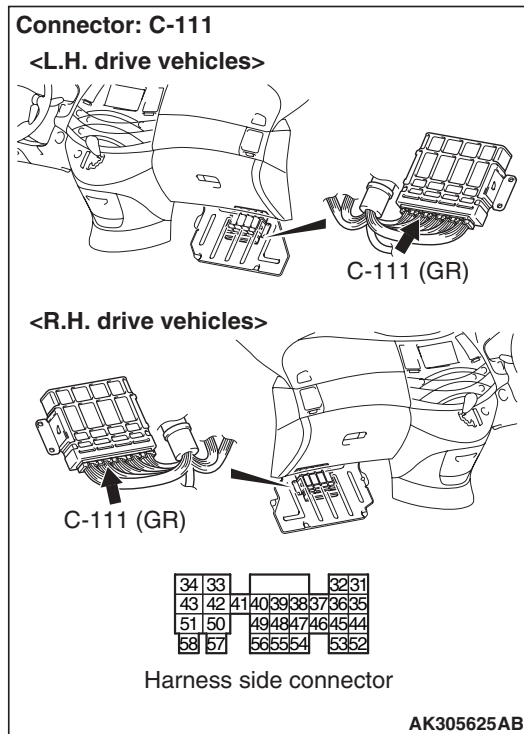
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

**STEP 4. Connector check: C-111 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector.**

YES : Go to Step 5 .
NO : Repair or replace.



STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?

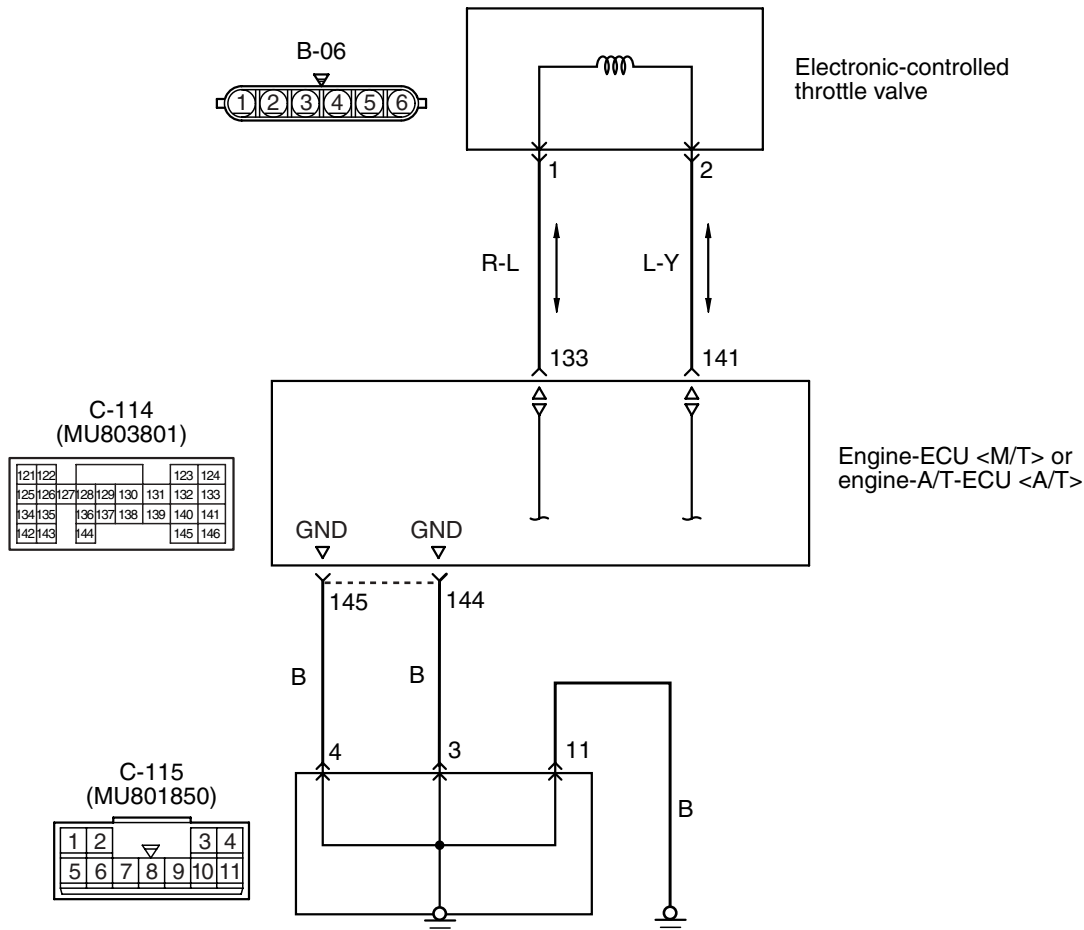
YES : Replace engine-ECU <M/T> or
engine-A/T-ECU <A/T>.

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

Q: Is the check result normal?

Code No. P2100: Throttle Valve Control Servo Circuit (open)

Throttle valve control servo 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

AK305570AB

OPERATION

- Controls the current that is applied from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminals No. 133, No. 141) to the electronic-controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> varies the direction and the amperage of the current that is applied to the throttle valve control servo in order to control the opening of the throttle valve.

TROUBLE JUDGMENT**Check Condition**

- Battery positive voltage is 8.3 V or higher.

Judgement Criteria

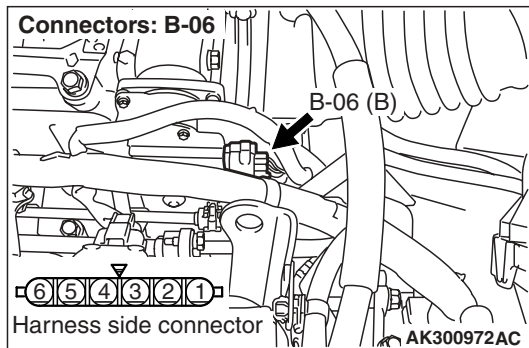
- Throttle actuator control motor current is 0.1 A or less for 0.72 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo circuit or lose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronic-controlled throttle valve connector

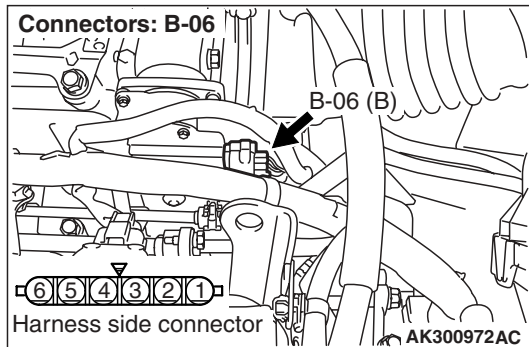


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-06 electronic-controlled throttle valve connector.



- Disconnect connector, and measure at electronic-controlled throttle valve side.
- Resistance between terminal No. 1 and No. 2.

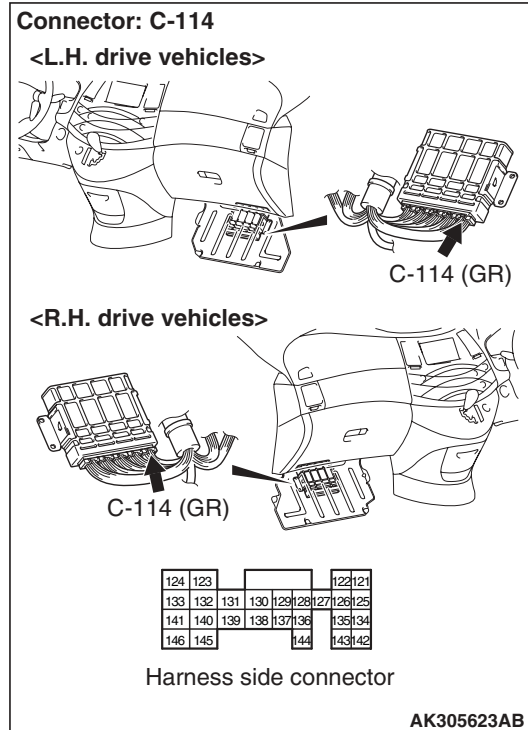
OK: 0.3 – 100 k Ω (at 20 °C)

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace throttle body assembly.

STEP 3. Connector check: C-114 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

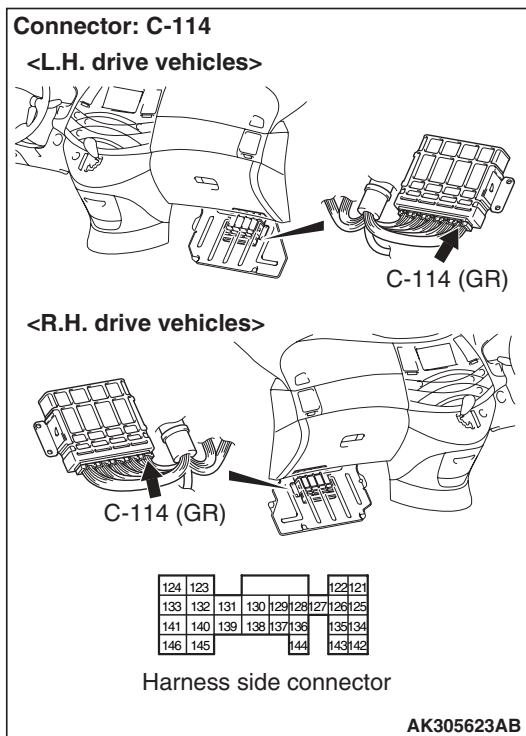


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Perform resistance measurement at C-114 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector and measure at harness side.
- Resistance between terminal No. 144, No. 145 and earth.

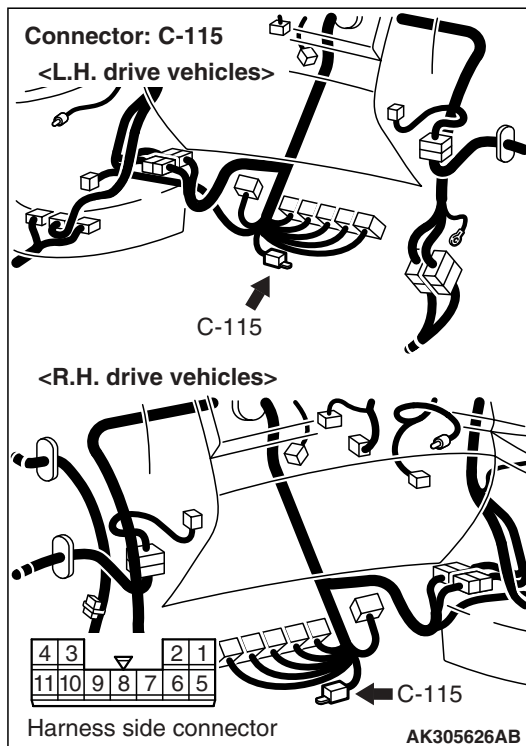
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 5 .

STEP 5. Connector check: C-115 earth connector

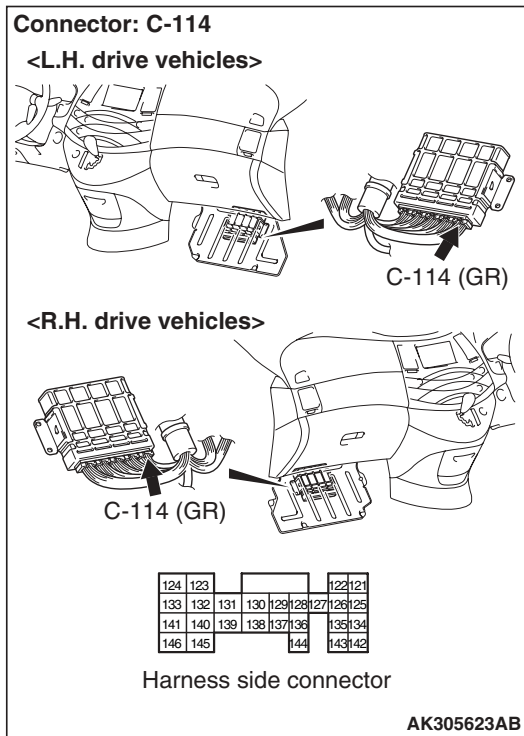


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check harness between C-114 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> and C-115 earth connector.



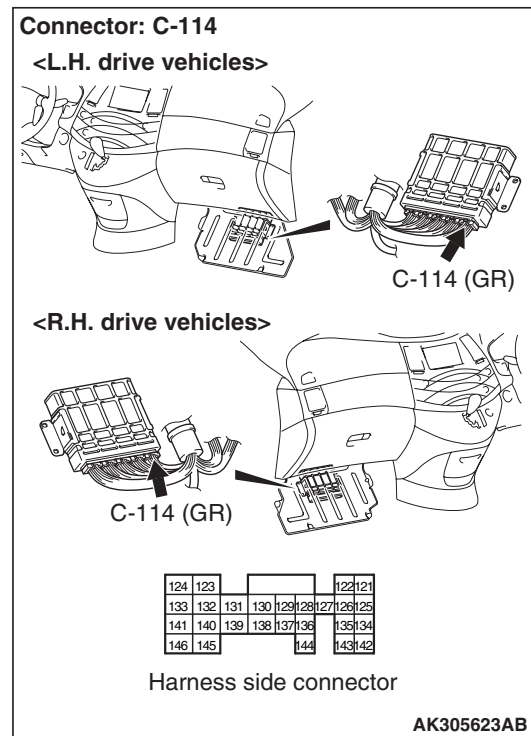
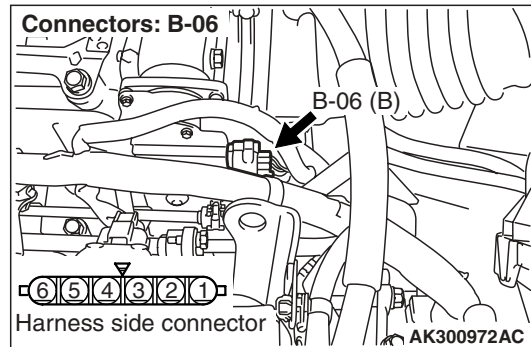
- Check harness between C-114 (terminal No. 144) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> and C-115 earth connector.
- Check harness between C-114 (terminal No. 145) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> and C-115 earth connector.

Q: Are the check results normal?

YES : Go to Step 7 .

NO : Repair

STEP 7. Check harness between B-06 (terminal No. 1) electronic-controlled throttle valve connector and C-114 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



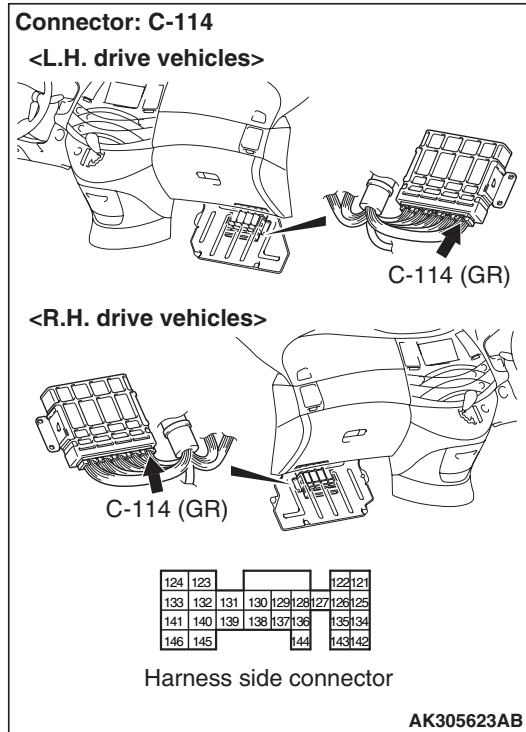
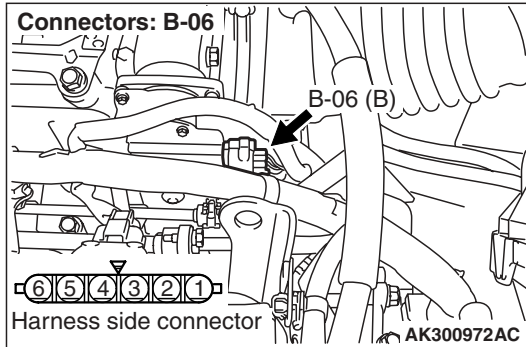
- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Check harness between B-06 (terminal No. 2) electronic-controlled throttle valve connector and C-114 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



YES : Go to Step 9 .

NO : Repair.

STEP 9. Check the trouble symptoms.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

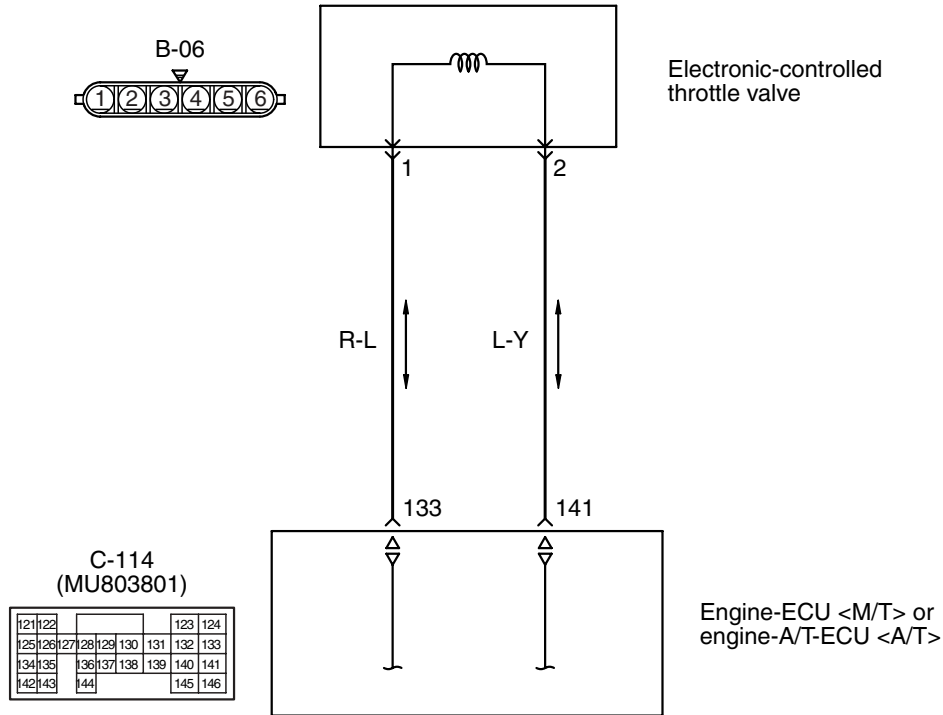
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

- Check output line for short circuit and damage.

Q: Is the check result normal?

Code No. P2101: Throttle Valve Control Servo Magneto Malfunction

Throttle valve control servo 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

AK305730AB

OPERATION

- Controls the current that is applied from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminals No. 133, No. 141) to the electronic-controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> check whether the throttle valve control servo magneto failed.

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 8.3 V or higher.

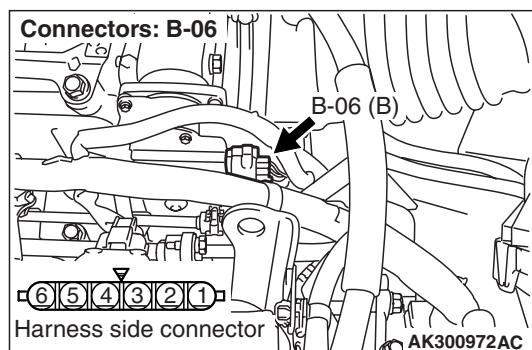
Judgement Criterion

- The coil temperature of the throttle actuator control motor is 180°C or higher for 0.8 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo circuit or lose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

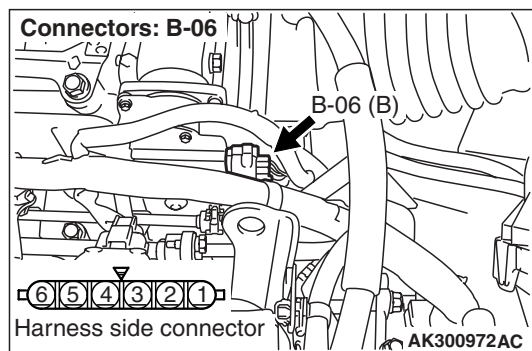
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06
electronic-controlled throttle valve connector

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-06
electronic-controlled throttle valve connector.

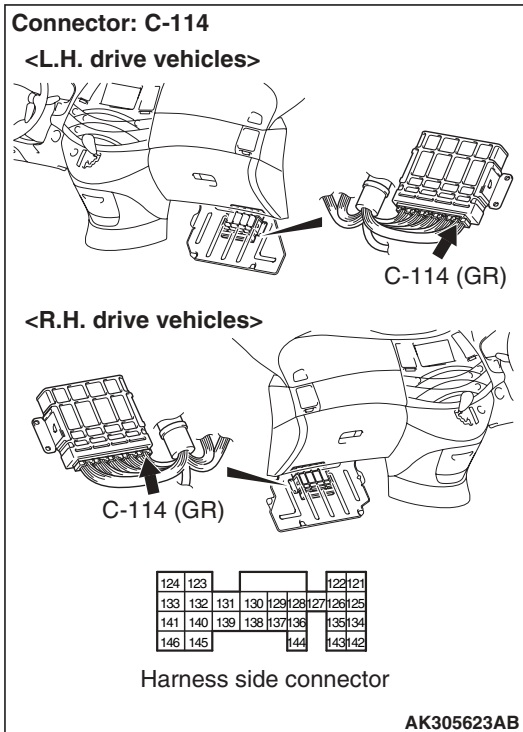
- Disconnect connector, and measure at electronic-controlled throttle valve side.
- Resistance between terminal No. 1 and No. 2.

OK: 0.3 – 100 k Ω (at 20 °C)

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace throttle body assembly.

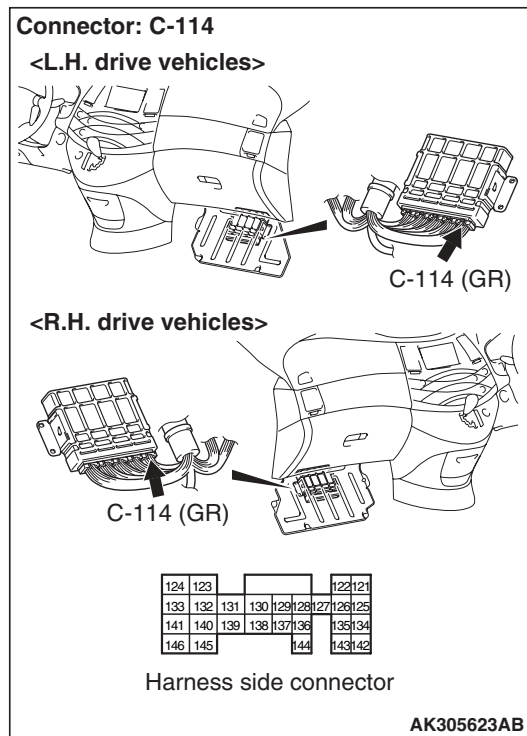
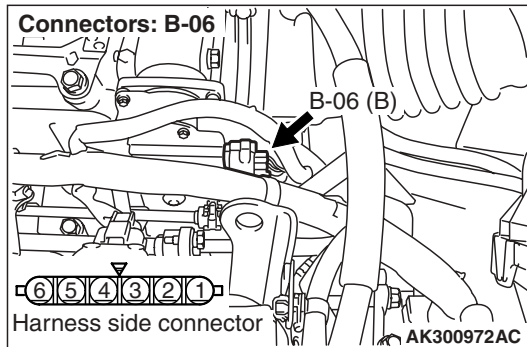
STEP 3. Connector check: C-114 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T> connector

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between B-06 (terminal No. 1) electronic-controlled throttle valve connector and C-114 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



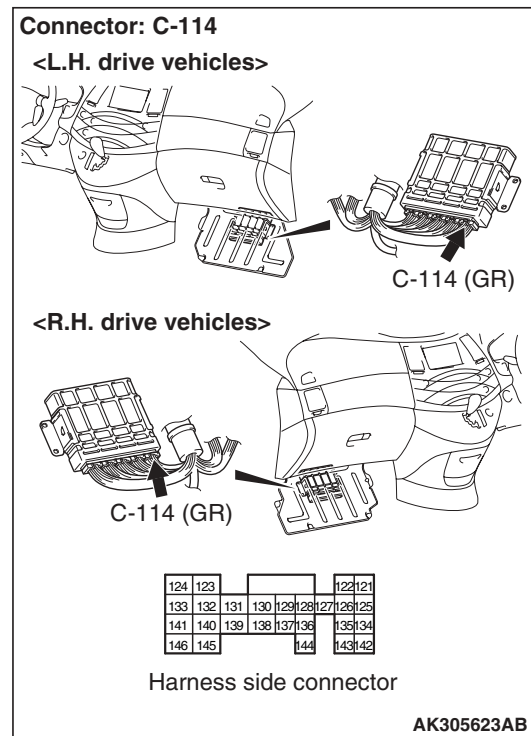
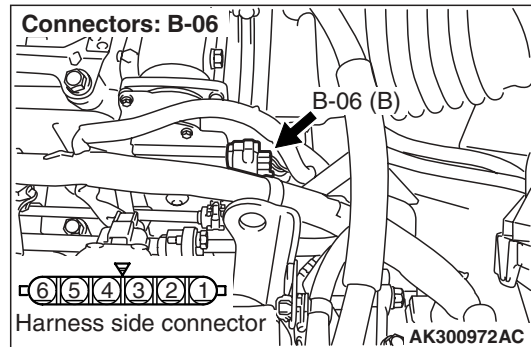
- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check harness between B-06 (terminal No. 2) electronic-controlled throttle valve connector and C-114 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check the trouble symptoms.

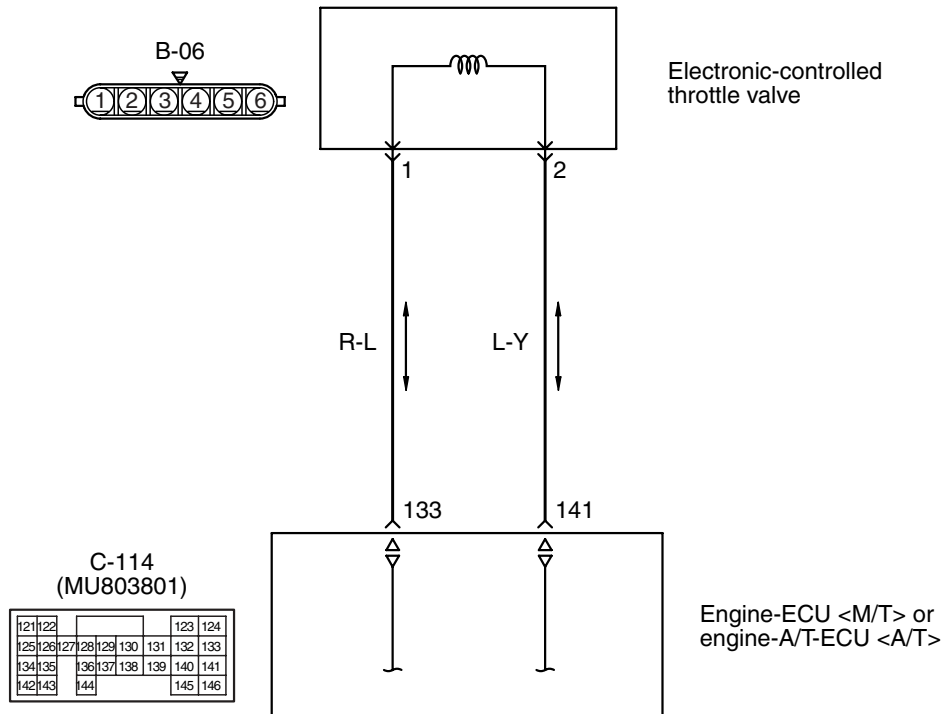
Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P2102: Throttle Valve Control Servo Circuit (Shorted Low)

Throttle valve control servo circuit



AK305730AB

OPERATION

- Controls the current that is applied from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminals No. 133, No. 141) to the electronic-controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> varies the direction and the amperage of the current that is applied to the throttle valve control servo in order to control the opening of the throttle valve.

TROUBLE JUDGMENT**Check Condition**

- Battery positive voltage is 8.3 V or higher.

Judgement Criterion

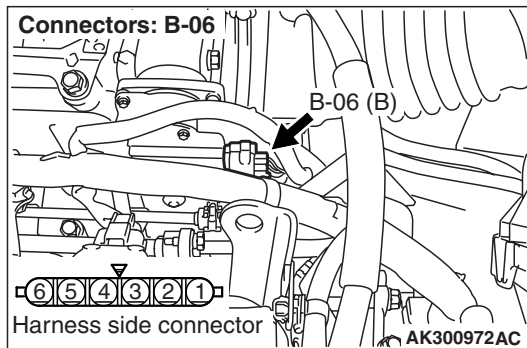
- Throttle valve control servo current is 12 A or higher for 0.8 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Short circuit in throttle valve control servo circuit or lose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronic-controlled throttle valve connector

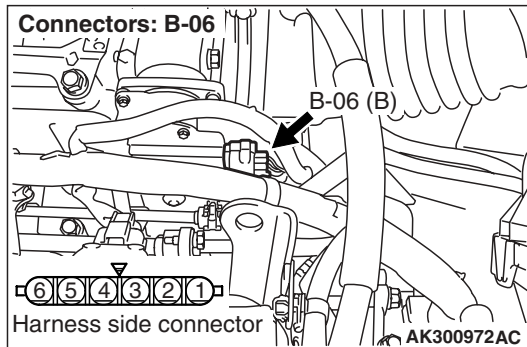


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-06 electronic-controlled throttle valve connector.



- Disconnect connector, and measure at electronic-controlled throttle valve side.
- Resistance between terminal No. 1 and No. 2.

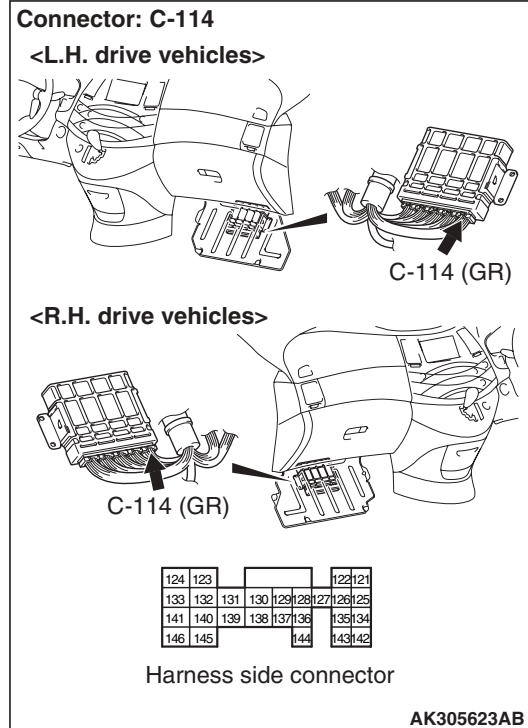
OK: 0.3 – 100 Ω (at 20 °C)

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace throttle body assembly.

STEP 3. Connector check: C-114 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

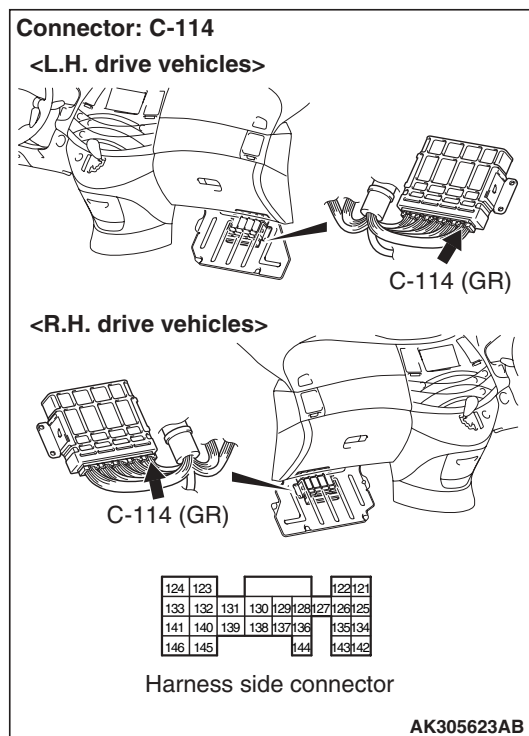
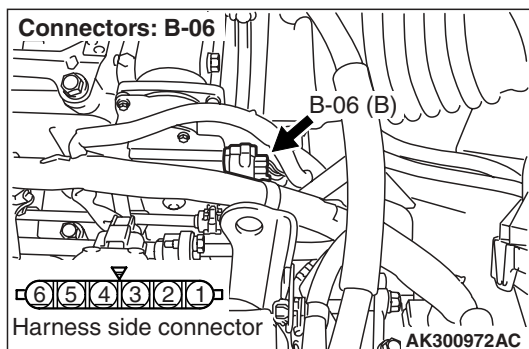


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between B-06 (terminal No. 1) electronic-controlled throttle valve connector and C-114 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



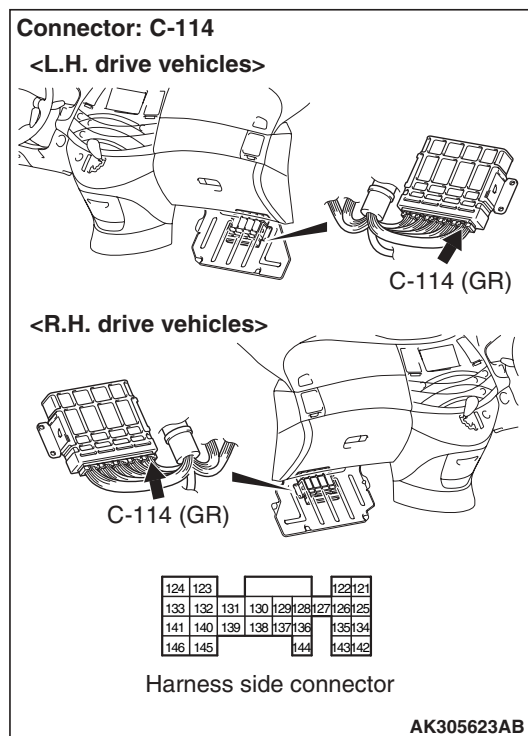
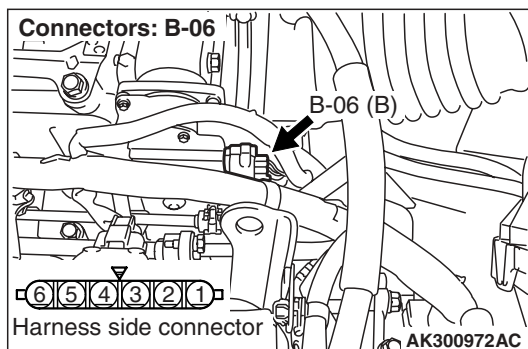
- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check harness between B-06 (terminal No. 2) electronic-controlled throttle valve connector and C-114 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check the trouble symptoms.

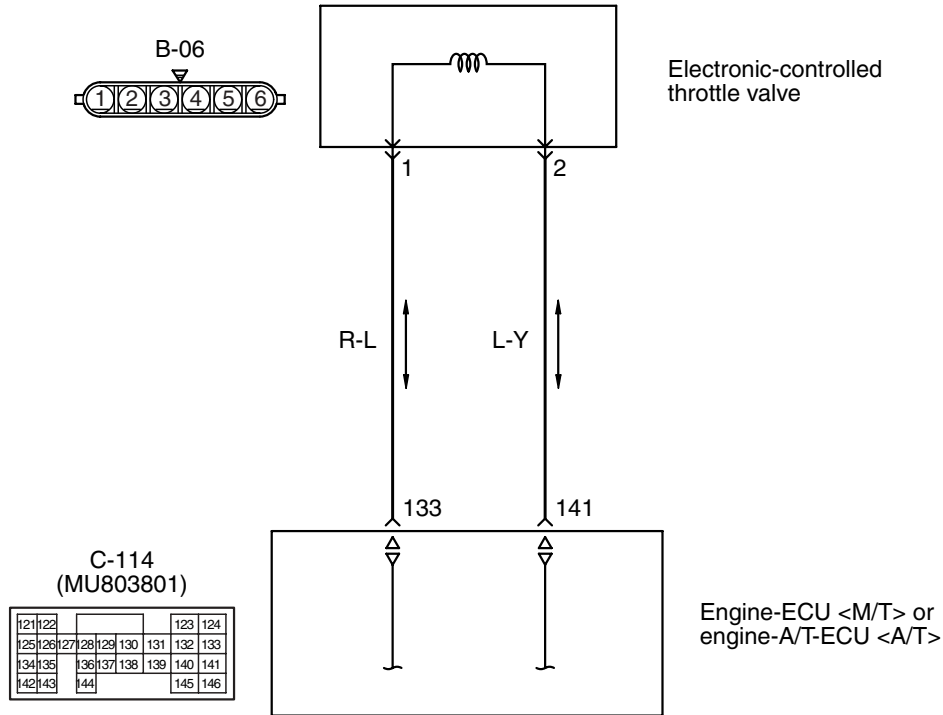
Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P2103: Throttle Valve Control Servo Circuit (Shorted High)

Throttle valve control servo 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

AK305730AB

OPERATION

- Controls the current that is applied from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminals No. 133, No. 141) to the electronic-controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> varies the direction and the amperage of the current that is applied to the throttle valve control servo in order to control the opening of the throttle valve.

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 8.3 V or higher.

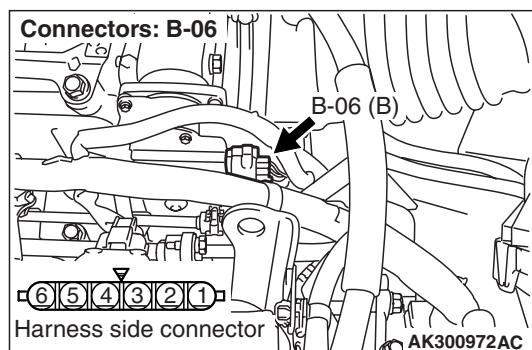
Judgement Criterion

- Throttle actuator control motor current is 8 A or higher for 0.8 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Short circuit in throttle valve control servo circuit or loose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

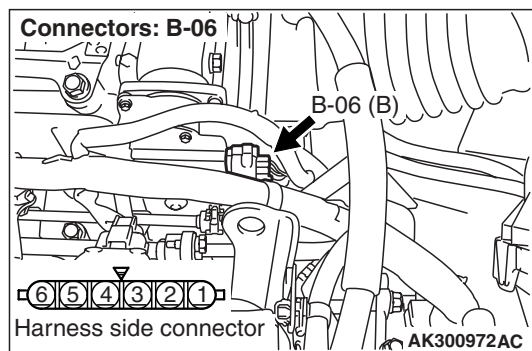
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06
electronic-controlled throttle valve connector

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-06
electronic-controlled throttle valve connector.

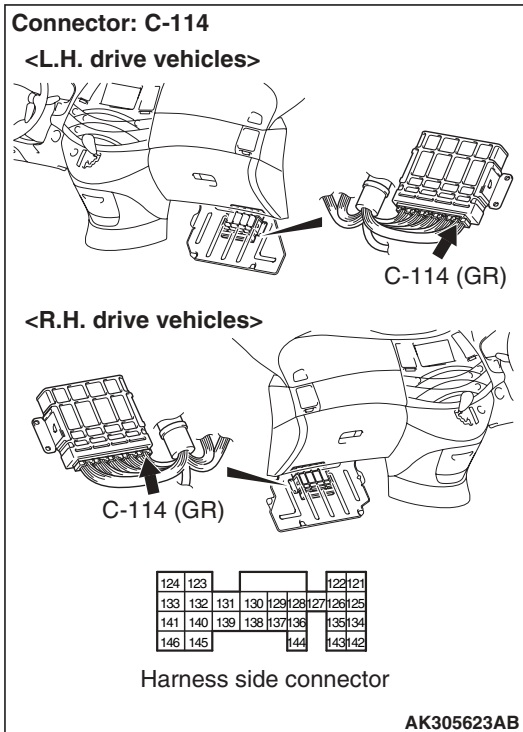
- Disconnect connector, and measure at electronic-controlled throttle valve side.
- Resistance between terminal No. 1 and No. 2.

OK: 0.3 – 100 Ω (at 20 °C)

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace the throttle body assembly.

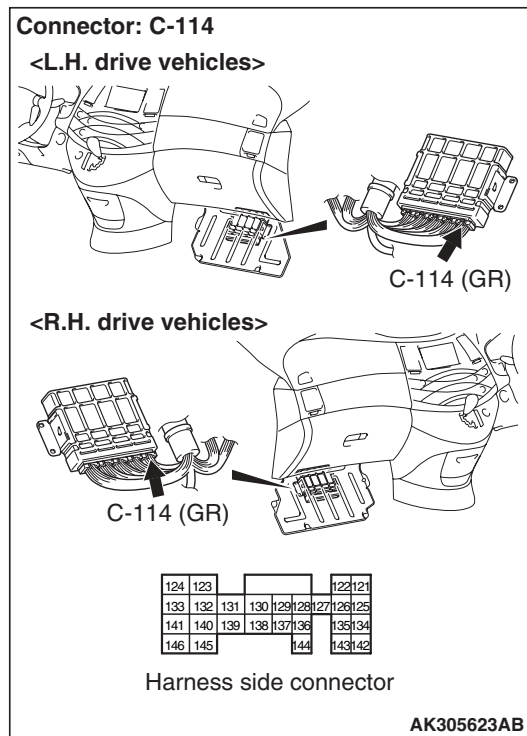
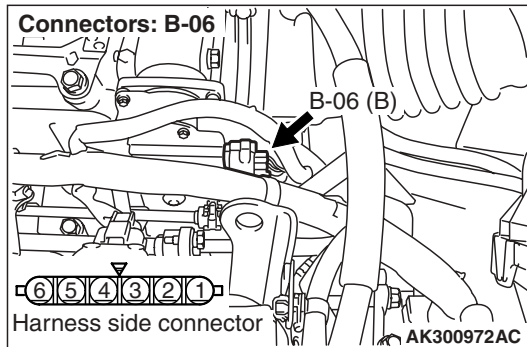
STEP 3. Connector check: C-114 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T> connector

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between B-06 (terminal No. 1) electronic-controlled throttle valve connector and C-114 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



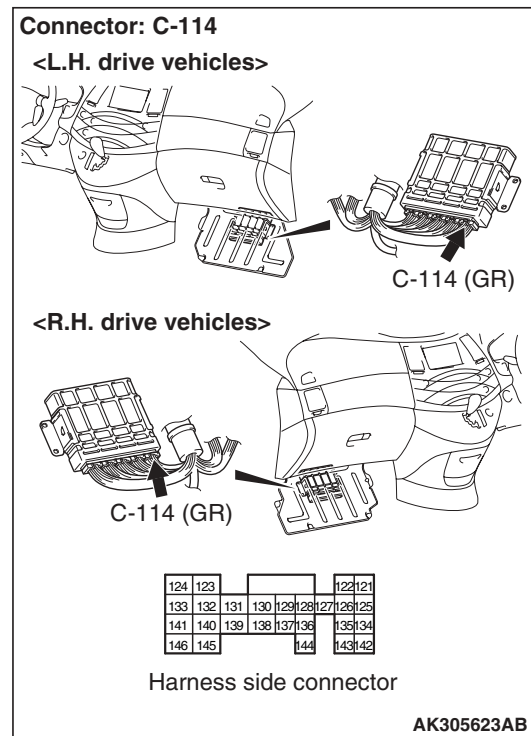
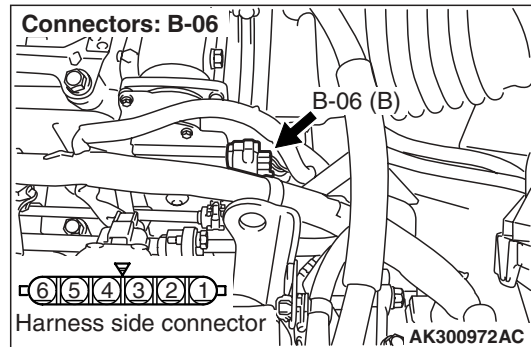
- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check harness between B-06 (terminal No. 2) electronic-controlled throttle valve connector and C-114 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 6 .

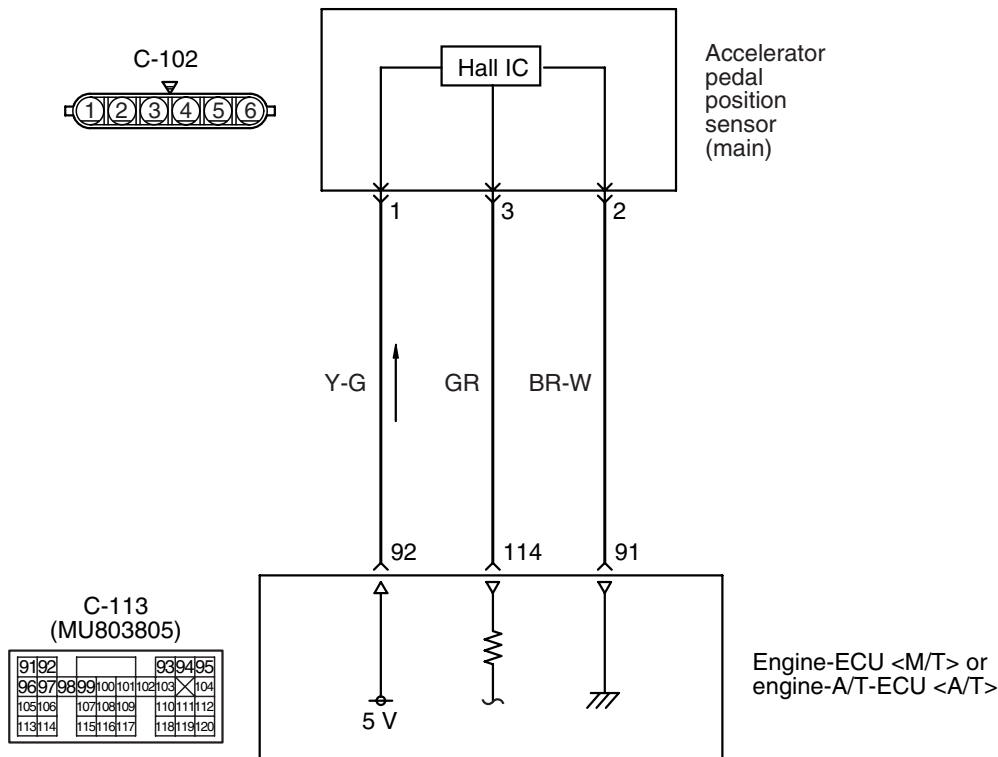
NO : Repair.

STEP 6. Check the trouble symptoms.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Code No. P2122: Accelerator Pedal Position Sensor (Main) Circuit Low Input**Accelerator pedal position sensor (main) circuit**

AK305571AB

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 1) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 92).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 91) from the accelerator pedal position sensor (terminal No. 2).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 114) from the accelerator pedal position sensor output terminal (terminal No. 3).

FUNCTION

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.

- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT**Check Condition**

- Ignition switch is in ON position.

Judgment Criterion

- Accelerator pedal position sensor (main) output voltage is 0.2 volt or less for 0.3 second.

PROBABLE CAUSE

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

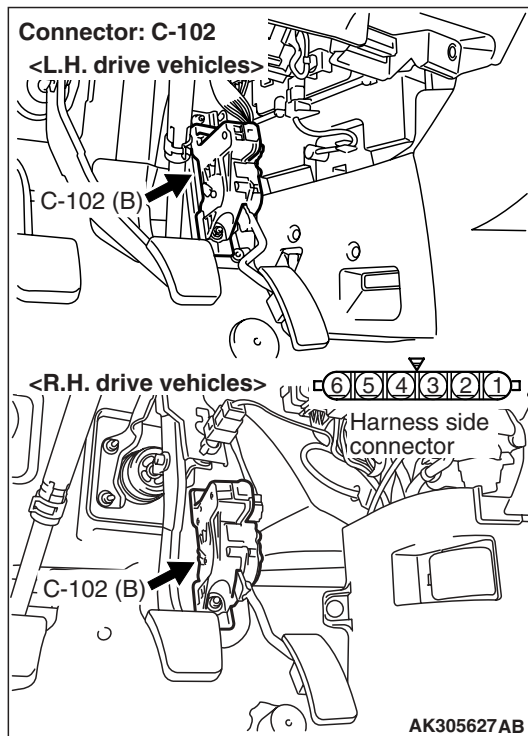
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: C-102 accelerator pedal position sensor connector

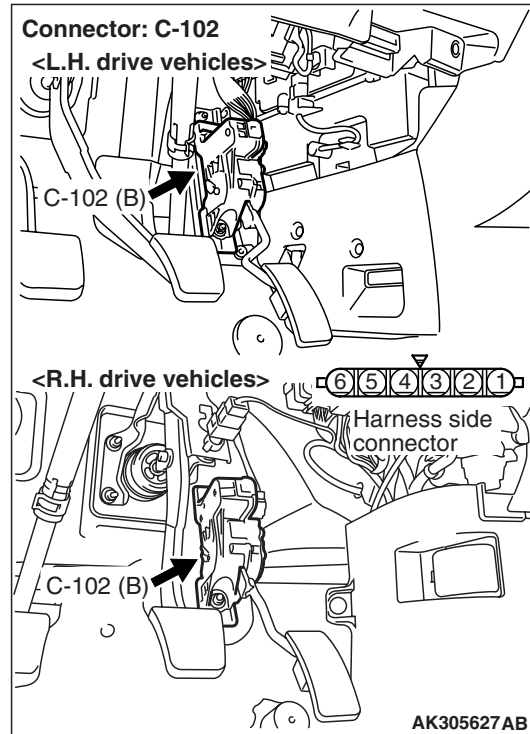


Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair or replace.

STEP 3. Perform voltage measurement at C-102 accelerator pedal position sensor connector.



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

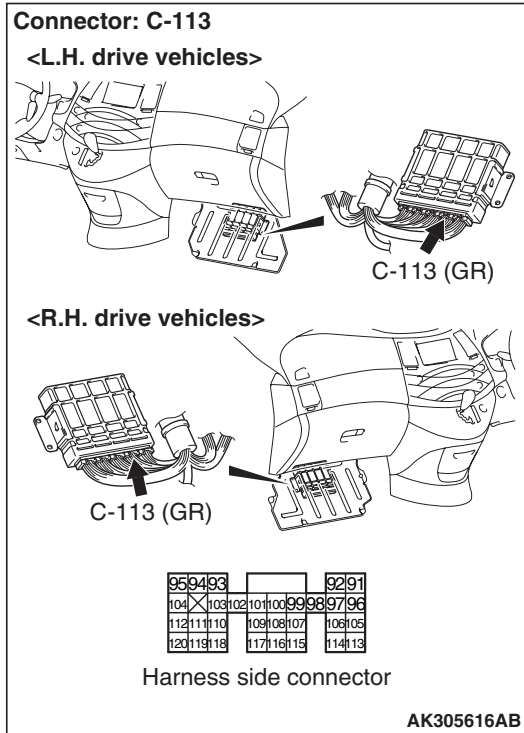
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

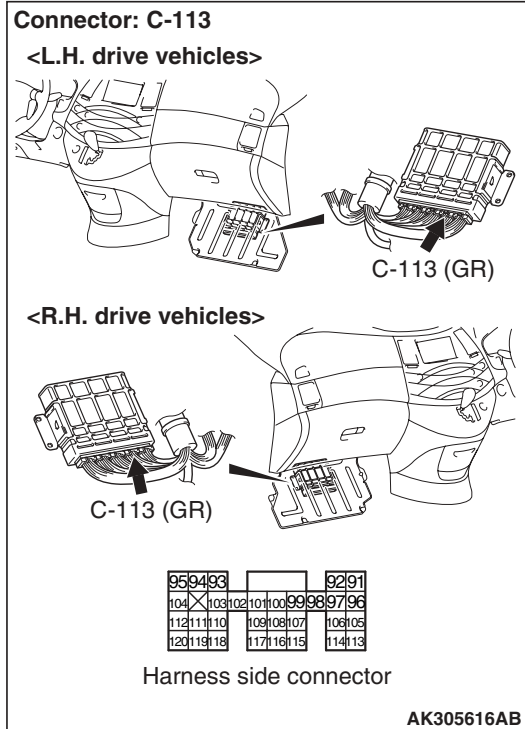
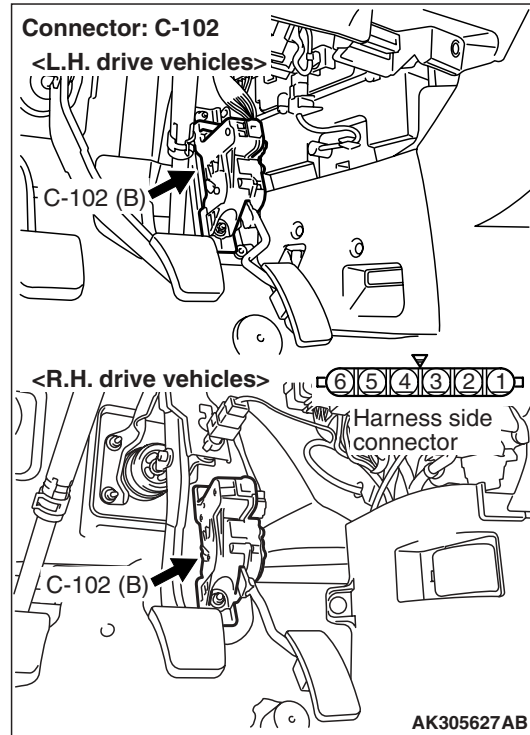


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between C-102 (terminal No. 1) accelerator pedal position sensor connector and C-113 (terminal No. 92) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.



Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. MUT-III data list

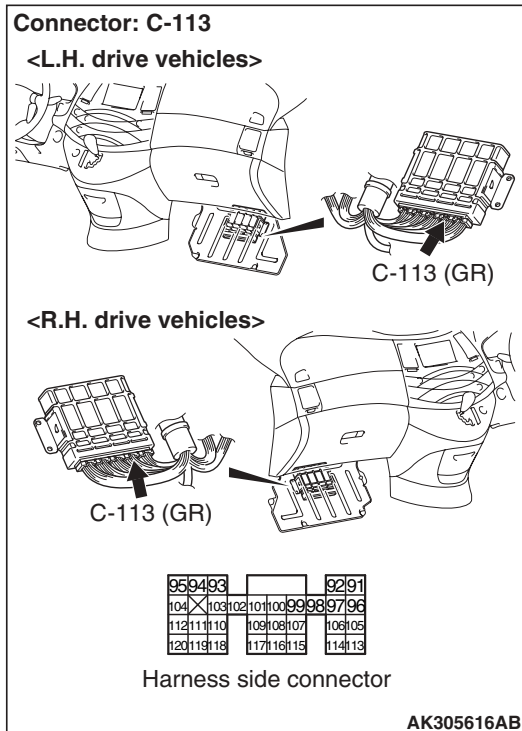
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

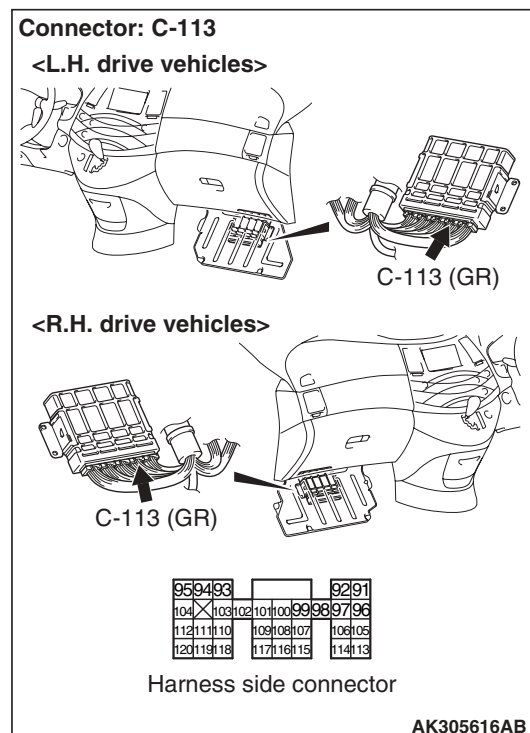
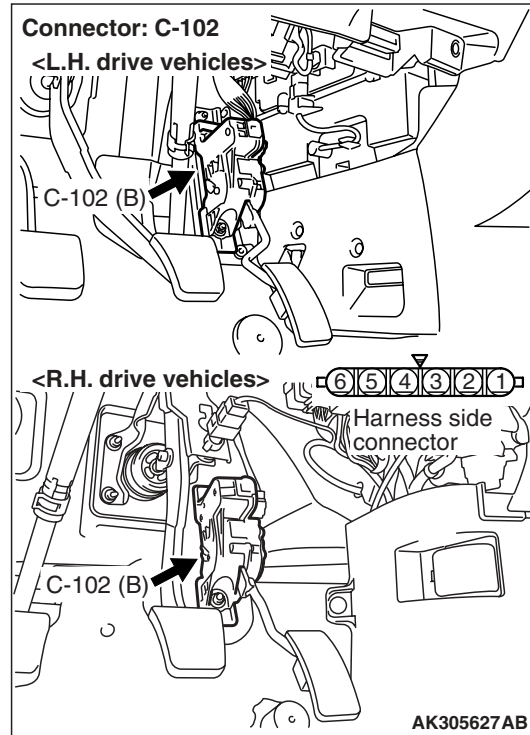


Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Check harness between C-102 (terminal No. 1) accelerator pedal position sensor connector and C-113 (terminal No. 92) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



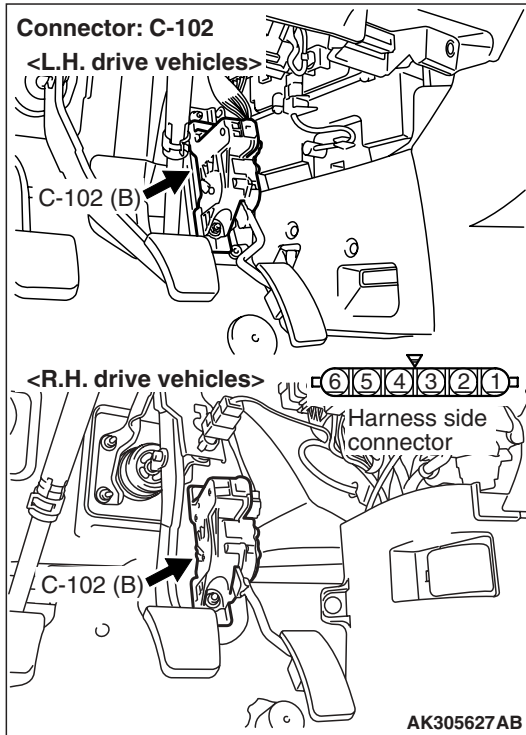
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check harness between C-102 (terminal No. 3) accelerator pedal position sensor connector and C-113 (terminal No. 114) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



YES : Go to Step 10 .

NO : Repair.

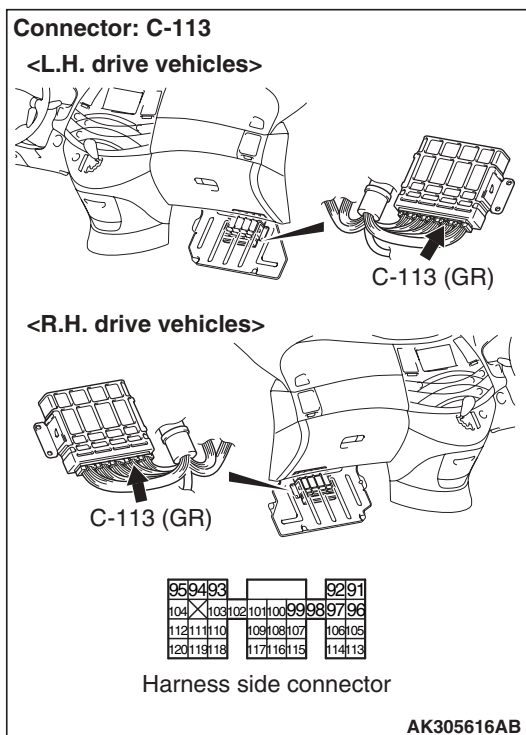
STEP 10. Replace the accelerator pedal assembly

- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Check end.

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

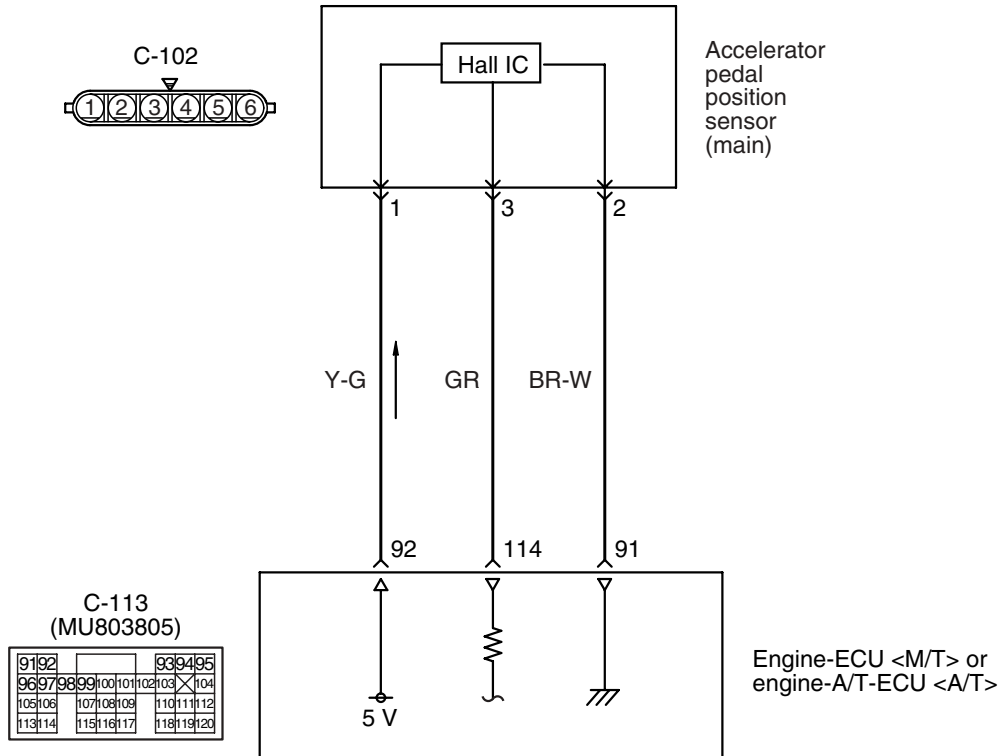


- Check output line for damage.

Q: Is the check result normal?

Code No. P2123: Accelerator Pedal Position Sensor (Main) Circuit High Input

Accelerator pedal position sensor (main) 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

AK305571AB

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 1) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 92).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 91) from the accelerator pedal position sensor (terminal No. 2).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 114) from the accelerator pedal position sensor output terminal (terminal No. 3).

FUNCTION

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.

- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in ON position.
- Accelerator pedal position sensor (sub) output voltage is 0.2 - 2.5 V.

Judgment Criterion

- Accelerator pedal position sensor (main) output voltage is 4.5 V or higher for is 1 second.

PROBABLE CAUSE

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T>

- Failed engine-A/T-ECU <A/T>

YES : Go to Step 3 .

NO : Repair or replace.

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

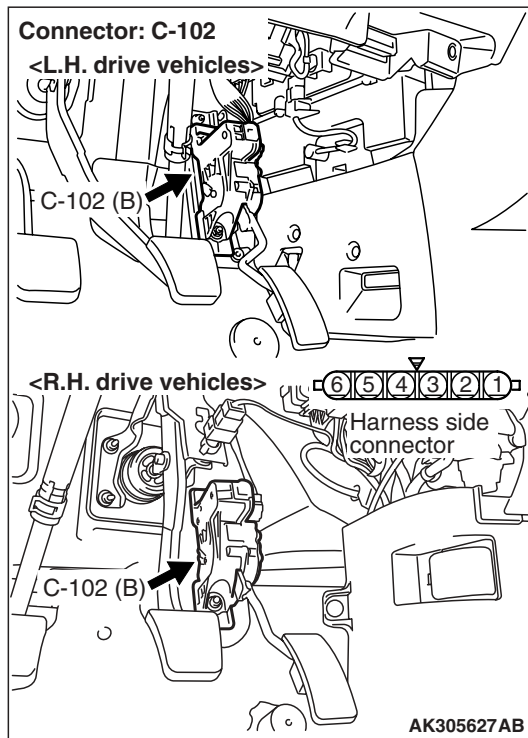
- Refer to Data List Reference Table [P.13A-363](#).
 - Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

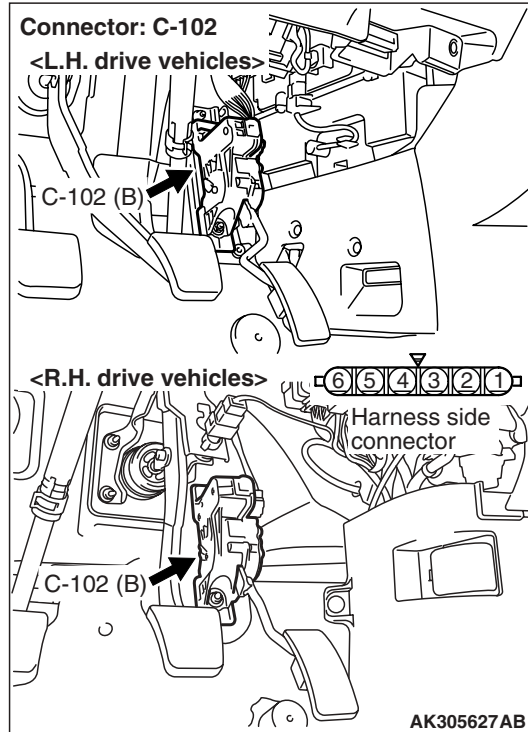
NO : Go to Step 2 .

STEP 2. Connector check: C-102 accelerator pedal position sensor connector



Q: Is the check result normal?

STEP 3. Perform resistance measurement at C-102 accelerator pedal position sensor connector.



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

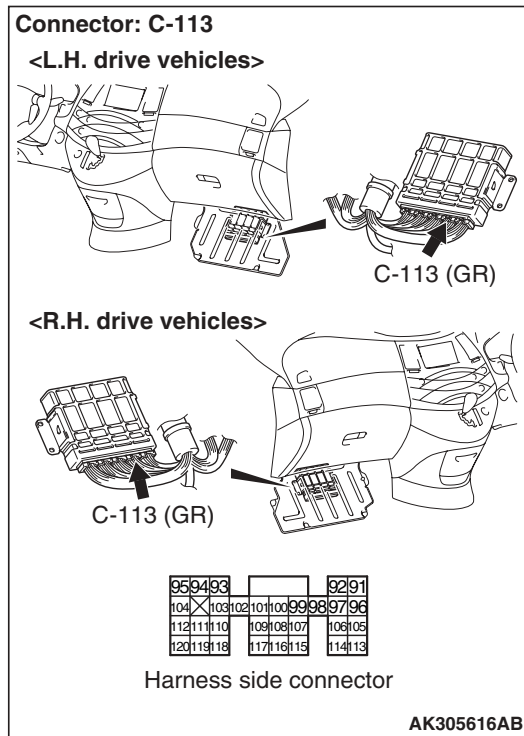
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

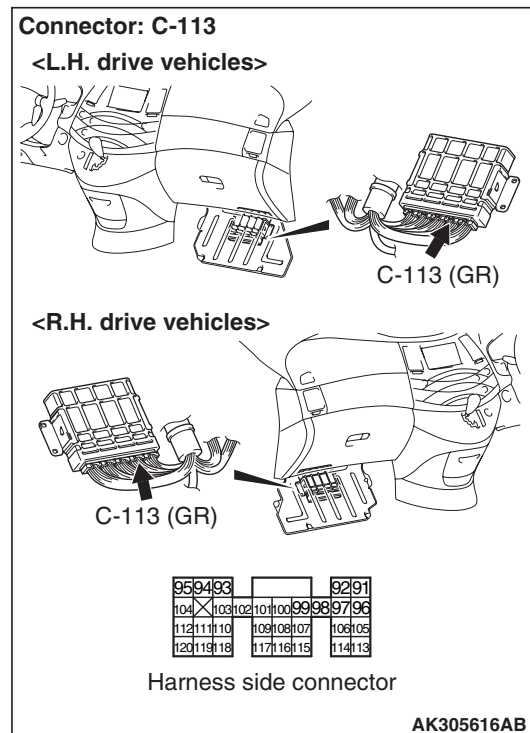
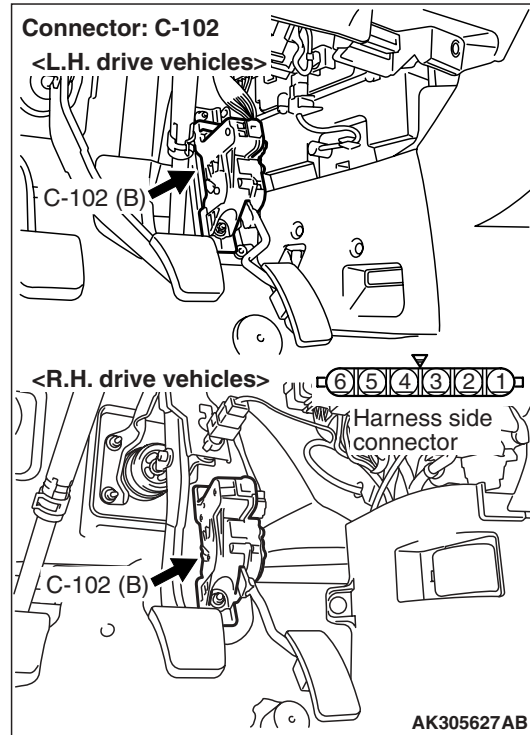
NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 5. Check harness between C-102 (terminal No. 2) accelerator pedal position sensor connector and C-113 (terminal No. 91) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open circuit and damage.

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

STEP 6. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Replace the accelerator pedal assembly

- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

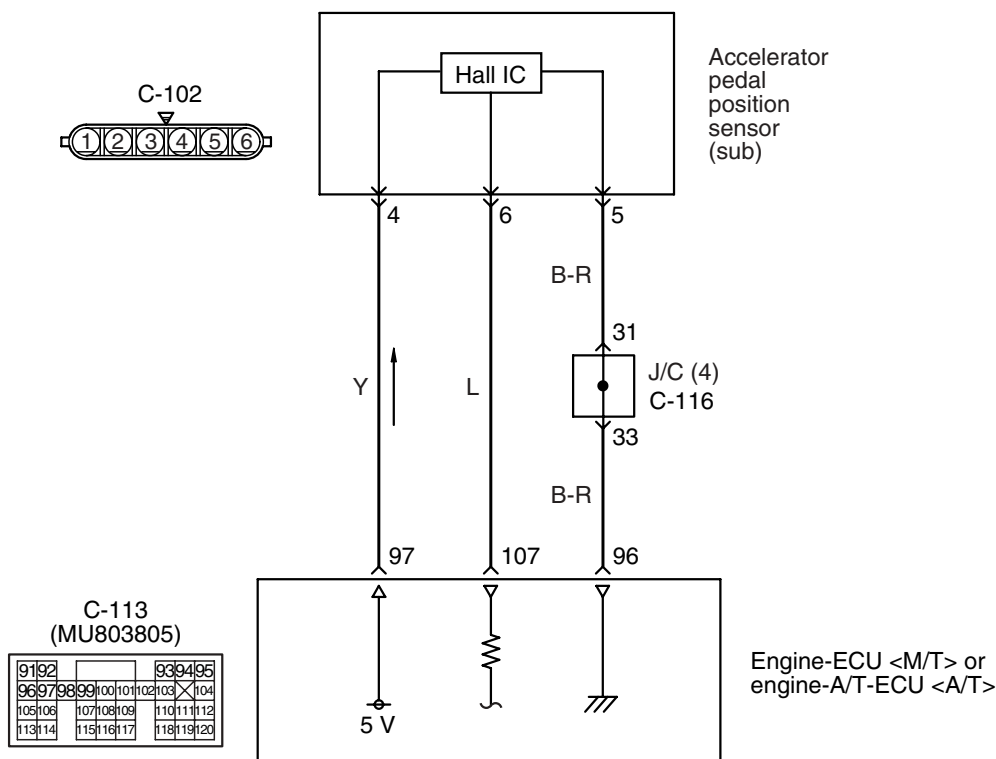
Q: Is the check result normal?

YES : Check end.

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Code No. P2127: Accelerator Pedal Position Sensor (Sub) Circuit Low Input

Accelerator pedal position sensor (sub) circuit



AK305572AB

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 4) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 97).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96) from the accelerator pedal position sensor (terminal No. 5).

- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 107) from the accelerator pedal position sensor output terminal (terminal No. 6).

FUNCTION

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in ON position

Judgment Criterion

- Accelerator pedal position sensor (sub) output voltage is 0.2 volt or less for 1 second.

PROBABLE CAUSE

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III data list

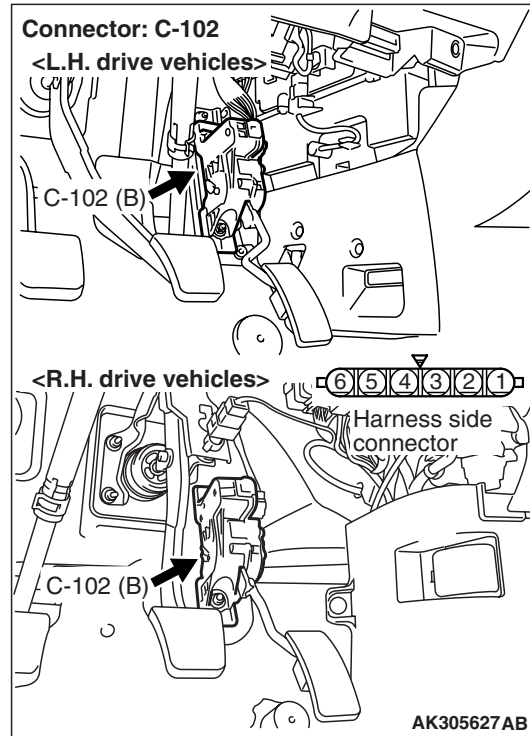
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

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

NO : Go to Step 2 .

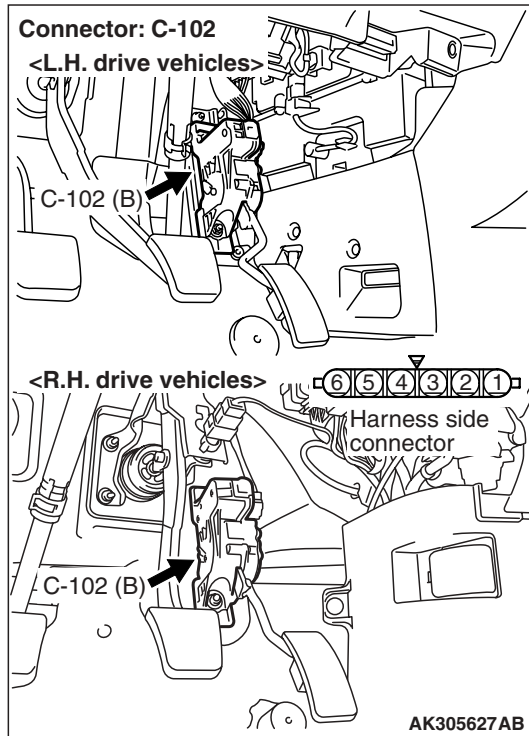
STEP 2. Connector check: C-102 accelerator pedal position sensor connector



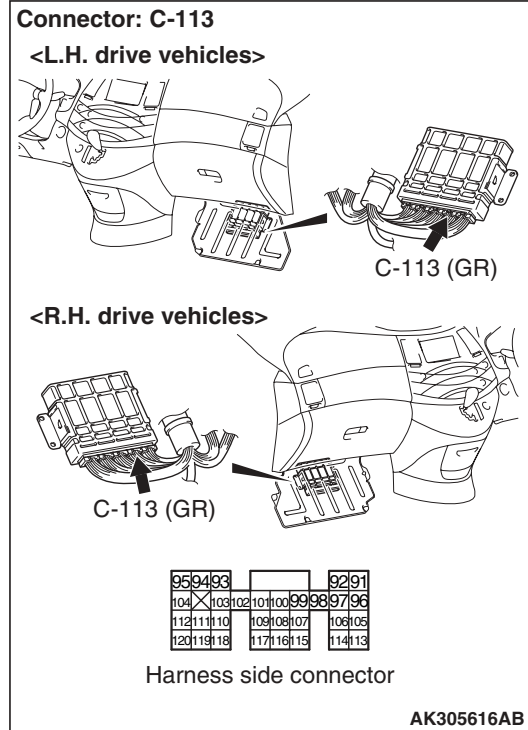
Q: Is the check result normal?

YES : Go to Step 3 .

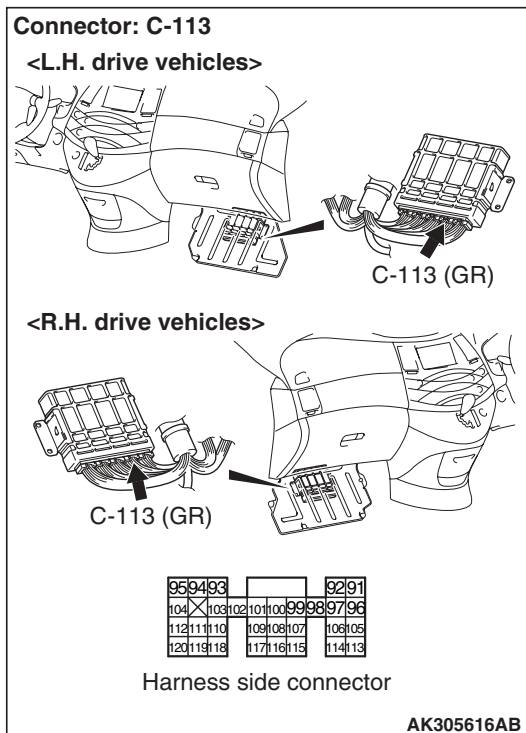
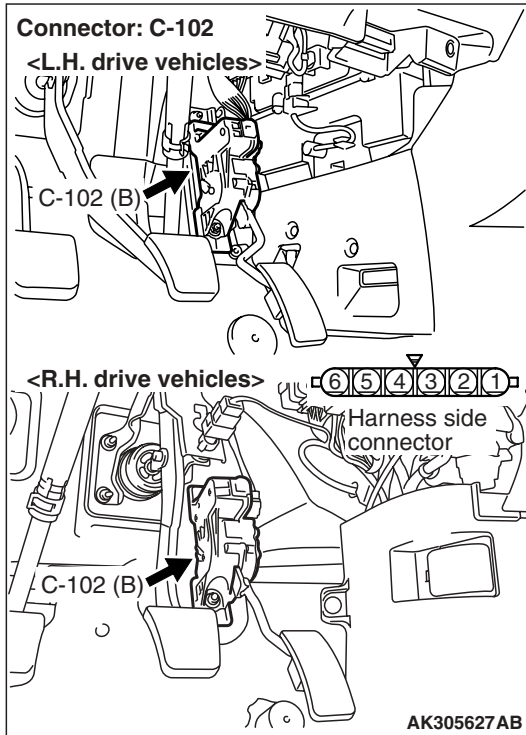
NO : Repair or replace.

**STEP 3. Perform voltage measurement at C-102
accelerator pedal position sensor connector.**

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

OK: 4.9 – 5.1 V**Q: Is the check result normal?****YES :** Go to Step 7 .**NO :** Go to Step 4 .**STEP 4. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector****Q: Is the check result normal?****YES :** Go to Step 5 .**NO :** Repair or replace.

STEP 5. Check harness between C-102 (terminal No. 4) accelerator pedal position sensor connector and C-113 (terminal No. 97) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.



- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. MUT-III data list

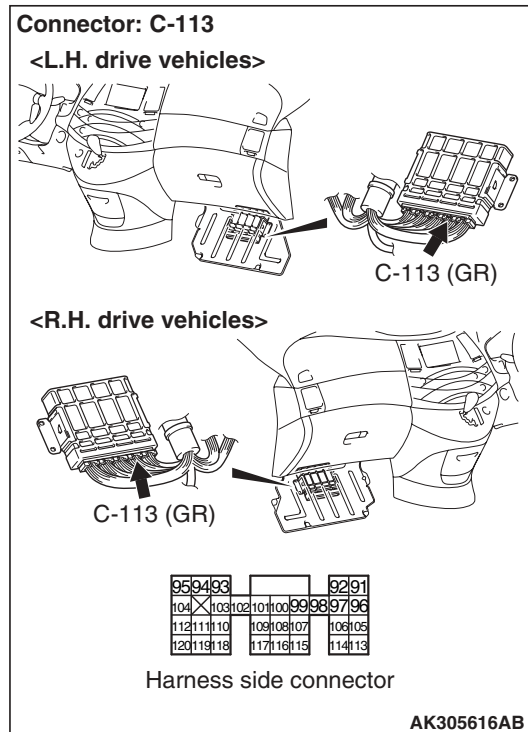
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

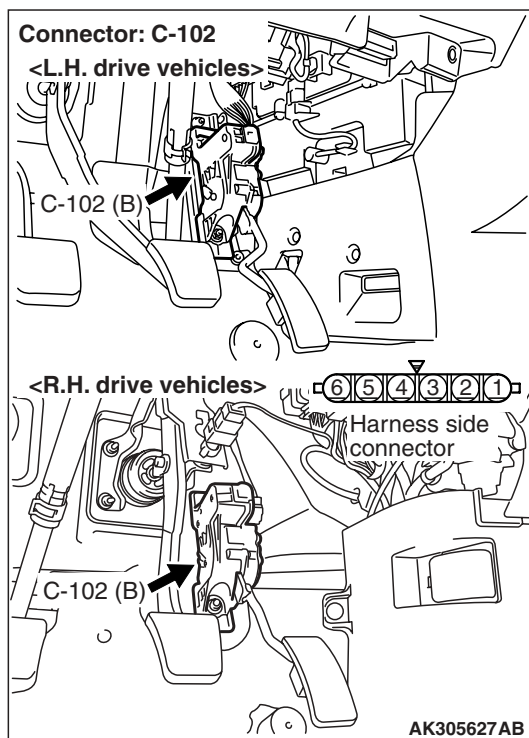


Q: Is the check result normal?

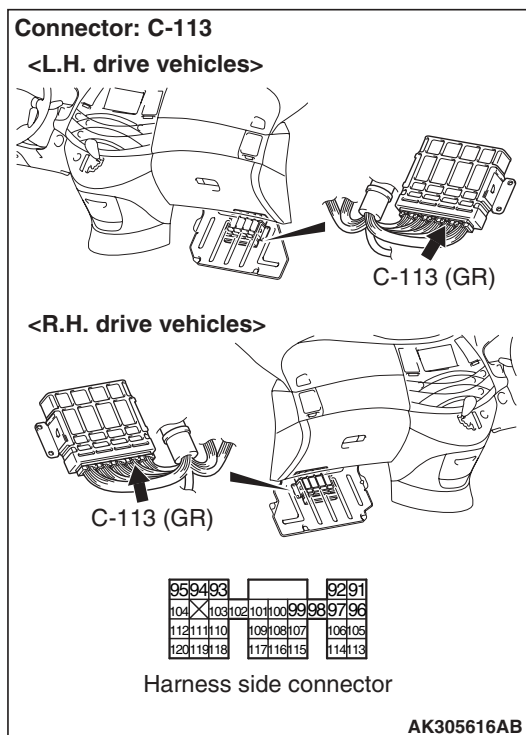
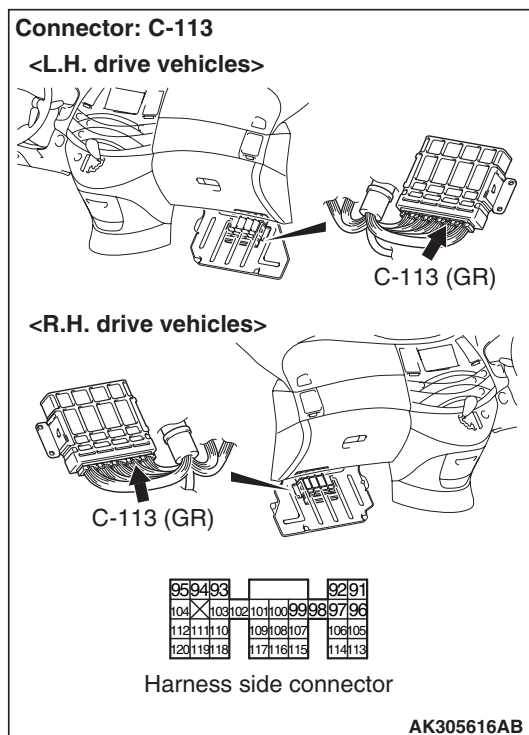
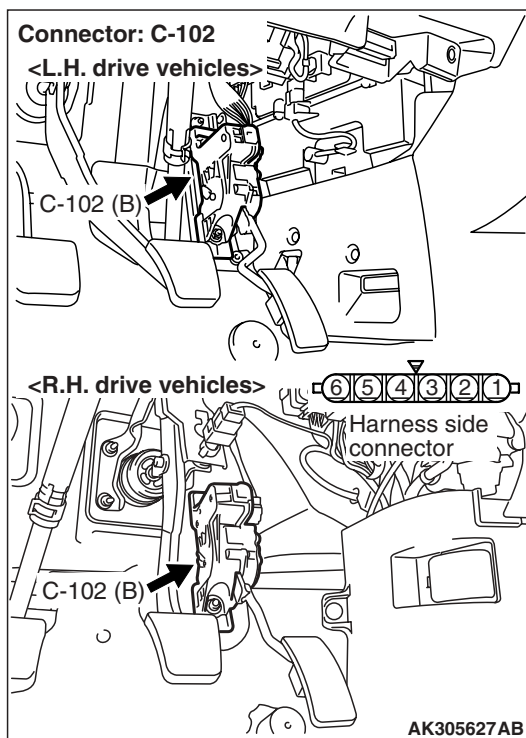
YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Check harness between C-102 (terminal No. 4) accelerator pedal position sensor connector and C-113 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 9. Check harness between C-102 (terminal No. 6) accelerator pedal position sensor connector and C-113 (terminal No. 107) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Repair.

STEP 10. Replace the accelerator pedal assembly

- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

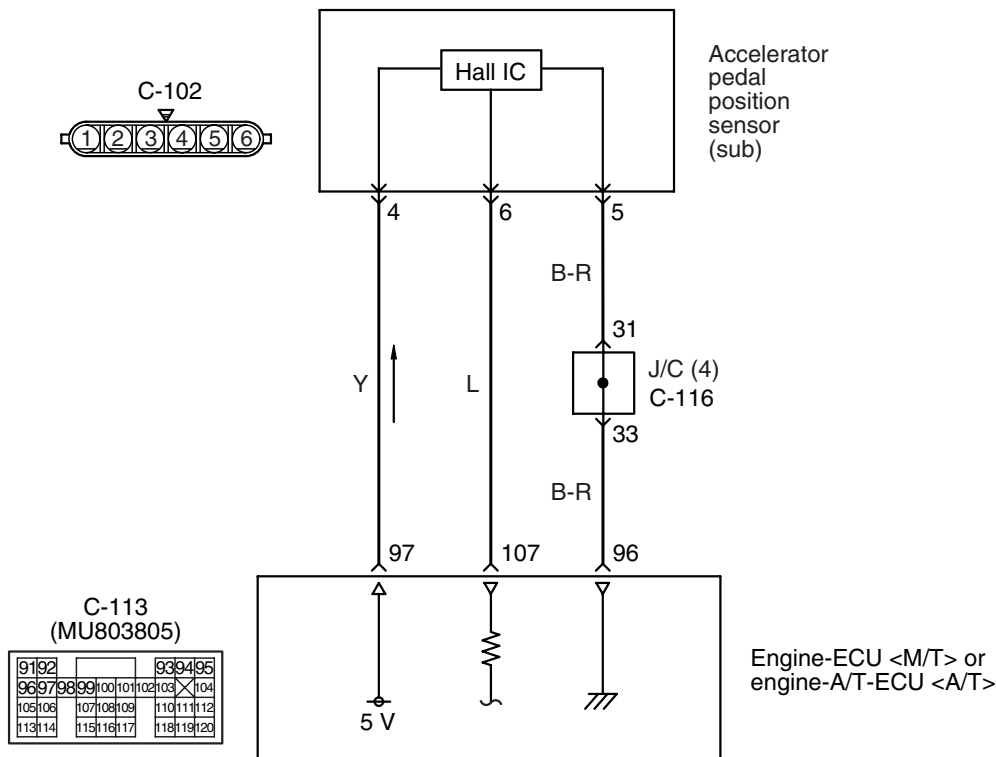
YES : Check end.

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Q: Is the check result normal?

Code No. P2128: Accelerator Pedal Position Sensor (Sub) Circuit High Input

Accelerator pedal position sensor (sub) 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

AK305572AB

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 4) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 97).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96) from the accelerator pedal position sensor (terminal No. 5).

- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 107) from the accelerator pedal position sensor output terminal (terminal No. 6).

FUNCTION

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT**Check Condition**

- Ignition switch is in ON position.
- Accelerator pedal position sensor (main) output voltage is 0.2 – 2.5 V.

Judgment Criterion

- Accelerator pedal position sensor (main) output voltage is 4.5 V or higher for 1 second.

PROBABLE CAUSE

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

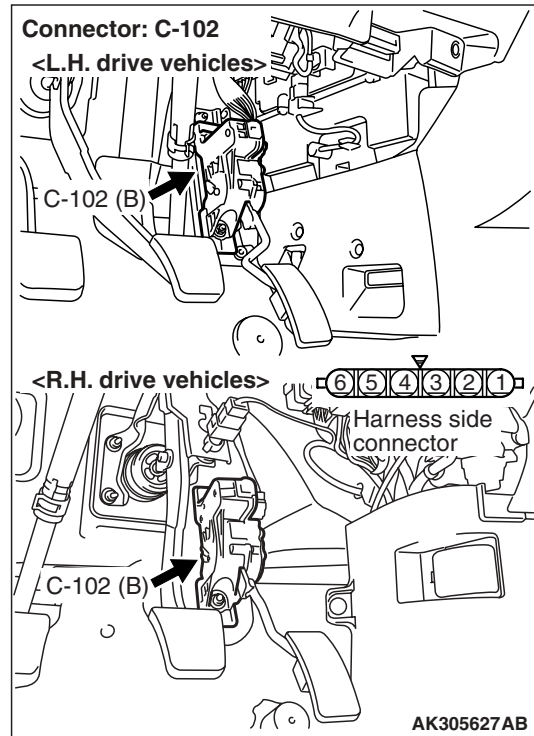
DIAGNOSIS PROCEDURE**STEP 1. MUT-III data list**

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

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

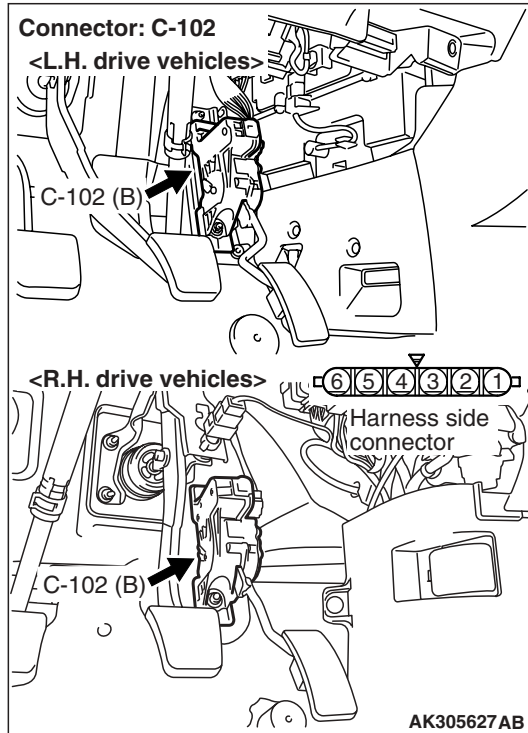
NO : Go to Step 2 .

STEP 2. Connector check: C-102 accelerator pedal position sensor connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at C-102 accelerator pedal position sensor connector.



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

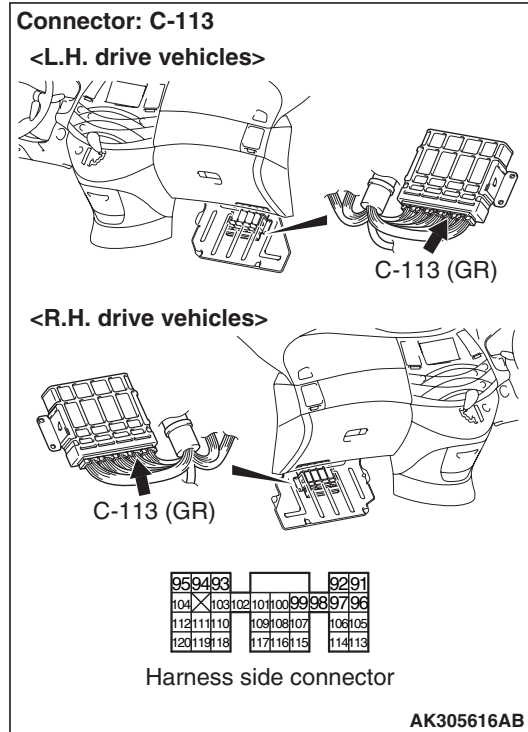
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

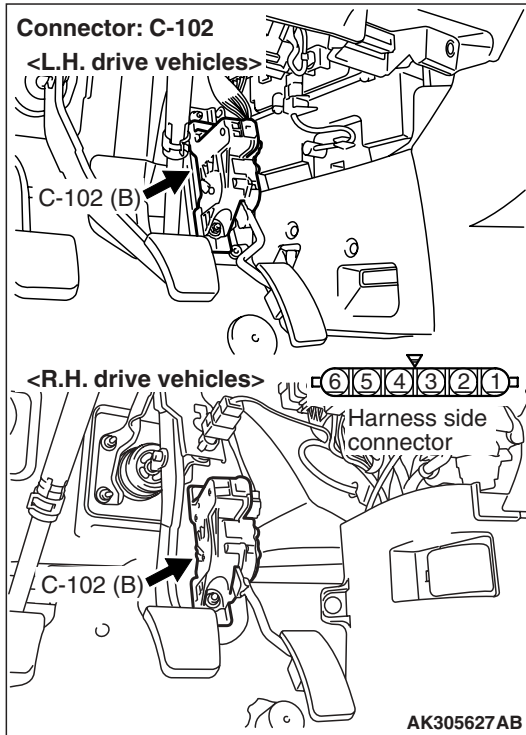


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between C-102 (terminal No. 5) accelerator pedal position sensor connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



YES : Go to Step 6 .

NO : Repair.

STEP 6. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

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

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

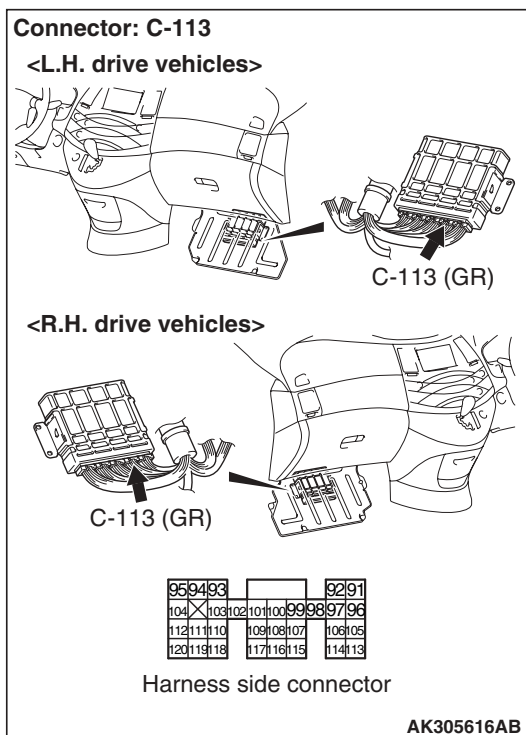
STEP 7. Replace the accelerator pedal assembly

- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Check end.

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

- Check earthing line for open circuit and damage.

Q: Is the check result normal?

Code No. P2135: Throttle Position Sensor (Main and Sub) Range/Performance Problem

OPERATION

- Refer to Code No. P0122: Throttle Position Sensor (main) Circuit Low Input [P.13A-44](#).
- Refer to Code No. P0222: Throttle Position Sensor (sub) Circuit Low Input [P.13A-135](#).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the throttle position sensor output signal characteristics for abnormal conditions.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in ON position.
- Throttle position sensor (main) output voltage is 0.35 – 2.5 V.
- Throttle position sensor (sub) output voltage is 2.25 – 4.8 V

Judgment Criterion

- Using the formula given below, the voltage of 0.3 V or higher is obtained for 0.5 second: $V^* - V^{**} - 2V$

V^* : throttle position sensor (main) output voltage

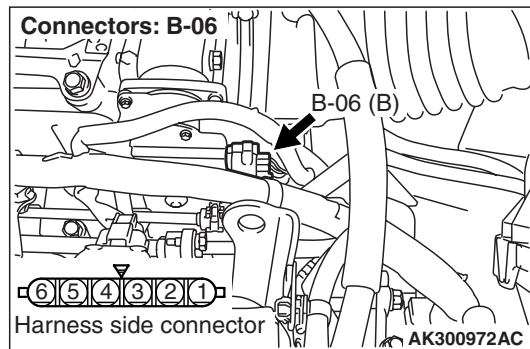
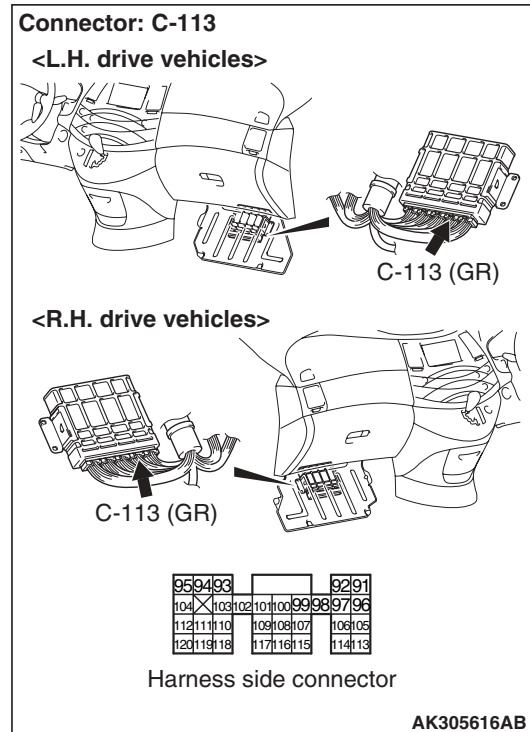
V^{**} : throttle position sensor (sub) output voltage.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-06 electronic-controlled throttle valve connector

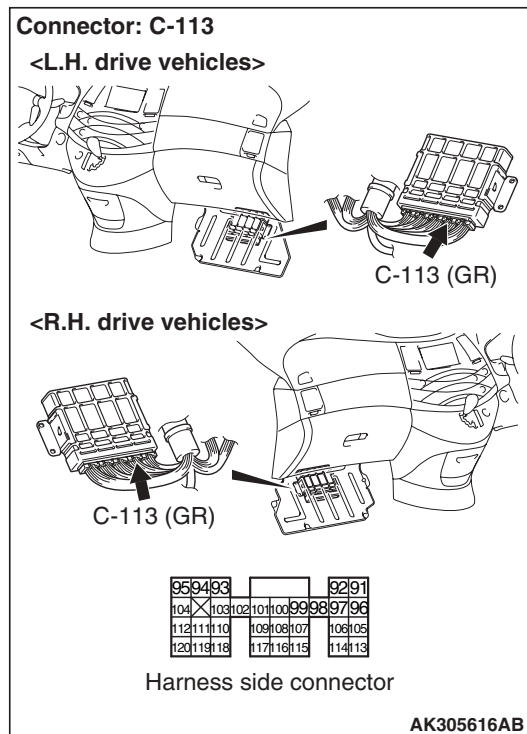
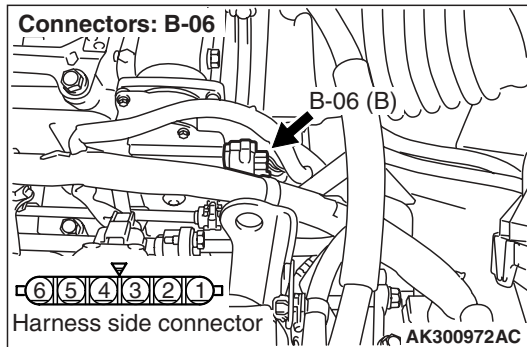


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Check harness between B-06 (terminal No. 4) electronic-controlled throttle valve connector and C-113 (terminal No. 115) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



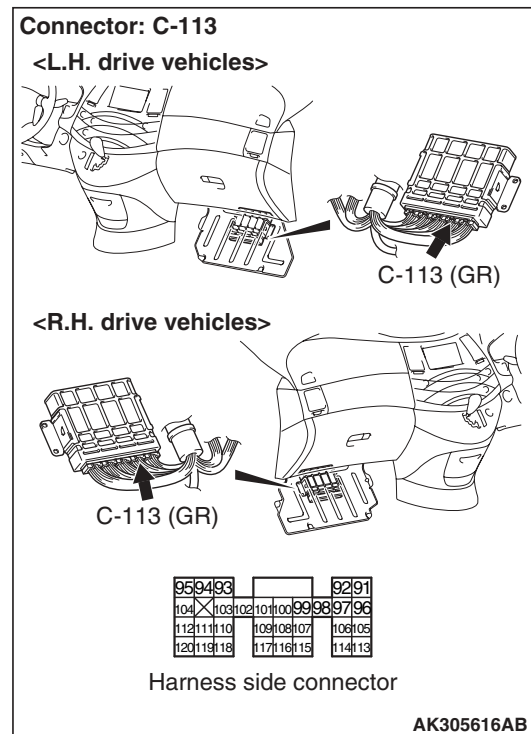
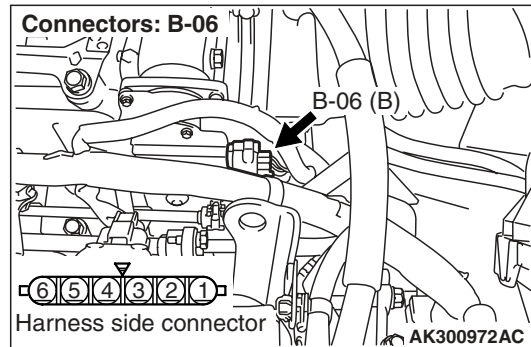
- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check harness between B-06 (terminal No. 6) electronic-controlled throttle valve connector and C-113 (terminal No. 113) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

STEP 4. Replace throttle body assembly.

- After throttle body assembly is replaced, re-check for trouble symptom.

Q: Does trouble system persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Check end.

Code No. P2138: Accelerator Pedal Position Sensor (Main and Sub) Range/Performance Problem

OPERATION

- Refer to Code No. P2122: Accelerator Pedal Position Sensor (main) Circuit Low Input
[P.13A-248.](#)
- Refer to Code No. P2127: Accelerator Pedal Position Sensor (sub) Circuit Low Input
[P.13A-256.](#)

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the accelerator pedal position sensor output signal characteristics for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in ON position
- Accelerator pedal position sensor (main) output voltage is 0.2 – 4.5 V.
- Accelerator pedal position sensor (sub) output voltage is 0.2 – 4.5 V.

Judgment Criteria

- Accelerator pedal position sensor (sub) output voltage minus Accelerator pedal position sensor (main) output voltage is 1 volt or higher for 1 second.
- Accelerator pedal position sensor (main) output voltage minus Accelerator pedal position sensor (sub) output voltage is 1 volt or higher for 0.2 seconds.

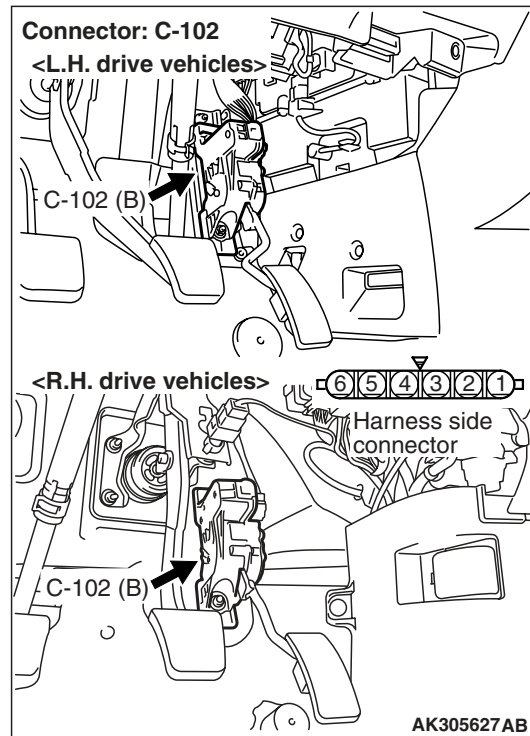
PROBABLE CAUSE

- Failed accelerator pedal position sensor

- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-102 accelerator pedal position connector

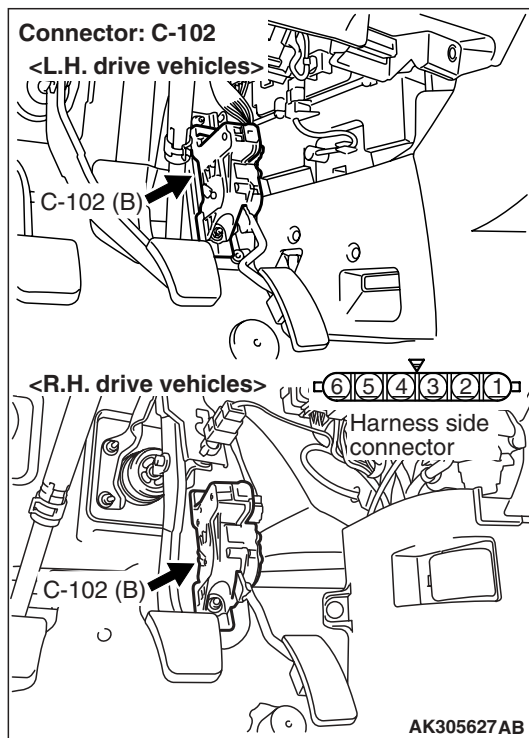


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at C-102 accelerator pedal position sensor connector.



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

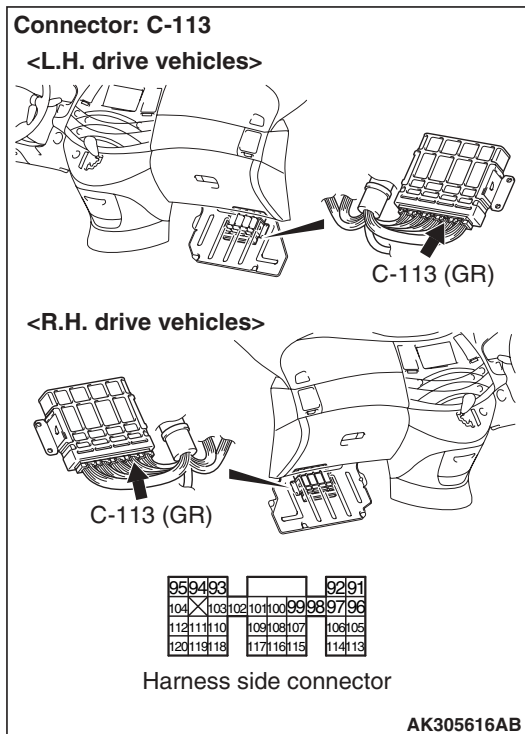
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 3 .

STEP 3. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

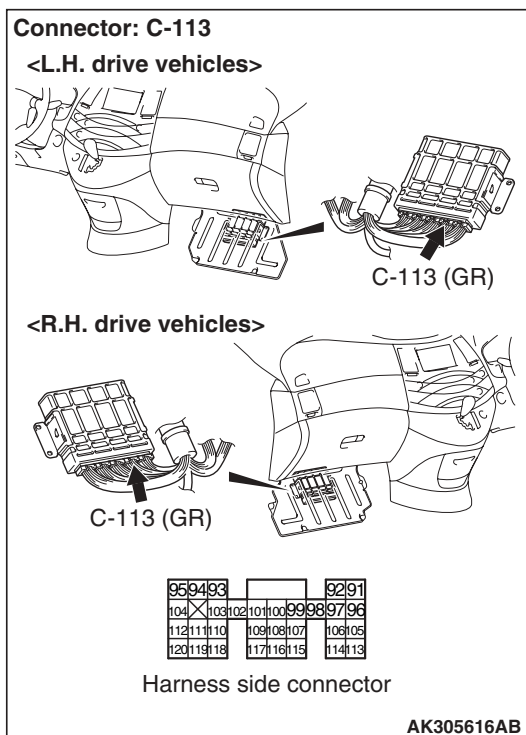
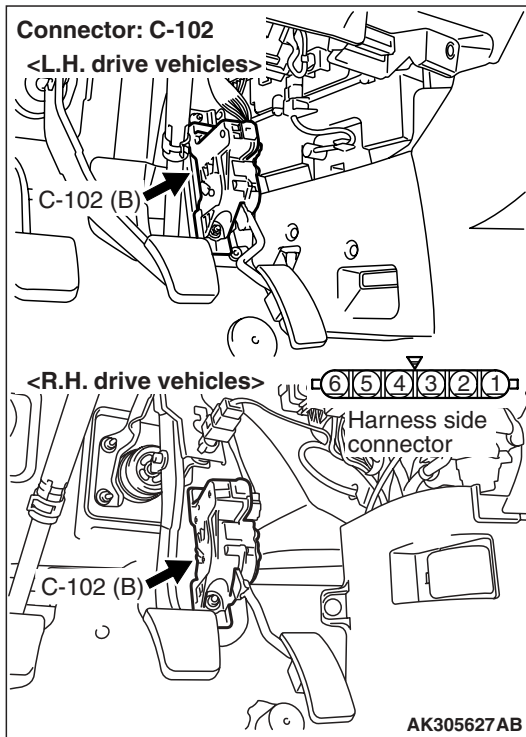


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between C-102 (terminal No. 2) accelerator pedal position sensor connector and C-113 (terminal No. 91) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 5 .
NO : Repair.

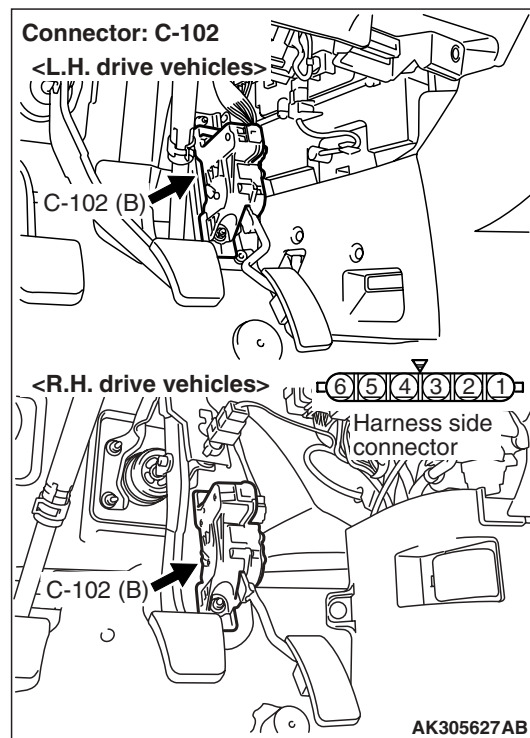
STEP 5. Check the trouble symptoms

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

STEP 6. Perform resistance measurement at C-102 accelerator pedal position sensor connector.



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

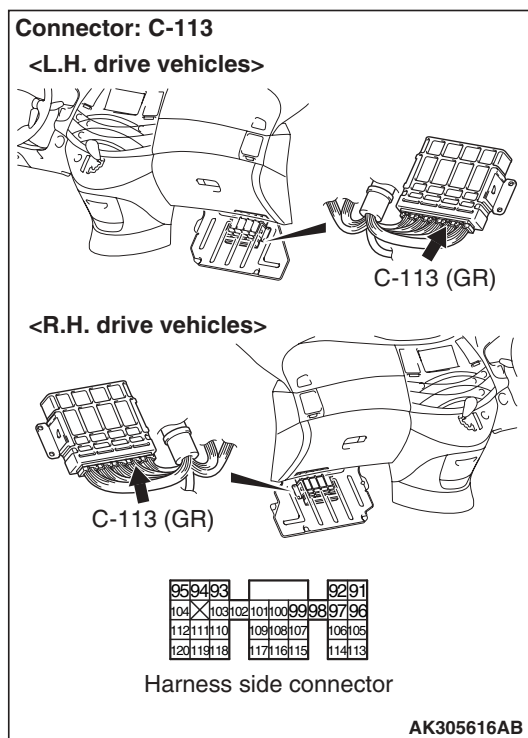
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 7 .

STEP 7. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

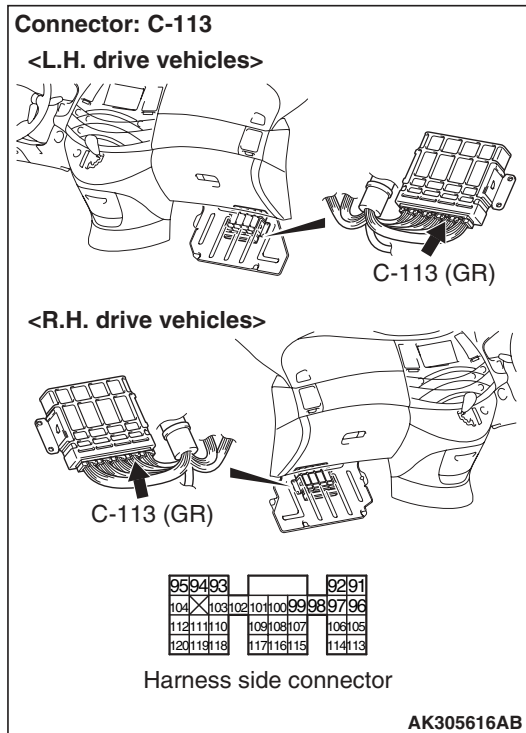
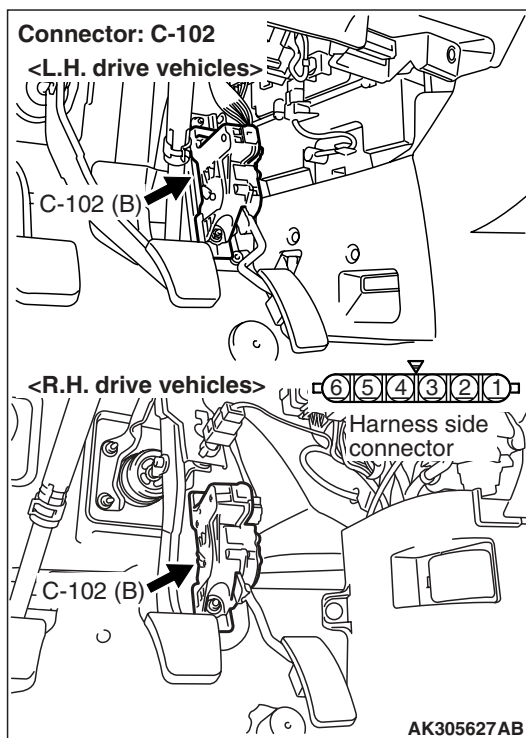


Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Check harness between C-102 (terminal No. 5) accelerator pedal position sensor connector and C-113 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

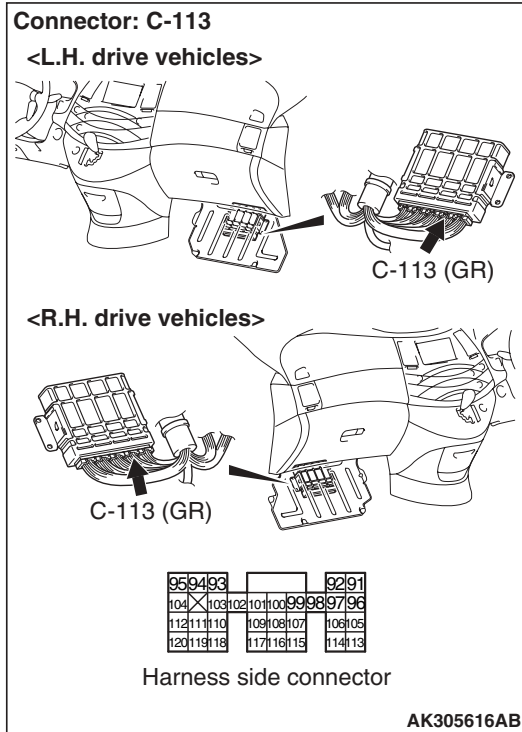
- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 9. Connector check: C-113 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

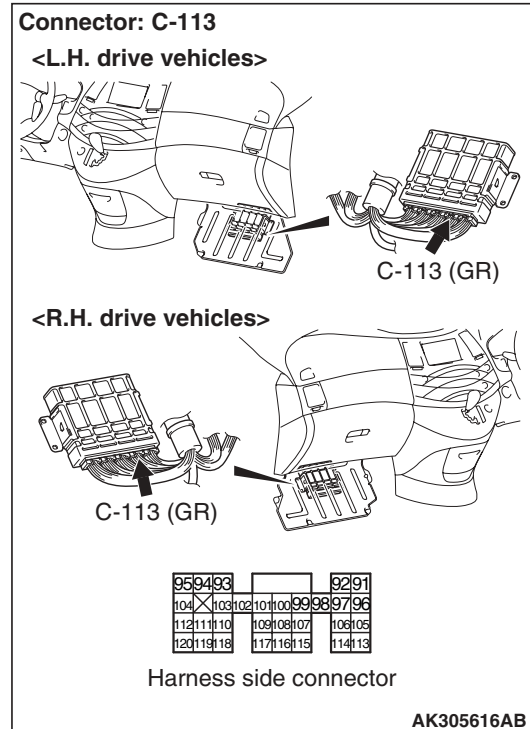
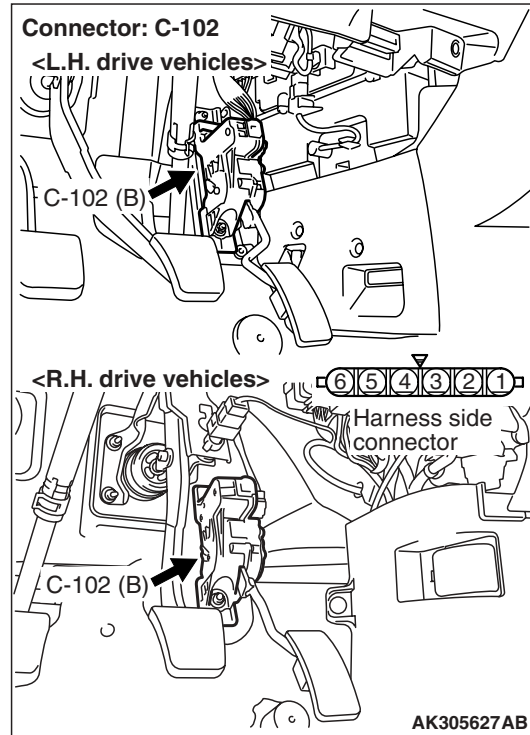


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. Check harness between C-102 (terminal No. 1) accelerator pedal position sensor connector and C-113 (terminal No. 92) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



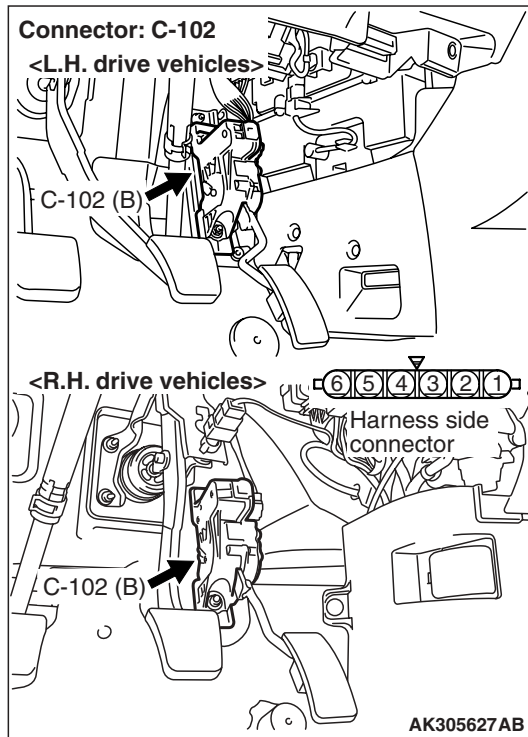
- Check power supply line for damage.

Q: Is the check result normal?

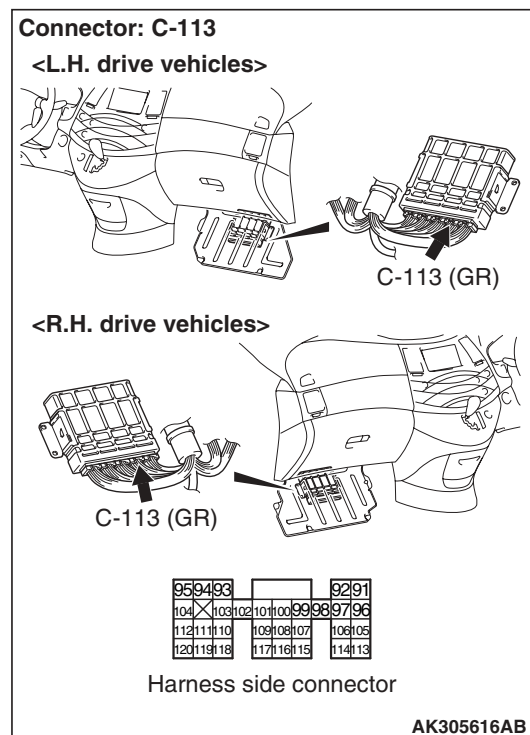
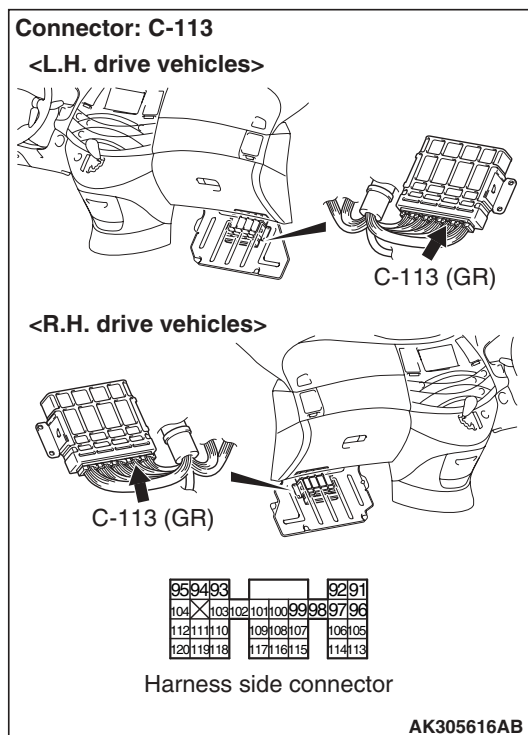
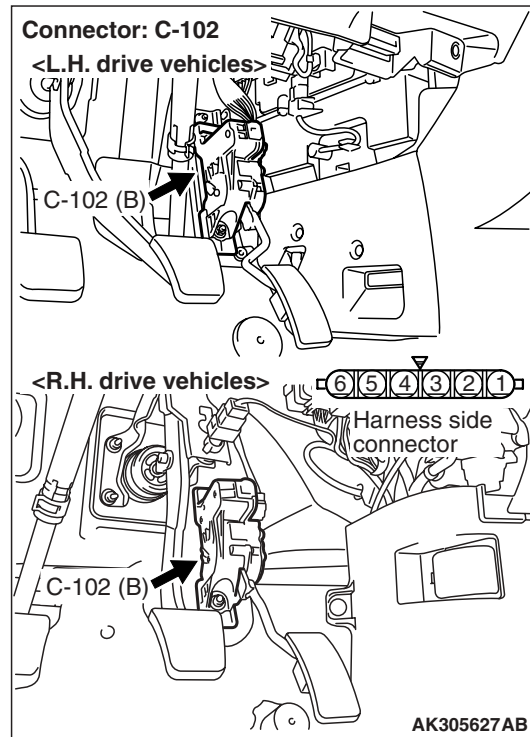
YES : Go to Step 11 .

NO : Repair.

STEP 11. Check harness between C-102 (terminal No. 4) accelerator pedal position sensor connector and C-113 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 12. Check harness between C-102 (terminal No. 3) accelerator pedal position sensor connector and C-113 (terminal No. 114) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 13.

NO : Repair.

STEP 13. Check harness between C-102 (terminal No. 6) accelerator pedal position sensor connector and C-113 (terminal No. 107) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

YES : Go to Step 14 .
NO : Repair.

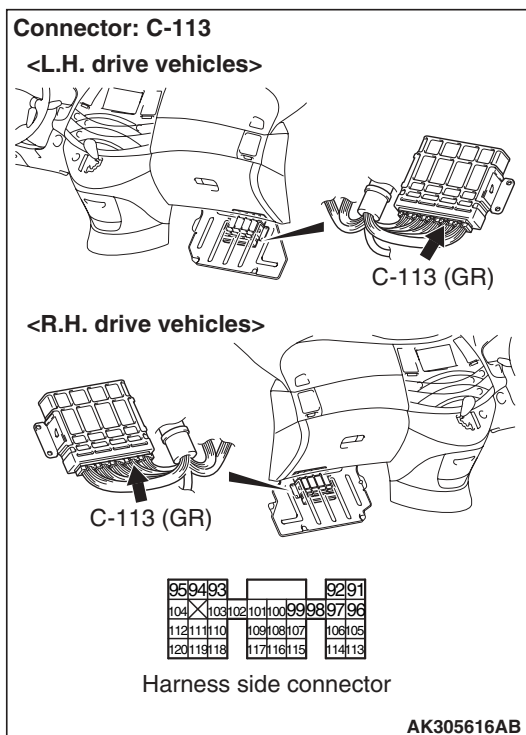
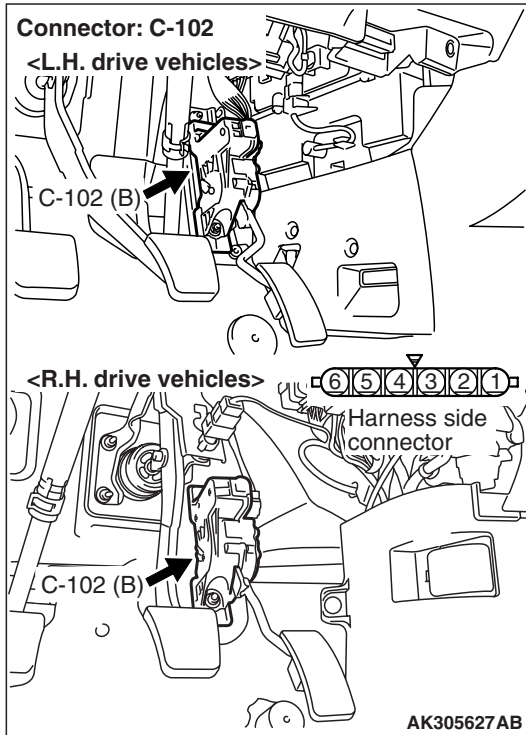
STEP 14. Replace the accelerator pedal assembly

- After replacing the accelerator pedal assembly, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Check end.

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.



- Check output line for damage.

Q: Is the check result normal?

Code No. P2173: Abnormal Intake Air Amount**FUNCTION**

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> decides the allowable intake air amount in accordance with the engine speed and the target opening angle of throttle valve.
- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the actual intake air amount is more than the allowable intake air amount.

TROUBLE JUDGMENT**Check Condition**

- While engine is running.

Judgment Criterion

- The actual intake air amount is more than the allowable intake air amount for 1.5 seconds.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Failed air flow sensor.
- Throttle valve faulty operation.
- Failed throttle position sensor
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS**STEP 1. MUT-III diagnosis code****Q: Diagnosis code set?**

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. Replace the air flow sensor.

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

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check end.

STEP 3. Replace the throttle body assembly.

- After replacing the throttle body assembly, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Replacing engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Check end.

Code No. U1073: Bus Off**⚠ CAUTION**

If diagnosis code U1073 is output from engine-ECU <M/T> or engine-A/T-ECU <A/T> surely perform CAN busline diagnosis.

⚠ CAUTION

Replace ECU after certainly confirming that the communication circuits are normal.

TROUBLE JUDGMENT**Check Condition**

- All the time

Judgment Criterion

- When the buss off error is detected.

COMMENT ON TROUBLE SYMPTOM

- The failure is possibly caused by malfunction of the harness and connector in CAN busline or by malfunction in engine-ECU <M/T> or engine-A/T-ECU <A/T>.

PROBABLE CAUSE

- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS**STEP 1. MUT-III CAN bus diagnostics**

- Using MUT-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Correct CAN busline (Refer to 54D – Diagnosis – Can Bus Diagnostics Chart [P.54D-16](#)), and then go to Step 3 .

STEP 2. MUT-III diagnosis code

Reconfirm whether the diagnosis codes are output from Engine-ECU <M/T> or engine-A/T-ECU <A/T>.

1. Erase the diagnosis codes being output.
2. Ignition switch: "LOCK" (OFF) to ON
3. Confirm whether the diagnosis codes are output.

Q: Are the diagnosis codes output?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>. Then go to Step 3 .

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

STEP 3. MUT-III diagnosis code

Reconfirm whether the diagnosis codes are output from engine-ECU <M/T> or engine-A/T-ECU <A/T>.

1. Erase the diagnosis codes being output.
2. Ignition switch: "LOCK" (OFF) to ON
3. Confirm whether the diagnosis codes are output.

Q: Are the diagnosis codes output?

YES : Go to Step 1 .

NO : Check end.

Code No. U1102: ABS-ECU time-out

CAUTION

If Diagnosis Code U1102 is output from engine-ECU <M/T> or engine-A/T-ECU <A/T> surely perform CAN busline diagnosis.

CAUTION

Replace ECU after certainly confirming that the communication circuits are normal.

TROUBLE JUDGMENT

Check Conditions

- While the cranking switch is in OFF position, or when 3 seconds pass after the cranking switch is in OFF from ON.
- The battery voltage is 10V or more.

Judgment Criterion

- The signals cannot be received from ABS-ECU through CAN busline.

COMMENT ON TROUBLE SYMPTOM

Current malfunction

- The failure is possibly caused by malfunction of the harness and connector in CAN busline between engine-ECU <M/T> and ABS-ECU or between engine-A/T-ECU <A/T> and ABS-ECU, by malfunction in the power supply system of ABS-ECU, in ABS-ECU itself, in engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Past malfunction

- Focus on diagnosing malfunction of the harness and connector in CAN busline between engine-ECU <M/T> and ABS-ECU or between engine-A/T-ECU as well as malfunction in the power supply system of ABS-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

NOTE: In case of Past trouble, MUT-III CAN bus diagnosis cannot detect the failure even if there is malfunction in CAN bus, so that check CAN busline in the same way as Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)). The diagnosis codes being output to each ECU with CAN communication can narrow down the most suspected area. (Refer to GROUP 54D – Explanation About The MUT-III Can Bus Diagnostics [P.54D-9](#)).

PROBABLE CAUSE

- Failed of the harness and the connector
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>
- Failed ABS-ECU

DIAGNOSIS

STEP 1. MUT-III CAN bus diagnostics

- Using MUT-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .
NO : Correct CAN busline (Refer to GROUP54D – Diagnosis – Can Bus Diagnostic Chart P.54D-16), and then go to Step 6 .

STEP 2. MUT-III other system diagnosis codes

- Confirm whether the diagnosis codes are output from ABS-ECU.

Q: Is the diagnosis code output?

YES : Perform the troubleshooting of ABS (Refer to GROUP 35B – Inspection Chart For Diagnosis Code P.35B-7).
NO : Go to Step 3 .

STEP 3. MUT-III other system diagnosis codes

- Confirm whether Diagnosis Code U1102:
 ABS-ECU time-out is output from the following ECU having CAN communication with ABS-ECU
 - EPS-ECU
 - Combination meter-ECU

Q: Is the diagnosis code output?

YES : Go to Step 4 .
NO : Go to Step 5 .

STEP 4. MUT-III diagnosis code

- Reconfirm whether the diagnosis codes are output from engine-ECU <M/T> or engine-A/T-ECU <A/T>.
 - Erase the diagnosis codes being output.
 - Ignition switch: "LOCK" (OFF) to ON
 - Confirm whether the diagnosis codes are output.

Q: Is the diagnosis code output?

YES : Replace ABS-ECU. Then go to Step 6 .
NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> and ABS-ECU or between engine-A/T-ECU <A/T> (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

STEP 5. MUT-III diagnosis code

- Reconfirm whether the diagnosis codes are output from engine-ECU <M/T> or engine-A/T-ECU <A/T>.
 - Erase the diagnosis codes being output.
 - Ignition switch: "LOCK" (OFF) to ON
 - Confirm whether the diagnosis codes are output.

Q: Is the diagnosis code output?

YES : Replace Engine-ECU <M/T> or engine-A/T-ECU <A/T>. Then go to Step 6 .
NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> or engine-A/T-ECU <A/T> and ABS-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

STEP 6. MUT-III diagnosis code

- Reconfirm whether the diagnosis codes are output from engine-ECU <M/T> or engine-A/T-ECU <A/T>.
 - Erase the diagnosis codes being output.
 - Ignition switch: "LOCK" (OFF) to ON
 - Confirm whether the diagnosis codes are output.

Q: Is the diagnosis code output?

YES : Go to step 1 .
NO : Check end.

Code No. U1108: Combination meter timeout**⚠ CAUTION**

If Diagnosis Code U1108 is output from Engine-ECU <M/T> or engine-A/T-ECU <A/T> surely perform CAN busline diagnosis.

⚠ CAUTION

Replace ECU after certainly confirming that the communication circuits are normal.

TROUBLE JUDGMENT**Check Conditions**

- While the cranking switch is in OFF position, or when 3 seconds pass after the cranking switch is in OFF from ON.
- The battery voltage is 10V or more.

Judgment Criterion

- The signals cannot be received from combination meter through CAN busline.

COMMENT ON TROUBLE SYMPTOM

Current malfunction

- The failure is possibly caused by malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-A/T-ECU <A/T> and combination meter or between engine-ECU <M/T> or engine-A/T-ECU <A/T> and combination meter, by malfunction in the power supply system of combination meter, in combination meter itself, in Engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Past malfunction

- Focus on diagnosing malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-A/T-ECU <A/T> and combination meter as well as malfunction in the power supply system of combination meter. Refer to past trouble (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)) for the diagnosis procedure.

NOTE: In case of Past trouble, MUT-III CAN bus diagnosis cannot detect the failure even if there is malfunction in CAN bus, so that check CAN busline in the same way as Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)). The diagnosis codes being output to each ECU with CAN communication can narrow down the most suspected area (Refer to GROUP 54D – Explanation About The MUT-III Can Bus Diagnostics [P.54D-9](#)).

PROBABLE CAUSE

- Failed of the harness and the connector
- Failed combination meter
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS

STEP 1. MUT-III CAN bus diagnostics

- Using MUT-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Correct CAN busline (Refer to Group 54D – Diagnosis – Can Bus Diagnostics Chart [P.54D-16](#)), and then go to Step 6 .

STEP 2. MUT-III other system diagnosis codes.

- Confirm whether the diagnosis codes are output from combination meter.

Q: Is the diagnosis code output?

YES : Perform the troubleshooting of combination meter (Refer to GROUP 54A – combination meter – Inspection Chart For Diagnosis Code codes [P.54A-35](#)).

NO : Go to Step 3 .

STEP 3. MUT-III other system diagnosis codes

- Confirm whether Diagnosis Code U1108: combination meter time-out is output from the following ECU having CAN communication with combination meter
 - a. ETACS-ECU

Q: Is the diagnosis code output?

YES : Go step 5 .

NO : Go step 4 .

STEP 4. MUT-III diagnosis code

- Reconfirm whether the diagnosis codes are output from engine-ECU <M/T> or engine-A/T-ECU <A/T>.
 - a. Erase the diagnosis codes being output.
 - b. Ignition switch: "LOCK" (OFF) to ON
 - c. Confirm whether the diagnosis codes are output.

Q: Is the diagnosis code output?

YES : Replace combination meter. Then go to Step 6 .

NO : Temporary malfunction in CAN busline between engine-ECU <M/T> or engine-A/T-ECU <A/T> and combination meter (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

STEP 5. MUT-III diagnosis code

- Reconfirm whether the diagnosis codes are output from engine-ECU <M/T> or engine-A/T-ECU <A/T>.
 - a. Erase the diagnosis codes being output.
 - b. Ignition switch: "LOCK" (OFF) to ON
 - c. Confirm whether the diagnosis codes are output.

Q: Is the diagnosis code output?

- YES** : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>. Then go to Step 6 .
- NO** : Temporary malfunction in CAN busline between Engine-ECU <M/T> or engine-A/T-ECU <A/T> and combination meter (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#))

STEP 6. MUT-III diagnosis code

- Reconfirm whether the diagnosis codes are output from engine-ECU <M/T> or engine-A/T-ECU <A/T>.
 - Erase the diagnosis codes being output.
 - Ignition switch: "LOCK" (OFF) to ON
 - Confirm whether the diagnosis codes are output.

Q: Is the diagnosis code output?**YES** : Go to step 1 .**NO** : The check is completed.**Code No. U1110: A/C-ECU timeout****⚠ CAUTION**

If Diagnosis Code U1110 is output from Engine-ECU <M/T> or engine-A/T-ECU <A/T> surely perform CAN busline diagnosis.

⚠ CAUTION

Replace ECU after certainly confirming that the communication circuits are normal.

TROUBLE JUDGMENT**Check Conditions**

- While the cranking switch is in OFF position, or when 3 seconds pass after the cranking switch is in OFF from ON.
- The battery voltage is 10V or more.

Judgment Criterion

- The signals cannot be received from A/C-ECU through CAN busline.

COMMENT ON TROUBLE SYMPTOM**Current malfunction**

- The failure is possibly caused by malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-A/T-ECU <A/T> and A/C-ECU, by malfunction in the power supply system of A/C-ECU, in A/C-ECU itself, in engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Past malfunction

- Focus on diagnosing malfunction of the harness and connector in CAN busline between engine-ECU <M/T> or engine-A/T-ECU <A/T> and A/C-ECU as well as malfunction in the power supply system of A/C-ECU. Refer to past trouble (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)) for the diagnosis procedure.

NOTE: In case of Past trouble, MUT-III CAN bus diagnosis cannot detect the failure even if there is malfunction in CAN bus, so that check CAN busline in the same way as Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)). The diagnosis codes being output to each ECU with CAN communication can narrow down the most suspected area (Refer to GROUP 54D – Explanation About The MUT-III Can Bus Diagnostics [P.54D-9](#)).

PROBABLE CAUSE

- Failed of the harness and the connector
- Failed A/C-ECU
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS**STEP 1. MUT-III CAN bus diagnostics**

- Using MUT-III, perform CAN busline diagnosis.

Q: Is the check result normal?**YES** : Go to Step 2 .**NO** : Correct CAN busline (Refer to Group 54D – Diagnosis – Can Bus Diagnostic Chart [P.54D-16](#)), and then go to Step 6 .**STEP 2. MUT-III other system diagnosis codes**

- Confirm whether the diagnosis codes are output from A/C-ECU.

Q: Is the diagnosis code output?**YES** : Perform the troubleshooting of A/C-ECU (Refer to GROUP 55 Check Chart for Diagnosis Codes [P.55-8](#)).**NO** : Go step 3 .

STEP 3. MUT-III other system diagnosis codes

- Confirm whether Diagnosis Code U1110 A/C-ECU time-out is output from the following ECU having CAN communication with A/C ECU.
 - a. ETACS-ECU

Q: Is the diagnosis code output?

YES : Go to Step 4 .

NO : Go to Step 5 .

STEP 4. MUT-III diagnosis code

- Reconfirm whether the diagnosis codes are output from engine-ECU <M/T> or engine-A/T-ECU <A/T>.
 - a. Erase the diagnosis codes being output.
 - b. Ignition switch: "LOCK" (OFF) to ON
 - c. Confirm whether the diagnosis codes are output.

Q: Is the diagnosis code output?

YES : replace A/C-ECU. Then go to Step 6 .

NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> or engine-A/T-ECU <A/T> and A/C-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

STEP 5. MUT-III diagnosis code

- Reconfirm whether the diagnosis codes are output from engine-ECU<M/T> or engine-A/T-ECU <A/T>.
 - a. Erase the diagnosis codes being output.
 - b. Ignition switch: "LOCK" (OFF) to ON
 - c. Confirm whether the diagnosis codes are output.

Q: Is the diagnosis code output?

YES : Replace engine-ECU<M/T> or engine-A/T-ECU <A/T>. Then go to Step 6 .

NO : Intermittent malfunction in CAN busline between engine-ECU <M/T> or engine-A/T-ECU <A/T> and A/C-ECU (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

STEP 6. MUT-III diagnosis code

- Reconfirm whether the diagnosis codes are output from engine-ECU <M/T> or engine-A/T-ECU <A/T>.
 - a. Erase the diagnosis codes being output.
 - b. Ignition switch: "LOCK" (OFF) to ON
 - c. Confirm whether the diagnosis codes are output.

Q: Is the diagnosis code output?

YES : Go to Step 1 .

NO : check end.

INSPECTION CHART FOR TROUBLE SYMPTOMS

M1131151501053

| Items | Trouble symptom | Inspection procedure No. |
|--|---|--------------------------|
| Communication with MUT-III is impossible | Communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> only is not possible | 1 |
| Engine warning lamp | The engine warning lamp does not illuminate right after the ignition switch is turned the "ON" position | 2 |
| | The engine warning lamp remains illuminating and never goes out | 3 |

| Items | Trouble symptom | | Inspection procedure No. |
|-----------------|--|--|--------------------------|
| Starting | Starting impossible (No initial combustion) | The starter is impossible to operate. | 4 <M/T>, 5 <A/T> |
| | 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 |

| Items | Trouble symptom | | Inspection procedure No. |
|----------------------|--------------------------------|--|--------------------------|
| Charging performance | Battery rundown | The battery is soon rundown or the charging ability of battery is small. | 19 |
| 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 |

PROBLEM SYMPTOMS TABLE

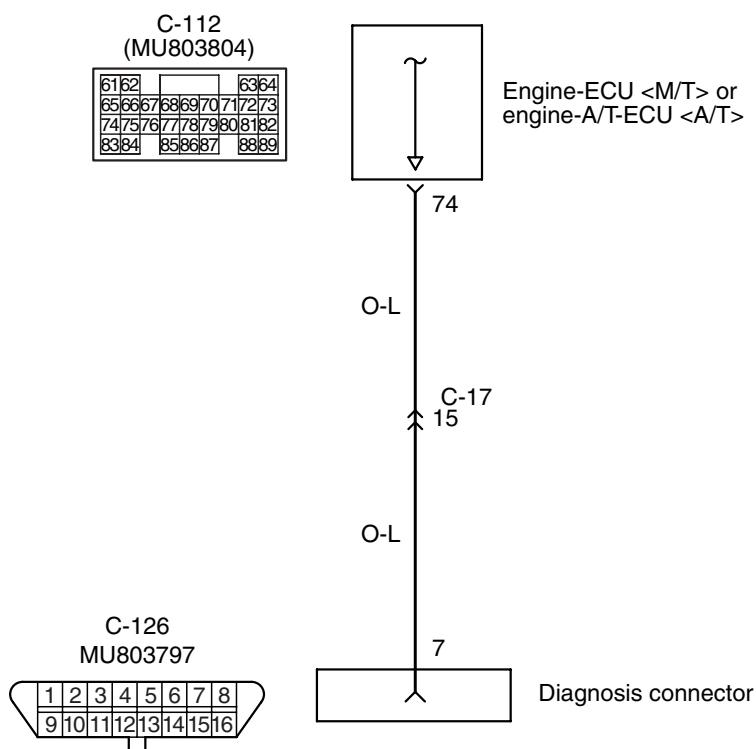
| Inspection procedure No. | Trouble symptom | Reference page |
|--------------------------|---|---------------------------|
| 1 | Communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> only is not possible | P.13A-283 |
| 2 | The engine warning lamp does not illuminate right after the ignition switch is turned the "ON" position | P.13A-285 |
| 3 | The engine warning lamp remains illuminating and never goes out | P.13A-285 |
| 4 | Starting impossible (No initial combustion) <M/T> | P.13A-286 |
| 5 | Starting impossible (No initial combustion) <A/T> | P.13A-292 |
| 6 | Starting impossible (Starter operative but no initial combustion) | P.13A-297 |
| 7 | Starting impossible (Initial combustion but no complete combustion) | P.13A-300 |
| | Starting impossible (Long time to start) | |
| 8 | Unstable idling (Rough idling, hunting) | P.13A-301 |
| | Improper idling speed (Too high or too low) | |
| | Engine stalls during idling (Die out) | |
| 9 | The engine stalls when starting the car (pass out) | P.13A-305 |
| 10 | The engine stalls when decelerating | P.13A-305 |
| 11 | Engine does not revolve up | P.13A-306 |
| 12 | Hesitation, sag | P.13A-307 |
| | Poor acceleration | |
| | Stumble | |
| | Surge | |
| 13 | The feeling of impact or vibration when accelerating | P.13A-308 |
| 14 | The feeling of impact or vibration when decelerating | P.13A-309 |
| 15 | Knocking | P.13A-309 |
| 16 | Ignition timing offset | P.13A-309 |
| 17 | Run on (Dieseling) | P.13A-311 |
| 18 | Odor, white smoke, black smoke, high-concentration CO/HC during idling | P.13A-311 |
| 19 | Battery rundown | P.13A-313 |

| Inspection procedure No. | Trouble symptom | Reference page |
|--------------------------|---|----------------|
| 20 | Overheating | P.13A-316 |
| 21 | Abnormal rotation of fan motor | P.13A-318 |
| 22 | Engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply, engine control relay, ignition switch-IG1 system | P.13A-321 |
| 23 | Fuel pump system | P.13A-328 |
| 24 | Fan control relay system | P.13A-340 |
| 25 | A/C compressor relay system | P.13A-347 |
| 26 | Ignition circuit system | P.13A-355 |

SYMPTOM PROCEDURES

Inspection Procedure 1: Communication with Engine-ECU <M/T> or Engine-A/T-ECU <A/T> is Not Possible.

Diagnosis 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

AK305574AB

OPERATION

- There is data communication between diagnosis

connector output terminal (terminal No. 7) and engine-ECU <M/T> (terminal No. 74).

COMMENT ON TROUBLE SYMPTOM

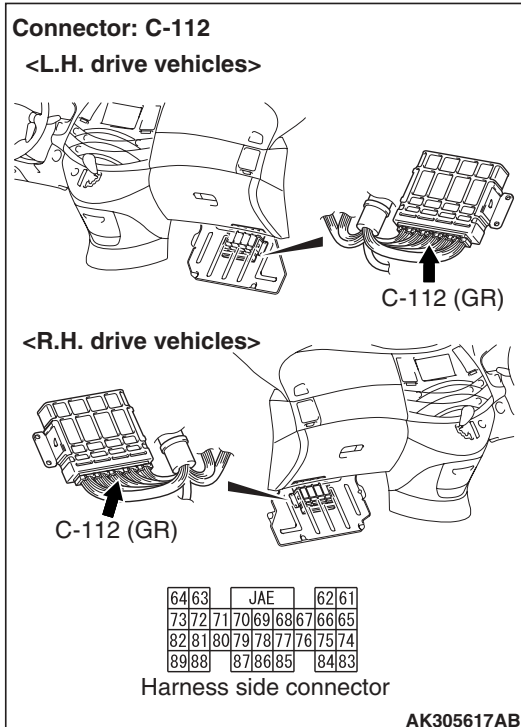
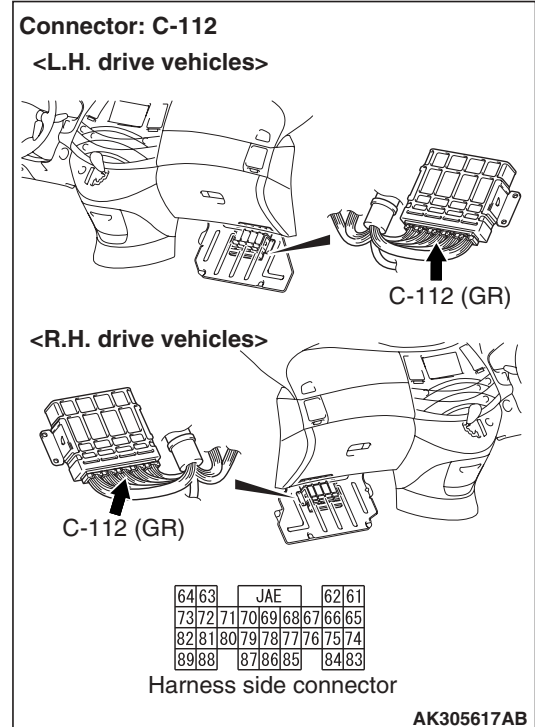
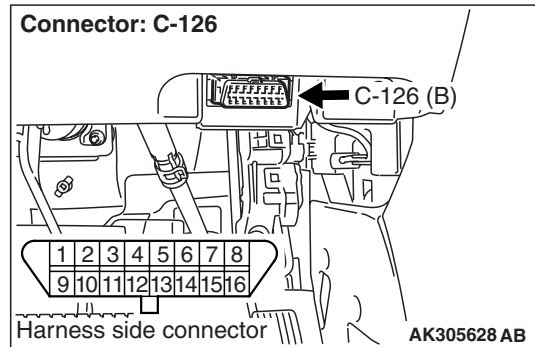
- The failure possibly occurs when engine-ECU <M/T> or engine-A/T-ECU <A/T> detects malfunction, or is caused by malfunction of open or short in the combination meter circuit.

PROBABLE CAUSE

- Open/short circuit in engine-ECU <M/T> or engine-A/T-ECU <A/T> power circuit
- Between engine-ECU <M/T> or engine-A/T-ECU <A/T> and diagnosis connector for short circuit
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1: Check start - up.****Q: Is engine started****YES :** Go to Step 2 .

NO : Check engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 22 P.13A-321).

STEP 2: Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**YES :** Go to Step 3 .**NO :** Repair or replace.**STEP 3: Check harness between C-126 (terminal No. 7) diagnosis connector and C-112 (terminal No. 74) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.**

NOTE: Before checking harness, check intermediate connectors C-17 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?****Q: Is the check result normal?**

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

Inspection Procedure 2: The Engine Warning Lamp Does Not Illuminate Right after the Ignition Switch is Turned the "ON" Position

COMMENTS ON TROUBLE SYMPTOM

- The combination meter illuminates engine warning lamp for 5 seconds just after the ignition switch is in "ON" position.
- If engine warning lamp does not illuminate just after the ignition switch is in "ON" position, the failure is possibly caused by malfunction of engine warning lamp, open or short in the combination meter circuits and so on.

PROBABLE CAUSE

- Failed engine warning lamp
- Open/short circuit in combination meter

DIAGNOSIS PROCEDURE

STEP 1: MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2: Check the trouble symptoms.

Q: Does trouble system persist?

YES : Replace combination meter assembly.

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

Inspection Procedure 3: The Engine Warning Lamp Remains Illuminating and Never Goes Out

COMMENT ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

- Short circuit in combination meter

DIAGNOSIS PROCEDURE

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#).)

NO : Go to Step 2 .

STEP 2: Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace combination meter assembly.

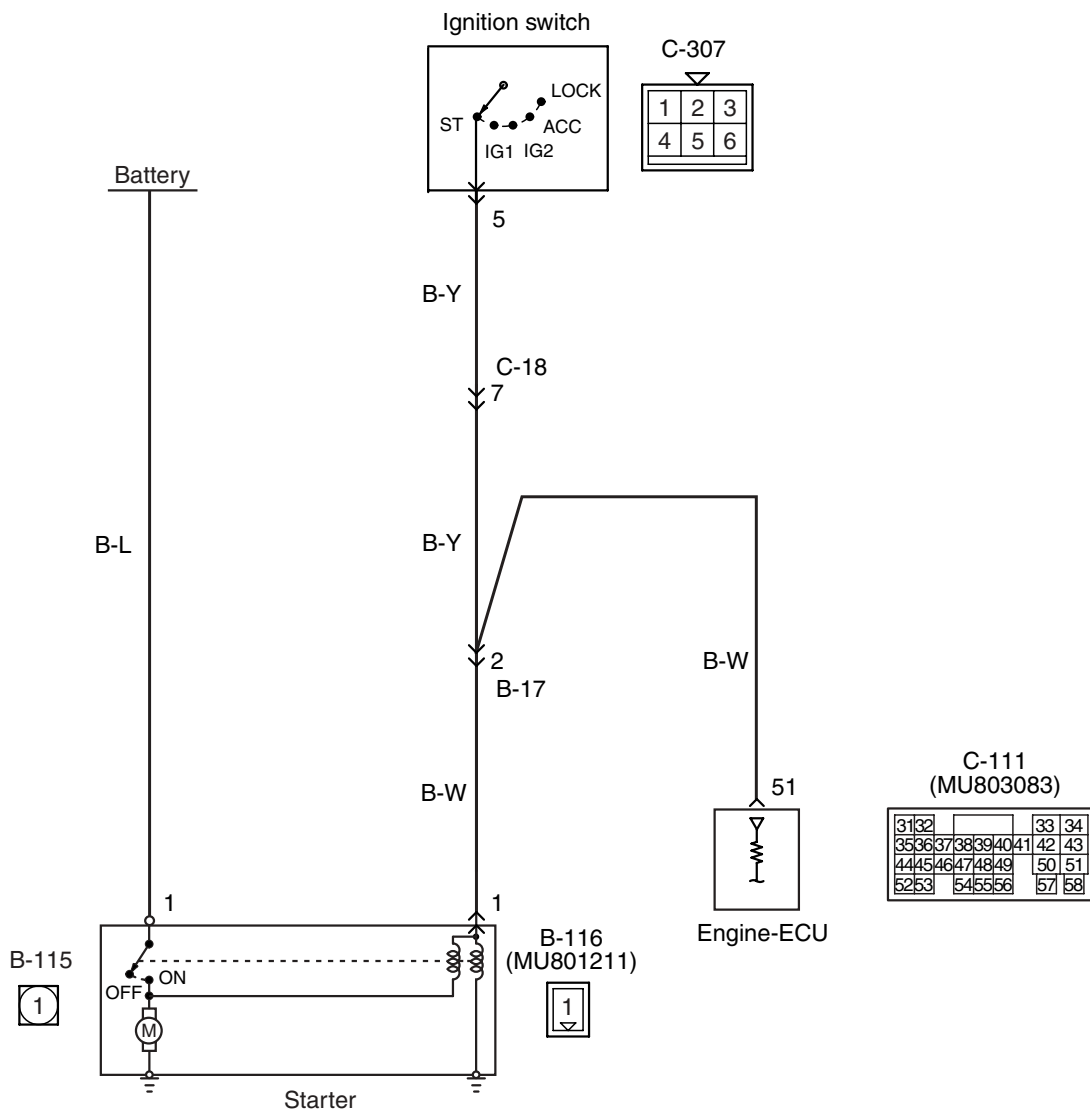
NO : Intermittent malfunction (Refer to GROUP00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

STEP 1: MUT-III diagnosis code

Q: Diagnosis code set?

Inspection Procedure 4: Starting Impossible (No Initial Combustion) <M/T>

Starting impossible (no initial combustion) <M/T>



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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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-6).

STEP 2: MUT-III data list

- Item 18: Cranking signal

OK:

ON (Ignition switch: ST)

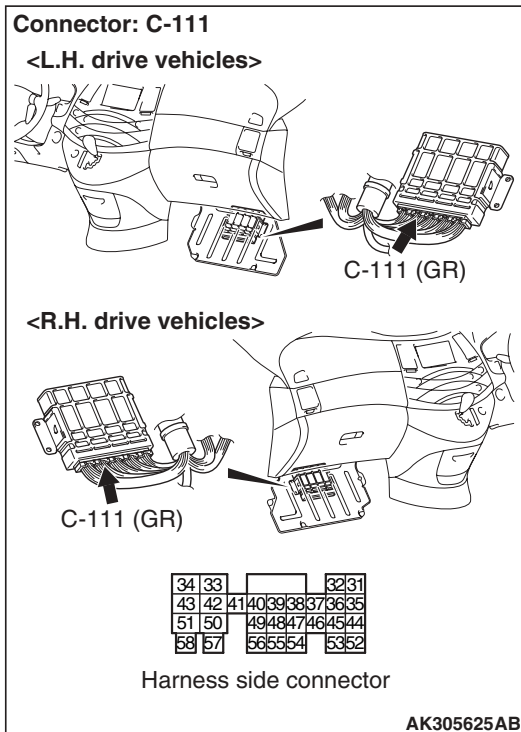
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 3 .

STEP 3: Connector check: C-111 engine-ECU connector

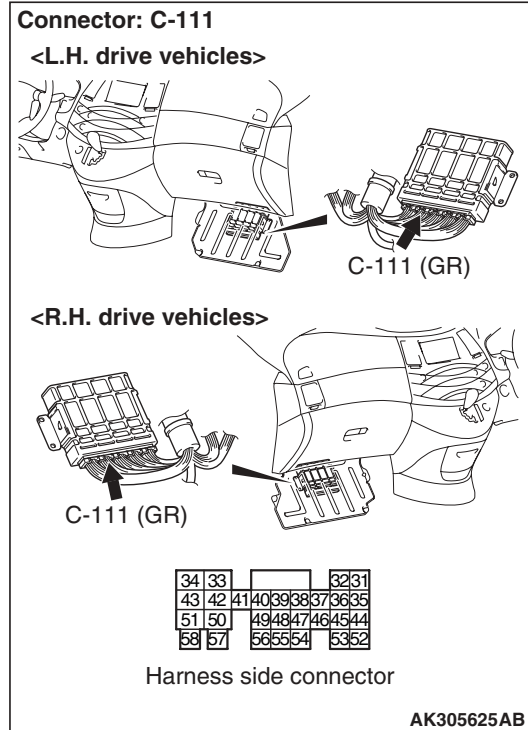


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4: Perform voltage measurement at C-111 engine-ECU connector.



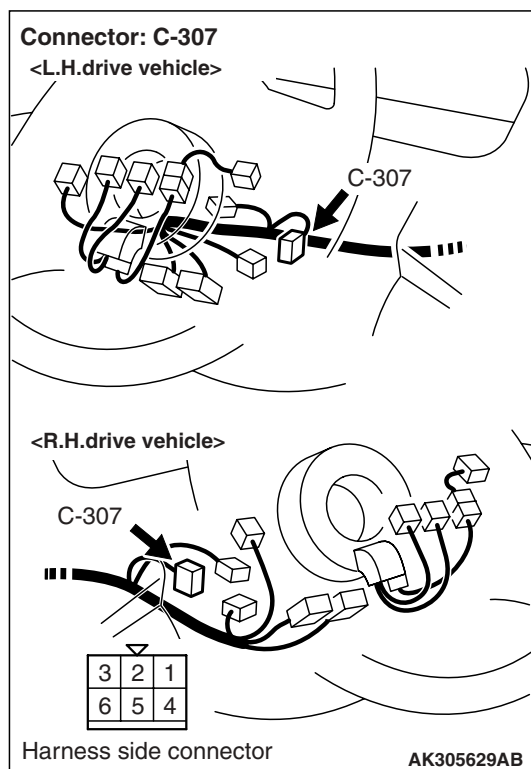
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 51 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

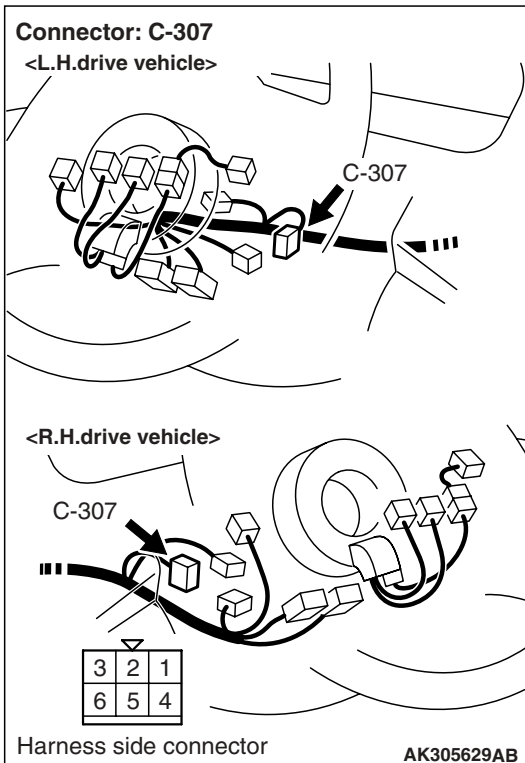
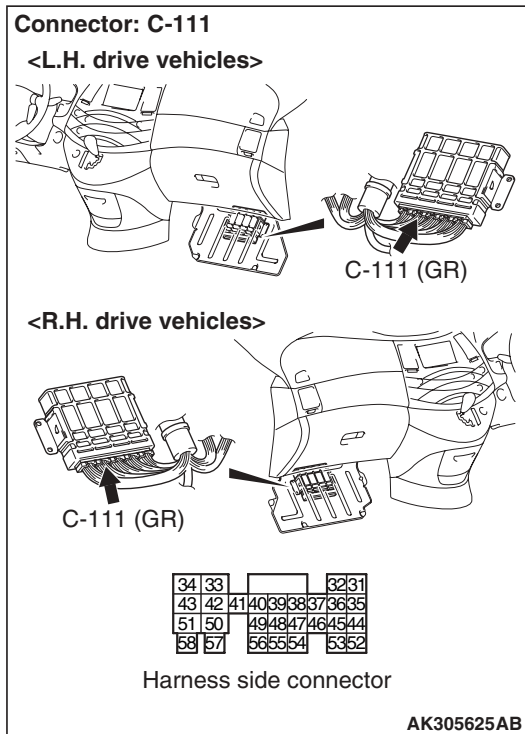
NO : Go to Step 5 .

STEP 5: Connector check: C-307 ignition switch connector

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6: Check ignition switch.

- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Inspection [P.54A-31](#)).

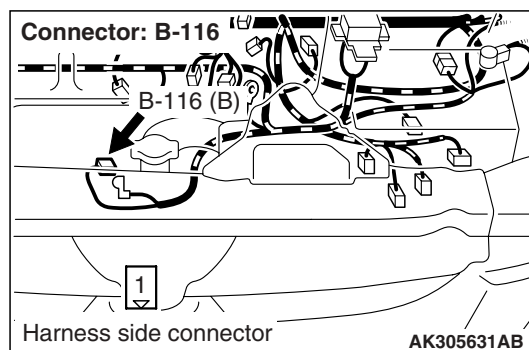
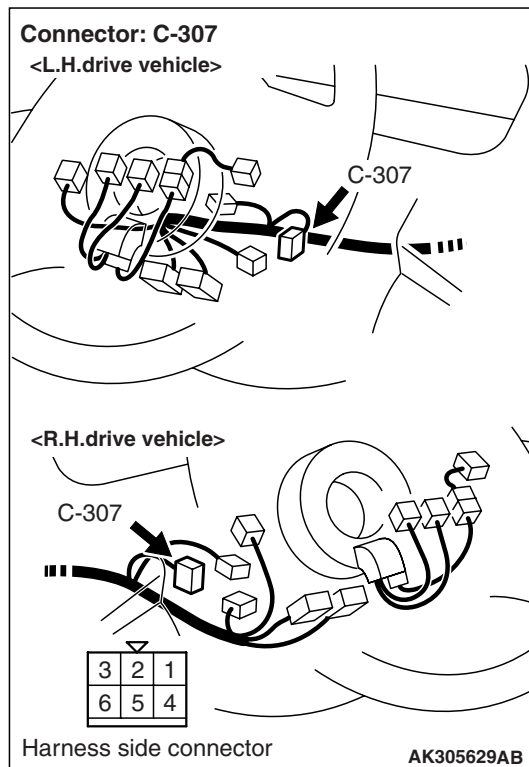
Q: Is the check result normal?

YES : Check intermediate connectors C-18 and B-17, and repair if necessary. If intermediate connector are normal, check and repair harness between C-111 (terminal No. 51) engine-ECU connector and C-307 (terminal No. 5) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 7: Connector check: C-307 ignition switch connector and B-116 starter connector



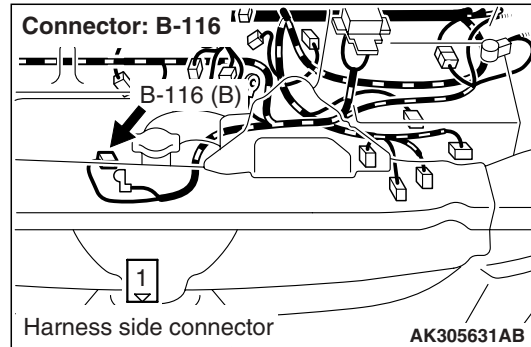
Q: Is the check result normal?

YES : Check intermediate connectors C-18 and B-17, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-307 (terminal No. 5) ignition switch connector and B-116 (terminal No. 1) starter connector.

- Check output line for short circuit.

NO : Repair or replace.

STEP 8: Connector check: B-116 starter connector

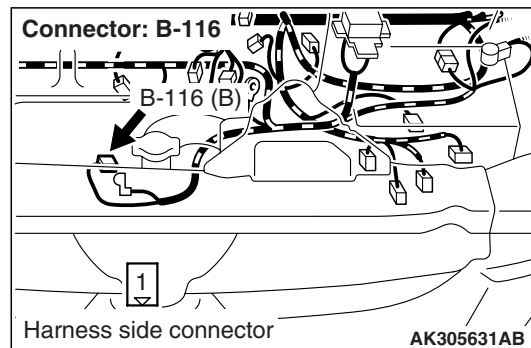


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9: Perform voltage measurement at B-116 starter connector.



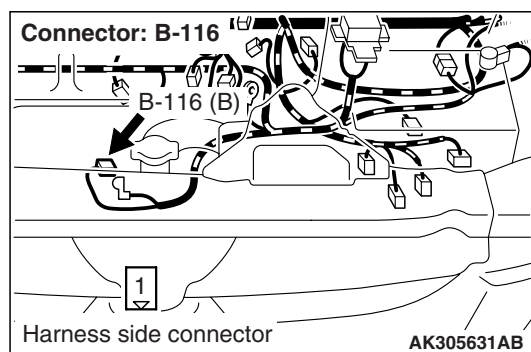
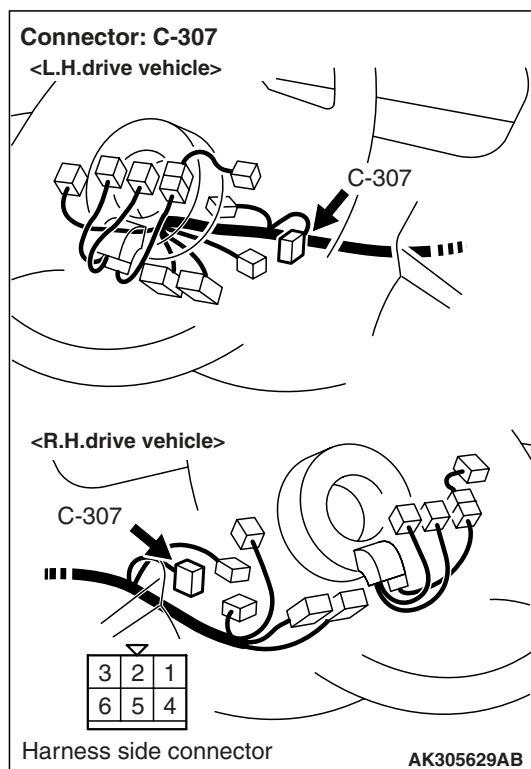
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 11 .

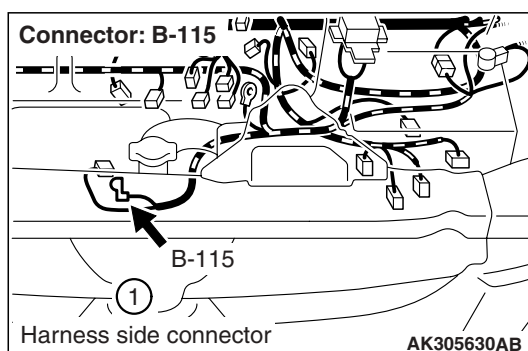
NO : Go to Step 10 .

STEP 10: Connector check: C-307 ignition switch connector**Q: Is the check result normal?**

YES : Check intermediate connectors B-17 and C-18, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-307 (terminal No. 5) ignition switch connector and B-116 (terminal No. 1) starter connector.

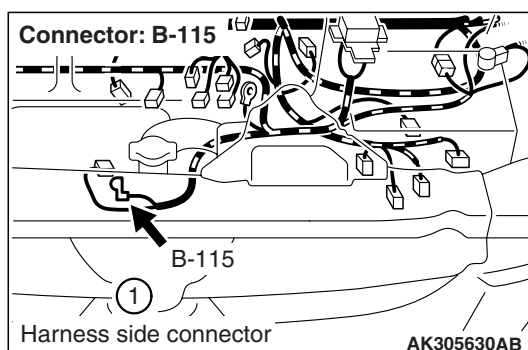
- Check output line for open circuit and damage.

NO : Repair or replace.

STEP 11: Connector check: B-115 starter connector**Q: Is the check result normal?**

YES : Go to Step 12 .

NO : Repair or replace.

STEP 12: Perform voltage measurement at B-115 starter connector.

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

OK: System voltage

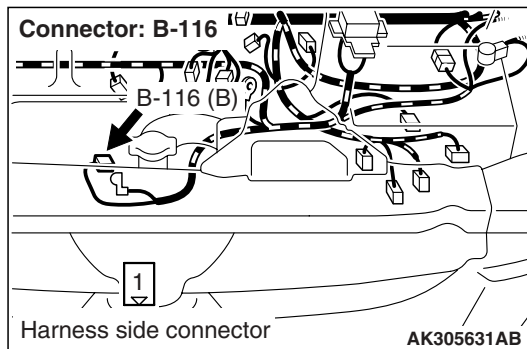
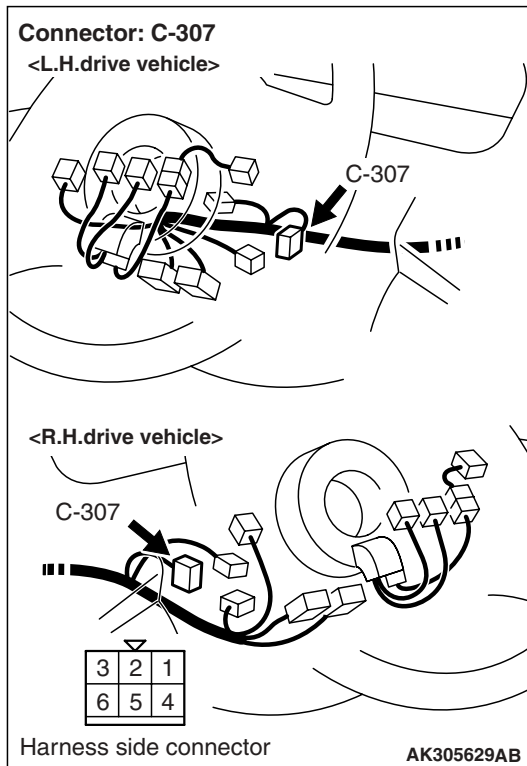
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Check and repair harness between B-115 (terminal No. 1) starter connector and battery.

- Check power supply line for open/short circuit.

STEP 13: Check harness between C-307 (terminal No. 5) ignition switch connector and B-116 (terminal No. 1) starter connector.



NOTE: Before checking harness, check intermediate connectors B-17 and C-18, and repair if necessary.

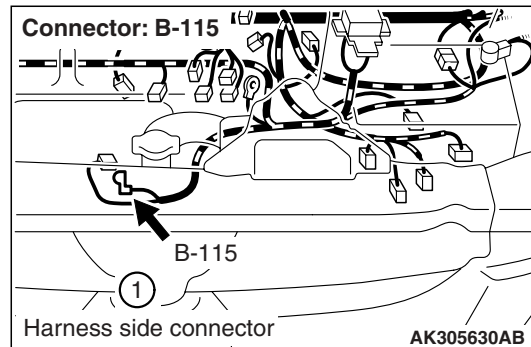
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14: Check harness between B-115 (terminal No. 1) starter connector and battery.



- Check power supply line for damage.

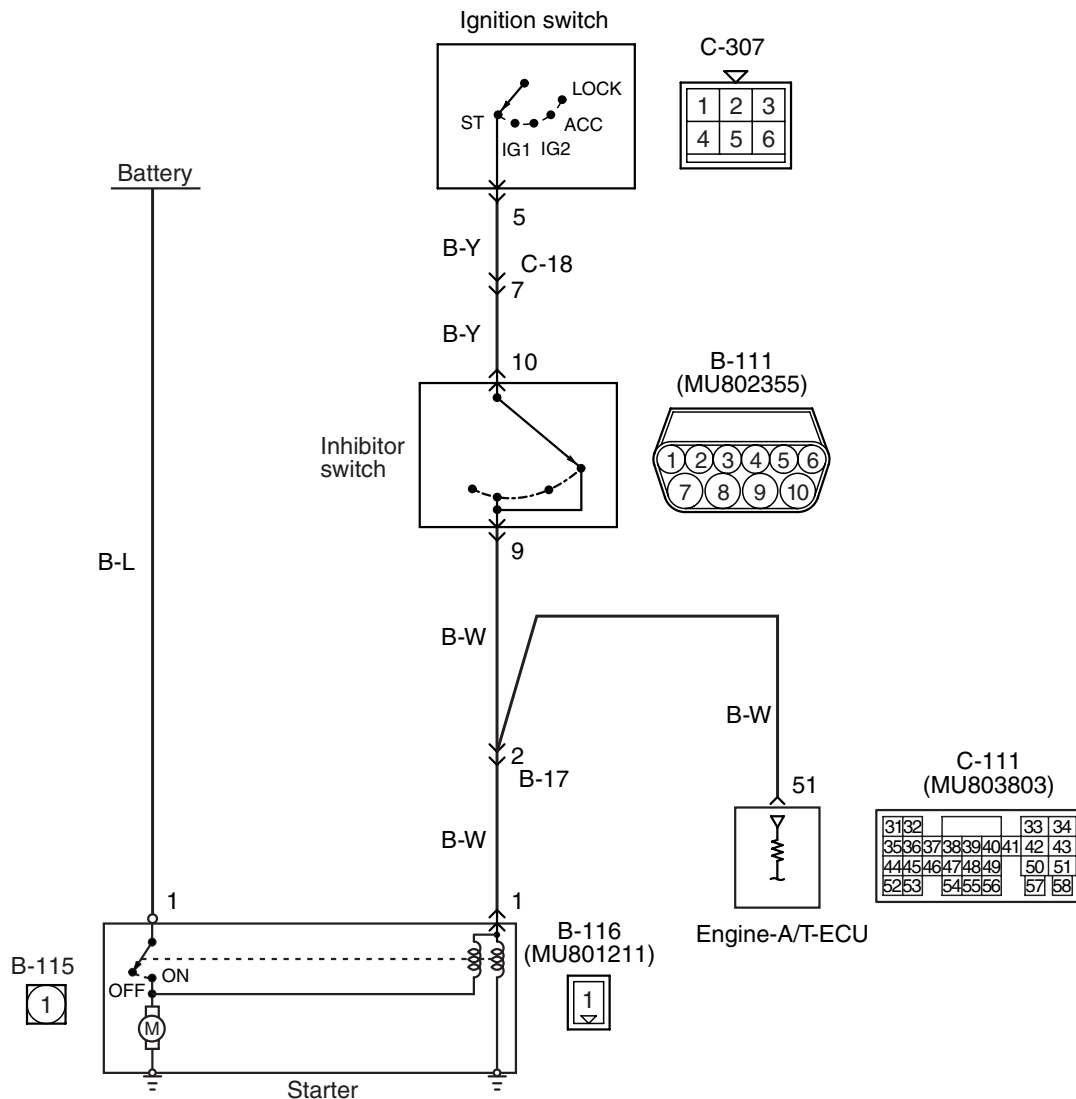
Q: Is the check result normal?

YES : Replace starter.

NO : Repair.

Inspection Procedure 5: Starting Impossible (No Initial Combustion) <A/T>

Starting impossible (no initial combustion) <A/T>



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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COMMENT ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

- Failed battery

- Failed inhibitor switch
- 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-6](#)).

STEP 2: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#)
 - Item 18: Cranking signal

OK:

ON (Ignition switch: ST)

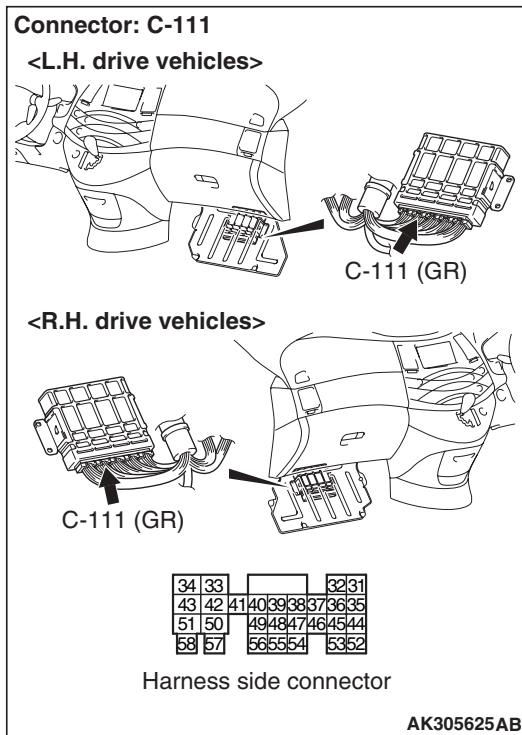
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 11.

NO : Go to Step 3.

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

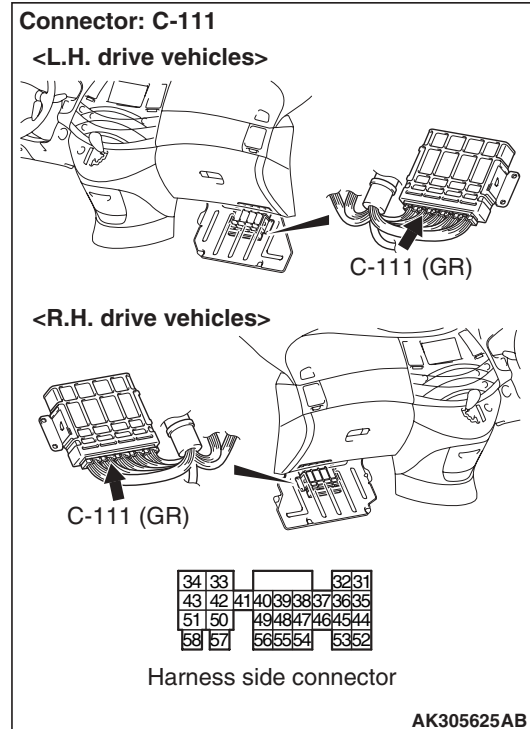


Q: Is the check result normal?

YES : Go to Step 4.

NO : Repair or replace.

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



- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 51 and earth.

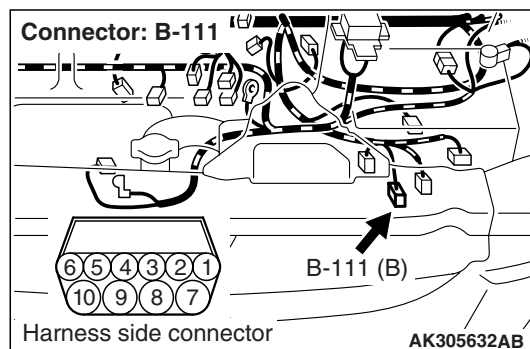
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10.

NO : Go to Step 5.

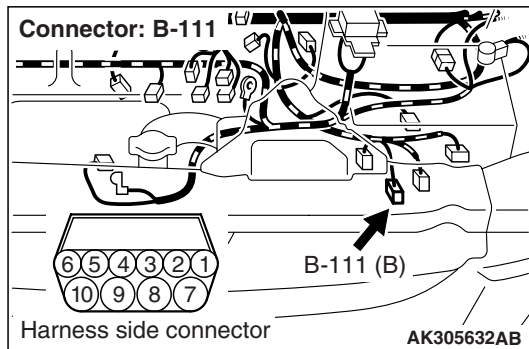
STEP 5: Connector check: B-111 inhibitor switch connector



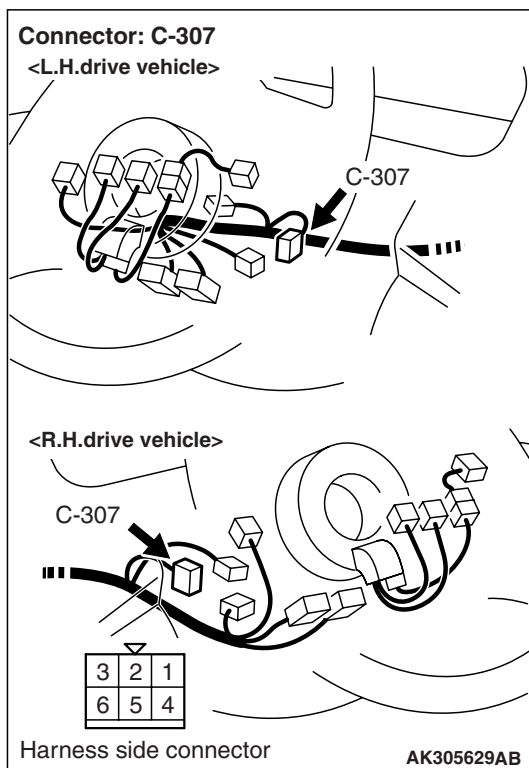
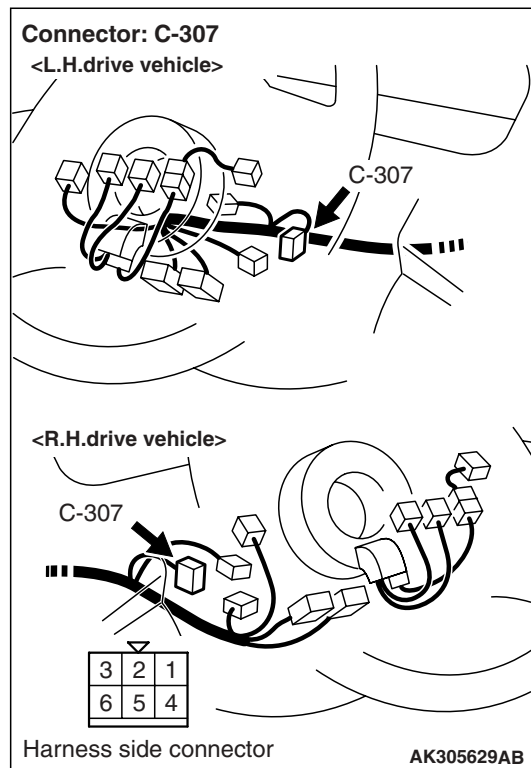
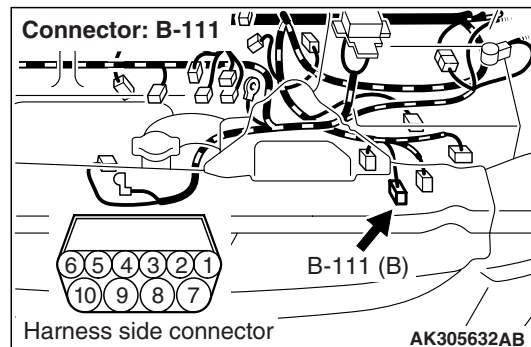
Q: Is the check result normal?

YES : Go to Step 6.

NO : Repair or replace.

STEP 6: Perform voltage measurement at B-111 inhibitor switch connector

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

OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 9.**NO :** Go to Step 7.**STEP 7: Connector check: C-307 ignition switch connector****Q: Is the check result normal?****YES :** Go to Step 8.**NO :** Repair or replace.**STEP 8: Check ignition switch**

- Check ignition switch (Refer to GROUP 54A – Ignition switch – Inspection P.54A-31).

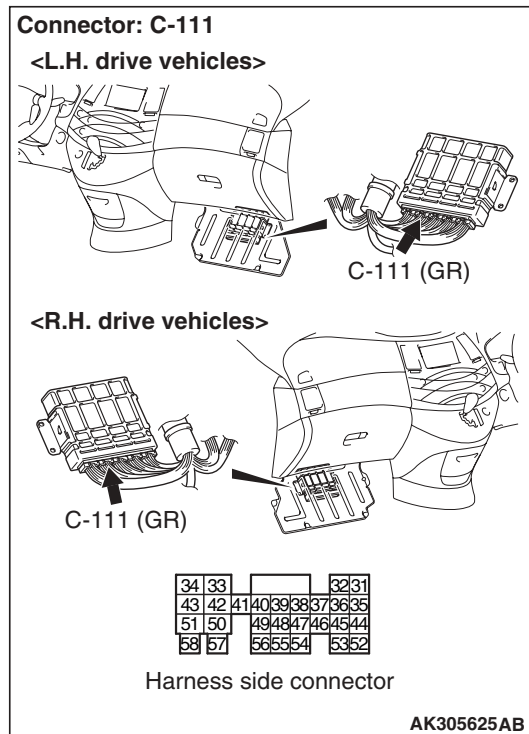
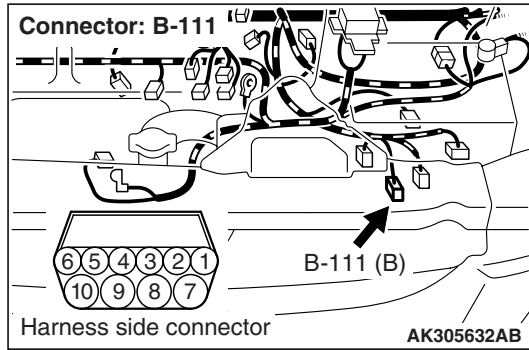
Q: Is the check result normal?

YES : Check intermediate connector C-18 and repair if necessary. If intermediate connector is normal, check and repair harness between B-111 (terminal No. 10) inhibitor switch connector and C-307 (terminal No. 5) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 9: Check inhibitor switch.



- Check ignition switch (Refer to GROUP 23A – On – vehicle Service – A/T Control Component Check – Inhibitor Switch Check [P.23A-130](#)).

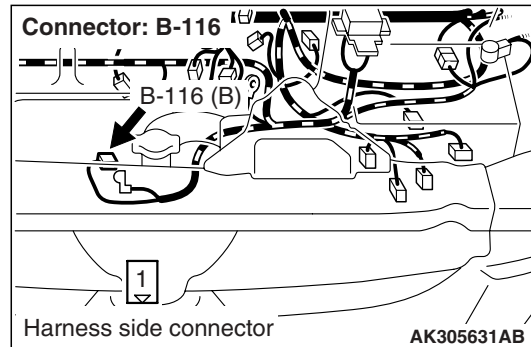
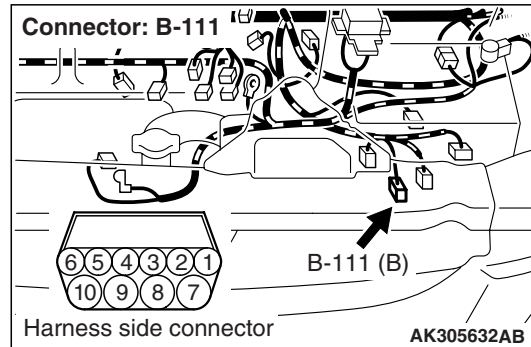
Q: Is the check result normal?

YES : Check intermediate connectors B-17, and repair if necessary. If intermediate connector are normal, check and repair harness between B-111 (terminal No. 9) inhibitor switch connector and C-111 (terminal No. 51) engine-A/T-ECU connector.

- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 10: Connector check: B-111 inhibitor switch connector and B-116 starter connector



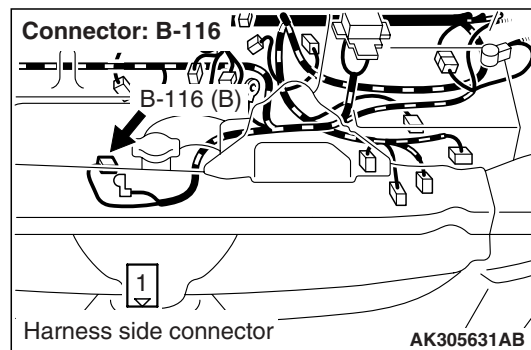
Q: Is the check result normal?

YES : Check intermediate connectors B-17, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-111 (terminal No. 9) inhibitor switch connector and B-116 (terminal No. 1) starter connector.

- Check output line for short circuit.

NO : Repair or replace.

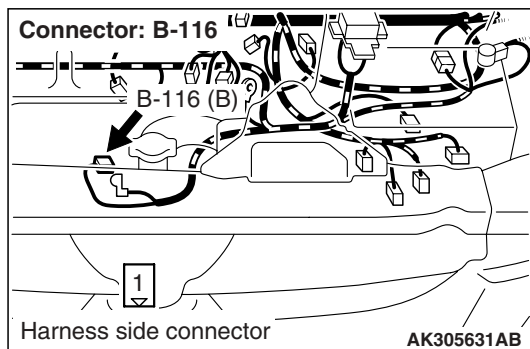
STEP 11: Connector check: B-116 starter connector



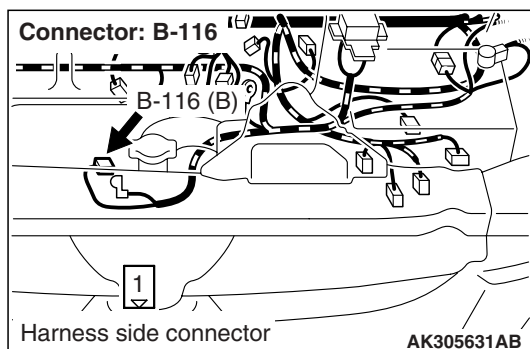
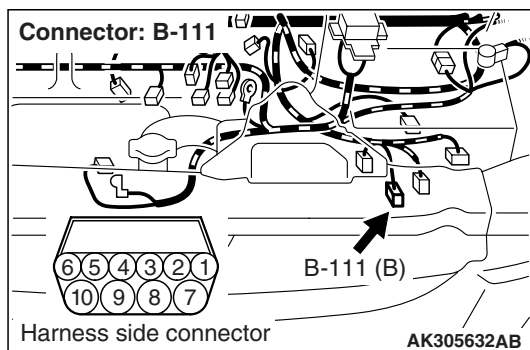
Q: Is the check result normal?

YES : Go to Step 12.

NO : Repair or replace.

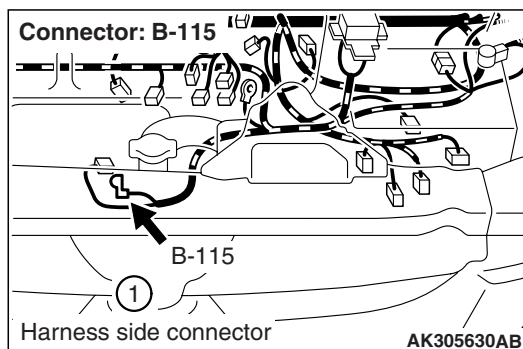
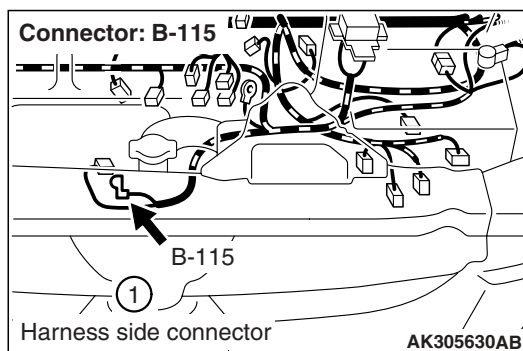
STEP 12: Perform voltage measurement at B-116 starter connector.

- 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 14.**NO :** Go to Step 13.**STEP 13: Connector check: B-111 inhibitor switch connector****Q: Is the check result normal?**

YES : Check intermediate connectors B-17, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-111 (terminal No. 9) inhibitor switch connector and B-116 (terminal No. 1) starter connector.

- Check output line for open circuit and damage.

NO : Repair or replace.**STEP 14: Connector check: B-115 starter connector****Q: Is the check result normal?****YES :** Go to Step 15 .**NO :** Repair or replace.**STEP 15: Perform voltage measurement at B-115 starter connector.**

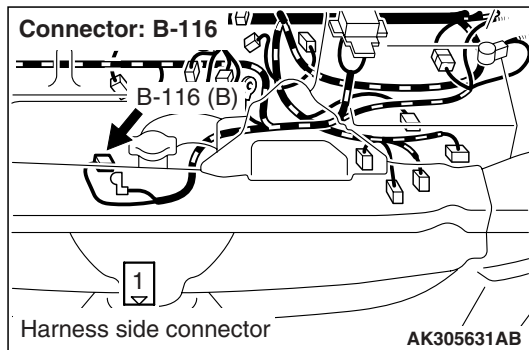
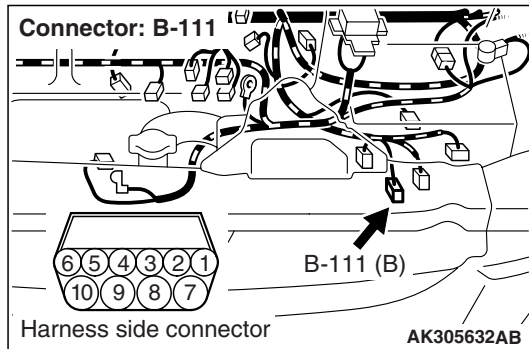
- Disconnect connector, and measure at the harness side.
- Voltage between terminal No. 1 and earth.

OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 16.

NO : Check and repair harness between B-115 (terminal No. 1) starter connector and battery.

- Check power supply line for open/short circuit.

STEP 16: Check harness between B-111 (terminal No. 9) inhibitor switch connector and B-116 (terminal No. 1) starter connector.



NOTE: Before checking harness, check intermediate connectors B-17 and repair if necessary.

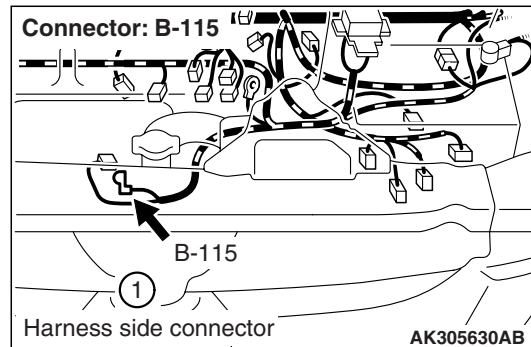
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 17.

NO : Repair.

STEP 17: Check harness between B-115 (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 inhibitor-switch <A/T>
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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-6).

STEP 2: With MUT-III of communication.

- Confirm the communication available MUT -III and engine-ECU <M/T> or engine-A/T-ECU <A/T>

Q: Is the check result normal?

YES : Go to Step 3 .
NO : Check engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 22 P.13A-321).

STEP 3: MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis codes (Refer to P.13A-20)
NO : Go to Step 4 .

STEP 4: MUT-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 23 P.13A-328)

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 throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Go to Step 7 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-383).

STEP 7: MUT-III data list

- Item 18: Cranking signal

OK:

ON (Ignition switch: ST)
OFF (Ignition switch: ON)

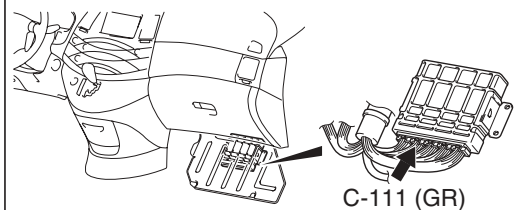
Q: Is the check result normal?

YES : Go to Step 10 .
NO : Go to Step 8 <M/T>, Go to Step 9 <A/T> .

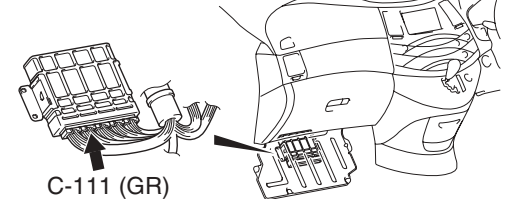
STEP 8: Connector check: C-111 engine-ECU connector

Connector: C-111

<L.H. drive vehicles>



<R.H. drive vehicles>



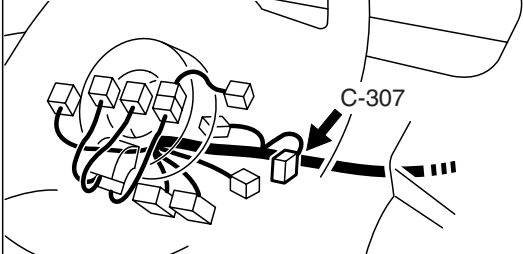
| | | | | | |
|----|----|----|----|----|----|
| 34 | 33 | | | 32 | 31 |
| 43 | 42 | 41 | 40 | 39 | 38 |
| 51 | 50 | 49 | 48 | 47 | 46 |
| 58 | 57 | 56 | 55 | 54 | 53 |

Harness side connector

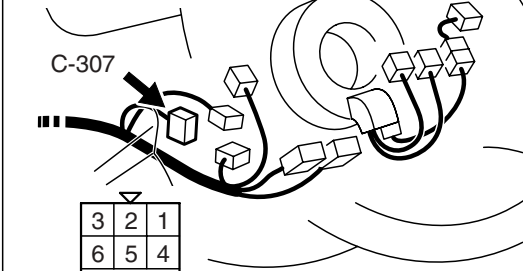
AK305625AB

Connector: C-307

<L.H. drive vehicle>



<R.H. drive vehicle>



| | | |
|---|---|---|
| 3 | 2 | 1 |
| 6 | 5 | 4 |

Harness side connector

AK305629AB

Q: Is the check result normal?

YES : Check intermediate connectors B-17 and C-18, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-307 (terminal No. 5) ignition switch connector and C-111 (terminal No. 51) engine-ECU connector.

- Check output line for open/short circuit.

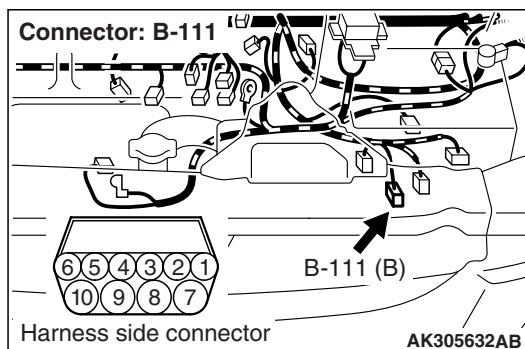
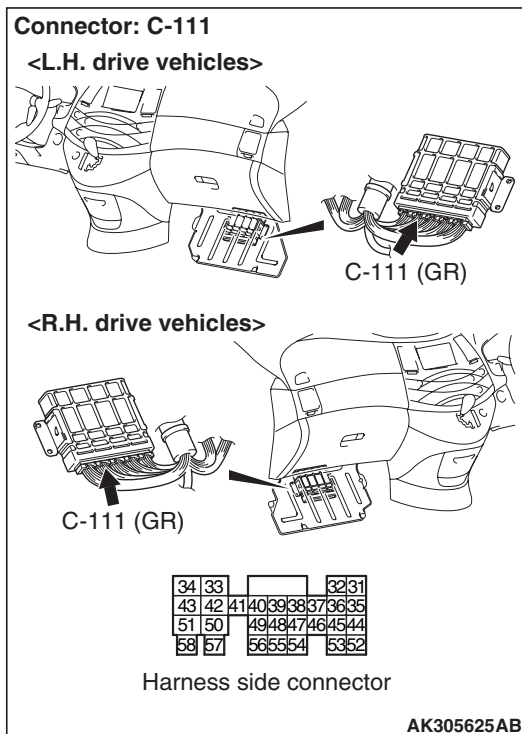
NO : Repair or replace.

YES : Check intermediate connectors B-17, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-111 (terminal No. 9) inhibitor switch connector and C-111 (terminal No. 51) engine-A/T-ECU connector.

- Check output line for open/short circuit.

NO : Repair or replace.

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



Q: Is the check result normal?

STEP 10: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - 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-157](#)).

STEP 11: Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13A-393](#)).

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-115](#).)

(Refer to Code No. P0202: No. 2 injector system [P.13A-120](#).)

(Refer to Code No. P0203: No. 3 injector system [P.13A-125](#).)

(Refer to Code No. P0204: No. 4 injector system [P.13A-130](#).)

STEP 12: Check ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#))

STEP 13: Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-383](#)).

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14: Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>

- After replacing the engine-ECU <M/T> or engine-A/T-ECU <A/T>, 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.

YES : Inspection chart for diagnosis codes (Refer to [P.13A-20](#))
NO : Go to Step 4 .

PROBABLE CAUSE

- Failed battery
- Failed ignition system
- Failed fuel system
- Air-fuel ratio control
- Failed throttle valve 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 <M/T>
- Failed engine-A/T-ECU <A/T>

STEP 4: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 12: Air flow sensor
 - b. Item 13: Intake air temperature sensor
 - c. Item 21: Engine coolant temperature 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 Code [P.13A-20](#)).

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-6](#)).

STEP 3: MUT-III diagnosis code

Q: Diagnosis code set?

STEP 5: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 25: Barometric pressure sensor

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 6: Check throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-383](#)).

STEP 7: MUT-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 23 [P.13A-328](#)).

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-393](#)).

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-115](#).)
(Refer to Code No. P0202: No.2 Injector System [P.13A-120](#).)
(Refer to Code No. P0203: No.3 Injector System [P.13A-125](#).)
(Refer to Code No. P0204: No.4 Injector System [P.13A-130](#).)

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: Check ignition coil spark.

Q: Is the check result normal?
YES : Go to Step 12 .
NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

STEP 12: Check spray condition of injector.

- Check each injector for spray condition (Refer to [P.13A-393](#)).

Q: Is the check result normal?
YES : Go to Step 13 .
NO : Replace injector.

STEP 13: Check compression pressure.

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service – Compression Pressure Check [P.11A-13](#)).

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

STEP 14: Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (stepper motor) Check [P.17-65](#)].

Q: Is the check result normal?
YES : Go to Step 15 .
NO : Replace EGR valve (stepper motor).

STEP 15: Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

- After replacing the engine-ECU <M/T> or engine-A/T-ECU <A/T>, 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 air control fuel system, etc. A sudden engine stall is possibly caused by poor connector contact.

PROBABLE CAUSE

- Failed ignition system
- Failed fuel system

- Failed throttle valve control system
- Failed intake/exhaust system
- Failed emission gas cleaning system
- Air drawn in from gaps in gasket, seal, etc.
- Throttle valve body fouled
- Timing belt out of place
- Compression pressure improper
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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: MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 3 .

STEP 3: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 12: Air flow sensor
 - b. Item 13: Intake air temperature sensor
 - c. Item 14: Throttle position sensor (sub)
 - d. Item 21: Engine coolant temperature sensor
 - e. Item 29: Inhibitor switch <A/T>
 - f. Item 77: Accelerator pedal position sensor (sub)
 - g. Item 78: Accelerator pedal position sensor (main)
 - h. Item 79: Throttle position sensor (main)
 - i. Item B4: Power steering fluid pressure sensor

Q: Are the check results normal?

YES : Go to Step 4 .

NO : engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 4: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 25: Barometric pressure sensor

Q: Is the check results normal?

YES : Go to Step 5 .

NO : Replace engine - ECU.

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 timing marks of timing belt.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Align timing marks.

STEP 7: Check throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-383](#)).

STEP 8. MUT-III data list

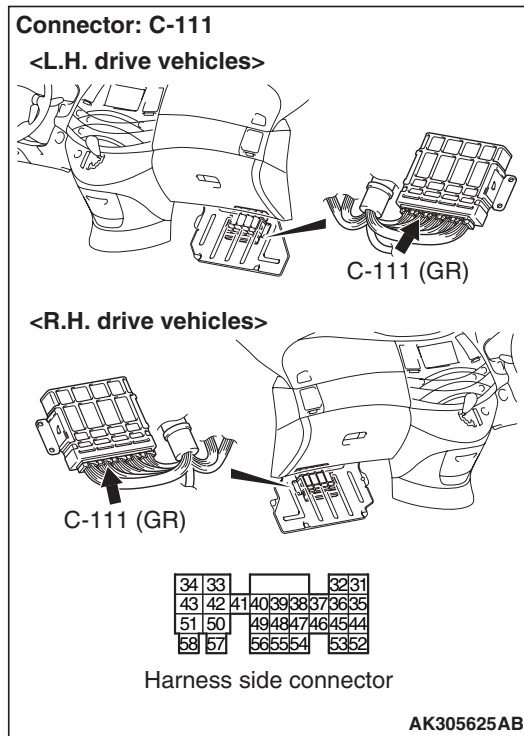
- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor (front)
 - b. Item 39: Cylinder 2, 3 oxygen sensor (front)
 - c. Item 59: Cylinder 1, 4 oxygen sensor (rear)
 - d. Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Are the check results normal?

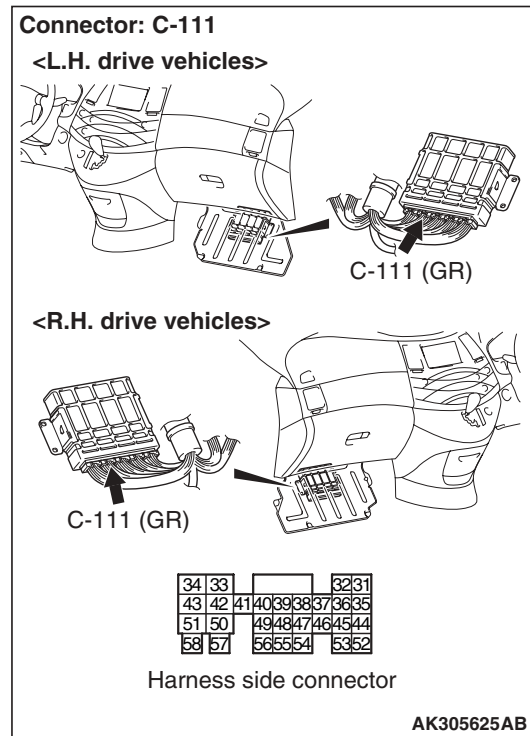
YES : Go to Step 9 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code [P.13A-20](#)).

STEP 9. Perform voltage measurement at C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 10. Connector check: C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-119 alternator connector



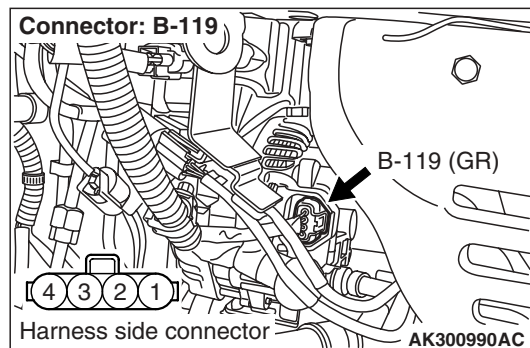
- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral <M/T> or P range <A/T>
- Radiator fan: Not operating
- Voltage between terminal No. 45 and earth.

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

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 10 .

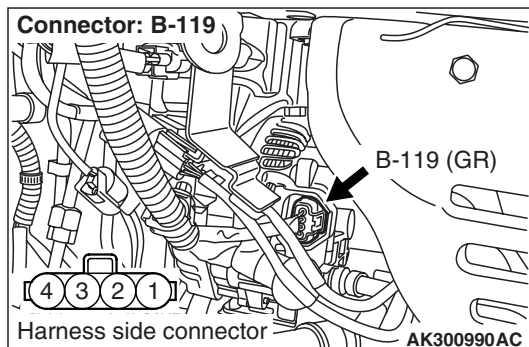
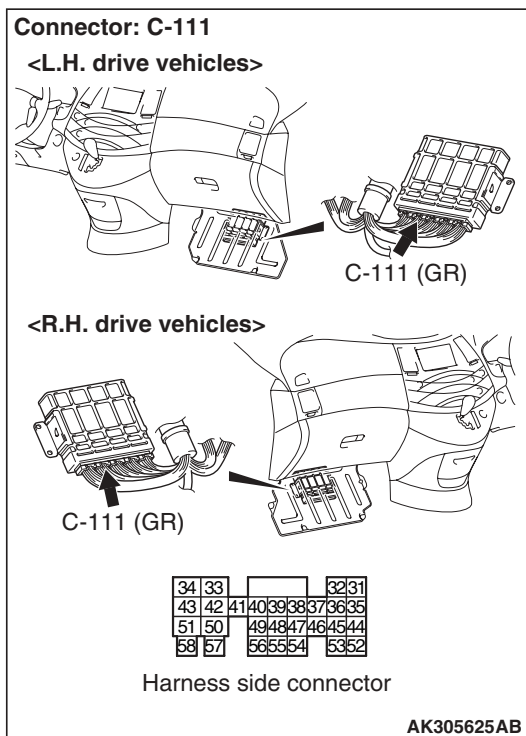


Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair or replace.

STEP 11. Check harness between C-111 (terminal No. 45) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-119 (terminal No. 1) alternator connector.



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

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

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

STEP 12. Replace alternator

- After alternator is replaced, re-check for trouble symptom.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Check end.

STEP 13. Check spark plug

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Replace spark plug.

STEP 14. Check ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

STEP 15. Check purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System– Purge Control Solenoid Valve Check [P.17-62](#))

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Replace purge control solenoid valve.

STEP 16. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check [P.17-65](#)].

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Replace EGR valve (stepper motor).

STEP 17. Check injector for spray condition.

- Check each injector for spray condition (Refer to [P.13A-393](#)).

Q: Is the check result normal?

YES : Go to Step 18 .

NO : Replace injector.

STEP 18. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service – Compression Pressure Check [P.11A-13](#)).

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Repair.

STEP 19. Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

- After engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 misfire due to failed spark plug, improper air-fuel ratio at accelerator pedal depression or other faults.

PROBABLE CAUSE

- Failed ignition system
- Failed intake system
- Failed emission gas cleaning system
- Air drawn in from gaps in gasket, seals, etc.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 14: Throttle position sensor (sub)
 - Item 77: Accelerator pedal position sensor (sub)
 - Item 78: Accelerator pedal position sensor (main)
 - Item 79: Throttle position sensor (main)

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 Code [P.13A-20](#)).

STEP 3. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check [P.17-65](#)].

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace EGR valve (stepper motor).

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. Check ignition coil spark.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

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 throttle valve control system
- Failed ignition system
- Failed emission control system
- Throttle valve fouled
- Failed engine-ECU <M/T>

- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 14: Throttle position sensor (sub)
 - Item 77: Accelerator pedal position sensor (sub)
 - Item 78: Accelerator pedal position sensor (main)
 - Item 79: Throttle position sensor (main)

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 Code [P.13A-20](#)).

STEP 3. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check [P.17-65](#)].

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace EGR valve (stepper motor).

STEP 4. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-383](#)).

STEP 5. Check ignition coil spark.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

Inspection Procedure 11: Engine Does Not Revolve Up

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed fuel system, throttle valve opening control system ignition system or other faults.

PROBABLE CAUSE

- Failed ignition system
- Failed fuel system
- Failed throttle valve opening control system
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 14: Throttle position sensor (sub)
 - Item 77: Accelerator pedal position sensor (sub)
 - Item 78: Accelerator pedal position sensor (main)
 - Item 79: Throttle position sensor (main)

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 Code [P.13A-20](#)).

STEP 3. Check ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

STEP 4. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-383](#)).

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Repair.

Q: Is the check result normal?

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, throttle valve opening control system 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
- Failed throttle valve opening control system
- Throttle valve fouled
- Improper compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13A-393](#)).

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-115](#)).

(Refer to Code No. P0202: No. 2 Injector System [P.13A-120](#)).

(Refer to Code No. P0203: No. 3 Injector System [P.13A-125](#)).

(Refer to Code No. P0204: No. 4 Injector System [P.13A-130](#)).

STEP 3. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 13: Intake air temperature sensor
 - Item 14: Throttle position sensor (sub)
 - Item 21: Engine coolant temperature sensor
 - Item 77: Accelerator pedal position sensor (sub)
 - Item 78: Accelerator pedal position sensor (main)
 - Item 79: Throttle position sensor (main)

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 Code [P.13A-20](#)).

STEP 4: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - Item 25: Barometric pressure sensor

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 5. Check purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System– Purge Control Solenoid Valve Check [P.17-62](#)).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace purge control solenoid valve.

STEP 6. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check [P.17-65](#)].

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Replace EGR valve (stepper motor).

STEP 7. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor (front)
 - b. Item 39: Cylinder 2, 3 oxygen sensor (front)
 - c. Item 59: Cylinder 1, 4 oxygen sensor (rear)
 - d. Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Are the check results normal?

YES : Go to Step 8 .

NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code [P.13A-20](#)).

STEP 8. Check ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

STEP 9. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-383](#)).

STEP 10. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-383](#)).

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service – Compression Pressure Check [P.11A-13](#)).

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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, throttle valve opening control system.

PROBABLE CAUSE

- Failed ignition system
- Failed throttle valve opening control system
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 14: Throttle position sensor (sub)
 - b. Item 77: Accelerator pedal position sensor (sub)
 - c. Item 78: Accelerator pedal position sensor (main)
 - d. Item 79: Throttle position sensor (main)

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 Code [P.13A-20](#)).

STEP 3. Check ignition coil spark.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 14: Throttle position sensor (sub)
 - b. Item 77: Accelerator pedal position sensor (sub)
 - c. Item 78: Accelerator pedal position sensor (main)
 - d. Item 79: Throttle position sensor (main)

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 Code [P.13A-20](#)).

STEP 3. Check throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-383](#)).

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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. Check ignition coil spark.

Q: Is the check result normal?

YES : Check detonation sensor system (Refer to Code No. P0325 [P.13A-154](#)).

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-355](#)).

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.

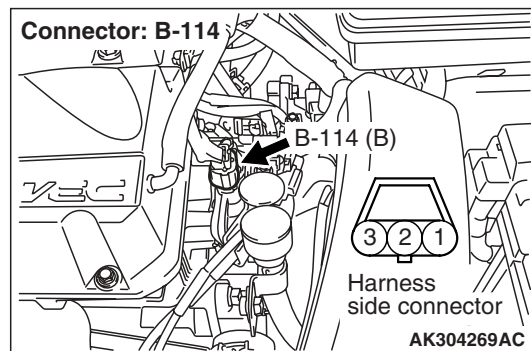
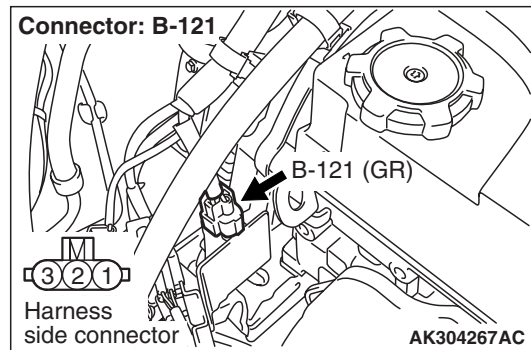
PROBABLE CAUSE

- Failed crank angle sensor
- Failed camshaft position sensor
- Improperly installed timing belt
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. MUT-III diagnosis code****Q: Diagnosis code set?**

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

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 (MB991658) to connect B-121 crank angle sensor intermediate connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
- Voltage between terminal No. 2 and earth.

Camshaft Position Sensor

- Use special tool test harness (MB991709) to connect B-114 camshaft position sensor connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
- 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-378](#)) 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 <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

STEP 4. Check crank angle sensor and camshaft position sensor mounted conditions.

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

STEP 5. Check timing marks of timing belt.

Q: Is the check result normal?
YES : Go to Step 6 .
NO : Align timing marks.

STEP 6. Check crank shaft sensing bleed.

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Replace crank shaft sensing bleed.

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 <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-5).

Inspection Procedure 17: Run On (Dieseling)

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by leakage from injector.

PROBABLE CAUSE

- Failed injector
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Check injector for spray condition.

- Check each injector for spray condition (Refer to P.13A-393).

Q: Does trouble symptom persist?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code**Q: Diagnosis code set?**

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13A-393](#)).

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-115](#))

(Refer to, Code No. P0202: No. 2 injector system [P.13A-120](#))

(Refer to, Code No. P0203: No. 3 injector system [P.13A-125](#))

(Refer to, Code No. P0204: No. 4 injector system [P.13A-130](#))

STEP 3. Check ignition timing.

- Check ignition timing. (Refer to GROUP 11A – On-vehicle Service – Ignition Timing Check [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-309](#)).

STEP 4. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 12: Air flow sensor
 - b. Item 13: Intake air temperature sensor
 - c. Item 21: Engine coolant temperature 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 Code [P.13A-20](#)).

STEP 5: MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 25: Barometric pressure sensor

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 6. Check air intake from intake hose and inlet manifold.**Q: Is the check result normal?**

YES : Go to Step 7 .

NO : Repair.

STEP 7. Check for emission leakage from exhaust manifold.**Q: Is the check result normal?**

YES : Go to Step 8 .

NO : Repair.

STEP 8. Check throttle body (throttle valve portion) for contamination.**Q: Is the check result normal?**

YES : Go to Step 9 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-383](#)).

STEP 9. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor (front)
 - b. Item 39: Cylinder 2, 3 oxygen sensor (front)
 - c. Item 59: Cylinder 1, 4 oxygen sensor (rear)
 - d. Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Are the check results normal?

YES : Go to Step 10 .

NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code [P.13A-20](#)).

STEP 10. Check Purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System – Purge Control Solenoid Valve Check [P.17-62](#)).

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Replace purge control solenoid valve.

STEP 11. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check [P.17-65](#)].

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Replace EGR valve (stepper motor).

STEP 12. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-383](#)).

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 – Positive Crankcase Ventilation (PCV) Valve Check [P.17-61](#)).

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Replace positive crankcase ventilation valve.

STEP 14. Check spark plug.

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Replace spark plug.

STEP 15. Check ignition coil itself.

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service – Ignition Coil Check [P.16-26](#)).

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Replace ignition coil.

STEP 16. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service – Compression Pressure Check [P.11A-13](#)).

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Check injector for spraying condition.

- Check each injector for spray condition (Refer to [P.13A-393](#)).

Q: Does trouble symptom persist?

YES : Go to Step 18 .

NO : Replace injector.

STEP 18. Replace catalytic converter.

- After replacing the catalytic converter, re-check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Check end

Inspection Procedure 19: Battery Run Down

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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

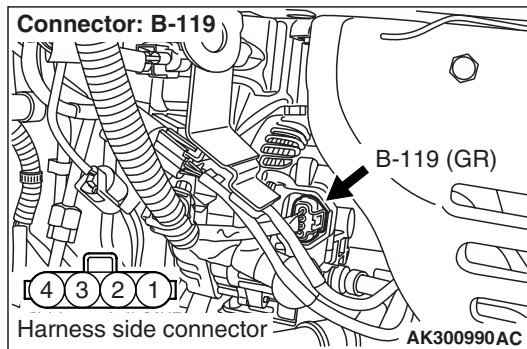
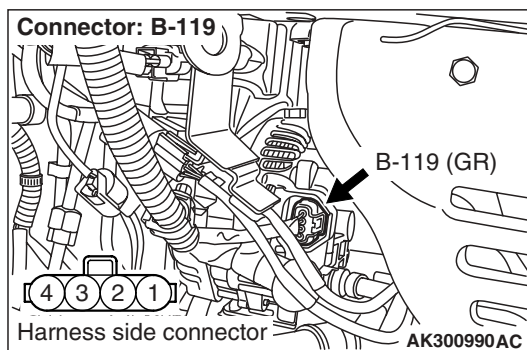
- Measure battery voltage during cranking.

OK: 8 V or more

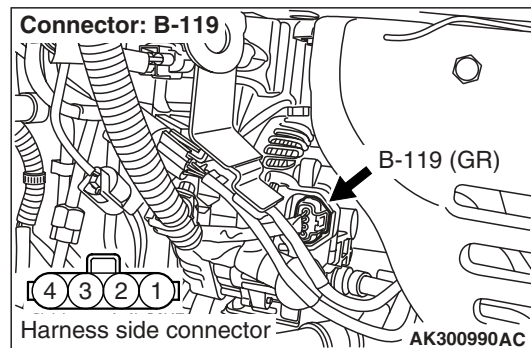
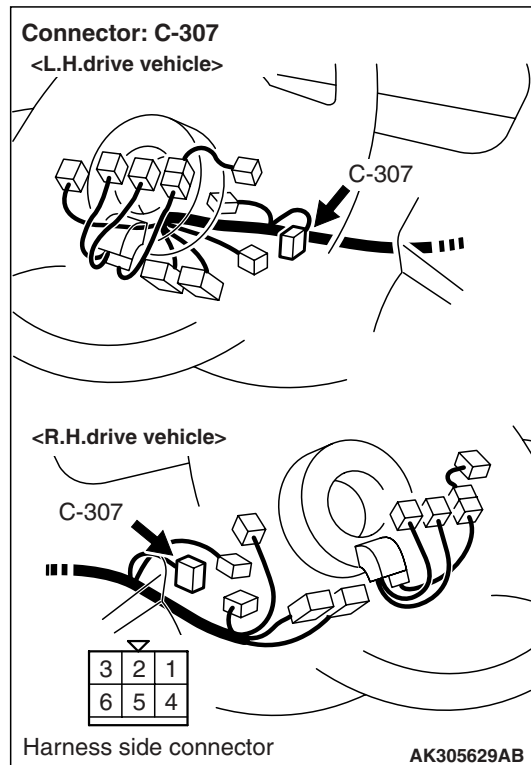
Q: Is the check result normal?

YES : Go to Step 2 .

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

STEP 2. Connector check: B-119 alternator connector**Q: Is the check result normal?****YES :** Go to Step 3 .**NO :** Repair or replace.**STEP 3. Perform voltage measurement at B-119 alternator connector.**

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

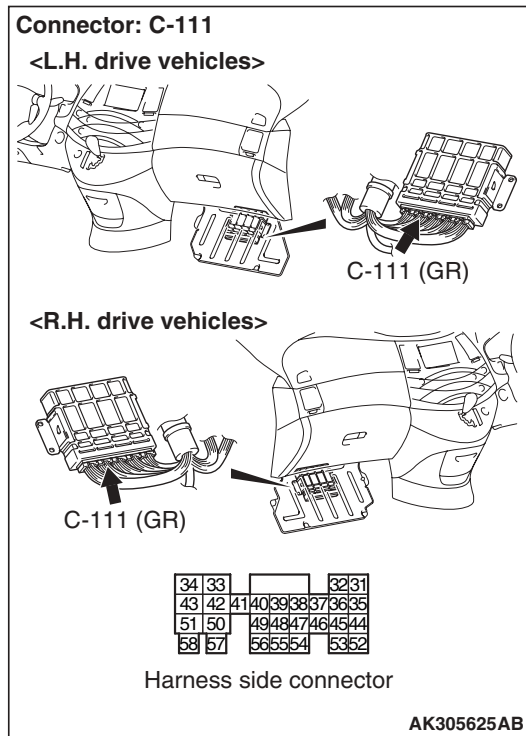
OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 5 .**NO :** Go to Step 4 .**STEP 4. Connector check: C-307 ignition switch connector****Q: Is the check result normal?**

YES : Check intermediate connectors B-17, C-02, C-202, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-119 (terminal No. 3) alternator connector and C-307 (terminal No. 2) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

**STEP 5. Connector check: C-111 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**

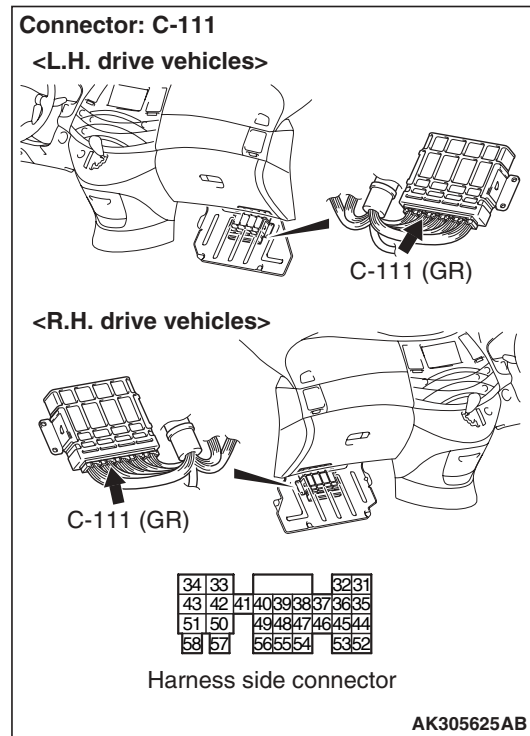


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

**STEP 6. Perform voltage measurement at C-111
engine-ECU <M/T> connector or engine-A/T-ECU
<A/T> connector**



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 45 and earth.

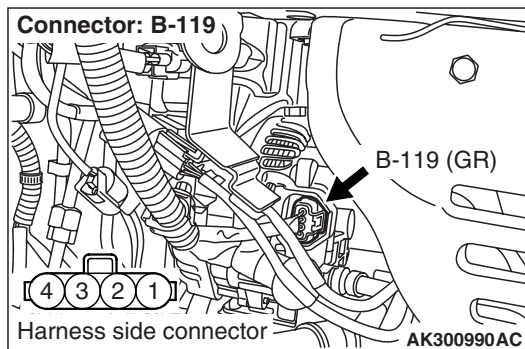
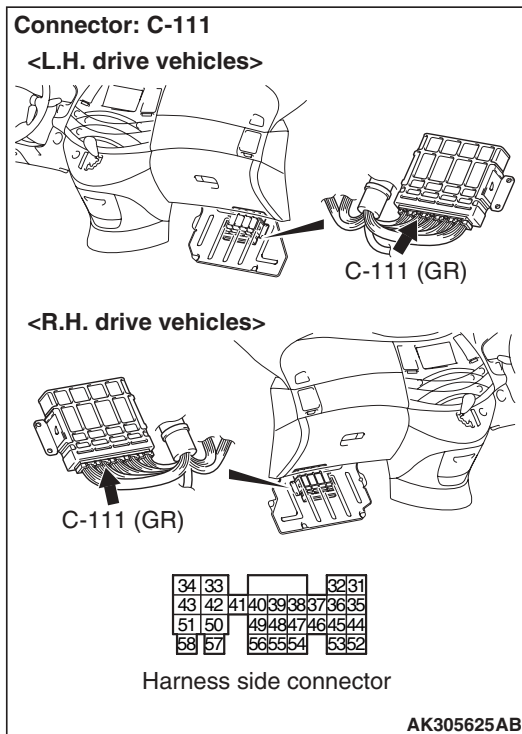
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Check harness between C-111 (terminal No. 45) engine-ECU <M/T> or engine-A/T-ECU <A/T> and B-119 (terminal No. 1) alternator connector.

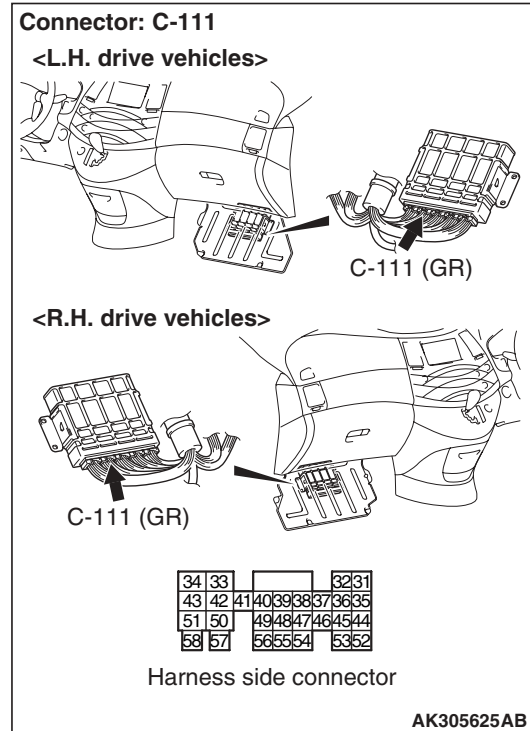


- Check output line for open/short circuit.

Q: Is the check result normal?

YES : replace alternator.
NO : Repair.

STEP 8. Perform voltage measurement at C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral <M/T> or P range <A/T>
- Radiator fan: Inactive
- Voltage between terminal No. 45 and earth.

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

Q: Is the check result normal?

YES : Go to Step 9 .
NO : Replace alternator.

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. MUT-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-20](#)).

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 – Engine Coolant Leak Check [P.14-16](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace or add engine coolant.

STEP 3. MUT-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 24 [P.13A-340](#)).

STEP 4. MUT-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-37](#)).

STEP 5. Check thermostat.

- Check thermostat (Refer to GROUP 14 – Thermostat – Thermostat Inspection [P.14-21](#)).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace thermostat.

STEP 6. Check water pump.

- Check water pump.

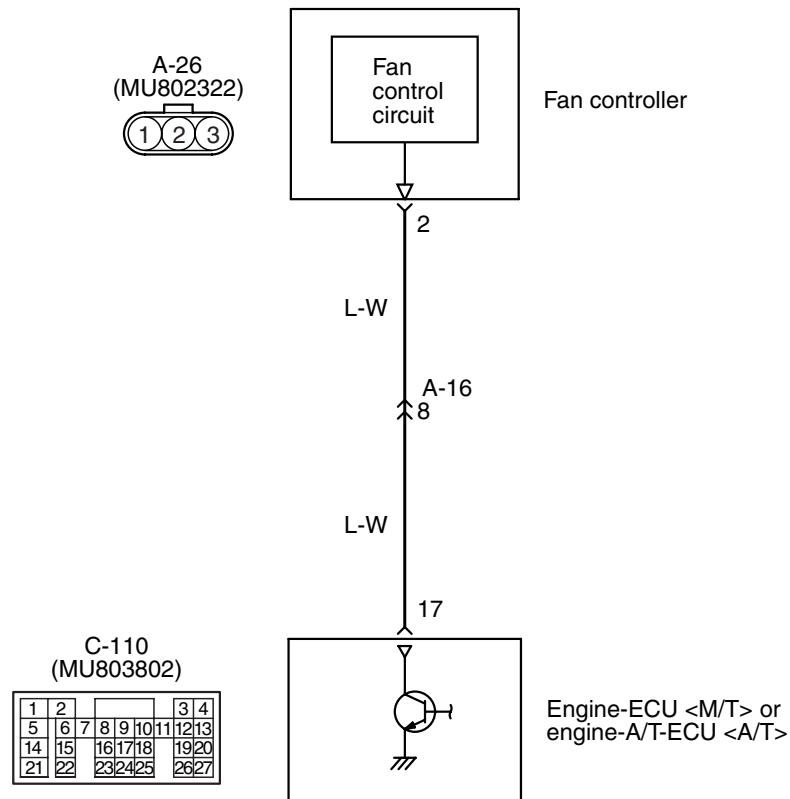
Q: Is the check result normal?

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

AK305577 AB

OPERATION

- The control (duty) signal is inputted to the fan controller (terminal No. 2) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 17).

FUNCTION

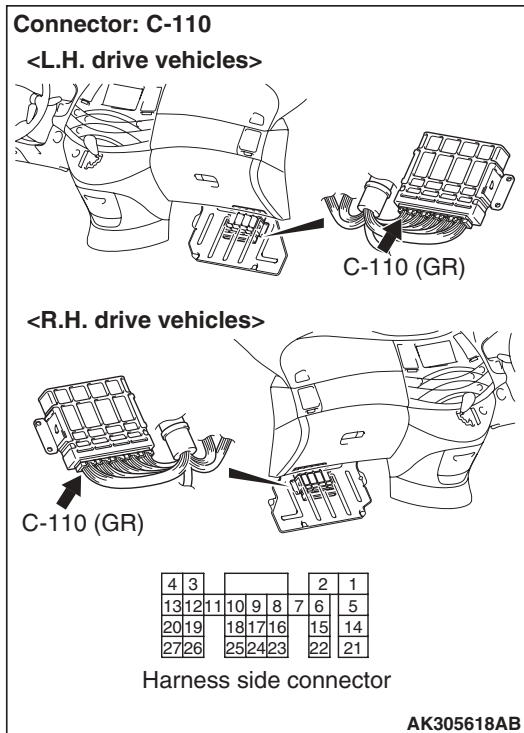
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> inputs a duty signal suitable for the engine coolant temperature, vehicle speed and A/C switch position to the fan controller. In response to the signal, the fan controller controls the rotating speeds of the radiator fan and A/C condenser fan (The fan speed 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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-110 engine-ECU <M/T> connector or engine-ECU <A/T> or engine-ECU

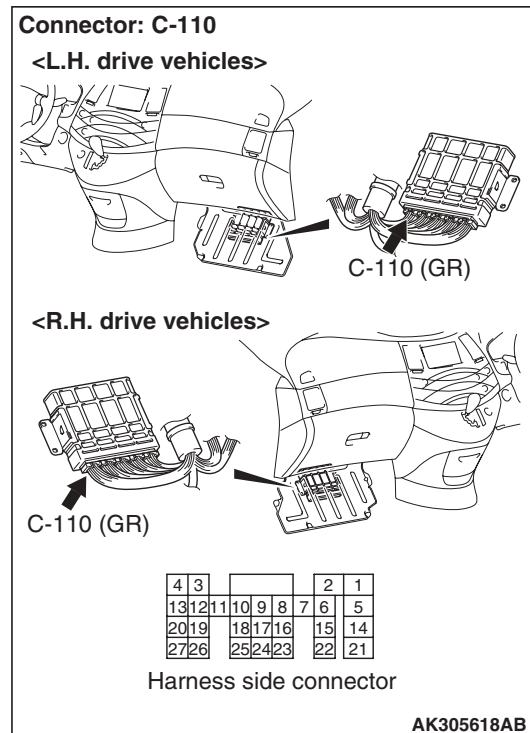


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Check at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Short-circuit terminal No. 17 to earth.

OK: Fan motor stops rotating.

Q: Is the check result normal?

YES : Go to Step 3 .

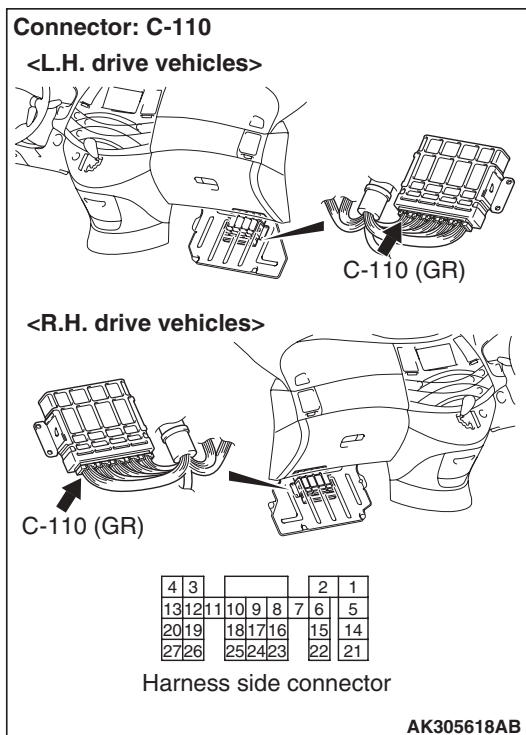
NO : Go to Step 4 .

STEP 3. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

STEP 4. Perform voltage measurement at C-110 engine-ECU <M/T> connector.

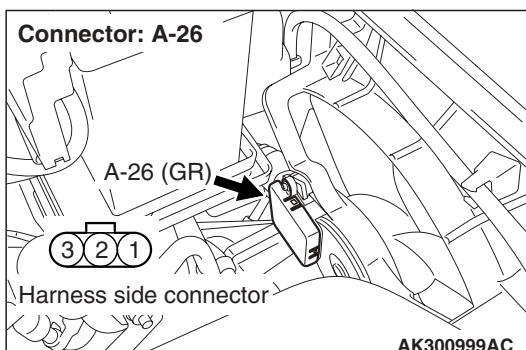
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 17 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Replace fan controller.

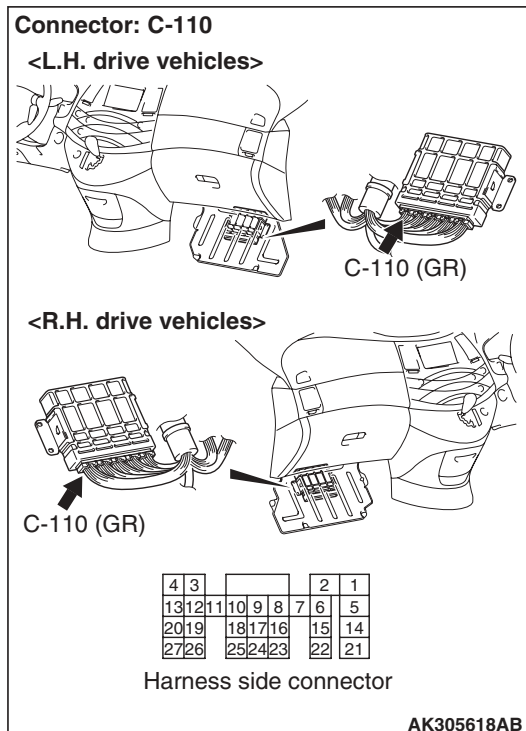
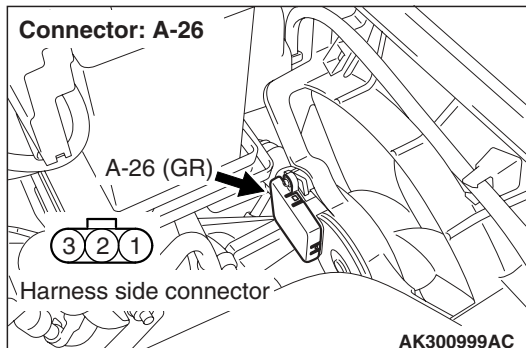
NO : Go to Step 5 .

STEP 5. Connector check: A-26 fan controller connector

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check harness between A-26 (terminal No. 2) fan controller connector and C-110 (terminal No. 17) engine-ECU <M/T> connector.

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

- Check output line for open circuit.

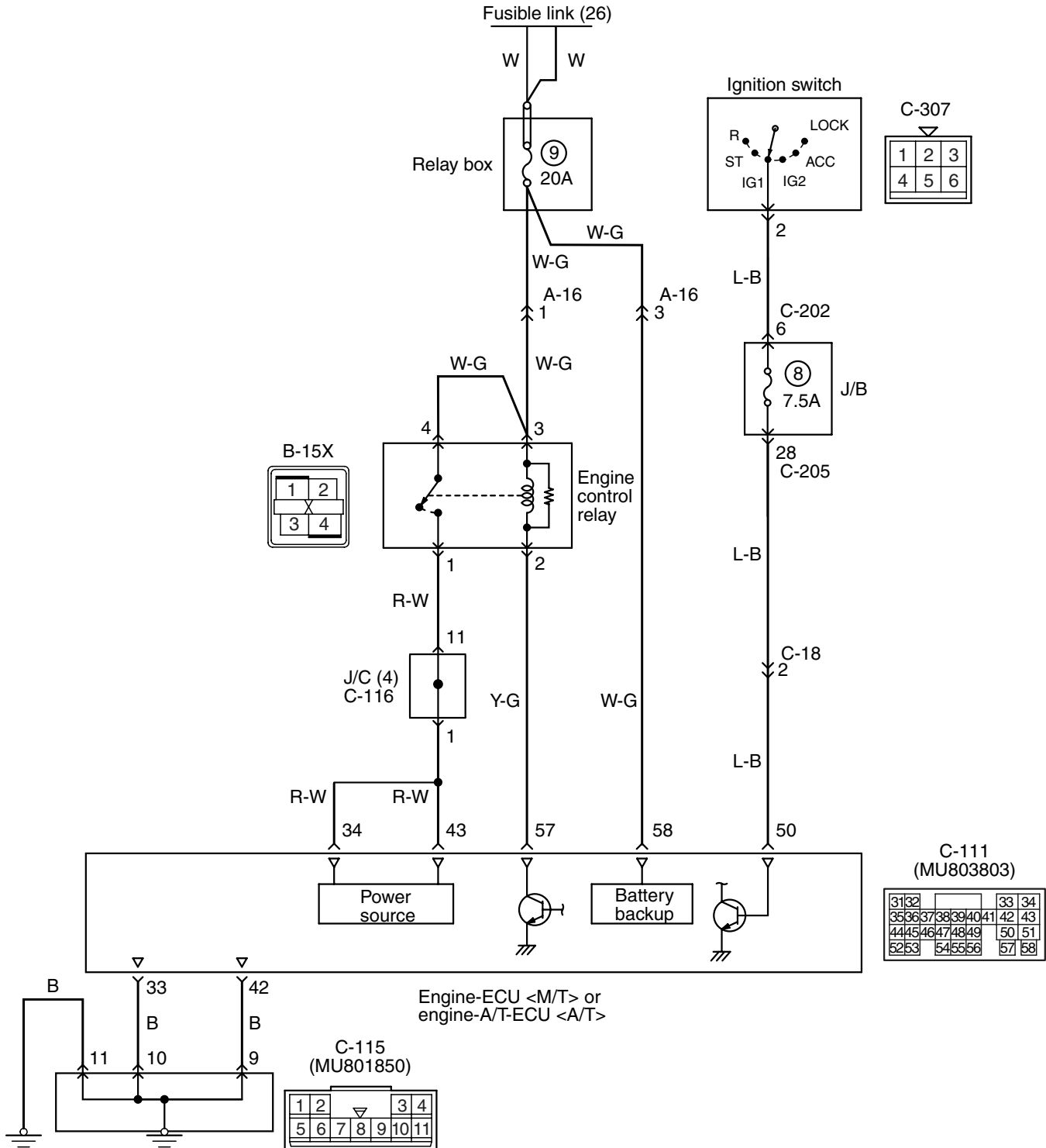
Q: Is the check result normal?

YES : Replace fan controller.

NO : Repair.

Inspection Procedure 22: Engine-ECU <M/T> or Engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> (terminal No. 57) 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 <M/T> or engine-A/T-ECU <A/T> (terminal No. 34 and No. 43), 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 <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> places the engine control relay in the ON position. Accordingly, the battery voltage is supplied to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, sensor and actuator.

PROBABLE CAUSE

- Failed engine control relay
- Open/short circuit in engine control relay circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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

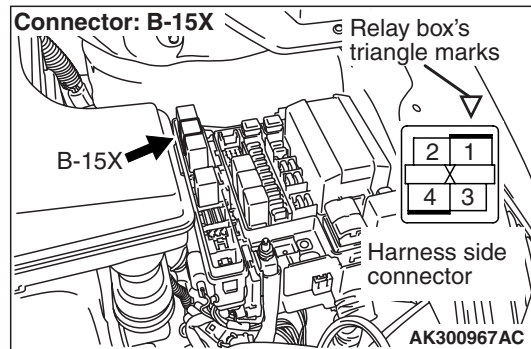
- Measure battery voltage during cranking.

OK: 8 V or more

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery test P.54A-6).

STEP 2. Connector check: B-15X engine control relay connector

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

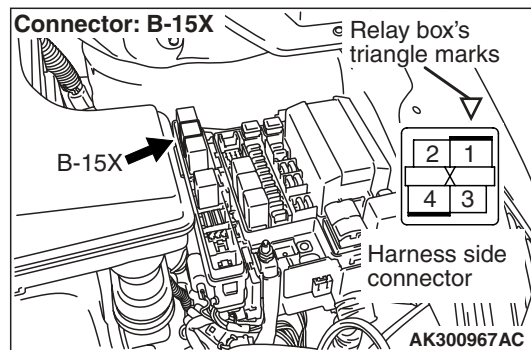
STEP 3. Check engine control relay.

- Check engine control relay (Refer to P.13A-388).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace engine control relay.

STEP 4. Perform voltage measurement at B-15X 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

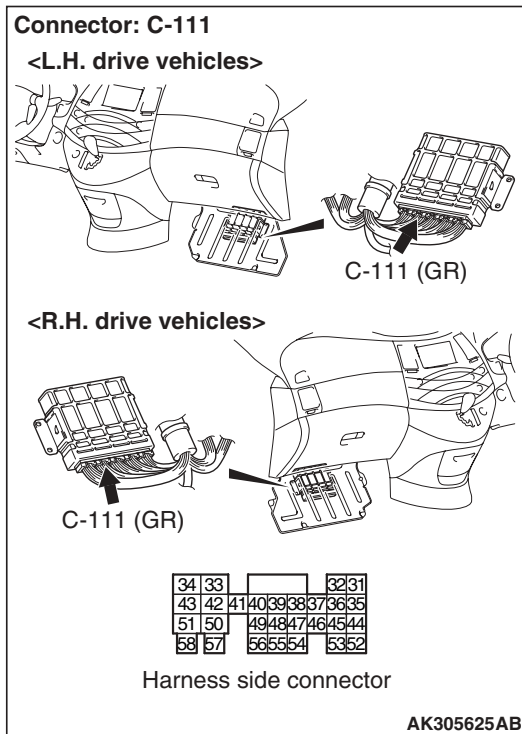
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check intermediate connector A-16, and repair if necessary. If intermediate connector is normal, check and repair harness between B-15X (terminal No. 3 and terminal No. 4) engine control relay connector and battery.

- Check power supply line for open/short circuit.

STEP 5. Perform voltage measurement at C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 34 and earth, also between terminal No. 43 and earth.

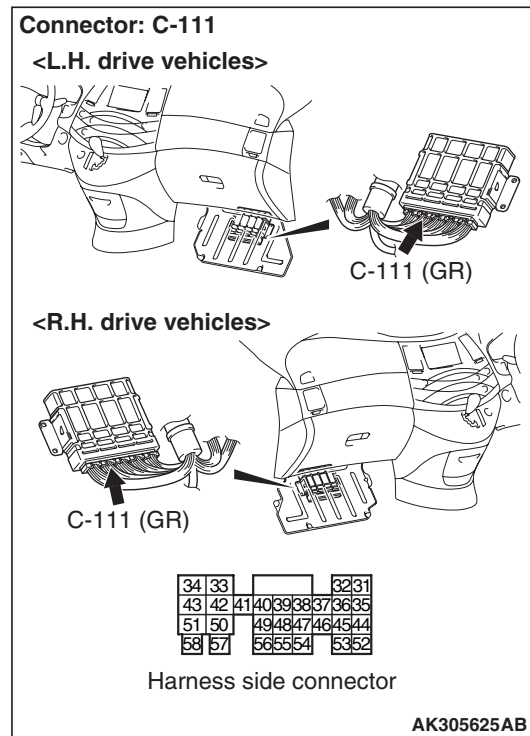
OK: System voltage

Q: Is the check result normal?

YES : Check and repair C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

NO : Go to Step 6 .

STEP 6. Connector check: C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

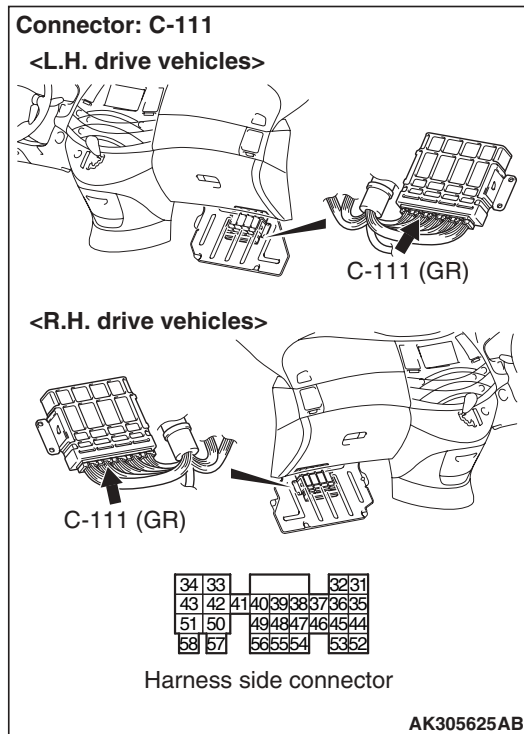


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Perform voltage measurement at C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 50 and earth.

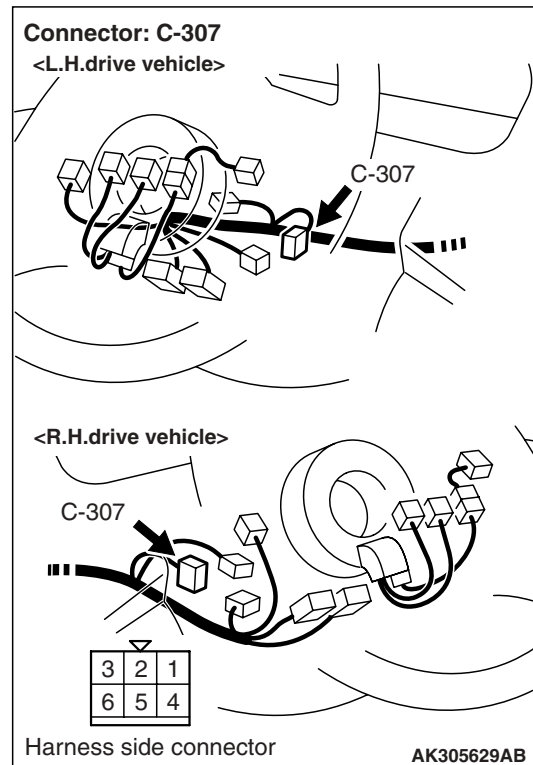
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 .

STEP 8. Connector check: C-307 ignition switch connector



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check ignition switch.

- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Inspection [P.54A-31](#)).

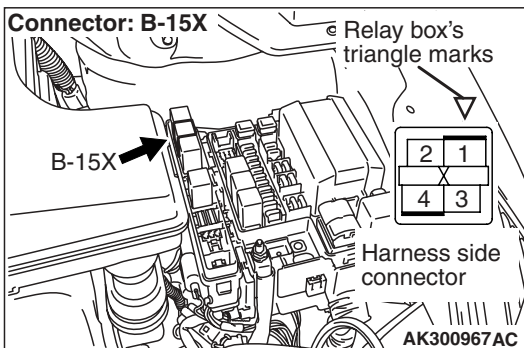
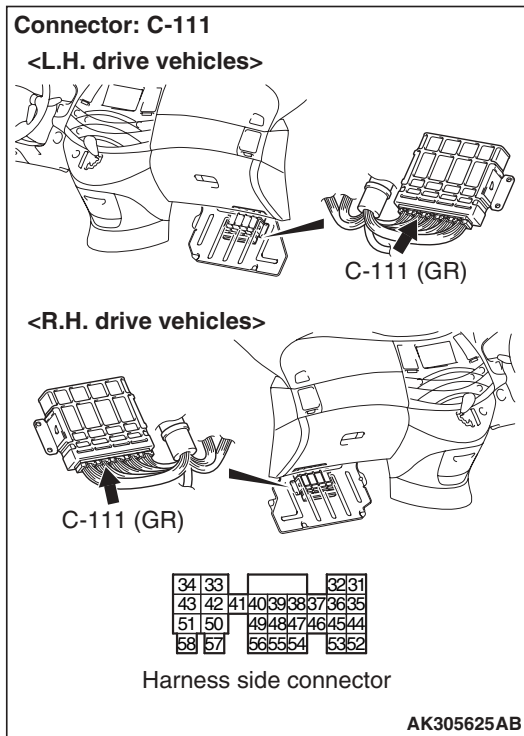
Q: Is the check result normal?

YES : Check intermediate connector C-18, C-205 and C-202, and repair if necessary. If intermediate connector is normal, check and repair harness between C-307 (terminal No. 2) ignition switch connector and C-111 (terminal No. 50) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

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

NO : Replace ignition switch.

STEP 10. Perform voltage measurement at C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: OFF
- Voltage between terminal No. 57 and earth.

OK: System voltage

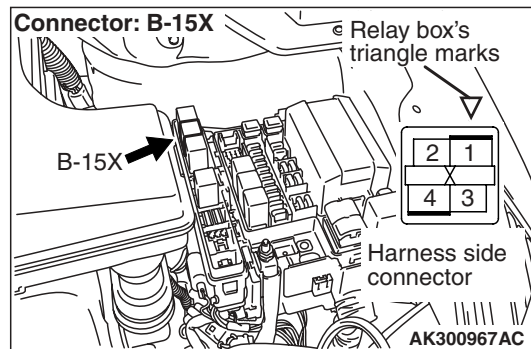
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Check and repair harness between B-15X (terminal No. 2) engine control relay connector and C-111 (terminal No. 57) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

STEP 11. Check harness between B-15X (terminal No. 3 and No. 4) engine control relay connector and battery.



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

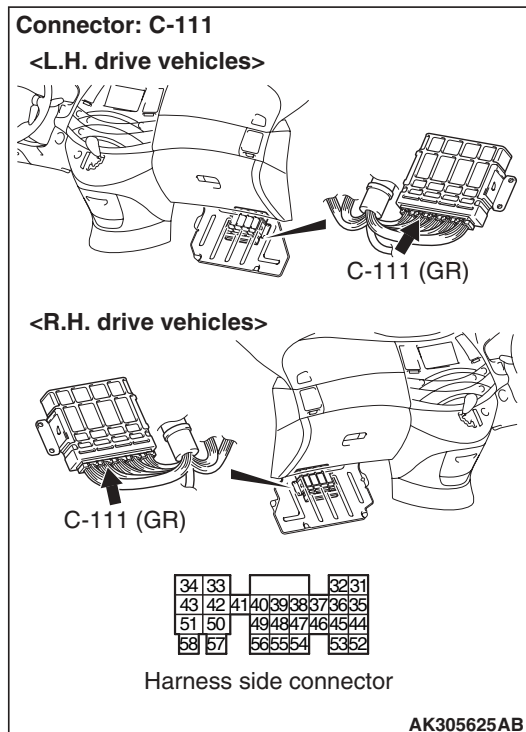
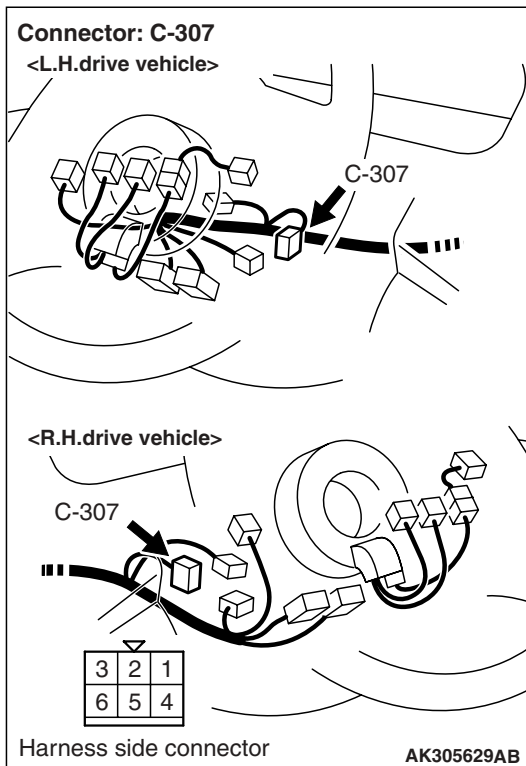
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

STEP 12. Check harness between C-307 (terminal No. 2) ignition switch connector and C-111 (terminal No. 50) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

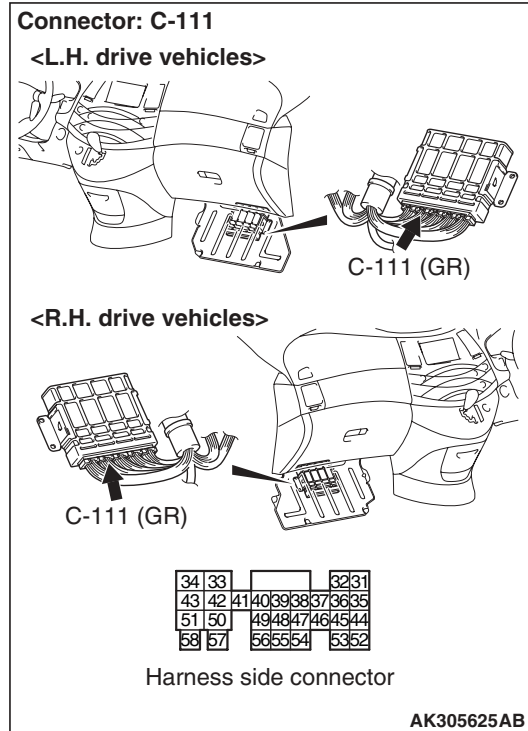


Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

STEP 13. Perform resistance measurement at C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 33, No. 42 and earth.

OK: 2 Ω or less

Q: Are the check results normal?

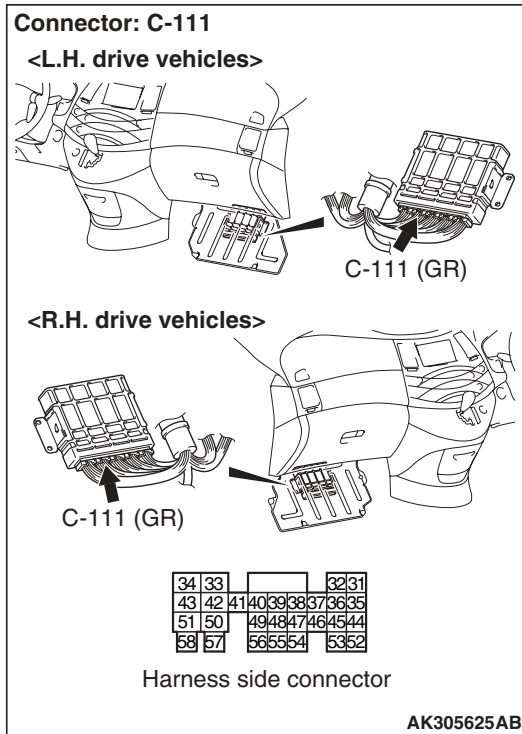
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>

NO : Go to Step 14

NOTE: Before checking harness, check intermediate connectors C-18, C-205 and C-202 and repair if necessary.

- Check output line for damage.

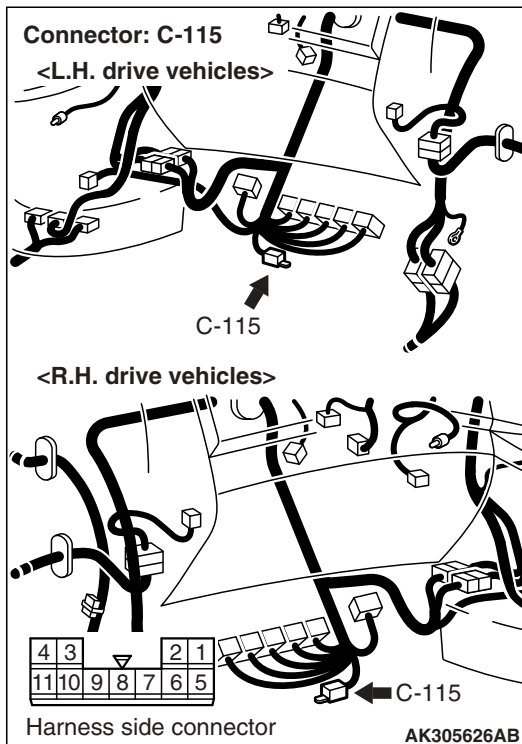
STEP 14. Connector check: C-115 earth connector.



YES : Check and repair harness between C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and C-115 earth connector.

- a. Check and repair harness between C-111 (terminal No. 33) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and C-115 (terminal No. 10) earth connector.
 - b. Check and repair harness between C-111 (terminal No. 42) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and C-115 (terminal No. 9) earth connector.
- Check earthing line for open circuit and damage.

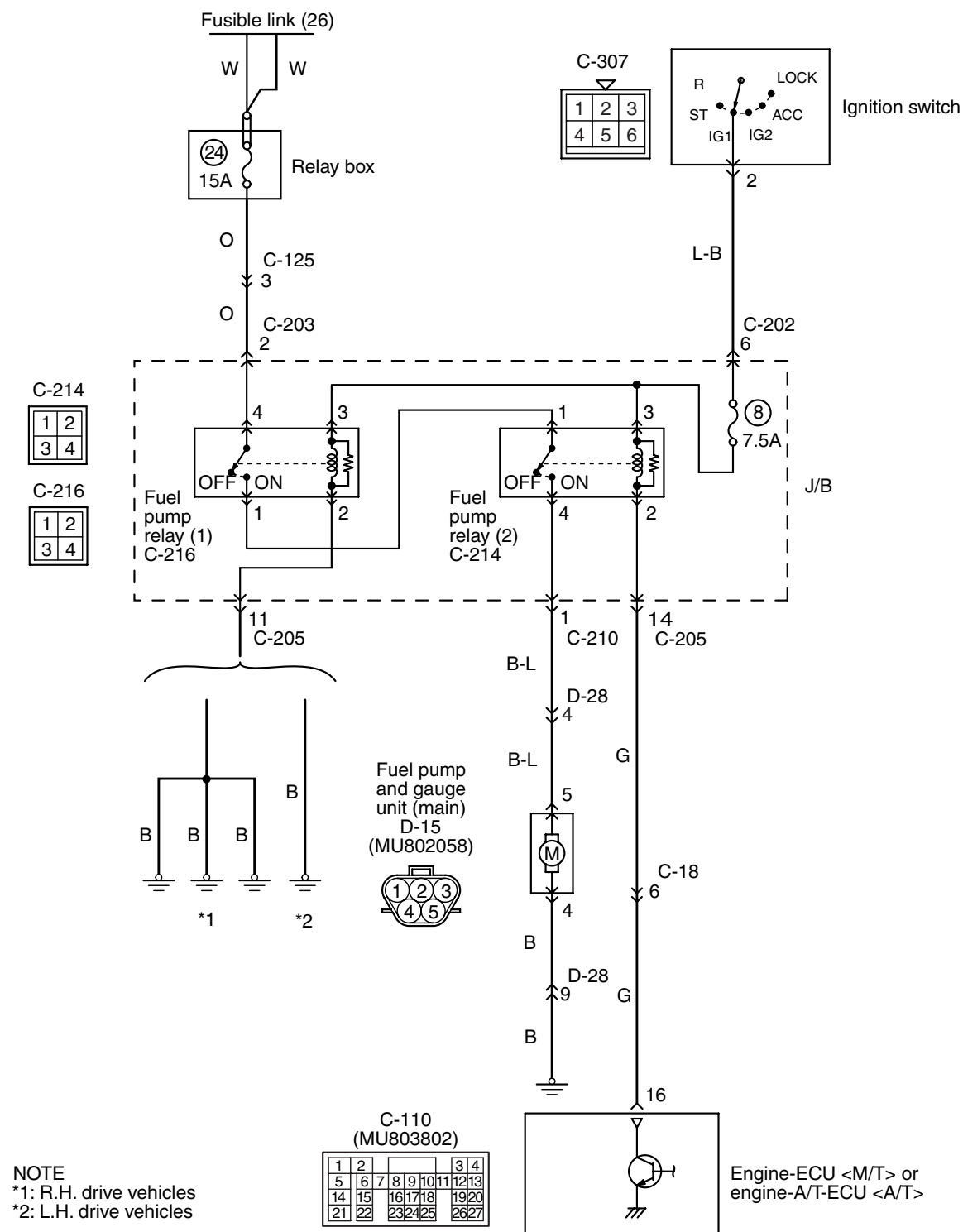
NO : Repair



Q: Is the check result normal?

Inspection Procedure 23: Fuel Pump System

Fuel pump and gauge unit (main) circuit



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 <M/T> or engine-A/T-ECU (terminal No. 16) 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

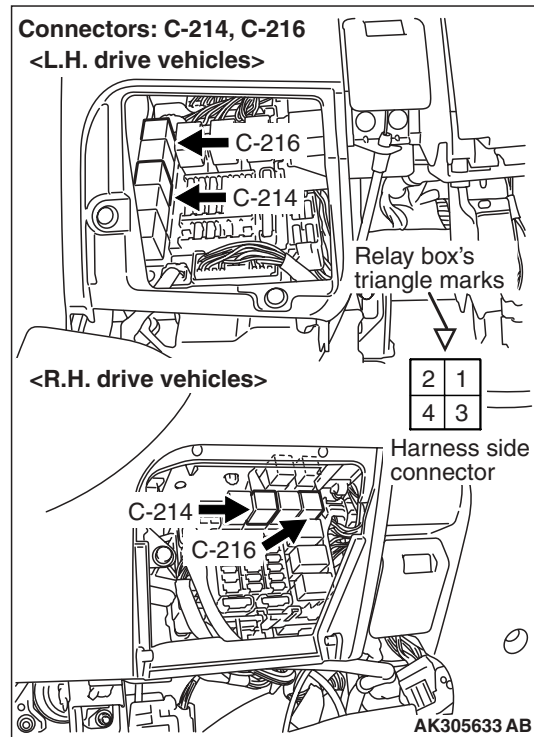
- When the ignition switch ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> places the fuel pump relay in the ON position. Accordingly, the battery voltage is supplied to the fuel pump.

PROBABLE CAUSE

- Failed fuel pump relay
- Failed fuel pump
- Open/short circuit in fuel pump drive circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-216 fuel pump relay (1) connector and C-214 fuel pump relay (2) connector



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

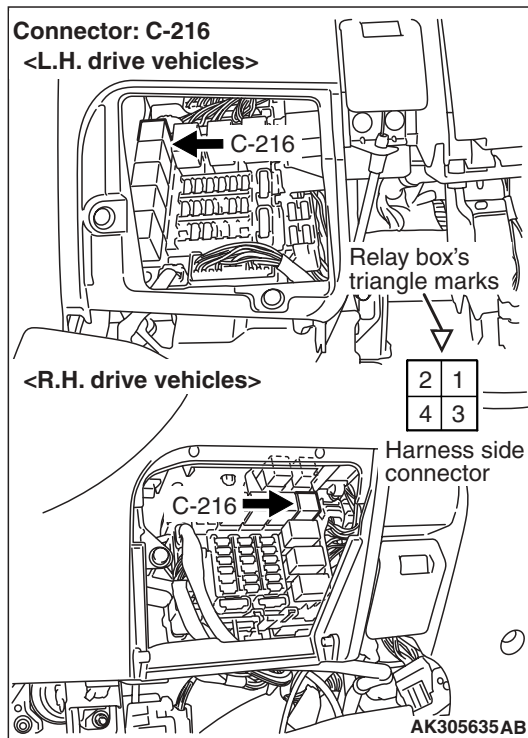
STEP 2. Check fuel pump relay.

- Fuel pump relay, continuity check (Refer to [P.13A-389](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace fuel pump relay.

STEP 3. Perform resistance measurement at C-216 fuel pump relay (1) connector.

- Remove relay, and measure at junction block side.
- Resistance between terminal No. 2 and earth.

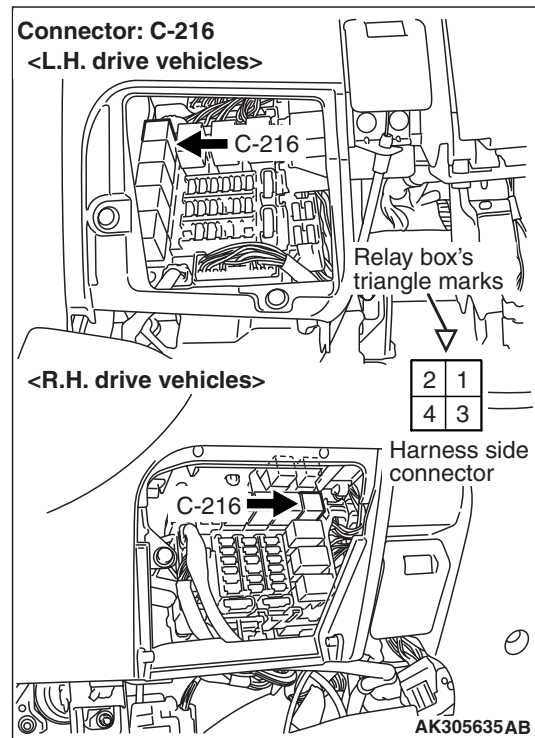
OK: 2 Ω or less

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-216 (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-216 fuel pump relay (1) connector.

- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

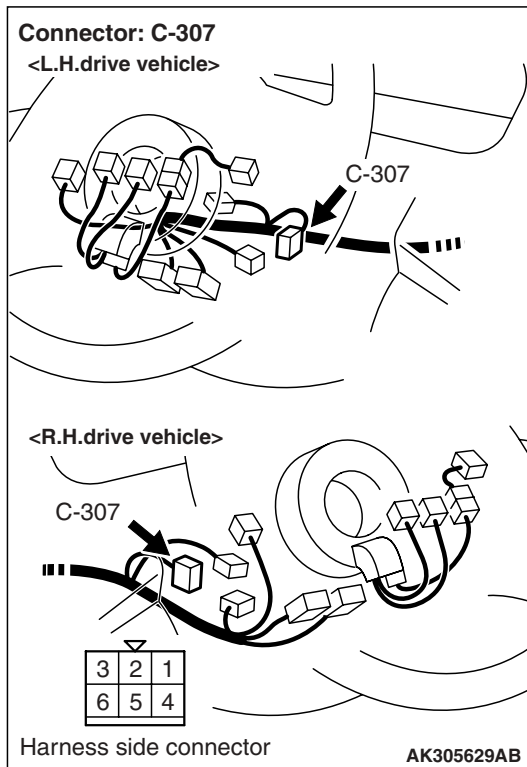
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: C-307 ignition switch connector

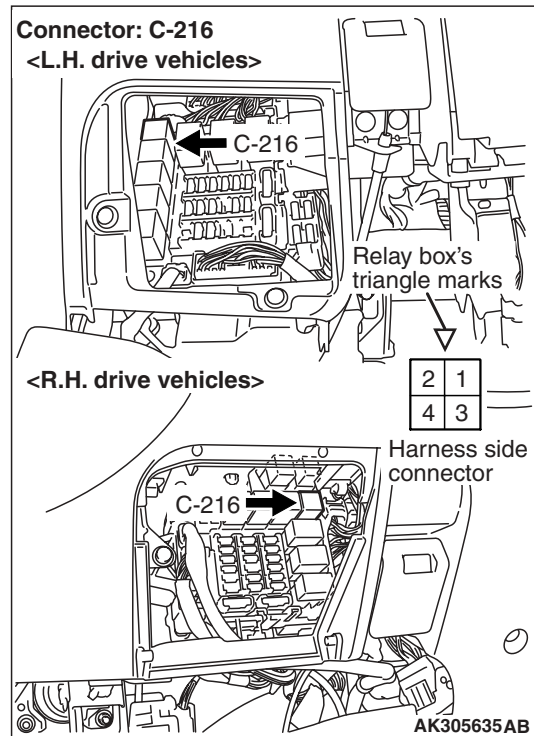


YES : Check intermediate connector C-202, and repair if necessary. If intermediate connector is normal, check and repair harness between C-216 (terminal No. 3) fuel pump relay (1) connector and C-307 (terminal No. 2) ignition switch connector.

- Check power supply line for open circuit and damage.

NO : Repair or replace.

STEP 6. Perform voltage measurement at C-216 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?

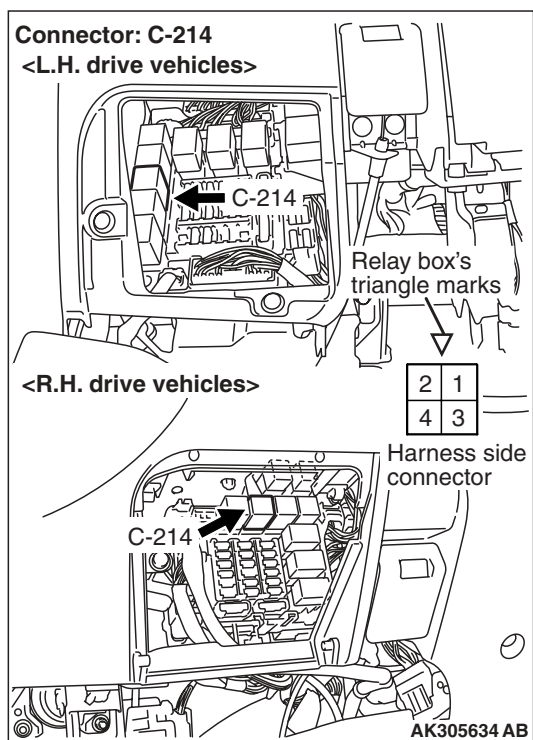
YES : Go to Step 7 .

NO : Check intermediate connectors C-125 and C-203, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-216 (terminal No. 4) fuel pump relay (1) connector and battery.

- Check power supply line for open/short circuit.

Q: Is the check result normal?

STEP 7. Perform voltage measurement at C-214 fuel pump relay (2) connector.



- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

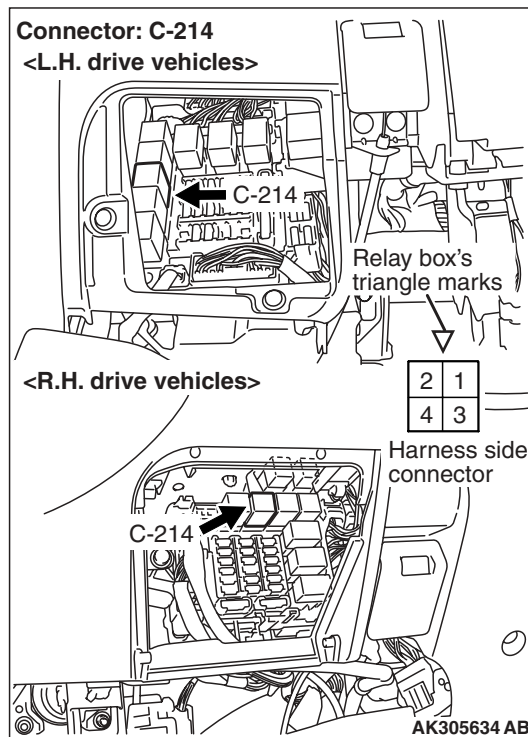
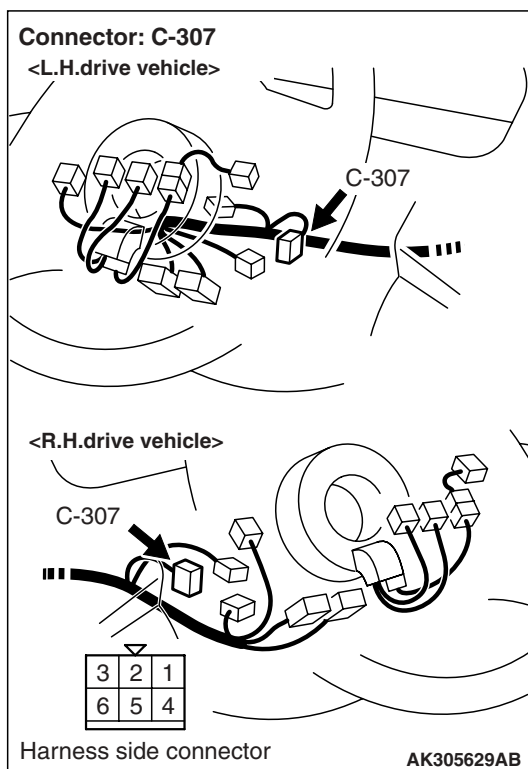
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 8 .

STEP 8. Connector check: C-307 ignition switch connector



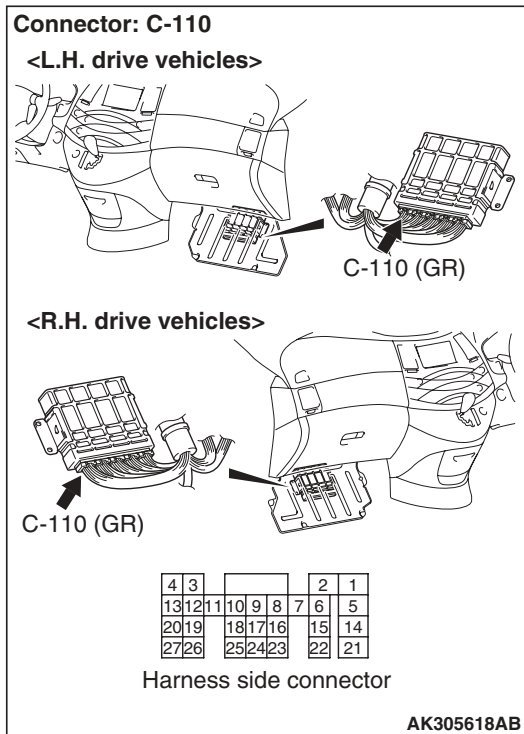
Q: Is the check result normal?

YES : Check intermediate connector C-202, and repair if necessary. If intermediate connector is normal, check and repair harness between C-307 (terminal No. 2) ignition switch connector and C-214 (terminal No. 3) fuel pump relay (2) connector.

- Check power supply line for open circuit.

NO : Repair or replace.

STEP 9. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

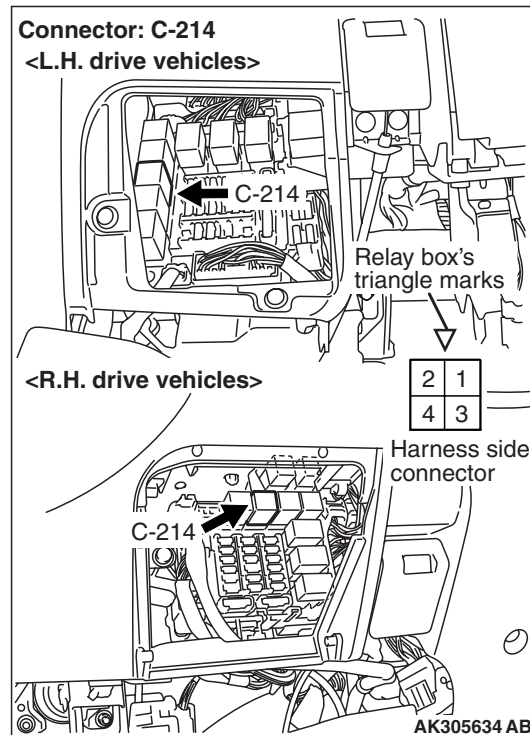
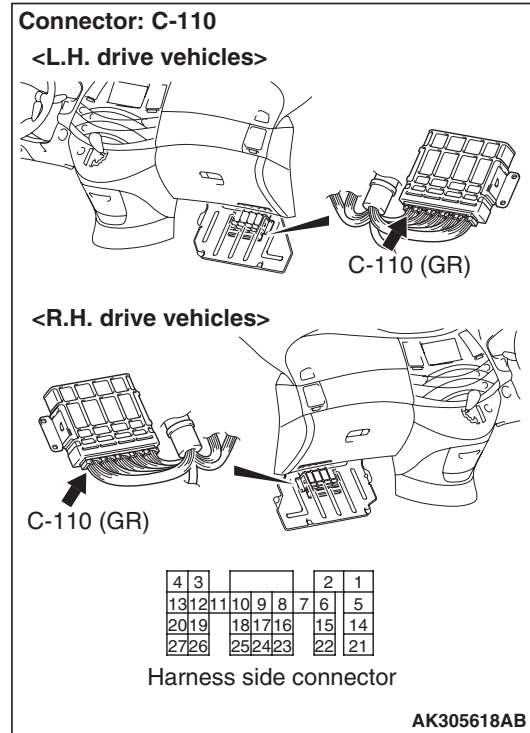


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. Perform voltage measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 16 and earth.

OK: System voltage

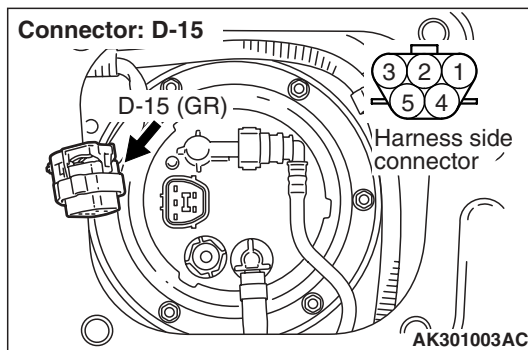
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Check intermediate connectors C-18 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-214 (terminal No. 2) fuel pump relay (2) connector and C-110 (terminal No. 16) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

STEP 11. Connector check: D-15 fuel pump connector

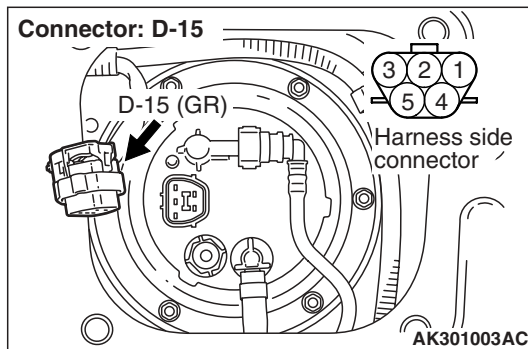


Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace.

STEP 12. Perform voltage measurement at D-15 fuel pump connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Using a jumper wire, connect C-110 (terminal No. 16) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and earth.
- Voltage between terminal No. 5 and earth.

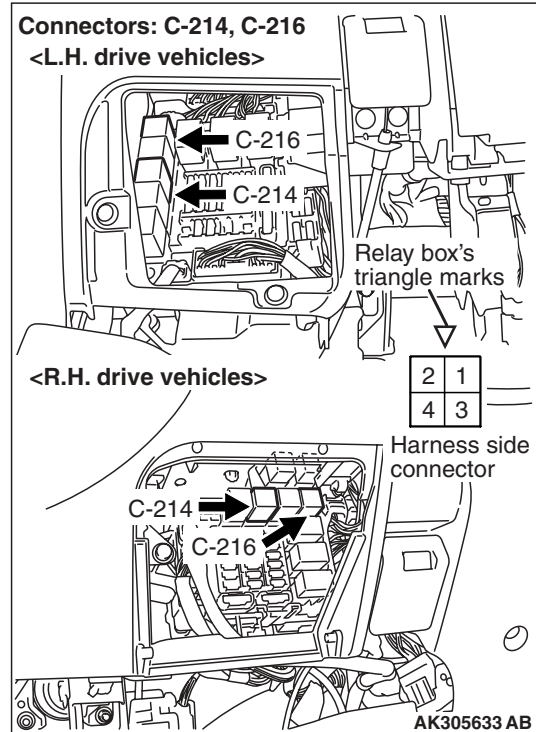
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Go to Step 13 .

STEP 13. Check harness between C-216 (terminal No. 1) fuel pump relay (1) connector and C-214 (terminal No. 1) fuel pump relay (2) connector.



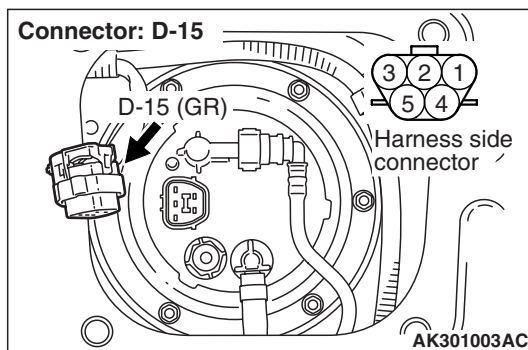
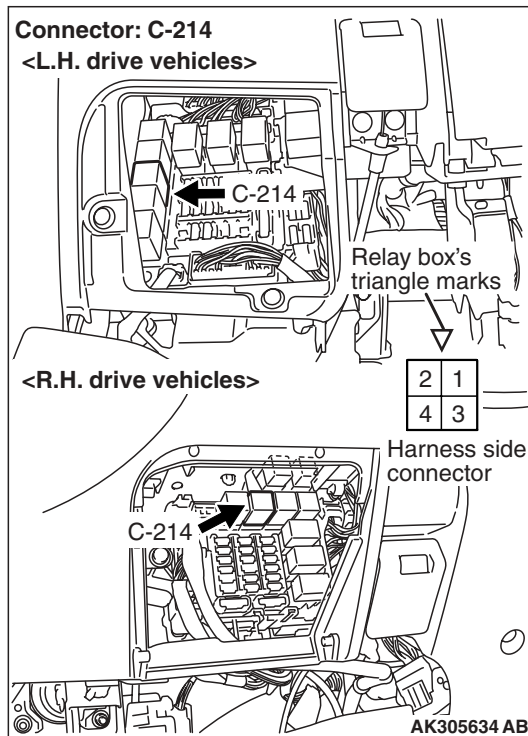
- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 14

NO : Repair.

STEP 14. Check harness between C-214 (terminal No. 4) fuel pump relay (2) connector and D-15 (terminal No. 5) fuel pump connector.



NOTE: Before checking harness, check intermediate connectors D-210 and D-28, and repair if necessary.

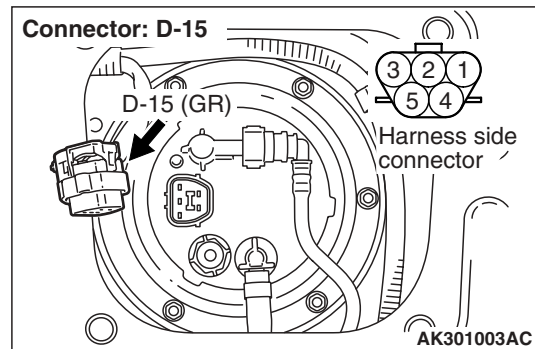
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Repair.

STEP 15. Perform resistance measurement at D-15 fuel pump connector.



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

OK: 2 Ω or less

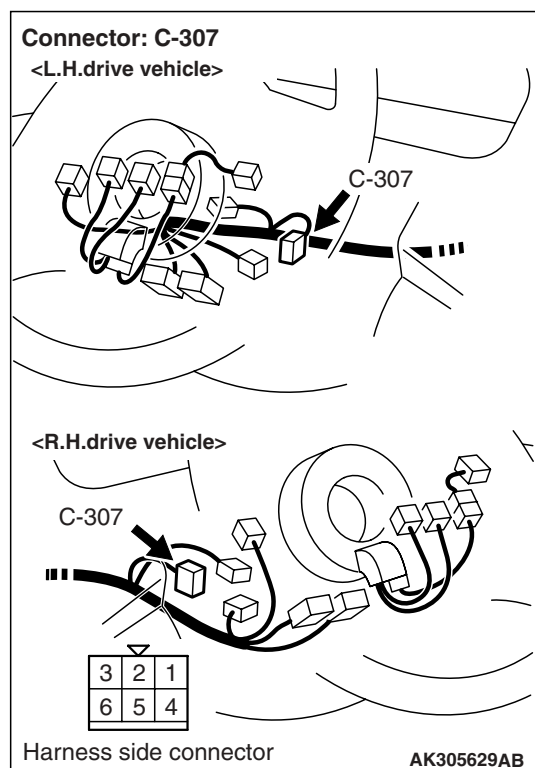
Q: Is the check result normal?

YES : Go to Step 16 .

NO : Check intermediate connector D-28, and repair if necessary. If intermediate connector is normal, check and repair harness between D-15 (terminal No. 4) fuel pump connector and body earth.

- Check earthing line for open circuit and damage.

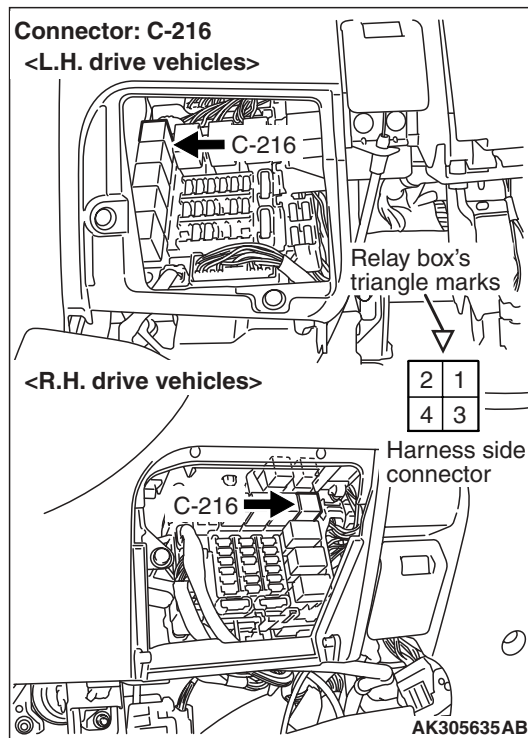
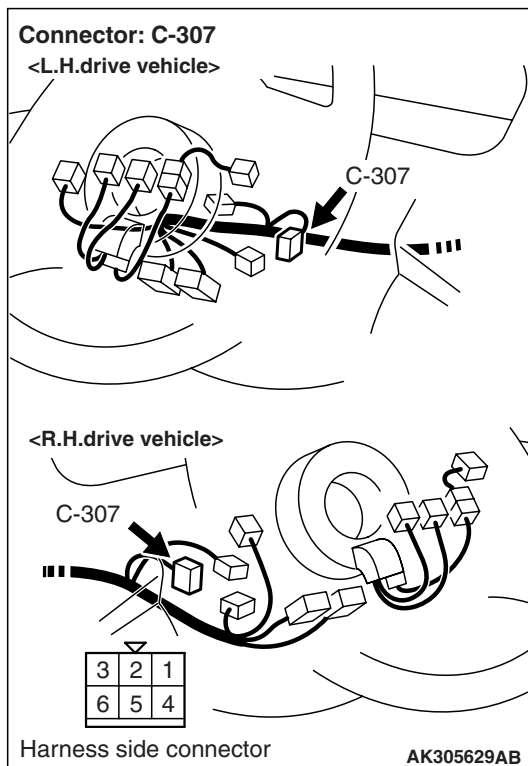
STEP 16. Connector check: C-307 ignition switch connector



Q: Is the check result normal?

YES : Go to Step 17 .
NO : Repair or replace.

STEP 17. Check harness between C-307 (terminal No. 2) ignition switch connector and C-216 (terminal No. 3) fuel pump relay (1) connector.



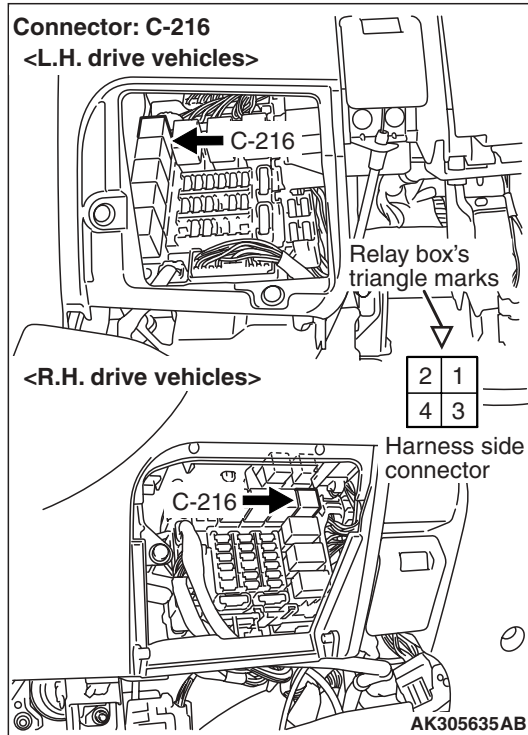
NOTE: Before checking harness, check intermediate connector C-202, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 18 .
NO : Repair.

STEP 18. Check harness between battery and C-216 (terminal No. 4) fuel pump relay (1) connector.



NOTE: Before checking harness, check intermediate connector C-203, C-125, and repair if necessary.

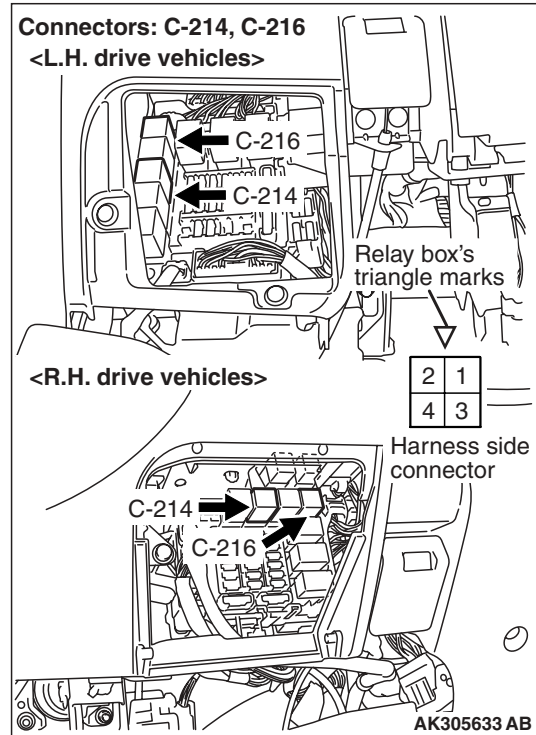
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Repair.

STEP 19. Check harness between C-216 (terminal No. 1) fuel pump relay (1) connector and C-214 (terminal No. 1) fuel pump relay (2) connector.



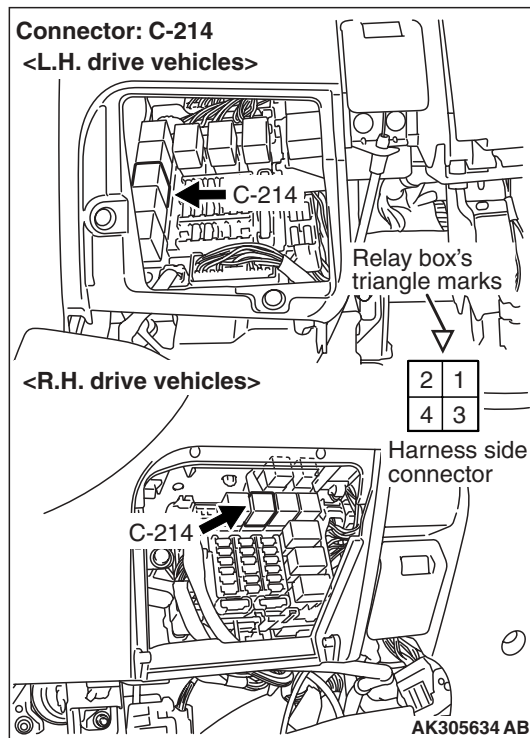
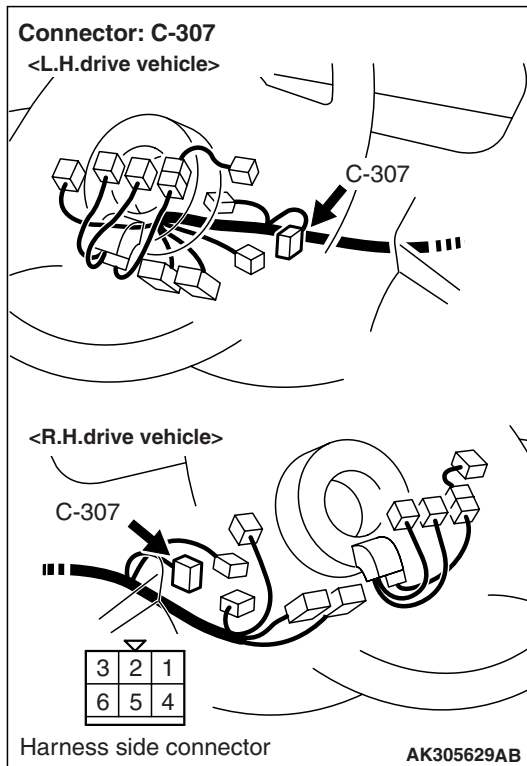
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair.

STEP 20. Check harness between C-307 (terminal No. 2) ignition switch connector and C-214 (terminal No. 3) fuel pump relay (2) connector.



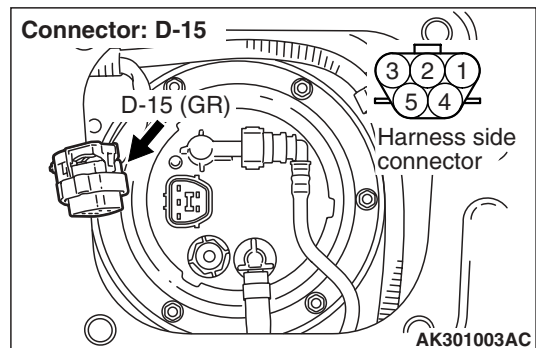
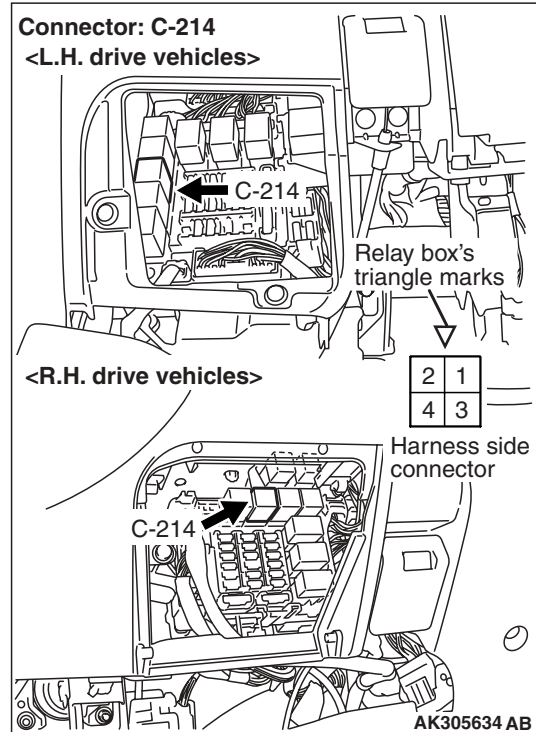
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 21 .

NO : Repair.

STEP 21. Check harness between C-214 (terminal No. 4) fuel pump relay (2) connector and D-15 (terminal No. 5) fuel pump connector.



NOTE: Before checking harness, check intermediate connectors D-28 and C-210, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

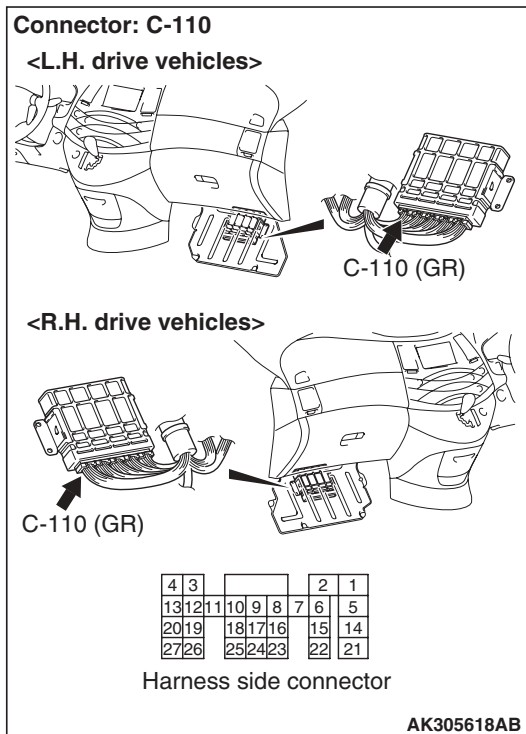
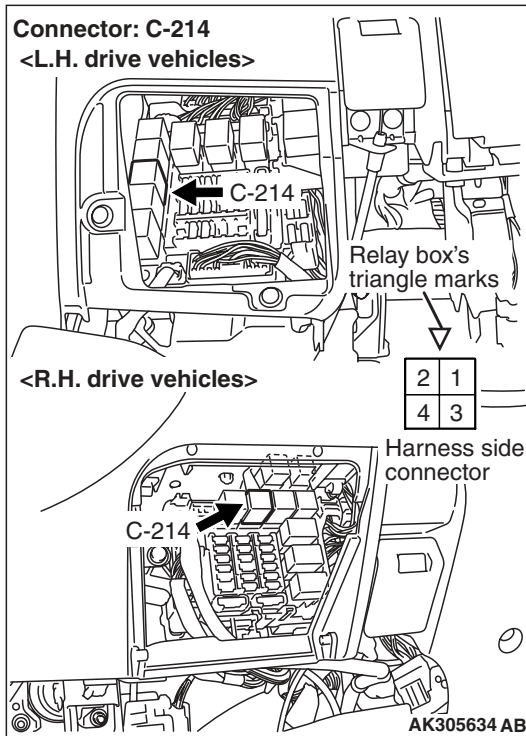
YES : Go to Step 22 .

NO : Repair.

STEP 22. Check harness between C-214 (terminal No. 2) fuel pump relay (2) connector and C-110 (terminal No. 16) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

YES : Replace fuel pump.

NO : Repair.



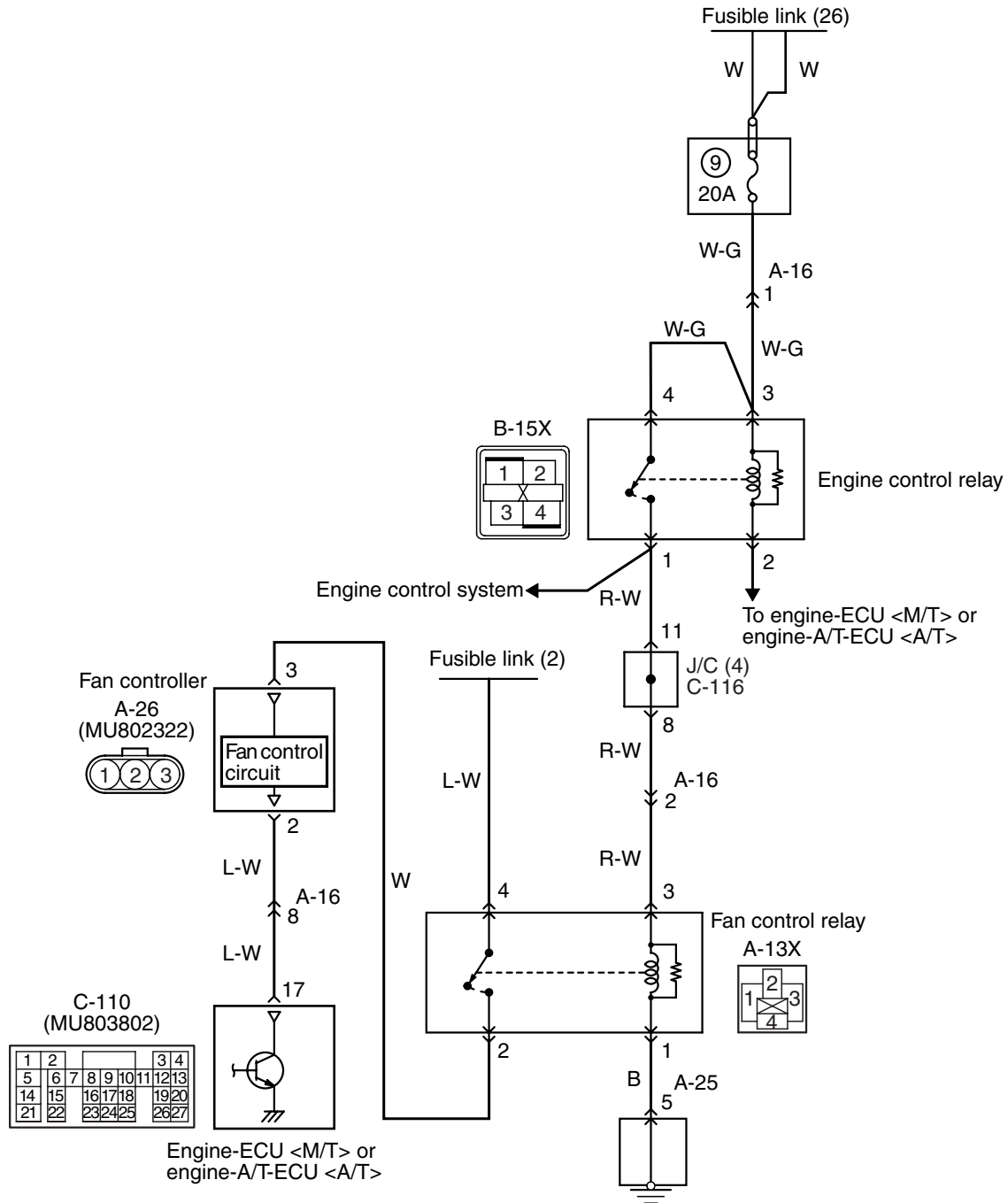
NOTE: Before checking harness, check intermediate connectors C-18 and C-205, and repair if necessary.

- Check earthing line for damage.

Q: Is the check result normal?

Inspection Procedure 24: 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

AK305580AB

OPERATION

- The battery voltage is applied to the fan control relay (terminal No. 1) from the engine control

relay (terminal No. 1) and is earthed to the vehicle body from the fan control relay (terminal No. 3).

- The battery voltage is applied to the fan control relay (terminal No. 4).
- When the fan control relay is in ON position, the battery voltage is supplied to the fan controller (terminal No. 1) from the fan control relay (terminal No. 2).

FUNCTION

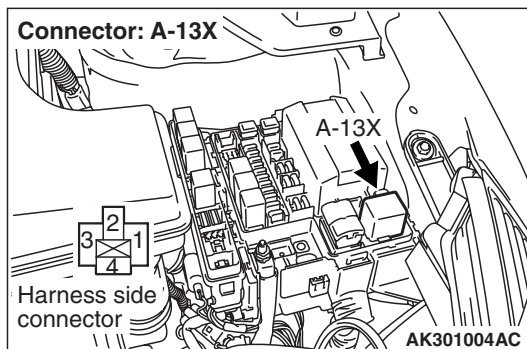
- When the engine control relay is in ON position, the fan control relay is also simultaneously placed in "ON" position. Accordingly, the battery voltage is supplied to the fan controller.

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 <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-13X fan control relay connector



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Check fan control relay.

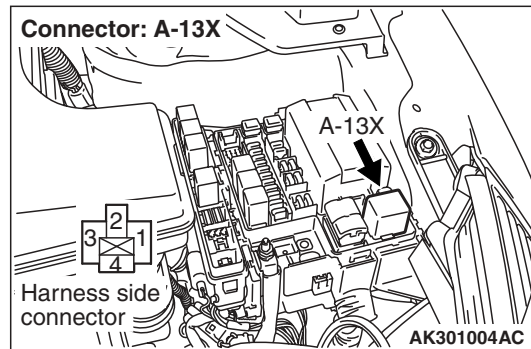
- Check fan control relay (Refer to GROUP 14 – On-vehicle Service – Fan Control Relay Continuity Check [P.14-19](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace fan control relay.

STEP 3. Perform resistance measurement at A-13X fan control relay connector.



- Remove relay and measure at relay box side.
- Resistance between terminal No. 1 and earth.

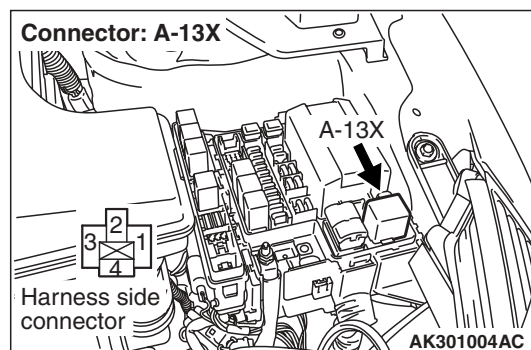
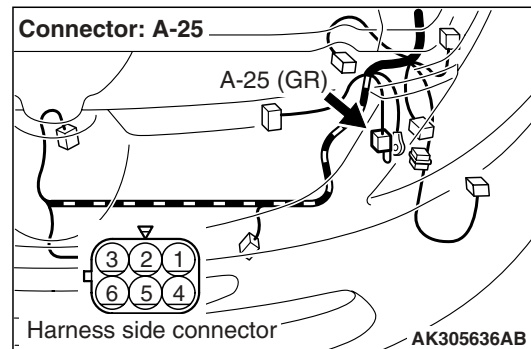
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: A-25 earth connector.

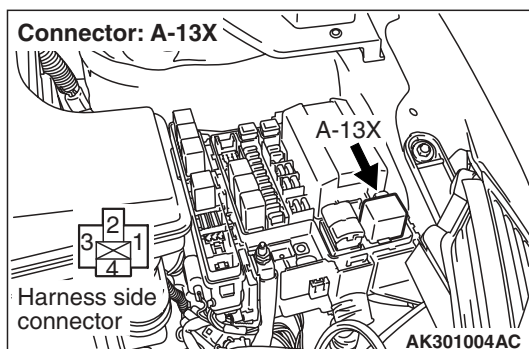


Q: Is the check result normal?

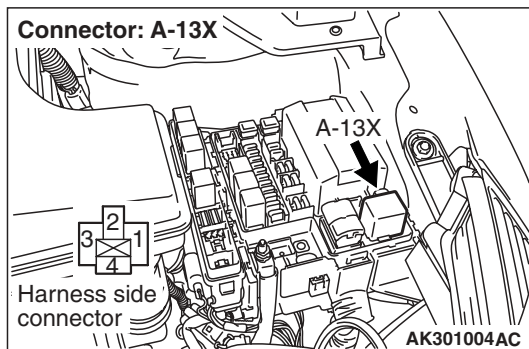
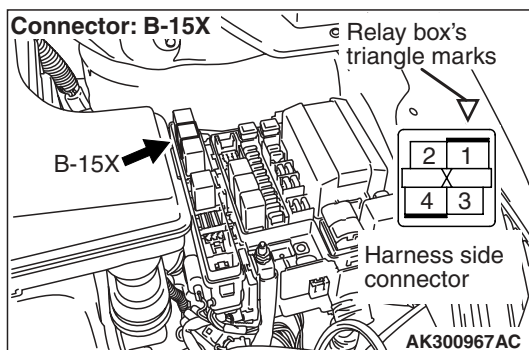
YES : Check and repair harness between A-13X (terminal No. 1) fan control relay connector and A-25 (terminal No. 5) earth connector.

- Check earthing line for open circuit and damage.

NO : Repair or replace.

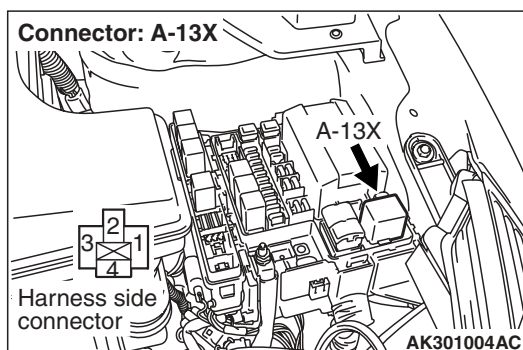
STEP 5. Perform voltage measurement at A-13X fan control relay connector.

- 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 7 .**NO :** Go to Step 6 .**STEP 6. Connector check: B-15X engine control relay connector****Q: Is the check result normal?**

YES : Check intermediate connectors A-16 and C-116, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-15X (terminal No. 1) engine control relay connector and A-13X (terminal No. 3) fan control relay connector.

- Check power supply line for open/short circuit.

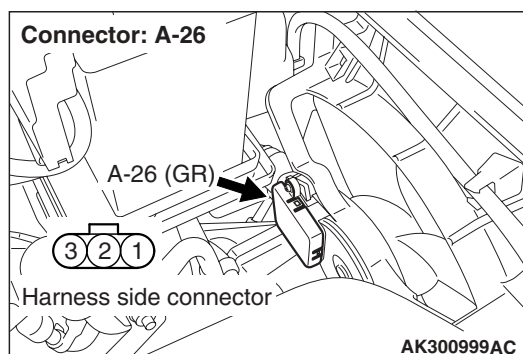
NO : Repair or replace.**STEP 7. Perform voltage measurement at A-13X fan control relay connector.**

- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth

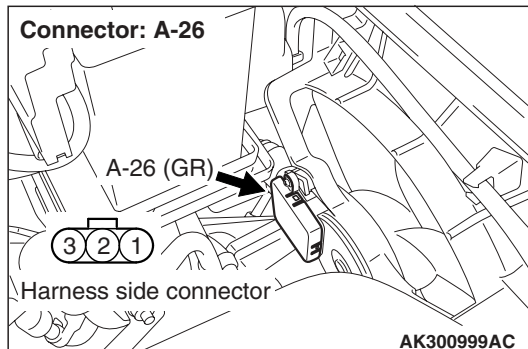
OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 8 .

NO : Check and repair harness between battery and A-13X (terminal No. 4) fan control relay connector.

- Check power supply line for open/short circuit.

STEP 8. Connector check: A-26 fan controller connector**Q: Is the check result normal?****YES :** Go to Step 9 .**NO :** Repair or replace.

STEP 9. Perform voltage measurement at A-26 fan controller connector.

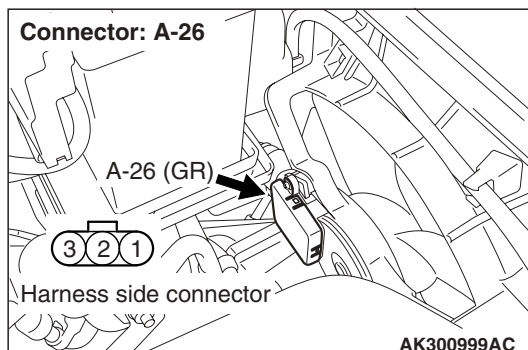
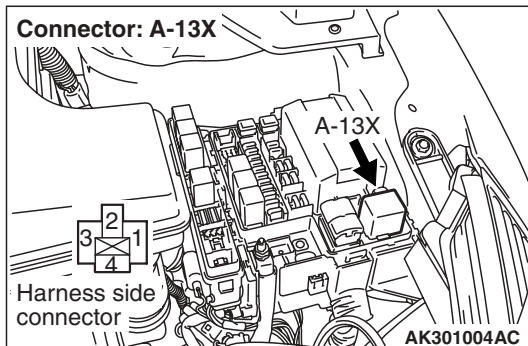


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 13 .
NO : Go to Step 10 .

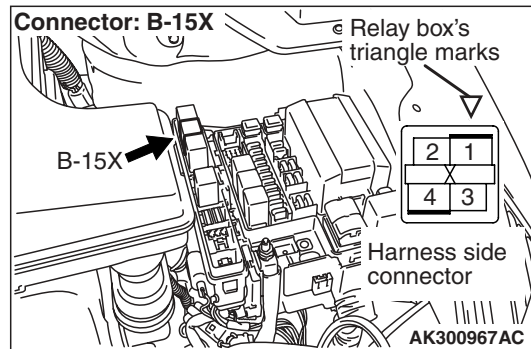
STEP 10. Check harness between A-13X (terminal No. 2) fan control relay connector and A-26 (terminal No. 3) fan controller connector.



- Check power supply line for open/short circuit.

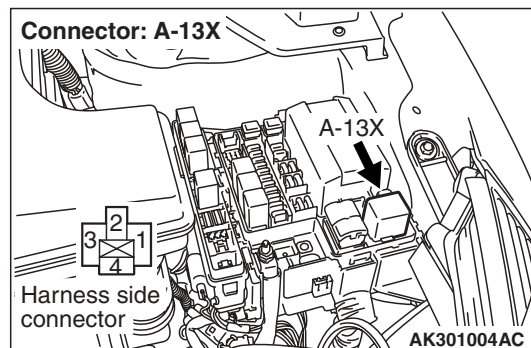
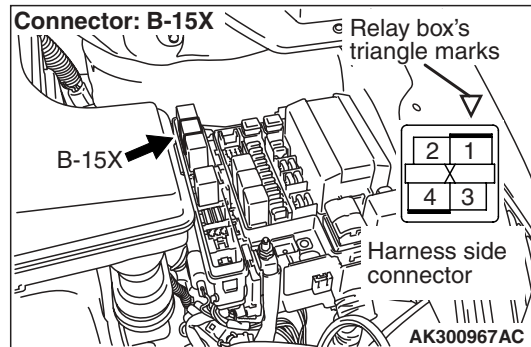
Q: Is the check result normal?
YES : Go to Step 11 .
NO : Repair.

STEP 11. Connector check: B-15X engine control relay connector



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

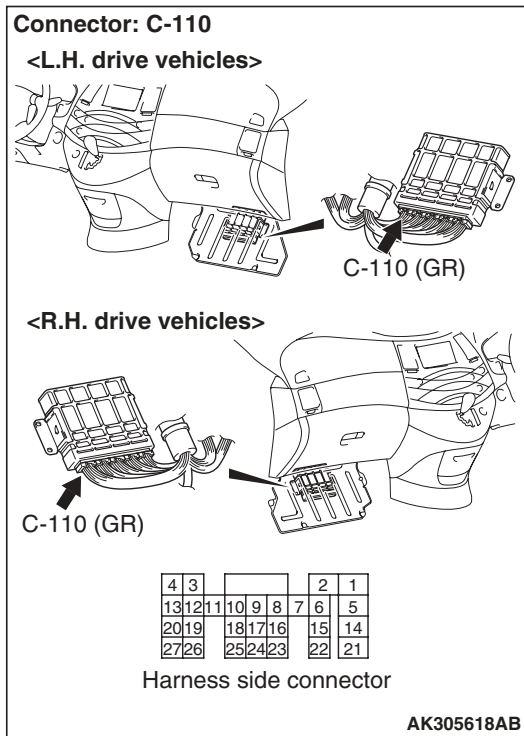
STEP 12. Check harness between B-15X (terminal No. 1) engine control relay connector and A-13X (terminal No. 3) fan control relay connector.



NOTE: Before checking harness, check intermediate connectors A-16 and C-116, and repair if necessary.

- Check power supply line for damage.

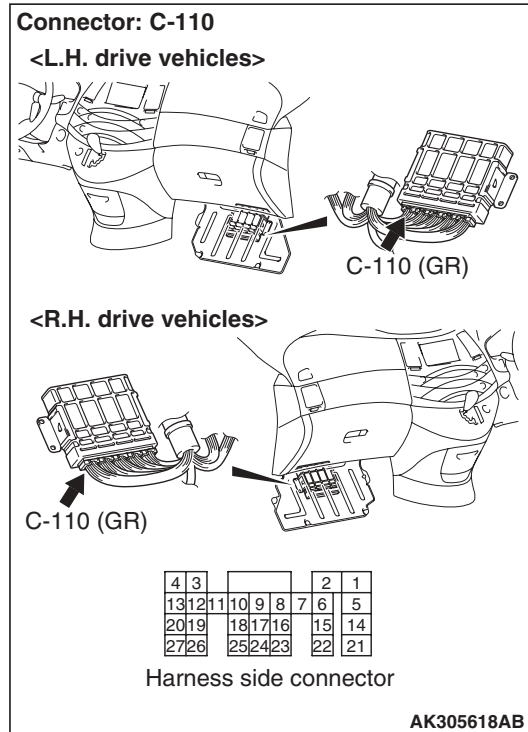
Q: Is the check result normal?
YES : Check and repair harness between A-13X (terminal No. 1) fan control relay connector and A-25 (terminal No. 5) earth connector.
 • Check earthing line for damage.
NO : Repair.

STEP 13. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair or replace.

STEP 14. Fan motor drive test.

- Disconnect C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Ignition switch: ON

OK: Fan motor rotates.

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Go to Step 16 .

STEP 15. MUT-III actuator test

- Refer to Actuator Test Reference Table

[P.13A-371](#)

- Item 21: Fan controller

OK: Fan motor rotates.

Q: Is the check result normal?

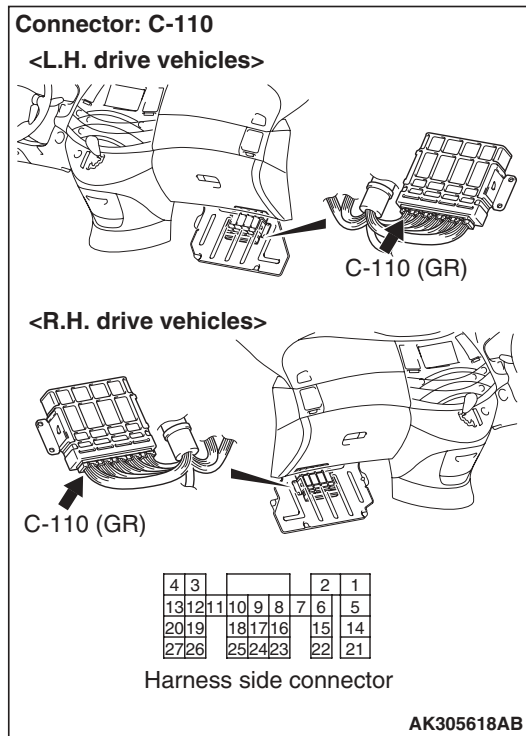
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use

Troubleshooting/Inspection Service Points

[P.00-5](#)).

NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

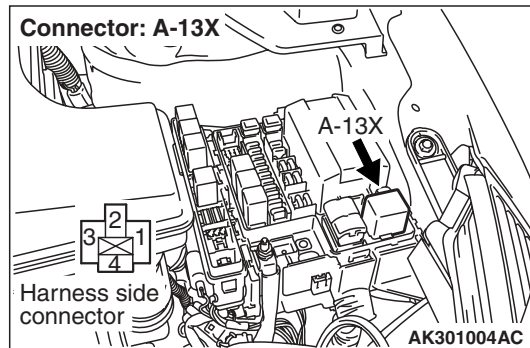
STEP 16. Perform voltage measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 17 and earth.
OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 17 .
NO : Go to Step 19 .

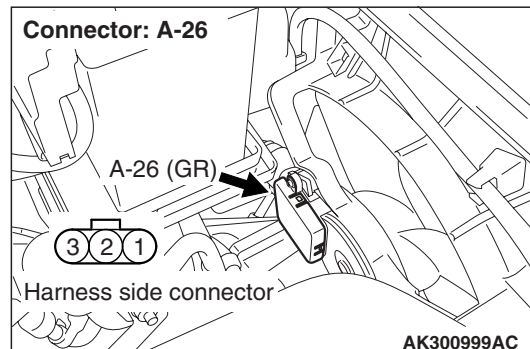
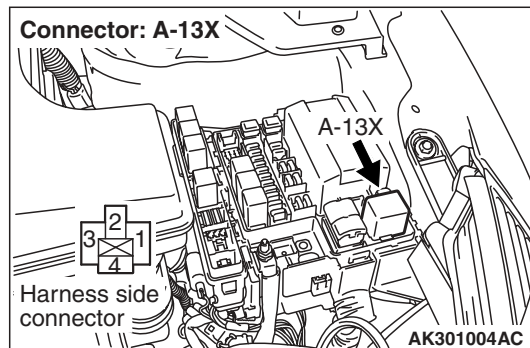
STEP 17. Check harness between A-13X (terminal No. 4) fan control relay connector and battery.



- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 18 .
NO : Repair.

STEP 18. Check harness between A-13X (terminal No. 2) fan control relay connector and A-26 (terminal No. 3) fan controller connector.

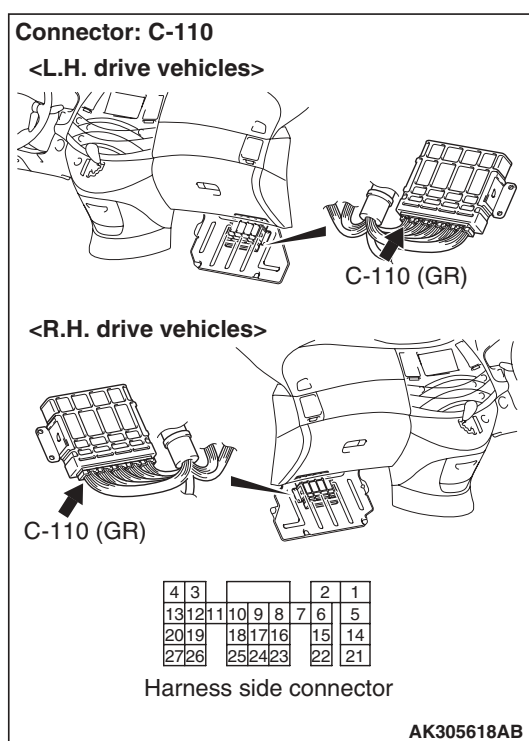
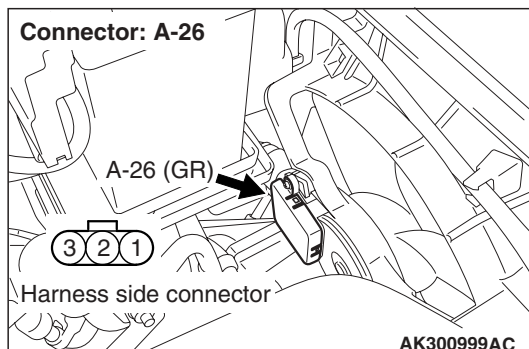


- Check power supply line for damage.

Q: Is the check result normal?
YES : Replace fan motor and fan controller.
NO : Repair.

STEP 19. Check harness between A-26 (terminal No. 2) fan controller connector and C-110 (terminal No. 17) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

YES : Replace fan motor and fan controller.
NO : Repair.



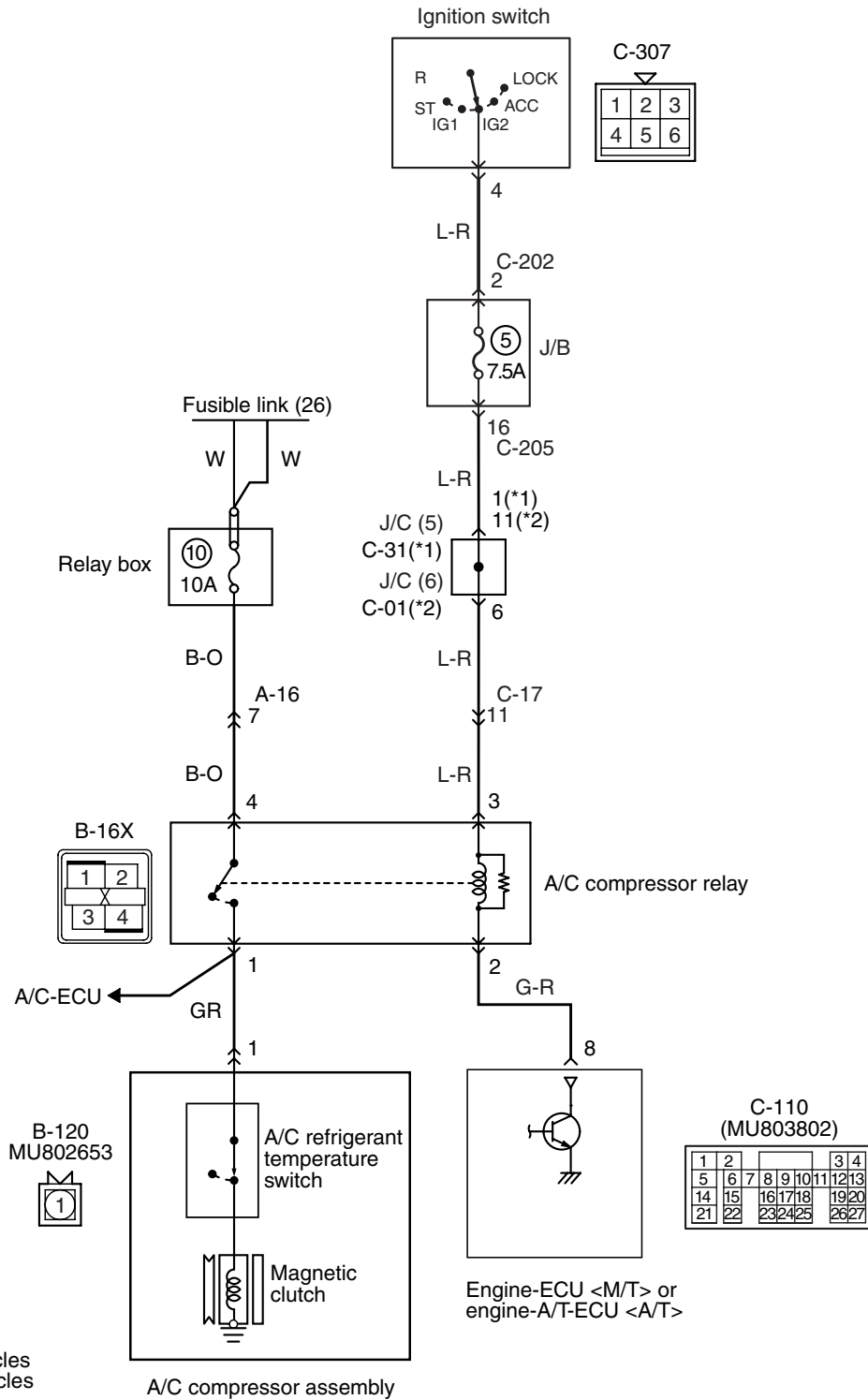
NOTE: Before checking harness, check intermediate connector A-16, and repair if necessary.

- Check earthing line for short circuit.

Q: Is the check result normal?

Inspection Procedure 25: A/C Compressor Relay System

A/C compressor relay circuit



NOTE
 *1: L.H. drive vehicles
 *2: R.H. drive vehicles

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 <M/T> or engine-A/T-ECU <A/T> (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 assembly (terminal No. 1).

FUNCTION

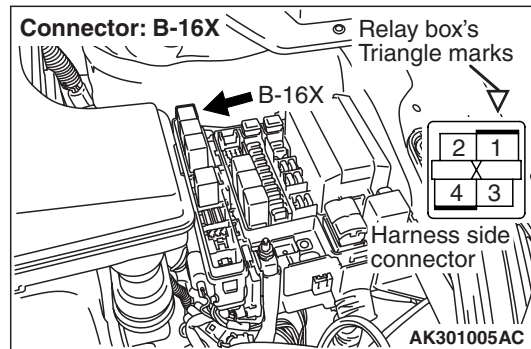
- When the A/C switch ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> places the A/C compressor relay in the ON position. Accordingly, the battery voltage supplied to the A/C compressor operates the magnet clutch.

PROBABLE CAUSE

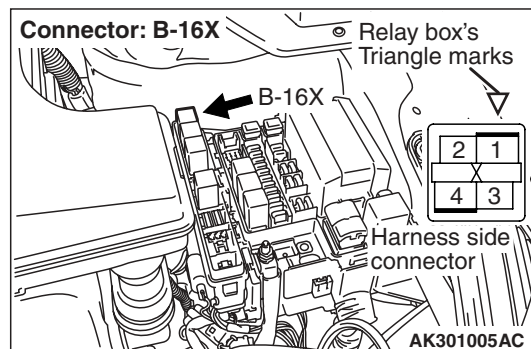
- Failed A/C compressor relay
- Failed A/C compressor magnet clutch
- Open/short circuit in A/C compressor relay circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**NOTE:**

- *1: L.H.drive vehicle
- *2: R.H.drive vehicle

STEP 1. Connector check: B-16X A/C compressor relay connector**Q: Is the check result normal?****YES :** Go to Step 2 .**NO :** Repair or replace.**STEP 2. A/C compressor relay check.**

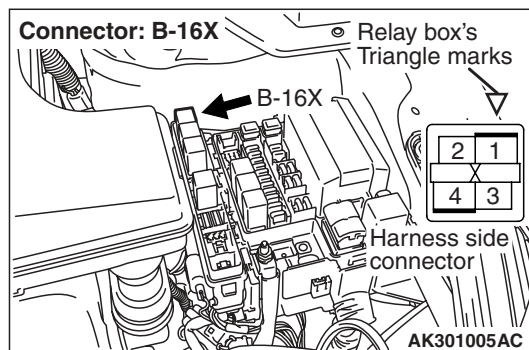
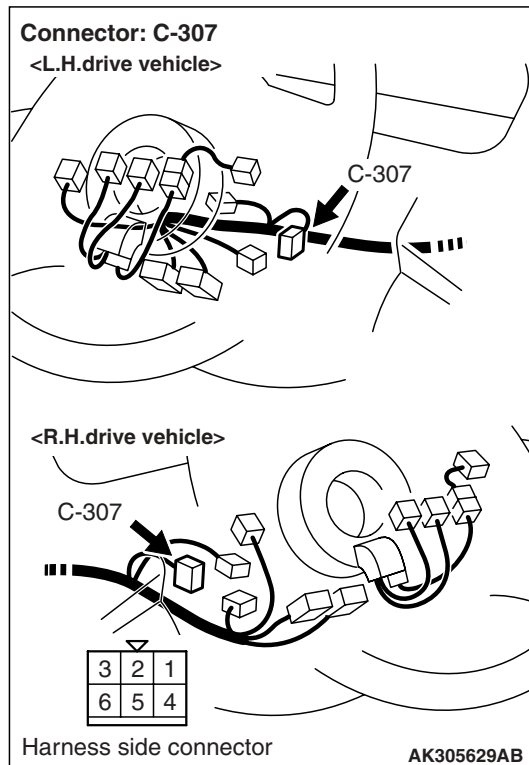
- Check A/C compressor relay (Refer to GROUP 55 – On-vehicle Service [P.55-196](#)).

Q: Is the check result normal?**YES :** Go to Step 3 .**NO :** Replace A/C compressor relay.**STEP 3. Perform voltage measurement at B-16X 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-307 ignition switch connector



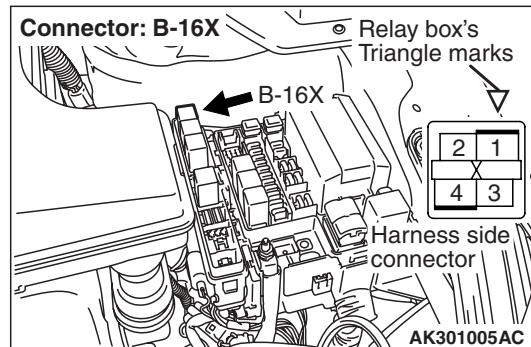
Q: Is the check result normal?

YES : Check intermediate connectors C-17, C-31*¹, C-01*², C-205 and C-202 and repair if necessary. If intermediate connectors are normal, check and repair harness between B-16X (terminal No. 3) A/C compressor relay connector and C-307 (terminal No. 4) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at B-16X A/C compressor relay connector.



- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth.

OK: System voltage

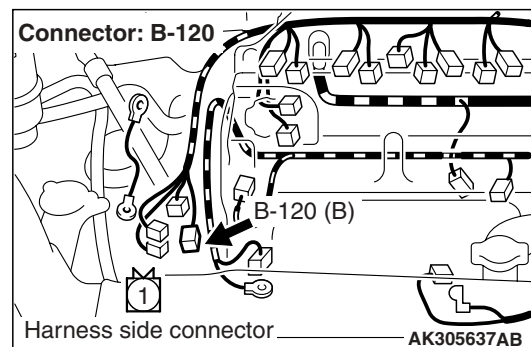
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Check intermediate connector A-16, and repair if necessary. If intermediate connector is normal, check and repair harness between B-16X (terminal No. 4) A/C compressor relay connector and battery.

- Check power supply line for open/short circuit.

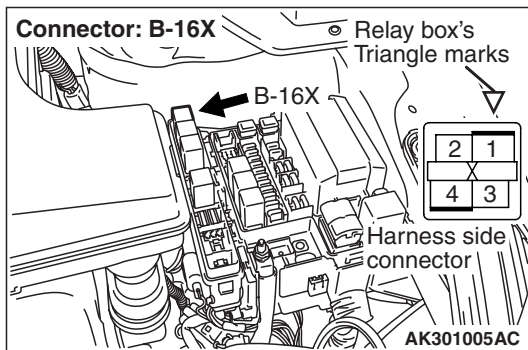
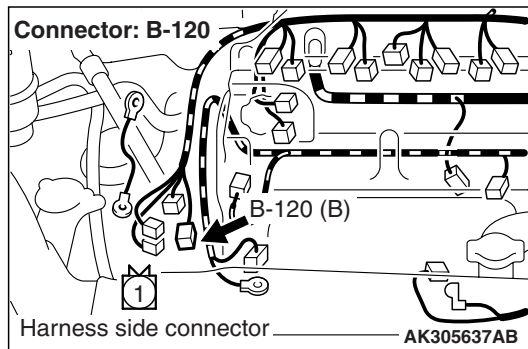
STEP 6. Connector check: B-120 A/C compressor assembly connector



Q: Is the check result normal?

YES : Go to Step 7 .

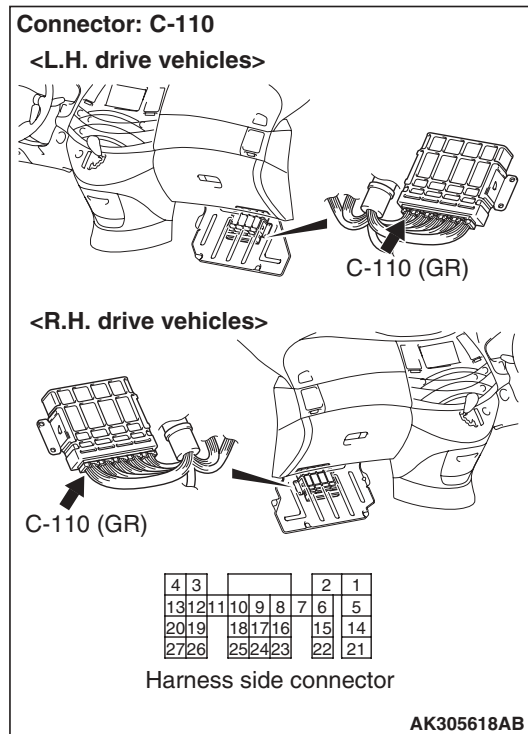
NO : Repair or replace.

STEP 7. Perform voltage measurement at B-120 A/C compressor assembly connector.

- Disconnect connector, and measure at harness side.
- Remove B-16X (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-120 (terminal No. 1) A/C compressor assembly connector and B-16X (terminal No. 1) A/C compressor relay connector.

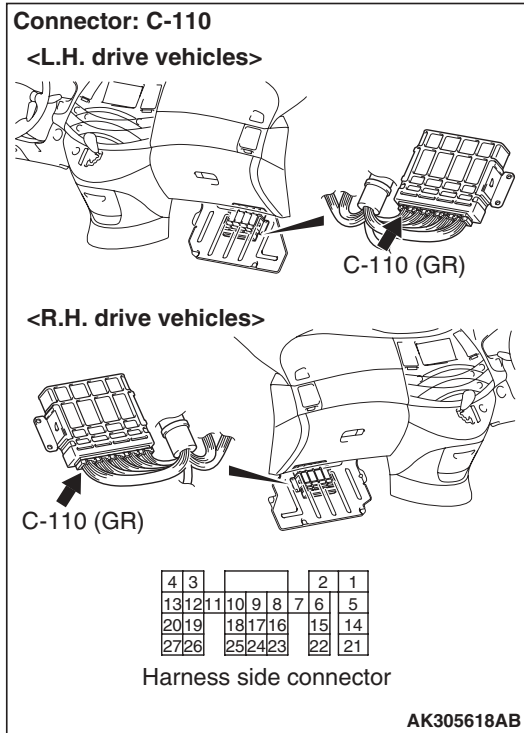
- Check output line for open/short circuit.

STEP 8. Perform voltage measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 8 and earth.

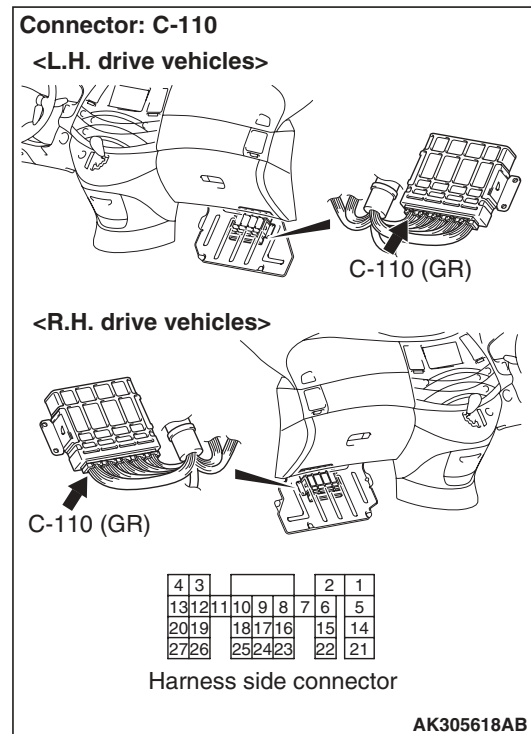
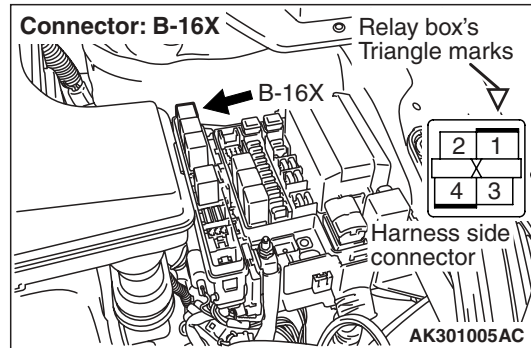
OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 12 .**NO :** Go to Step 9 .

STEP 9. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 10. Check harness between B-16X (terminal No. 2) A/C compressor relay connector and C-110 (terminal No. 8) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open/short circuit.

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

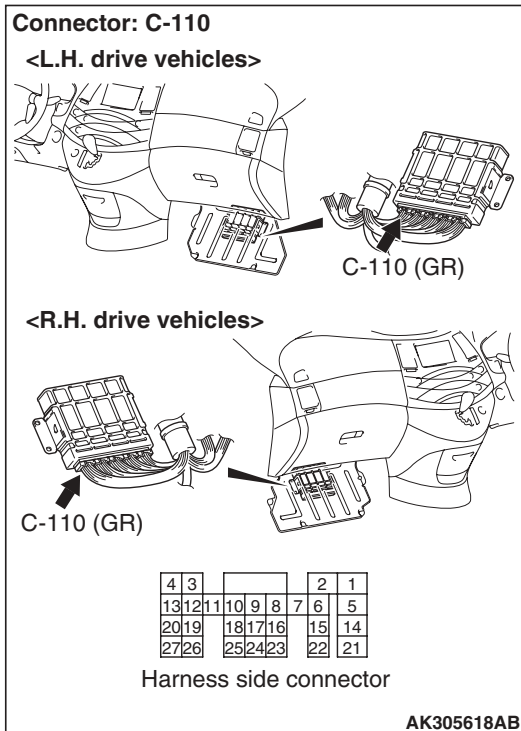
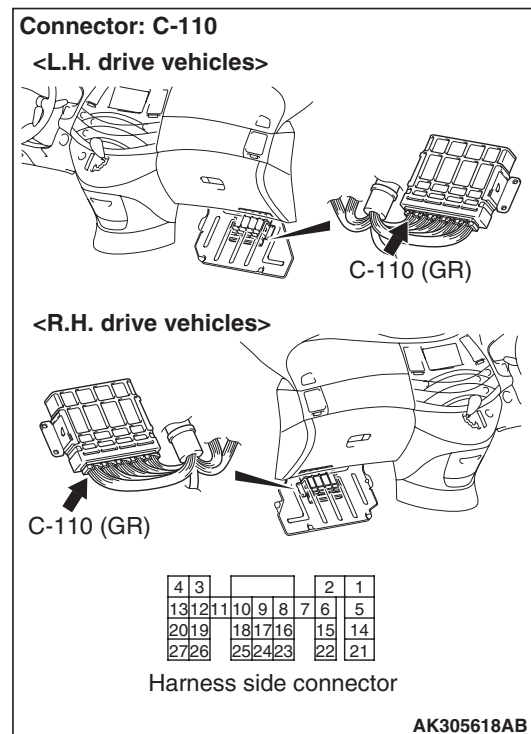
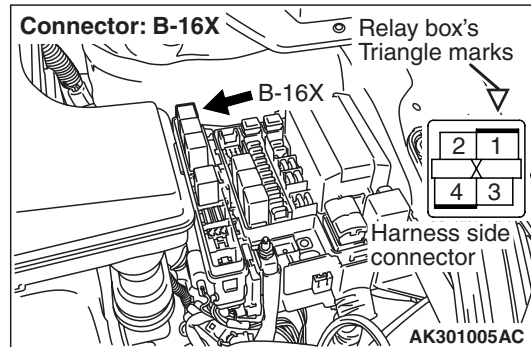
STEP 11. MUT-III data list

- Refer to Data List Reference Table [P.13A-363](#)
 - Item 49: A/C relay
 - 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:**ON (when A/C is ON)****OFF (when A/C is OFF)****Q: Is the check result normal?**

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

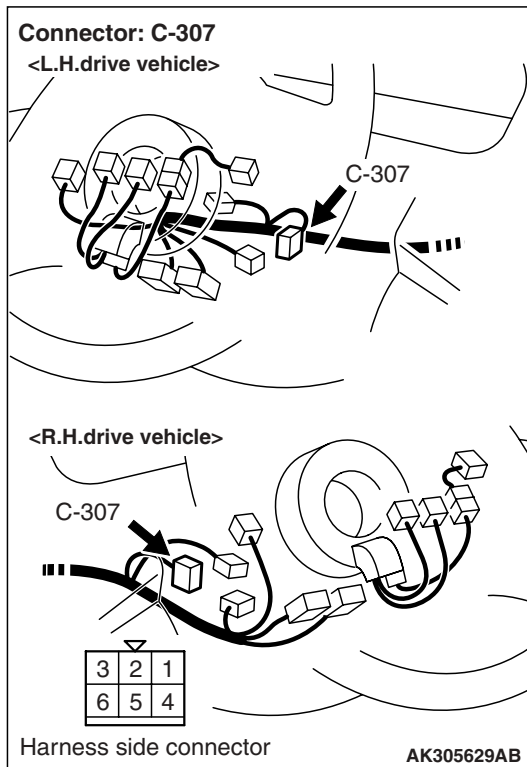
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 12. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**YES :** Go to Step 13 .**NO :** Repair or replace.**STEP 13. Check harness between B-16X (terminal No. 2) A/C compressor relay connector and C-110 (terminal No. 8) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.**

- Check earthing line for damage.

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

STEP 14. Connector check: C-307 ignition switch connector

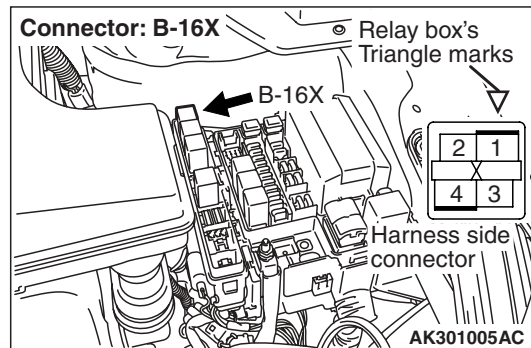
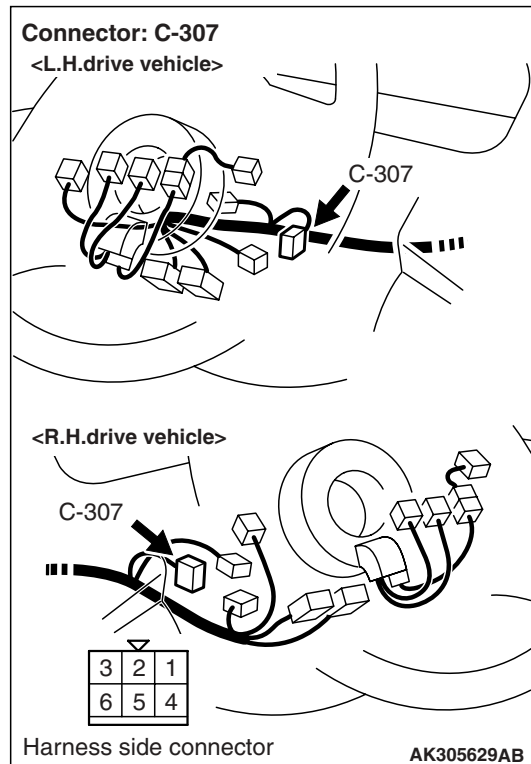


Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair or replace.

STEP 15. Check harness between C-307 (terminal No. 4) ignition switch connector and B-16X (terminal No. 3) A/C compressor relay connector.



NOTE: Before checking harness, check intermediate connectors C-17, C-31*¹, C-01*², C-205, and C-202 and repair if necessary.

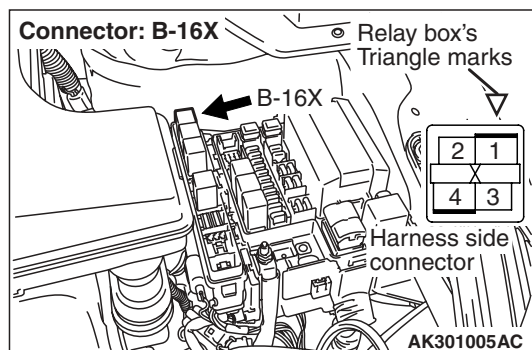
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair.

STEP 16. Check harness between battery and B-16X (terminal No. 4) A/C compressor relay connector.



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

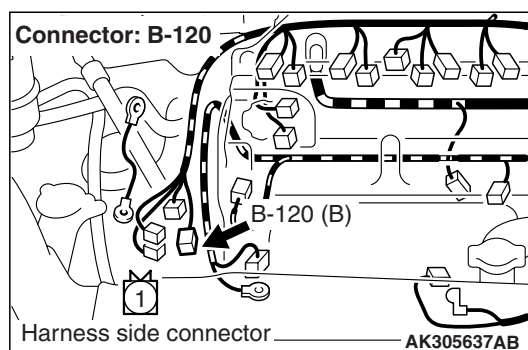
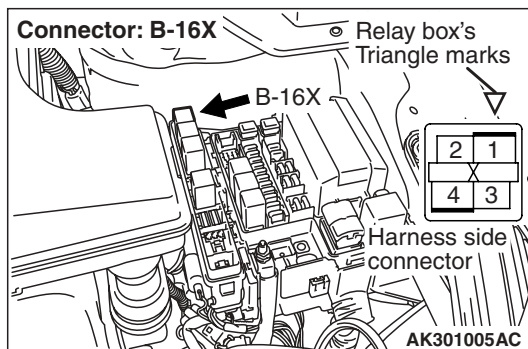
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Check harness between B-16X (terminal No. 1) A/C compressor relay connector and B-120 (terminal No. 1) A/C compressor assembly connector.



- Check output line for damage.

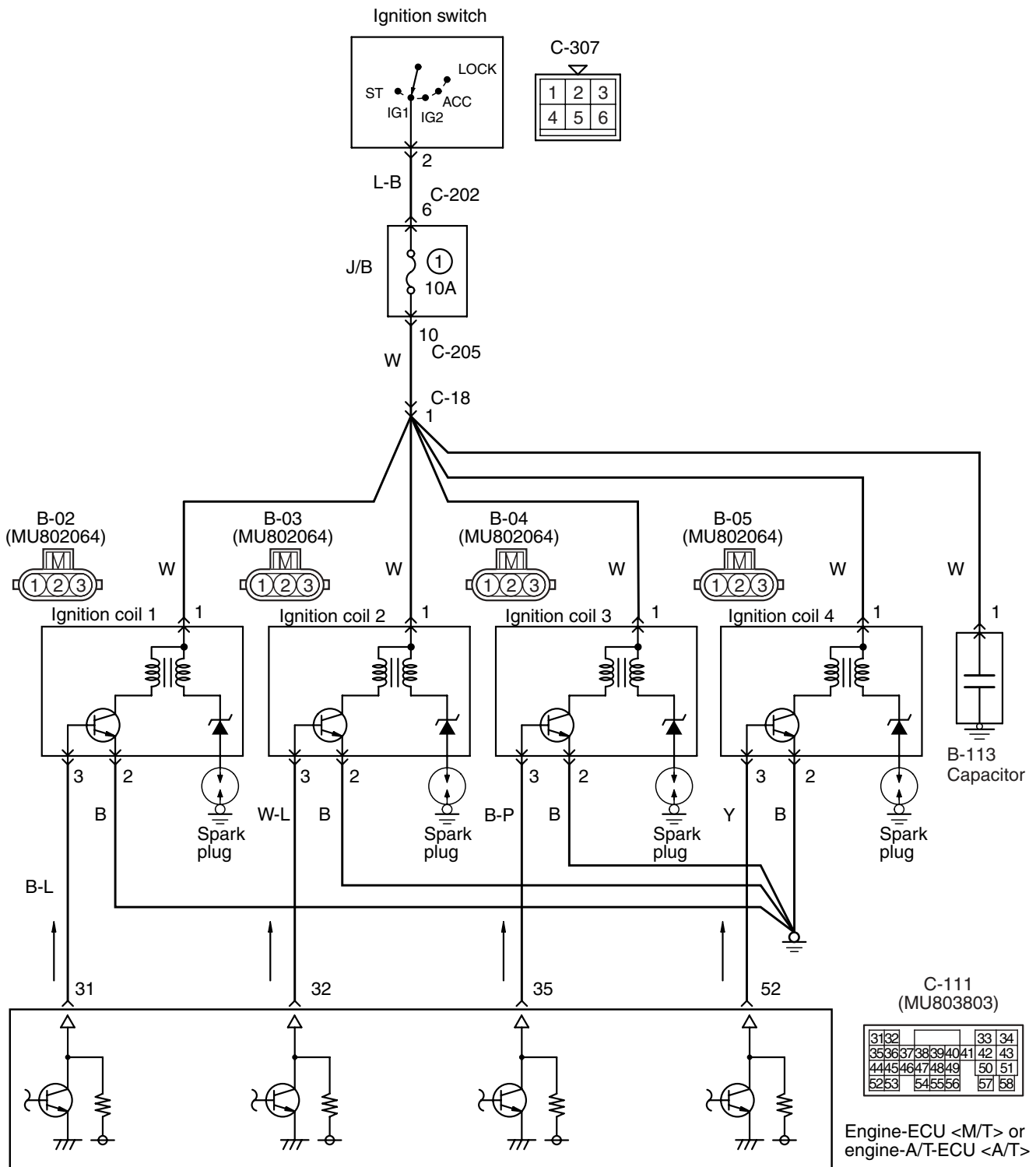
Q: Is the check result normal?

YES : Replace A/C compressor magnet clutch.

NO : Repair.

Inspection Procedure 26: Ignition Circuit System

Ignition 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 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 <M/T> or engine-A/T-ECU <A/T> (terminals No. 31, No. 32, No. 35 and No. 52).

FUNCTION

- When the engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T>, 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

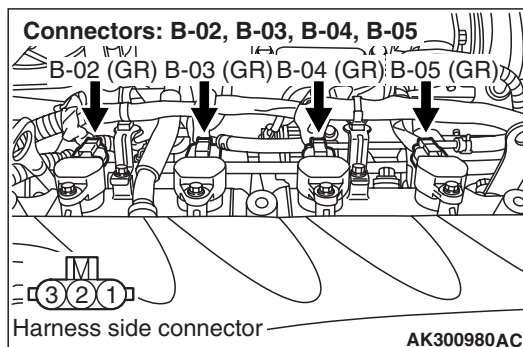
- Failed ignition coil
- Failed spark plug
- Failed spark plug cable
- Open/short circuit in ignition primary circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. Check spark plug.**

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Replace spark plug.

STEP 2. Connector check: B-02, B-03, B-04 and B-05 ignition coil connectors

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

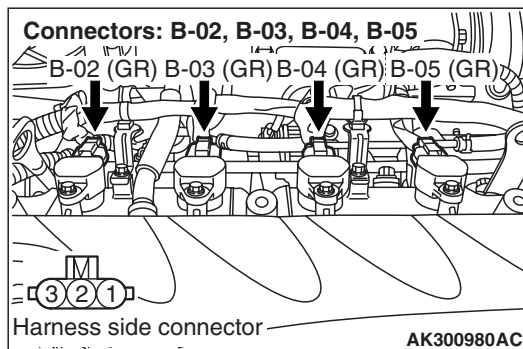
STEP 3. Check ignition coil itself.

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service – Ignition coil check [P.16-26](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace ignition coil.

STEP 4. Perform voltage measurement at B-02, B-03, B-04 and B-05 ignition coil connectors.

- Disconnect connector, and measure at harness side.

- Ignition switch: ON

- Voltage between terminal No. 1 and earth.

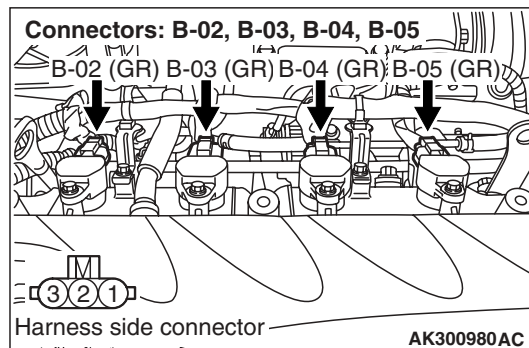
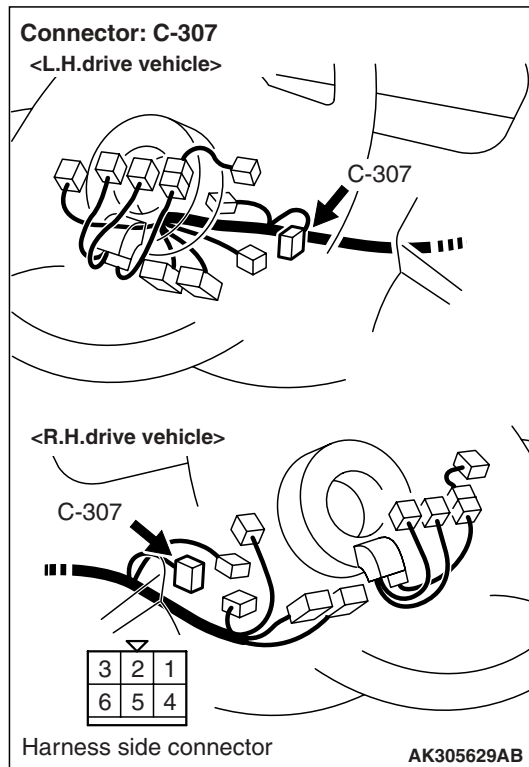
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: C-307 ignition switch connector



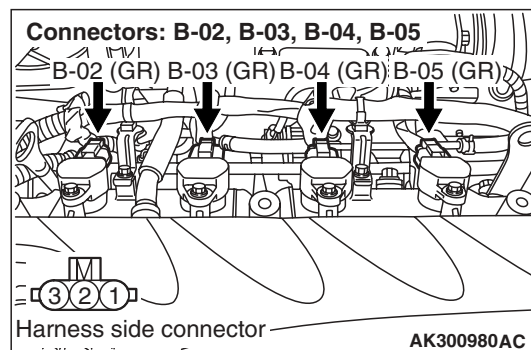
Q: Is the check result normal?

YES : Check intermediate connectors C-18, C-202 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between ignition switch connector and ignition coil connector

- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-02 (terminal No. 1) No. 1 ignition coil connector
- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-03 (terminal No. 1) No. 2 ignition coil connector
- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-04 (terminal No. 1) No. 3 ignition coil connector
- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-05 (terminal No. 1) No. 4 ignition coil connector
 - Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 6. Perform voltage measurement at B-02, B-03, B-04 and B-05 ignition coil connectors.



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

OK: 0.3 – 3.0 V

Q: Is the check result normal?

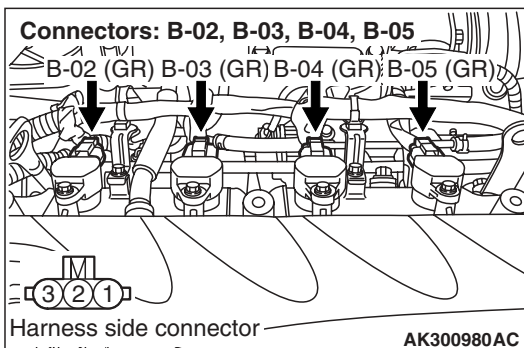
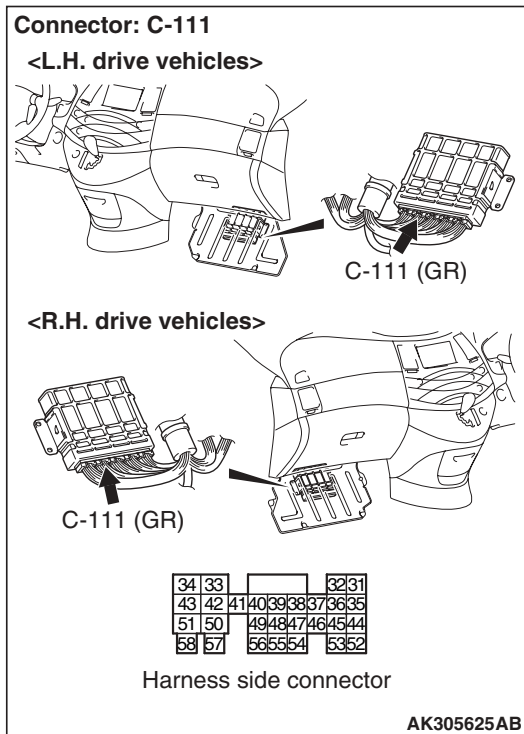
YES : Go to Step 12 .

NO : Go to Step 7 .

STEP 7. Perform voltage measurement at C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T>.

YES : Go to Step 8 .

NO : Go to Step 9 .

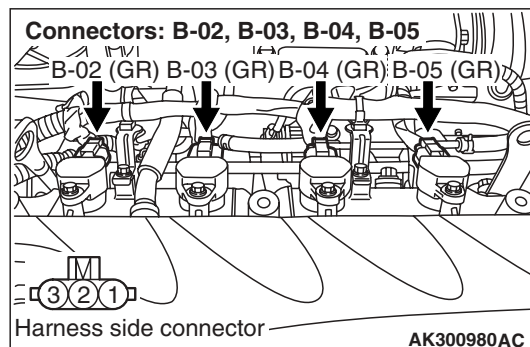
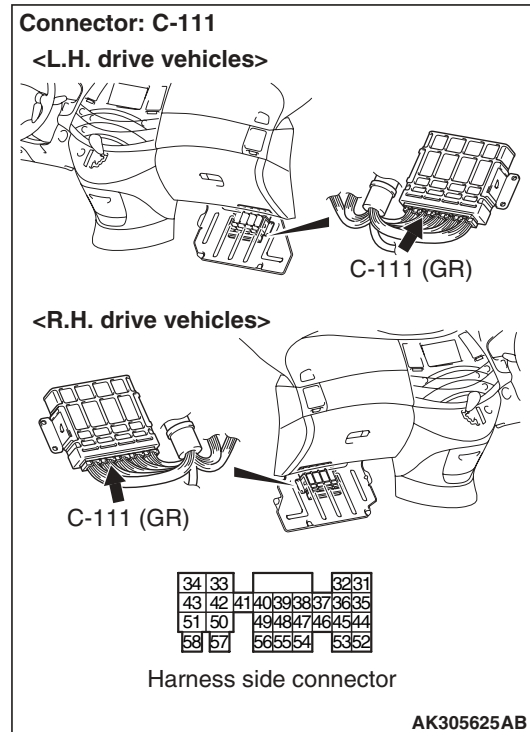


- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Disconnect B-02, B-03, B-04 and B-05 ignition coil connectors.
- Engine: Cranking
 - a. Voltage between terminal No. 31 and earth (No. 1 Ignition coil).
 - b. Voltage between terminal No. 32 and earth (No. 2 Ignition coil).
 - c. Voltage between terminal No. 35 and earth (No. 3 Ignition coil).
 - d. Voltage between terminal No. 52 and earth (No. 4 Ignition coil).

OK: 0.3 – 3.0 V

Q: Are the check results normal?

STEP 8. Connector check: C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



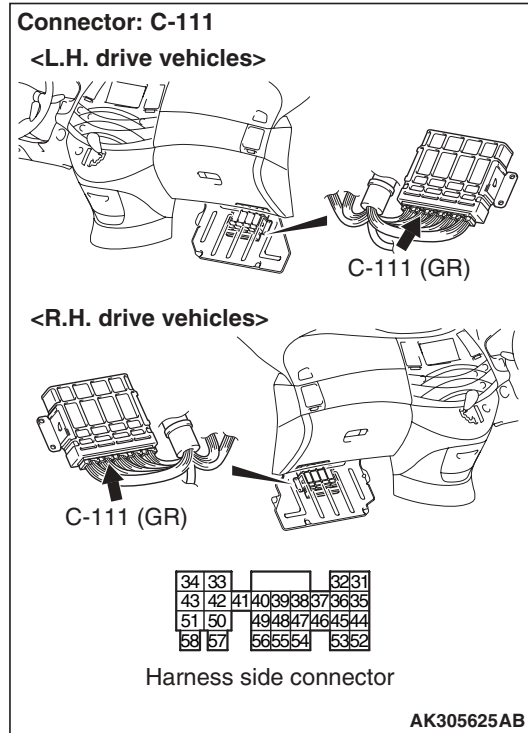
Q: Is the check result normal?

YES : Check and repair harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

- a. Check and repair harness between B-02 (terminal No. 3) No. 1 ignition coil connector and C-111 (terminal No. 31) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- b. Check and repair harness between B-03 (terminal No. 3) No. 2 ignition coil connector and C-111 (terminal No. 32) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- c. Check and repair harness between B-04 (terminal No. 3) No. 3 ignition coil connector and C-111 (terminal No. 35) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- d. Check and repair harness between B-05 (terminal No. 3) No. 4 ignition coil connector and C-111 (terminal No. 52) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
 - Check output line for open circuit.

NO : Repair or replace.

STEP 9. Connector check: C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

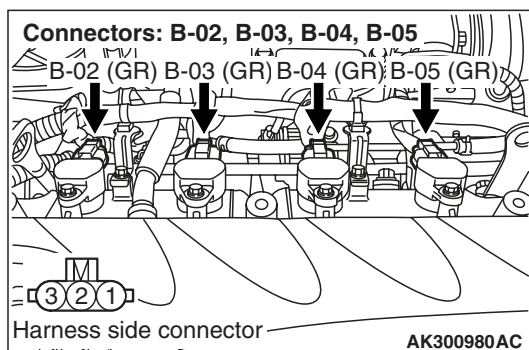
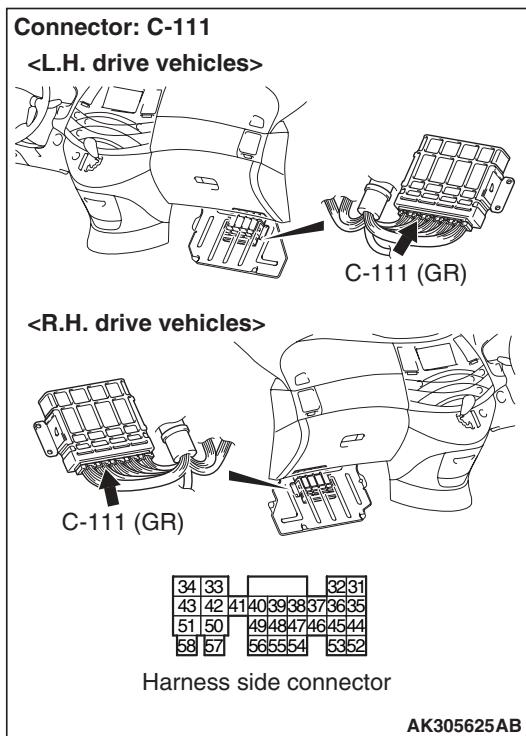


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. Check harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check and repair harness between B-02 (terminal No. 3) No. 1 ignition coil connector and C-111 (terminal No. 31) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-03 (terminal No. 3) No. 2 ignition coil connector and C-111 (terminal No. 32) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-04 (terminal No. 3) No. 3 ignition coil connector and C-111 (terminal No. 35) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-05 (terminal No. 3) No. 4 ignition coil connector and C-111 (terminal No. 52) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
 - Check output line for short circuit.

Q: Are the check results normal?

YES : Go to Step 11 .

NO : Repair.

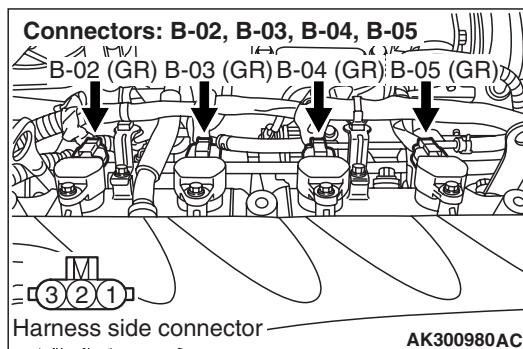
STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T> .

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

STEP 12. Perform resistance measurement at B-02, B-03, B-04 and B-05 ignition coil connectors.



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

OK: 2 Ω or less

Q: Is the check result normal?

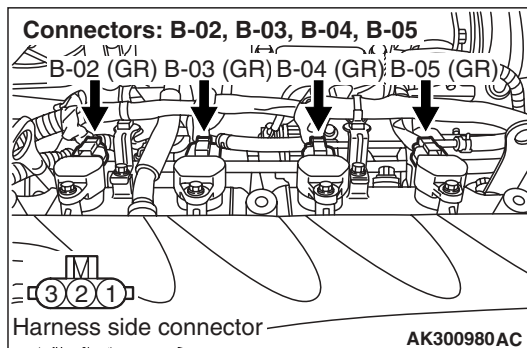
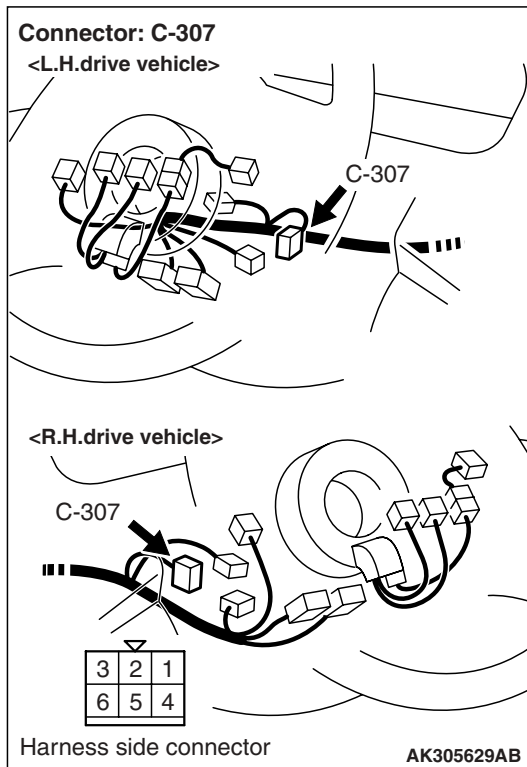
YES : Go to Step 13.

NO : Check and repair harness between ignition coil connector and body earth

- Check and repair harness between B-02 (terminal No. 2) No. 1 ignition coil connector and body earth
- Check and repair harness between B-03 (terminal No. 2) No. 2 ignition coil connector and body earth
- Check and repair harness between B-04 (terminal No. 2) No. 3 ignition coil connector and body earth
- Check and repair harness between B-05 (terminal No. 2) No. 4 ignition coil connector and body earth
 - Check earthing line for open circuit and damage.

STEP 13. Check harness between ignition switch connector and ignition coil connector.

YES : Go to Step 14 .
NO : Repair.



- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-02 (terminal No. 1) No. 1 ignition coil connector
- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-03 (terminal No. 1) No. 2 ignition coil connector
- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-04 (terminal No. 1) No. 3 ignition coil connector
- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-05 (terminal No. 1) No. 4 ignition coil connector

NOTE: Before checking harness, check intermediate connectors C-18, C-202 and C-205, and repair if necessary.

- Check power supply line for damage.

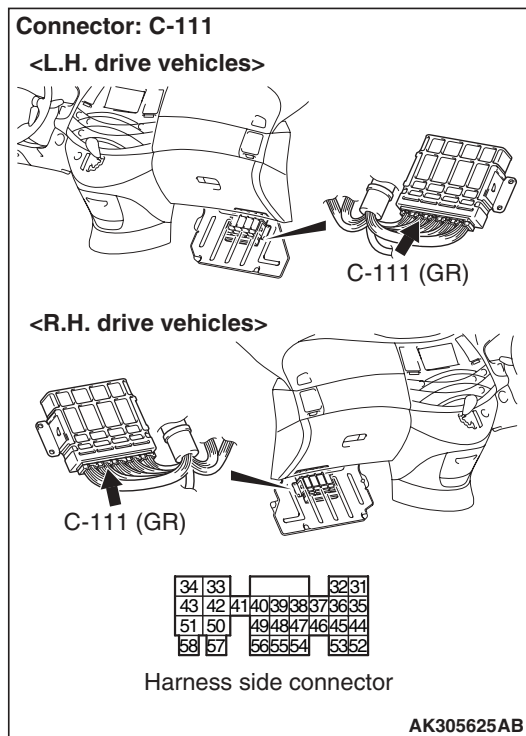
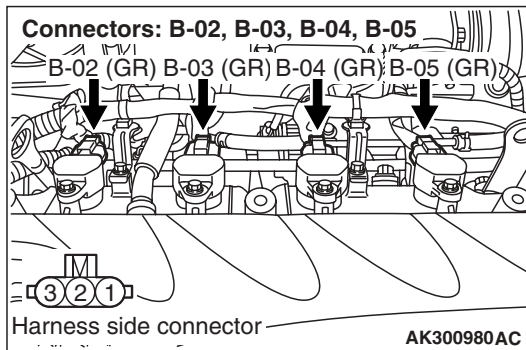
Q: Are the check results normal?

STEP 14. Check harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Q: Are the check results normal?

YES : Go to Step 11 .

NO : Repair.



- Check and repair harness between B-02 (terminal No. 3) No. 1 ignition coil connector and C-111 (terminal No. 31) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-03 (terminal No. 3) No. 2 ignition coil connector and C-111 (terminal No. 32) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-04 (terminal No. 3) No. 3 ignition coil connector and C-111 (terminal No. 35) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-05 (terminal No. 3) No. 4 ignition coil connector and C-111 (terminal No. 52) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
 - Check output line for damage.

Data List Reference Table

M1131152001233

| Item No. | Inspection item | Inspection condition | | Normal condition | Inspection procedure No. | Reference page |
|----------|------------------------------------|---|---|--|--------------------------|--|
| 11 | Cylinder 1,4 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-57 |
| | | | 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 <M/T> or engine-A/T-ECU <A/T>. | Idle operation | 400 mV or less | | |
| | | | 2,500 r/min | ⇔ 600 – 1,000 mV (altered) | | |
| 12 | Air flow sensor *1 | <ul style="list-style-type: none"> Engine coolant temperature: 85 – 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral <M/T>, "P" range <A/T> | Idle operation | 2.0 – 4.0 g/s | – | – |
| | | | 2,500 r/min | 6.5 – 12.0 g/s | | |
| | | | 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-30 |
| | | | 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 (sub) *4 | <ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor, and the connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. Ignition switch: ON | Fully close the throttle valve with your finger | 2,200 – 2,800 mV | Code No. P0222, P0223 | P.13A-135 P.13A-139 |
| | | | Fully open the throttle valve with your finger | 4,000 mV or more | | |

| Item No. | Inspection item | Inspection condition | | Normal condition | Inspection procedure No. | Reference page |
|----------|--------------------------------------|---|--|---------------------|--------------------------|---------------------------|
| 16 | Power supply voltage | Ignition switch: "ON" | | System voltage | Procedure No. 22 | P.13A-321 |
| 18 | Cranking signal (ignition switch-ST) | Ignition switch: ON | Engine: Stopped | OFF | Procedure No. 22 | P.13A-321 |
| | | | Engine: Cranking | ON | | |
| 21 | Engine coolant temperature sensor | Ignition switch: ON or engine running | Coolant temperature: -20°C | -20°C | Code No. P0115 | P.13A-37 |
| | | | 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 | <ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected | Compare engine speed on tachometer with the value displayed on MUT-III | Matched | Code No. P0335 | P.13A-157 |
| | | Engine: Idle operation | Coolant temperature: -20°C | 1,280 – 1,480 r/min | | |
| | | | Coolant temperature: 0°C | 1,270 – 1,470 r/min | | |
| | | | Coolant temperature: 20°C | 1,230 – 1,430 r/min | | |
| | | | Coolant temperature: 40°C | 1,140 – 1,340 r/min | | |
| | | | Coolant temperature: 90°C | 600 – 800 r/min | | |
| 25 | Barometric pressure sensor | Ignition switch: ON | Altitude: 0m | 101 kPa | – | – |
| | | | Altitude: 600m | 95 kPa | | |
| | | | Altitude: 1,200m | 88 kPa | | |
| | | | Altitude: 1,800m | 81 kPa | | |
| 29 | Inhibitor switch <A/T> | Ignition switch: ON | Selector lever: P or N | P, N | Procedure No. 5 | P.13A-292 |
| | | | Selector lever: D, 2, L, or R | D, 2, L, R | | |

| Item No. | Inspection item | Inspection condition | | Normal condition | Inspection procedure No. | Reference page |
|----------|------------------------------------|---|---|--|--------------------------|---------------------------|
| 37 | Volumetric efficiency | <ul style="list-style-type: none"> Engine coolant temperature: 85 – 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral <M/T>, "P" range <A/T> | Idle operation | 15 – 35 % | — | — |
| | | | 2,500 r/min | 15 – 35 % | | |
| | | | Excessive acceleration | According to acceleration, volumetric efficiency is increased. | | |
| 39 | Cylinder 2,3 oxygen sensor (front) | Engine: After warm-up (leaner by deceleration, richer acceleration) | Excessive deceleration from 4,000 r/m | 200 mV or less | Code No. P0150 | P.13A-82 |
| | | | At excessive acceleration | 600 – 1,000 ms | | |
| | | 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 | 400 mV or less ⇔ 600 – 1,000 mV (altered) | | |
| 41 | Injectors* ³ | <ul style="list-style-type: none"> Engine coolant temperature: 80 – 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral <M/T>, "P" range <A/T> | Idle operation | 2.0 – 3.2 ms | — | — |
| | | | 2,500 r/min | 1.7 – 2.9 ms | | |
| | | | Excessive acceleration | Increased | | |
| 44 | Ignition advance | <ul style="list-style-type: none"> Engine: After warm-up Install timing light (for use to measure actual ignition timing) | Idle operation | 2 – 18°BTDC | Procedure No. 26 | P.13A-355 |
| | | | 2,500 r/min | 26 – 46°BTDC | | |
| 49 | A/C relay | Engine: After warm-up, idle operation after warm-up | A/C switch: OFF | | Procedure No. 25 | P.13A-347 |
| | | | A/C switch : ON | A/C compressor is not driven | | |
| | | | | A/C compressor is driven | | |
| 59 | Cylinder 1,4 Oxygen Sensor (rear) | Engine: After warm-up | At excessive acceleration (during the increase in the engine speed) | 0 mV or less ⇔ 600 – 1,000 mV (altered) | Code No. P0136 | P.13A-69 |

| Item No. | Inspection item | Inspection condition | | Normal condition | Inspection procedure No. | Reference page |
|----------|--|--|---|--|--------------------------|--|
| 67 | Stop lamp switch | Ignition switch: ON | Brake pedal: Depressed | OFF | — | — |
| | | | Brake pedal: Released | ON | | |
| 68 | EGR valve | <ul style="list-style-type: none"> Engine coolant temperature: 85 – 95°C Lights and all accessories: OFF Transmission: Neutral <M/T>, "P" range <A/T> | Idling | 3 STEP | Code No. P0403 | P.13A-176 |
| | | | 2,500 r/min | 3 – 22 STEP | | |
| 69 | Cylinder 2,3 oxygen sensor (rear) | Engine: After warm-up | At excessive acceleration (during the increase in the engine speed) | 0 mV or less ⇔ 600 – 1,000 mV (altered) | Code No. P0156 | P.13A-95 |
| 77 | Accelerator pedal position sensor (sub) | Ignition switch: ON | Release the accelerator pedal | 400 – 1,000 mV | Code No. P2127, P2128 | P.13A-256 P.13A-261 |
| | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke | | |
| | | | Depress the accelerator pedal fully | 3,600 mV or more | | |
| 78 | Accelerator pedal position sensor (main) | Ignition switch: ON | Release the accelerator pedal | 800 – 1,200 mV | Code No. P2122, P2123 | P.13A-248 P.13A-253 |
| | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke | | |
| | | | Depress the accelerator pedal fully | 4,000 mV or more | | |

| Item No. | Inspection item | Inspection condition | | Normal condition | Inspection procedure No. | Reference page |
|----------|--------------------------------------|--|---|--|--------------------------|--|
| 79 | Throttle position sensor (main) | <ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. Ignition switch: ON | Fully close the throttle valve with your finger | 300 – 700 mV | Code No. P0122, P0123 | P.13A-44 P.13A-48 |
| | | | Fully open the throttle valve with your finger | 4,000 mV or more | | |
| | | No load | | 500 – 700 mV | | |
| | | • Shift lever: "N" → "D" <A/ T> | | Voltage rises | | |
| B4 | Power steering fluid pressure sensor | Engine: Idle operation | Steering wheel: Not operated | 400 – 1,000 mV | Code No. P0551 | P.13A-196 |
| | | | Steering wheel: Operated | Voltage rises | | |
| | | | Full lock | 3,000 – 4,000 mV | | |
| 12 *5 | Air flow sensor | <ul style="list-style-type: none"> Engine coolant temperature: 85 – 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral <M/T>, "P" range <A/T> | Idle operation | 2.0 – 4.0 gm/s | – | – |
| | | | 2,500 r/min | 6.5 – 12.0 gm/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-30 |
| | | | 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 | P.13A-37 |
| | | | 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 | <ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected | Compare engine speed on tachometer with the value displayed on MUT-III | Matched | — | — |
| | | | | | | |
| | | Engine: Idle operation | Coolant temperature: -20°C | 1,280 – 1,480 r/min | | |
| | | | Coolant temperature: 0°C | 1,270 – 1,470 r/min | | |
| | | | Coolant temperature: 20°C | 1,230 – 1,430 r/min | | |
| | | | Coolant temperature: 40°C | 1,140 – 1,340 r/min | | |
| | | | Coolant temperature: 90°C | 600 – 800 r/min | | |
| 24 *5 | Vehicle speed sensor | Drive 40 km/h | | Approximately 40 km/h | — | — |
| 44 *5 | Ignition advance | <ul style="list-style-type: none"> Engine: After warm-up Install timing light (for use to measure actual ignition timing) | Idle operation | 2 – 18 deg | — | — |
| | | | 2,500 r/min | 26 – 46 deg | | |
| 81 *5 | Long-term fuel compensation cylinder 1, 4 | Engine: After warm-up, 2,500 r/min without any load (during closed loop) | | -13 – 13 % | Code No. P0170 | P.13A-108 |
| 82 *5 | Shot-term fuel compensation cylinder 1, 4 | Engine: After warm-up, 2,500 r/min without any load (during closed loop) | | -10 – 10 % | Code No. P0170 | P.13A-108 |

| Item No. | Inspection item | Inspection condition | | Normal condition | Inspection procedure No. | Reference page |
|----------|---|--|---|---------------------------|--------------------------|--|
| 83 *5 | Long-term fuel compensati on cylinder 2, 3 | Engine: After warm-up, 2,500 r/min without any load (during closed loop) | | -13 – 13 % | Code No. P0173 | P.13A-111 |
| 84 *5 | Short-term fuel compensati on cylinder 2, 3 | Engine: After warm-up, 2,500 r/min without any load (during closed loop) | | -10 – 10 % | Code No. P0173 | P.13A-111 |
| 87 *5 | Calculation load value | Engine: After warm-up | Idle operation | 15 – 40 % | – | – |
| | | | 2,500 r/min | 15 – 40 % | | |
| 88 *5 | Fuel control condition cylinder 1, 4 | Engine: After warm-up | 2,500 r/min | Closed loop | – | – |
| | | | Acceleration | Open loop-drive condition | | |
| 89 *5 | Fuel control condition cylinder 2, 3 | Engine: After warm-up | 2,500 r/min | Closed loop | – | – |
| | | | Acceleration | Open loop-drive condition | | |
| 8A *5 | Throttle position sensor (main) *4 | <ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor, and then connect terminal numbers No. 3, and No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. Ignition switch: ON | Fully close the throttle valve with your finger | 0 – 12 % | Code No. P0122, P0123 | P.13A-44 P.13A-48 |
| | | | Fully open the throttle valve with your finger | 75 – 100 % | | |
| A1 *5 | Cylinder 1,4 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 | Code No. P0130 | P.13A-57 |
| | | | At excessive acceleration | 0.6 – 1 V | | |
| | | Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU <M/T> or engine-A/T-ECU <A/T>) | Idle operation | 0.4 V or less | | |
| | | | 2,500 r/min | ⇔ 0.6 – 1 V (altered) | | |

| Item No. | Inspection item | Inspection condition | | Normal condition | Inspection procedure No. | Reference page |
|----------|------------------------------------|---|---|---------------------------------------|--------------------------|----------------|
| A2 *5 | Cylinder 1,4 oxygen sensor (rear) | Engine: After warm-up | At excessive acceleration (during the increase in the engine speed) | 0 V or less ⇔ 0.6 – 1 V (altered) | Code No. P0136 | P.13A-69 |
| A3 *5 | Cylinder 2,3 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 | Code No. P0150 | P.13A-82 |
| | | | At excessive acceleration | 0.6 – 1 V | | |
| | | Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU <M/T> or engine-A/T-ECU <A/T>) | Idle operation 2,500 r/min | 0.4 V or less ⇔ 0.6 – 1V (altered) | | |
| A4 *5 | Cylinder 2,3 oxygen sensor (rear) | Engine: After warm-up | At excessive acceleration (during the increase in the engine speed) | 0.6 – 1 V | Code No. P0156 | P.13A-95 |
| A9 *5 | MIL distance | Running distance in the engine warning light on | | | – | – |

⚠ 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: After the inspection has been completed, disconnect the throttle actuator control motor connector, and then use the MUT-III to delete the diagnosis code that was recorded during the inspection.*

*NOTE: *5: When service data in check mode is selected, the data is not displayed.*

Actuator Test Reference Table

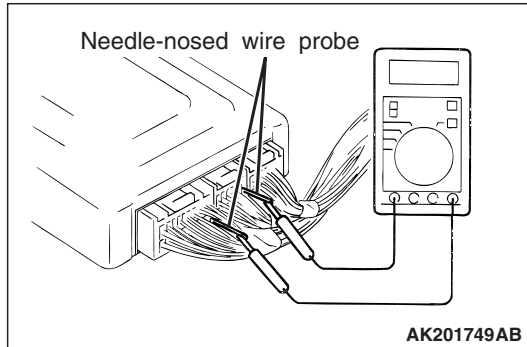
M1131152500796

| 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 | P.13A-115 |
| 02 | | Cut off No. 2 injector | | | | Code No. P0202 | P.13A-120 |
| 03 | | Cut off No. 3 injector | | | | Code No. P0203 | P.13A-125 |
| 04 | | Cut off No. 4 injector | | | | Code No. P0204 | P.13A-130 |
| 07 | Fuel pump | Drive fuel pump to circulate fuel | Ignition switch: "ON" | Check for pump operating noise near fuel tank | Operating noise audible | Procedure No. 23 | P.13A-328 |
| 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 | P.13A-184 |
| 17 | Basic ignition timing | Switch engine-ECU <M/T> or engine-A/T-ECU <A/T> to ignition timing adjusting mode | <ul style="list-style-type: none"> Engine: Idle operation Install timing light | | 5° BTDC | — | — |
| 21 | Fan controller | Actuate fan motor | <ul style="list-style-type: none"> Ignition switch: "ON" A/C switch: ON | | Fan motor is rotated | Procedure No. 21 | P.13A-318 |
| 22 | Oil control valve | Oil control valve turns from OFF the ON | Ignition switch: "ON" | | Clicks when oil control valve is driven | Code No. P1021 | P.13A-225 |
| 34 | Throttle valve control servo | Stop the throttle valve control servo | Ignition switch: "ON" | | Throttle valve is open | Code No. P2100, P2101, P2102, P2103 | P.13A-234 P.13A-239 P.13A-242 P.13A-245 |

CHECK AT THE ECU TERMINALS

M1131153500368

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 <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> connector connected.
2. You may find it convenient to pull out the engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> Connector Terminal Arrangement

Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Connector

| C-110 | C-111 | C-112 | C-113 | C-114 |
|-------|-------|-------|-------|-------|
| 1 | 32 | 33 | 92 | 122 |
| 2 | 31 | 62 | 91 | 121 |
| 5 | 4 | 61 | 96 | 125 |
| 6 | 13 | 43 | 73 | 104 |
| 14 | 12 | 42 | 72 | 112 |
| 15 | 11 | 41 | 81 | 111 |
| 21 | 3 | 34 | 63 | 103 |
| | 10 | 66 | 97 | 102 |
| | 18 | 67 | 101 | 109 |
| | 25 | 76 | 100 | 108 |
| | 9 | 75 | 99 | 107 |
| | 17 | 74 | 106 | 114 |
| | 24 | 83 | 105 | 113 |
| | 23 | 58 | 82 | 89 |
| | | 57 | 88 | 87 |
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AK303309AC

| 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 9 – 13 V*, momentarily drops slightly |
| 5 | No. 2 injector | | |
| 14 | No. 3 injector | | |
| 21 | No. 4 injector | | |
| 3 | EGR valve (A) | Ignition switch: Immediately after turning ON | 5 – 8 V* (fluctuates for approximately 3 seconds) |
| 12 | EGR valve (B) | | |
| 19 | EGR valve (C) | | |
| 26 | EGR valve (D) | | |
| 8 | A/C relay | <ul style="list-style-type: none"> • Engine: Idle speed • A/C switch: OFF → ON (A/C compressor is operating) | System voltage → 1 V or less |

| Terminal No. | Check item | Check condition (Engine condition) | Normal condition |
|---------------------|---|---|---|
| 10 | Cylinder 2,3 oxygen sensor heater (front) | Engine: Idling after warming up | 2 – 5 V* |
| | | Engine: 4,000 r/min or more | 0 V |
| 15 | Throttle valve control servo relay | Ignition switch: ON | System voltage |
| | | Running at 3,500 r/min while engine is warming up after having been started. | 1 V or less |
| 16 | Fuel pump relay | Ignition switch: ON | System voltage |
| | | Engine: Idle speed | 1 V or less |
| 17 | Fan controller | Radiator and condenser fan is not operating | 0 – 0.3 V* |
| | | Radiator and condenser fan is operating | 0.7 V* or more |
| 18 | Cylinder 2,3 oxygen sensor heater (rear) | Engine: Idling after warming up | System voltage |
| | | Engine: 4,000 r/min or more | 0 V |
| 23 | Purge control solenoid valve | Ignition switch: ON | Decreases Voltage |
| | | Running at 3,500 r/min while engine is warming up after having been started. | 1 V or less |
| 24 | Cylinder 1,4 oxygen sensor heater (rear) | Engine: Idling after warming up | System voltage |
| | | Engine: 4,000 r/min or more | 0 V |
| 25 | Cylinder 1,4 oxygen sensor heater (front) | Engine: Idling after warming up | 2 – 5 V* |
| | | Engine: 4,000 r/min or more | 0 V |
| 31 | Ignition coil – No. 1 | Engine r/min: 3,000 r/min | 0.3 – 3.0 V* |
| 32 | Ignition coil – No. 2 | | |
| 35 | Ignition coil – No. 3 | | |
| 52 | Ignition coil – No. 4 | | |
| 34 | Power supply | Ignition switch: ON | System voltage |
| 43 | | | |
| 40 <M/T> | Clutch pedal position switch | Depress the clutch pedal | System voltage |
| | | Release the clutch pedal | 1 V or less |
| 45 | Alternator G terminal | <ul style="list-style-type: none"> • Engine: Warm, idle (radiator fan: OFF) • Headlamp: OFF → ON • Stop lamp: OFF → ON • Rear defogger switch: OFF → ON | Voltage increases |
| 50 | Ignition switch – IG | Ignition switch: ON | System voltage |
| 51 | Ignition switch – ST | Engine: Cranking | 8 V or more |
| 57 | Engine control relay (Power supply) | Ignition switch: "LOCK" (OFF) | System voltage |
| | | Ignition switch: ON | 1 V or less |
| 58 | Backup power supply | Ignition switch: "LOCK" (OFF) | System voltage |
| 63 | Air flow sensor | Engine: Gradually increase the speed. | Voltage increase in response to revving |
| 70 | Crank angle sensor | Engine: Cranking | 0.4 – 4.0 V |
| | | Engine: Idling | 2.0 – 3.0 V |

| Terminal No. | Check item | Check condition (Engine condition) | | Normal condition |
|--------------|---|---|--|----------------------------|
| 71 | Camshaft position sensor | Engine: Cranking | | 2.0 – 4.8 V |
| | | Engine: Idling | | 3.0 – 4.0 V |
| 79 <M/T> | Vehicle speed sensor | <ul style="list-style-type: none"> Ignition switch: "ON" Move the vehicle forward slowly | | 0 ⇔ 5 V Changes repeatedly |
| 84 | Power steering fluid pressure sensor | Engine: Idling after warning up | When steering wheel is Stationary | 0.4 – 1.0 V |
| | | | When steering wheel is turned | Voltage rises |
| | | | Full lock | 3.0 – 4.0 V |
| 86 | Alternator FR terminal | <ul style="list-style-type: none"> Engine: Warm, idle (radiator fan: OFF) Headlamp: OFF → ON Stop lamp: OFF → ON Rear defogger switch: OFF → ON | | Voltage decreases |
| 92 | Power supply voltage applied to accelerator pedal position sensor | Ignition switch: "ON" | | 4.9 – 5.1 V |
| 95 | Oil control valve | Ignition switch: ON | | System voltage |
| | | Engine: warming up, 4,000 r/min | | 4.0 – 10 V* |
| 97 | Sensor impressed voltage | Ignition switch: ON | | 4.9 – 5.1 V |
| 98 | 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 |
| 99 | 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 |

| Terminal No. | Check item | Check condition (Engine condition) | | Normal condition |
|--------------|--|---|---|--|
| 106 | Power supply voltage applied to throttle position sensor | Ignition switch: ON | | 4.9 – 5.1 V |
| 107 | Accelerator pedal position sensor (sub) | Ignition switch: ON | Release the accelerator pedal | 0.4 – 1.0 V |
| | | | Depress the accelerator pedal fully | 3.6 V or more |
| 108 | Cylinder 2,3 oxygen sensor (front) | Engine: Running at 2,500 r/min after warmed up | | 0.4 V or less ⇔ 0.6 – 1.0 V (Changes repeatedly) |
| 109 | Cylinder 1,4 oxygen sensor (front) | Engine: Running at 2,500 r/min after warmed up | | 0.4 V or less ⇔ 0.6 – 1.0 V (Changes repeatedly) |
| 113 | Throttle position sensor (sub) | <ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool (MB991658). Ignition switch: ON | Fully close the throttle valve with your finger | 2.2 – 2.8 V |
| | | | Fully open the throttle valve with your finger | 4.0 V or more |
| 114 | Accelerator pedal position sensor (main) | Ignition switch: ON | Release the accelerator pedal | 0.9 – 1.2 V |
| | | | Depress the accelerator pedal fully | 4.0 V or more |
| 115 | Throttle position sensor (main) | <ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool (MB991658). Ignition switch: "ON" | Fully close the throttle valve with your finger | 0.3 – 0.7 V |
| | | | Fully open the throttle valve with your finger | 4.0 V or more |
| 116 | Cylinder 2,3 oxygen sensor (rear) | Engine: Idling after warmed up (Check using a digital type voltmeter) | | 0.4 V or less ⇔ 0.6 – 1.0 V (Changes repeatedly) |
| 117 | Cylinder 1,4 oxygen sensor (rear) | Engine: Idling after warmed up (Check using a digital type voltmeter) | | 0.4 V or less ⇔ 0.6 – 1.0 V (Changes repeatedly) |

| Terminal No. | Check item | Check condition (Engine condition) | Normal condition |
|--------------|--|---|--|
| 132 | Power supply voltage applied to throttle valve control servo | Ignition switch: ON | System voltage |
| 133 | Throttle valve control servo (+) | <ul style="list-style-type: none"> Ignition switch: ON Accelerator pedal: fully opened → fully closed | Decreases slightly (approximately 2 V) from battery voltage. |
| 141 | Throttle valve control servo (–) | <ul style="list-style-type: none"> Ignition switch: ON Accelerator pedal: fully closed → fully opened | Decreases slightly (approximately 2 V) from battery voltage. |

NOTE: *: The average voltage is shown when an analog voltmeter is used (because the average voltage might not be shown stably when digital voltmeter is used).

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to "LOCK" (OFF) position.
2. Disconnect the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> Harness Side Connector Terminal Arrangement

Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Harness Side Connector

| C-114 | | | | C-113 | | | | C-112 | | | | C-111 | | | | C-110 | | | | | | | | | | | | | | | | | | | | | | |
|-------|-----|-----|-----|-------|-----|-----|-----|-------|-----|----|-----|-------|----|----|----|-------|----|----|----|----|----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 124 | 123 | 133 | 141 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 124 | 123 | 132 | 140 | 128 | 129 | 130 | 131 | 101 | 102 | 99 | 100 | 101 | 98 | 63 | 64 | 65 | 62 | 33 | 34 | 35 | 32 | 3 | 4 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | | | | |

AK303310AC

| Terminal No. | Inspection item | Normal condition (Check condition) |
|------------------|---|------------------------------------|
| 1 – 34 | No. 1 injector | 10.5 – 13.5 Ω (at 20°C) |
| 5 – 34 | No. 2 injector | |
| 14 – 34 | No. 3 injector | |
| 21 – 34 | No. 4 injector | |
| 3 – 34 | EGR valve (A) | 20 – 24 Ω (at 20°C) |
| 12 – 34 | EGR valve (B) | |
| 19 – 34 | EGR valve (C) | |
| 26 – 34 | EGR valve (D) | |
| 10 – 34 | Cylinder 2,3 oxygen sensor heater (front) | 4.5 – 8.0 Ω (at 20°C) |
| 25 – 34 | Cylinder 1,4 oxygen sensor heater (front) | |
| 18 – 34 | Cylinder 2,3 oxygen sensor heater (rear) | 11 – 18 Ω (at 20°C) |
| 24 – 34 | Cylinder 1,4 oxygen sensor heater (rear) | |
| 23 – 34 | Purge control solenoid valve | 30 – 34 Ω (at 20°C) |
| 33 – Body earth | ECU earth | Continuity (2 Ω or less) |
| 42 – Body earth | | |
| 144 – Body earth | | |
| 145 – Body earth | | |
| 34 – 95 | Oil control valve | 6.9 – 7.9 Ω (at 20°C) |

| Terminal No. | Inspection item | Normal condition (Check condition) |
|--------------|-----------------------------------|--|
| 96 – 98 | Engine coolant temperature sensor | 14 – 17 k Ω (When coolant temperature is –20°C) |
| | | 5.1 – 6.5 k Ω (When coolant temperature is 0°C) |
| | | 2.1 – 2.7 k Ω (When coolant temperature is 20°C) |
| | | 0.9 – 1.3 k Ω (When coolant temperature is 40°C) |
| | | 0.48 – 0.68 k Ω (When coolant temperature is 60°C) |
| | | 0.26 – 0.36 k Ω (When coolant temperature is 80°C) |
| 96 – 99 | Intake air temperature sensor | 13 – 17 k Ω (When intake air temperature is –20°C) |
| | | 5.3 – 6.7 k Ω (When intake air temperature is 0°C) |
| | | 2.3 – 3.0 k Ω (When intake air temperature is 20°C) |
| | | 1.0 – 1.5 k Ω (When intake air temperature is 40°C) |
| | | 0.56 – 0.76 k Ω (When intake air temperature is 60°C) |
| | | 0.30 – 0.45 k Ω (When intake air temperature is 80°C) |
| 133 – 141 | Throttle actuator control motor | 0.3 – 100 Ω (at 20°C) |

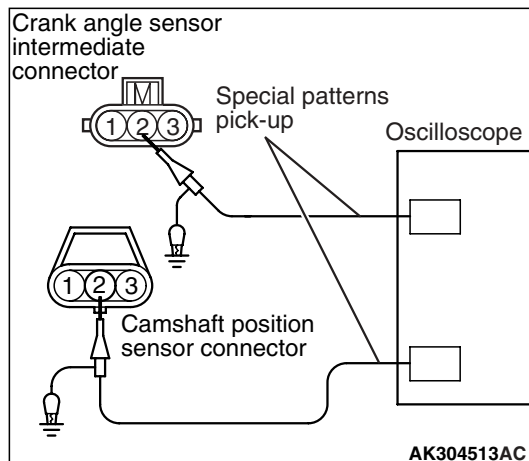
INSPECTION PROCEDURE USING OSCILLOSCOPE

M1131154500907

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.

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 intermediate connector and connect the special tool Test harness (MB991658) in between.
4. Connect the oscilloscope special patterns pickup to crank angle sensor terminal No. 2.

Alternate Method (Test harness not available)

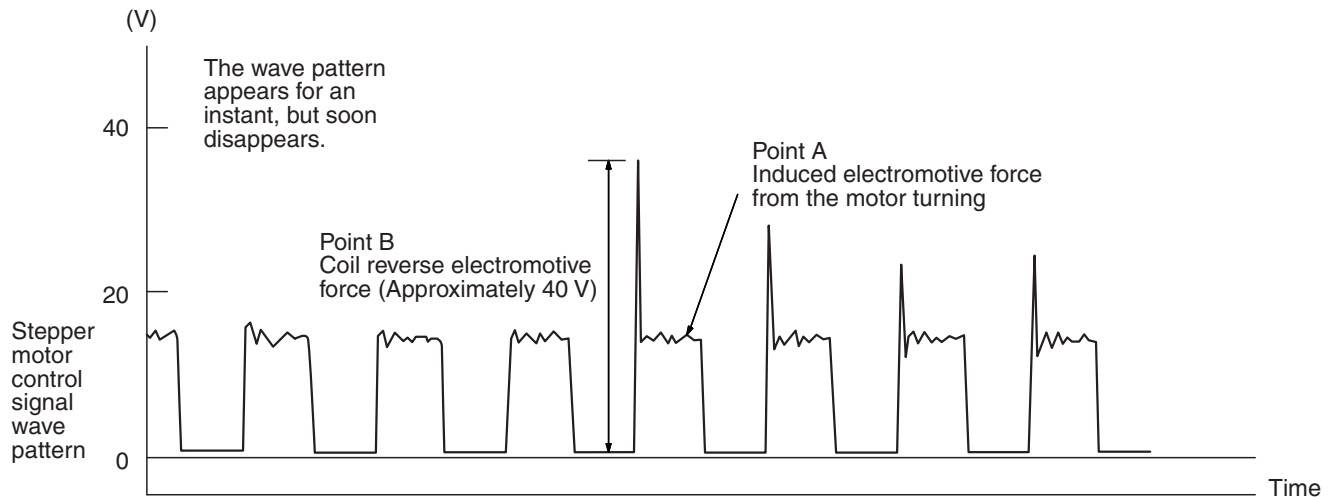
1. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 71 (When checking the camshaft position sensor signal wave pattern).
2. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 70 (When checking 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



AK305868AB

Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.

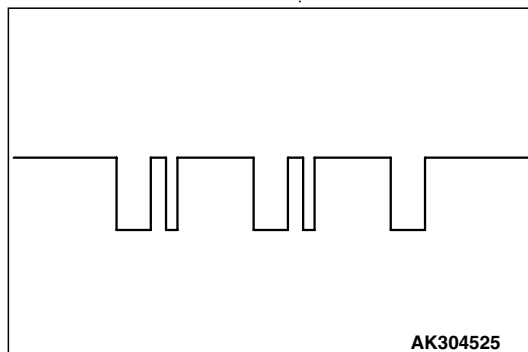
Cause of problem

Loose timing belt
Abnormality in sensor disk

Wave pattern characteristics

Wave pattern is displaced to the left or right.

Examples of Abnormal Wave Patterns



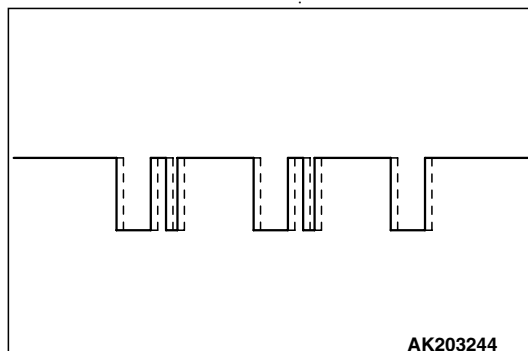
Example 1

Cause of problem

Sensor interface malfunction

Wave pattern characteristics

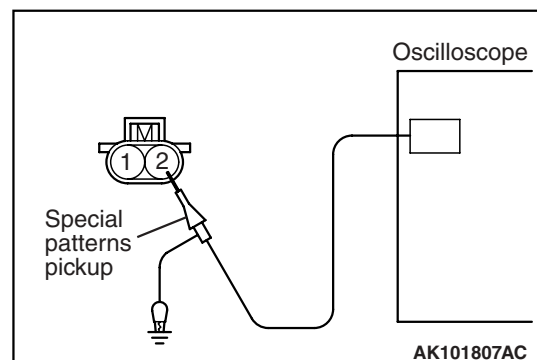
Rectangular wave pattern is output even when the engine is not started.



Example 2

INJECTOR

Measurement Method



1. Disconnect the injector connector, and then connect the special tool Test harness set (MB991658) 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 <M/T> or engine-A/T-ECU <A/T> terminal No. 1 (When checking the No. 1 cylinder).

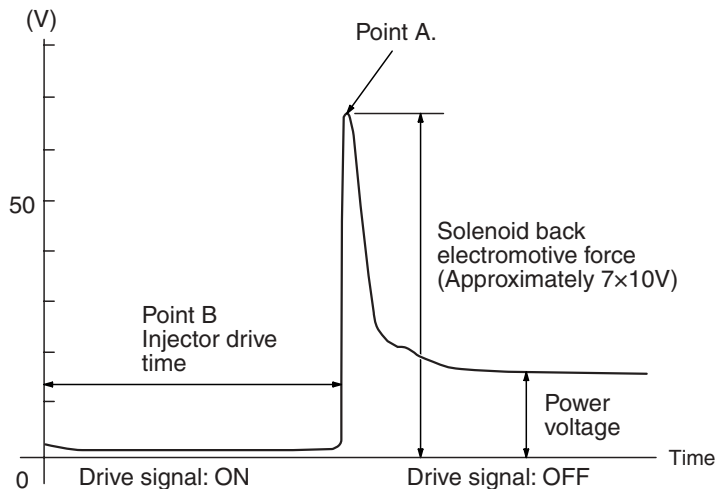
2. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 5 (When checking the No. 2 cylinder).
3. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 14 (When checking the No. 3 cylinder).
4. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 21 (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



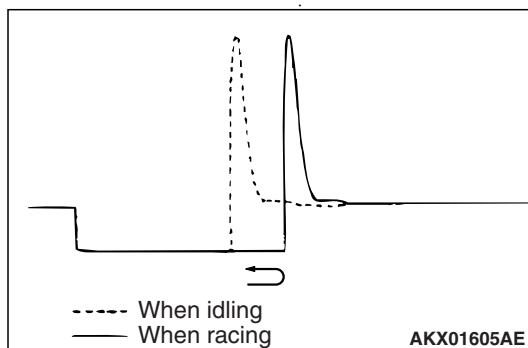
AK305803AB

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



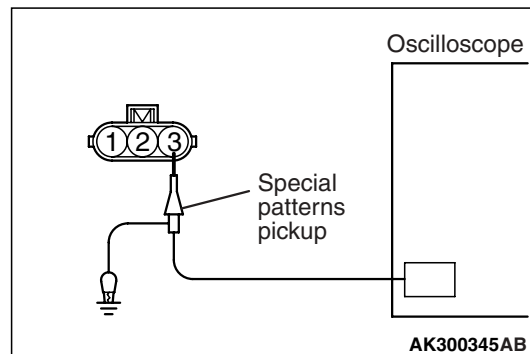
AKX01605AE

The injector drive time will be synchronized with the MUT-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.

IGNITION COIL AND POWER TRANSISTOR

Measurement Method



AK300345AB

1. Disconnect the ignition coil connector, and connect the special tool Test harness (MB991658) 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 probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 31. (When checking the number 1 cylinder.)
2. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 32. (When checking the number 2 cylinder.)
3. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 35. (When checking the number 3 cylinder.)

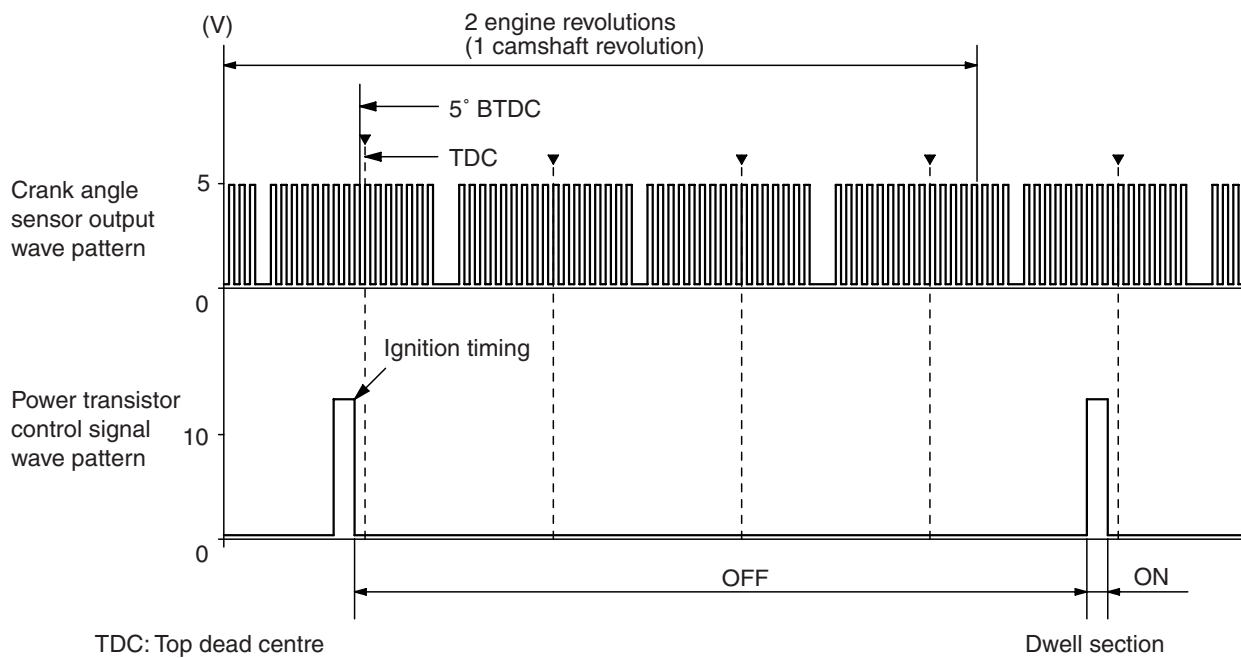
4. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 52. (When checking the number 4 cylinder.)

Standard Wave Pattern

Observation condition

| Function | Special patterns |
|------------------|---------------------------|
| Pattern height | Low |
| Pattern selector | Display |
| Engine | Approximately 1,200 r/min |

Standard wave pattern

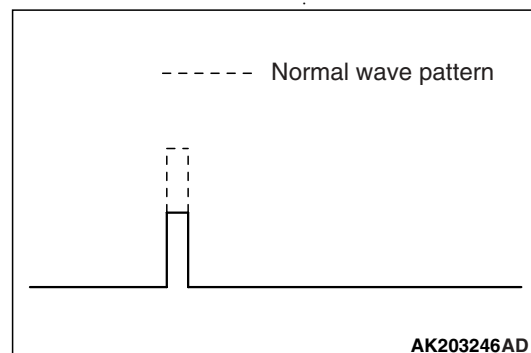


AK305797AB

Wave Pattern Observation Points

Point: When the engine speed increases, verify that the power transistor control signal (ignition timing) advances.

Examples of Abnormal Wave Patterns



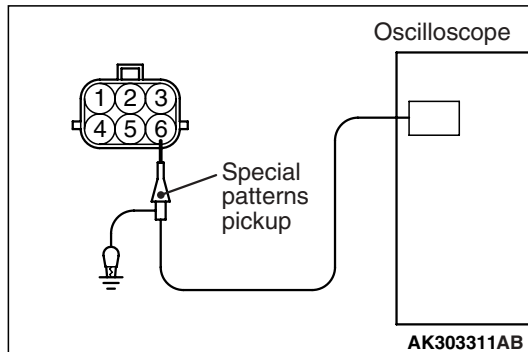
Example
Wave pattern during engine cranking

Cause of problem

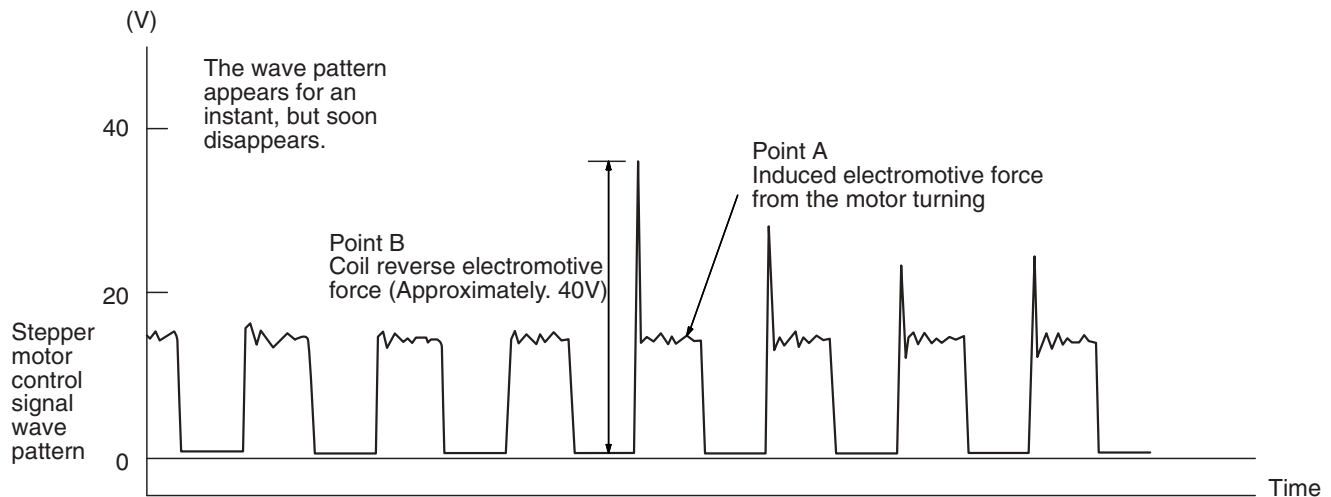
Open-circuit in ignition primary circuit

Wave pattern characteristics

Top-right part of the build-up section cannot be seen, and voltage value is approximately 2 V too low.

EGR VALVE (STEPPER MOTOR)**Measurement Method**

1. Disconnect the EGR valve connector, and connect the special tool test harness (MB991658) in between.

Standard wave pattern

AK301251AB

Wave pattern Observation Points

Check that the standard wave pattern appears when the EGR control servo 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 |

2. Connect the oscilloscope probe to the EGR valve-side connector terminal 1, terminal 3, terminal 4 and terminal 6 respectively.

Alternate Method (Test Harness not Available)

1. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 3, connection terminal No. 12, connection terminal No. 19, and connection terminal No. 26 respectively.

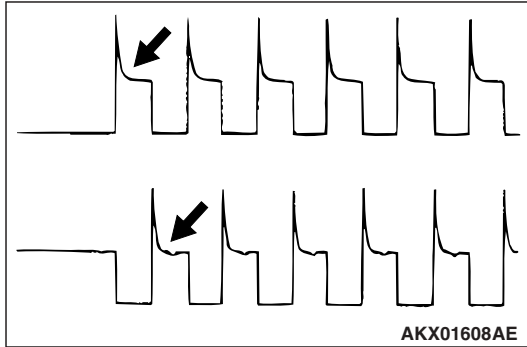
Standard Wave Pattern**Observation condition**

| Function | Special patterns |
|------------------|---------------------------|
| Pattern height | High |
| Pattern selector | Display |
| Engine | Ignition switch: OFF → ON |

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 Patterns



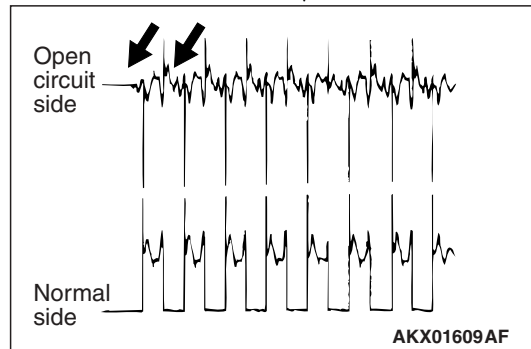
Example 1

Cause of problem

Sensor interface malfunction. (Motor is not operating)

Wave pattern characteristics

Induced electromotive force from the motor turning dose not appear.



Example 2

Cause of problem

Open circuit in the line between the EGR valve and the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Wave pattern characteristics

Current is not supplied to the motor coil on the open circuit side. (Voltage dose not drop to 0 V.)

Furthermore, the induced electromotive force waveform at the normal side is slightly different from the normal waveform.

ON-VEHICLE SERVICE

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001000699

1. Remove the air intake hose from the throttle body.
2. Remove the throttle body assembly.

⚠ 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.
3. Spray cleaning fluid on a clean cloth.
 4. Wipe off the dirt around the throttle valve with the cloth sprayed with cleaning fluid.
 5. Install the throttle body assembly.
 6. Attach the air intake hose.

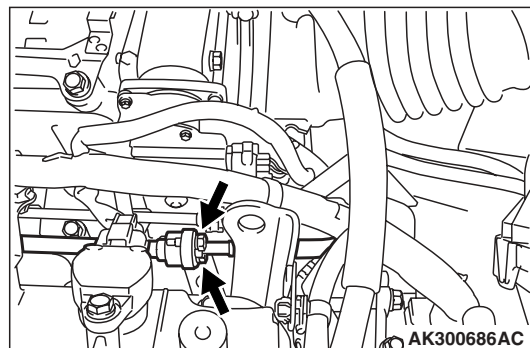
FUEL PRESSURE TEST

M1131001900830

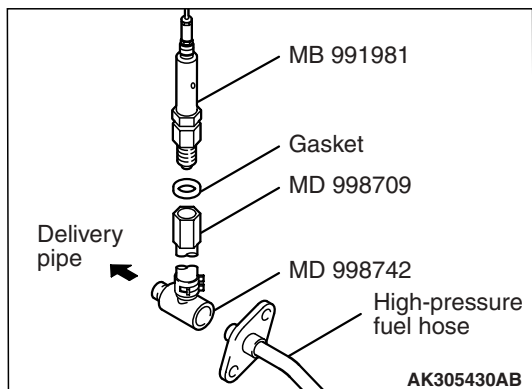
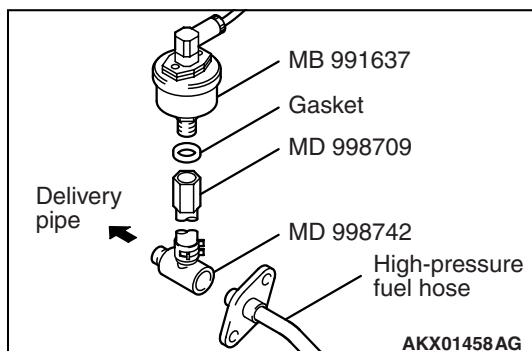
1. Release residual pressure from the fuel pipe line to prevent fuel gush out (Refer to [P.13A-386](#)).

⚠ CAUTION

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



2. Disconnect the high-pressure fuel hose at the delivery pipe side.



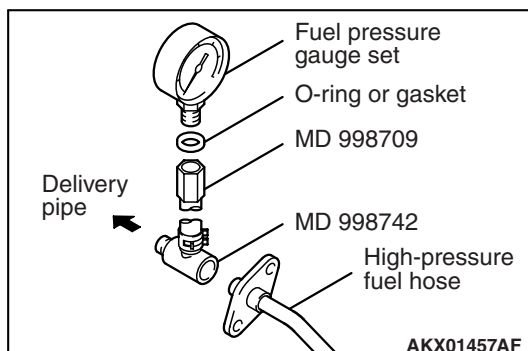
3. Assemble the fuel pressure measurement tools as follows.

<When using the fuel pressure gauge set (special tool)>

- Remove the union joint and bolt from the special tool adaptor hose (MD998709) and attach the special tool hose adaptor (MD998742) to the adaptor hose.
- Via a gasket, install the special tool fuel pressure gauge set (MB991637 or MB991981) into the special tool that has already assembled as described in (a) above.

<When using the fuel pressure gauge>

- Remove the union joint and bolt from special tool adaptor hose (MD998709) and attach the special tool hose adaptor (MD998742) to the adaptor hose.
- Via a suitable O-ring or gasket, install the fuel pressure gauge to the special tool that has already assembled as described in (a) above.



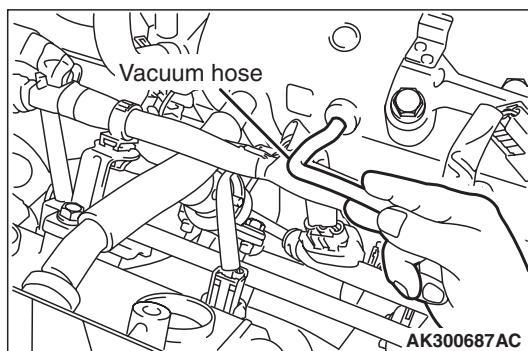
4. Install the assembled fuel pressure measurement tools between the fuel rail and high-pressure fuel hose.

CAUTION

To prevent damage to the MUT-III, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting the MUT-III.

- Connect the MUT-III to the diagnosis connector.
- Turn the ignition switch to ON position (But do not start the engine).
- Select "Item No. 07" from the MUT-III actuator test to drive the fuel pump. Check that there are no fuel leaks from any parts.
- Finish the actuator test or turn the ignition switch to "LOCK" (OFF) position.
- Start the engine and run at idle.
- Fuel pressure measurement while the engine is running at idle.

Standard value: Approximately 248 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: 324 – 334 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"> Fuel pressure too low Fuel pressure drops after racing No fuel pressure in fuel return hose | 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-386).

⚠ CAUTION

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

17. Remove the fuel pressure gauge and special tool from the delivery pipe.

18. Replace the O-ring at the end of the fuel high pressure hose with a new one. Furthermore, apply engine oil to the new O-ring before replacement.

19. Fit the fuel high pressure hose over the delivery pipe and tighten the bolt to specified torque.

Tightening torque: 5 ± 1 N·m

20. Check for any fuel leaks by following the procedure in step 7.

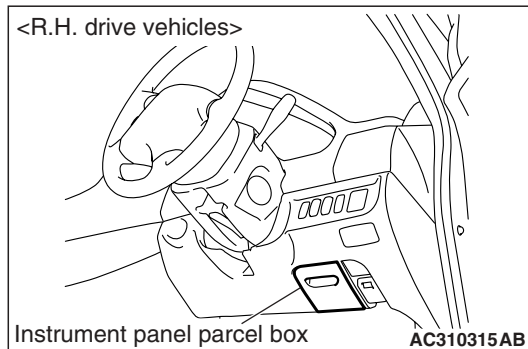
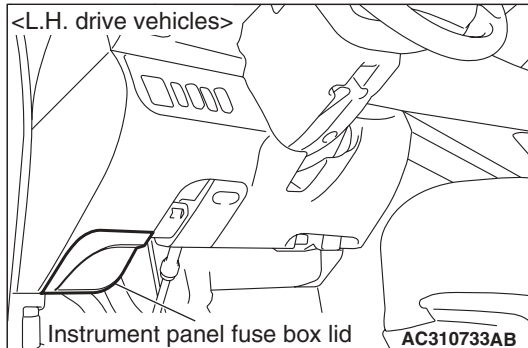
21. Disconnect the MUT-III.

**FUEL PUMP RELAY DISCONNECTION
(HOW TO REDUCE PRESSURIZED FUEL
LINES)**

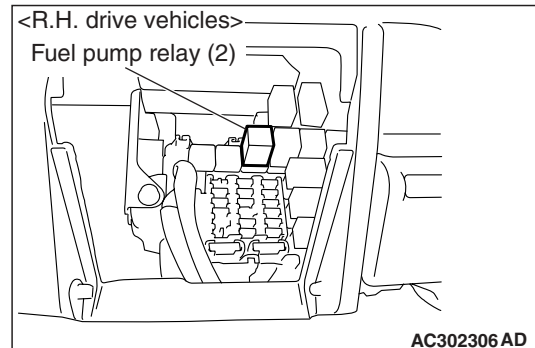
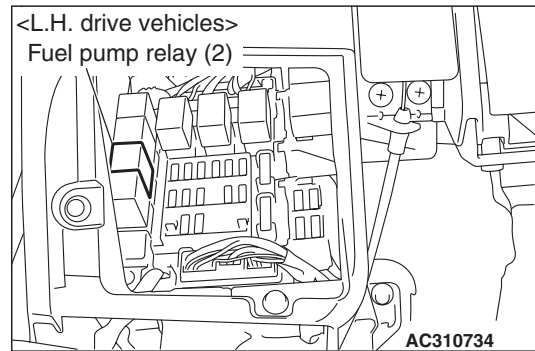
M1131000900729

⚠ WARNING

When removing the fuel pipe, etc., release fuel pressure to prevent fuel spray.



1. Remove the instrument panel fuse box lid <L.H. drive vehicles> or instrument panel parcel box <R.H. drive vehicles> (Refer to GROUP 52A – Instrument Panel [P.52A-2](#)).



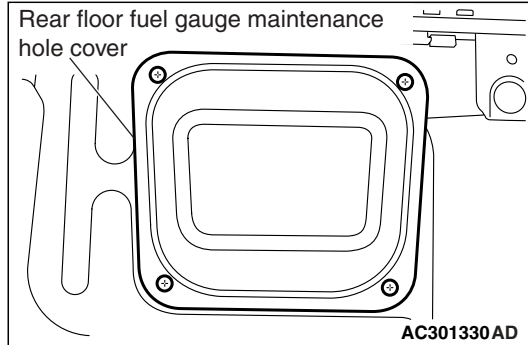
2. Remove the fuel pump relay (2) in the the junction block.
3. Crank the engine for at least two seconds.
4. If the engine is not started, turn the ignition switch to the "LOCK (OFF)" position.
5. If the engine is started, turn the ignition switch to the "LOCK (OFF)" position after the engine stopped.
6. Install the fuel pump relay (2).
7. Install the instrument panel fuse box lid <L.H. drive vehicles> or instrument panel parcel box <R.H. drive vehicles> (Refer to GROUP 52A – Instrument Panel [P.52A-2](#)).

FUEL PUMP OPERATION CHECK

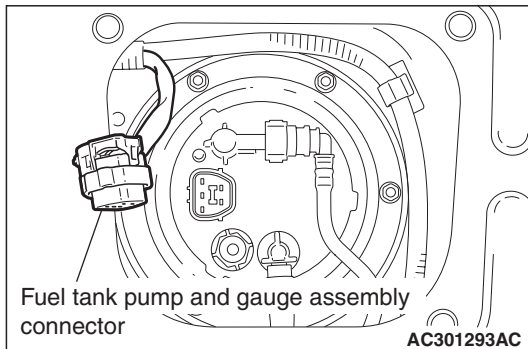
M1131002000829

1. Remove the fuel tank cap.
NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear. Then check the sound from the tank inlet.
2. Check the operating of the fuel pump by MUT-III to force-drive the fuel pump.
3. 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 second seat assembly, the rail cover outer and the rail cover inner. (Refer to GROUP 52A, Second Seat Assembly Removal and Installation [P.52A-26](#)).

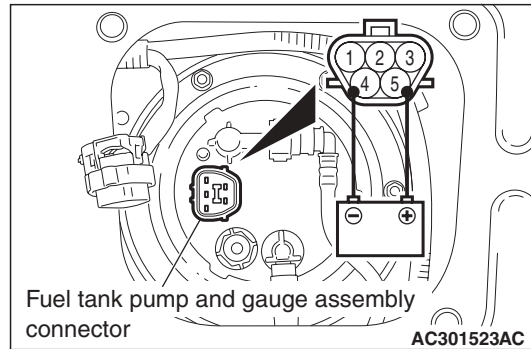
- (3) Remove the rear scuff plate (Refer to GROUP 52A, Trim Removal and Installation P.52A-10), and turn up the floor mat.



- (4) Remove the rear floor fuel gauge maintenance hole cover (LH).



- (5) Disconnect the fuel tank pump and gauge assembly connector.



- (6) When the fuel pump drive connector (Fuel tank pump and gauge assembly side) 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 13B, Fuel Pump Module Disassembly and Assembly P.13B-8).

NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear. Then check the sound from the tank inlet.

- (7) Connect fuel tank pump and gauge assembly connector.
- (8) Install the rear floor fuel gauge maintenance hole cover (LH).
- (9) Return the floor mat and install the rear scuff plate. (Refer to GROUP 52A, Trim Removal and Installation P.52A-10).
- (10) Install the rail cover outer, the rail cover inner and the second seat assembly. (Refer to GROUP 52A, Second Seat Assembly Removal and Installation P.52A-26).

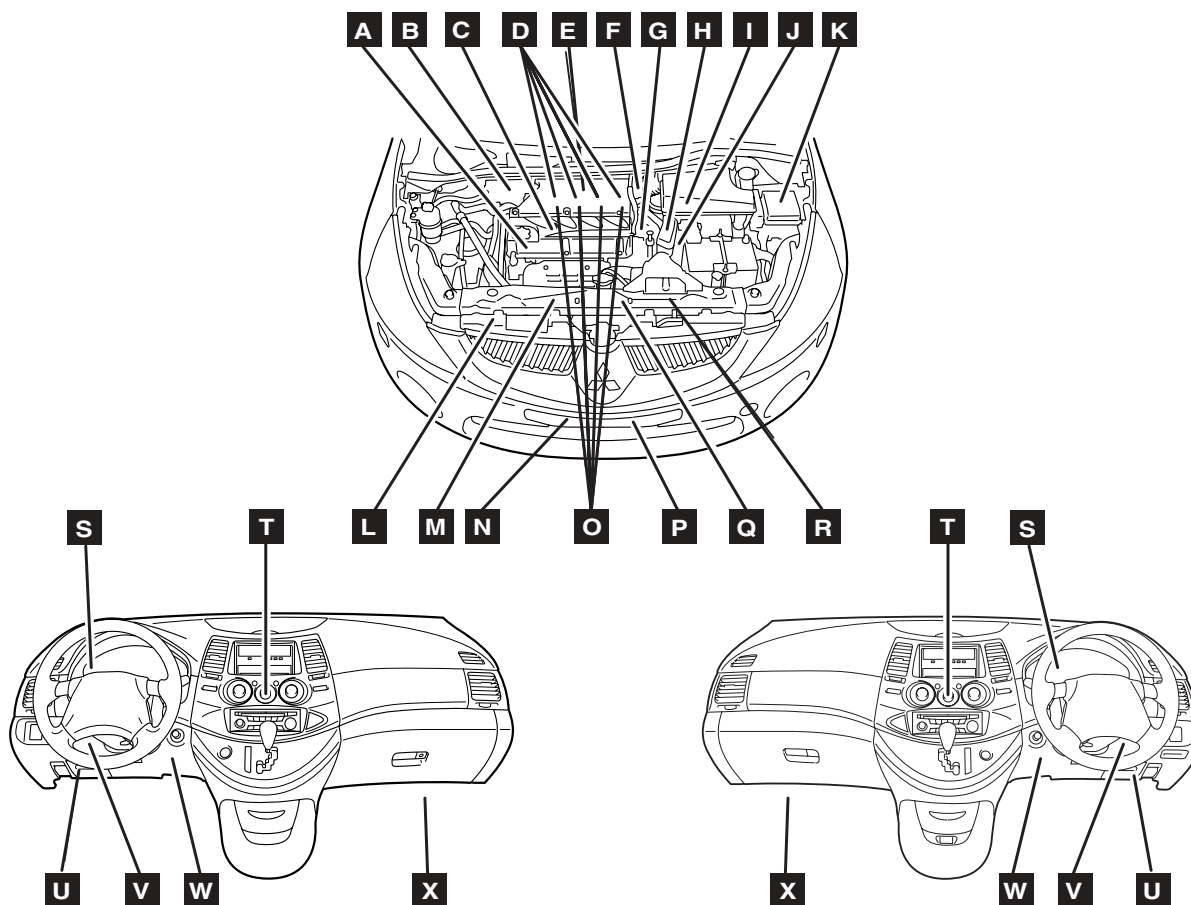
4. Install the fuel tank cap.

COMPONENT LOCATION

M1131002101078

| Name | Symbol | Name | Symbol |
|--|--------|--|--------|
| Accelerator pedal position sensor | U | Engine-ECU <M/T> or engine-A/T-ECU <A/T> (with barometric pressure sensor) | X |
| A/C relay | K | Engine control relay | K |
| A/C switch | T | Engine coolant temperature sensor | G |
| Air flow sensor (with intake air temperature sensor) | I | Engine warning lamp (check engine lamp) | S |
| Camshaft position sensor | G | Fuel pump relay (1) and (2) | V |
| Crank angle sensor | L | Ignition coil | O |
| Cylinder 1,4 oxygen sensor (front) | M | Inhibitor switch <A/T> | R |
| Cylinder 1,4 oxygen sensor (rear) | N | Injector | D |
| Cylinder 2,3 oxygen sensor (front) | Q | Oil control valve | G |

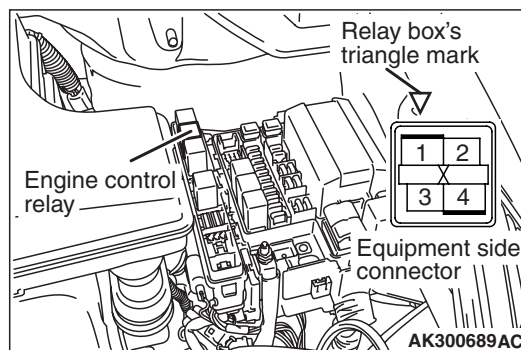
| Name | Symbol | Name | Symbol |
|--|--------|--|--------|
| Cylinder 2,3 oxygen sensor (rear) | P | Power steering fluid pressure sensor (L. H. drive vehicle) | J |
| Detonation sensor | C | Power steering fluid pressure sensor (R. H. drive vehicle) | A |
| Diagnosis connector | W | Purge control solenoid valve | B |
| EGR valve | E | Throttle valve control servo relay | K |
| Electronic-controlled throttle valve (Throttle position sensor and throttle valve control servo) | F | Vehicle speed sensor <M/T> | H |



AK305638AB

ENGINE CONTROL RELAY CONTINUITY CHECK

M1131050000497

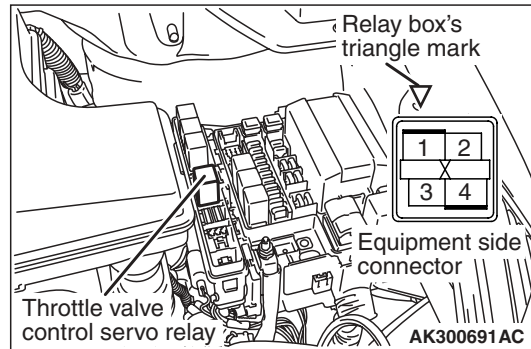


AK300689AC

| 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 |

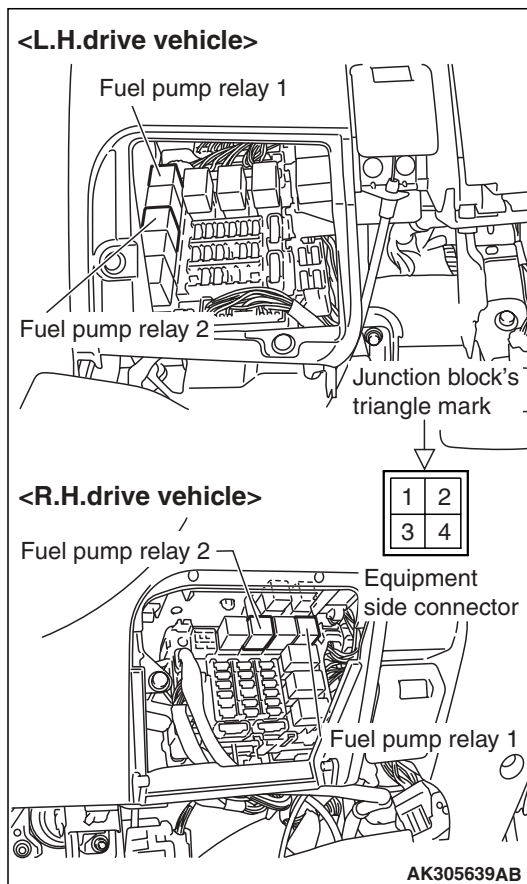
THROTTLE VALVE CONTROL SERVO RELAY CONTINUITY CHECK

M1131053500048



FUEL PUMP RELAY CONTINUITY CHECK

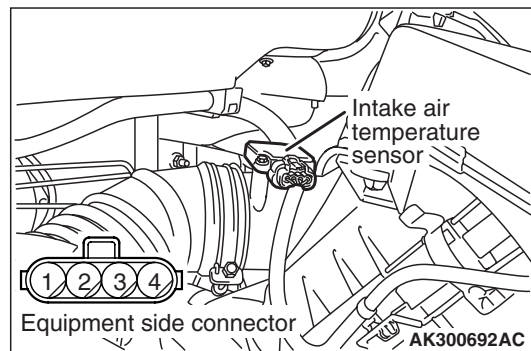
M1131033000494



| Tester Connection Terminal | Battery Voltage | Normal State |
|----------------------------|--|---------------|
| 2 - 3 | No Voltage | Continuity |
| 1 - 4 | No Voltage | No continuity |
| | Voltage (Connect positive (+) terminal of battery to terminal No. 3 and negative (-) terminal of battery to terminal No. 2.) | Continuity |

INTAKE AIR TEMPERATURE SENSOR CHECK

M1131002800740



| 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 |

1. Disconnect the air flow sensor connector.
2. Measure resistance between terminals No. 1 and No. 4.

Standard value:

13 - 17 kΩ (at -20°C)

5.3 - 6.7 kΩ (at 0°C)

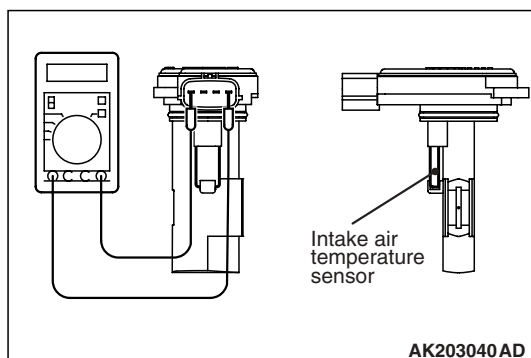
2.3 - 3.0 kΩ (at 20°C)

1.0 - 1.5 kΩ (at 40°C)

0.56 - 0.76 kΩ (at 60°C)

0.30 - 0.45 kΩ (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 (kΩ) |
|------------------|-----------------|
| 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.

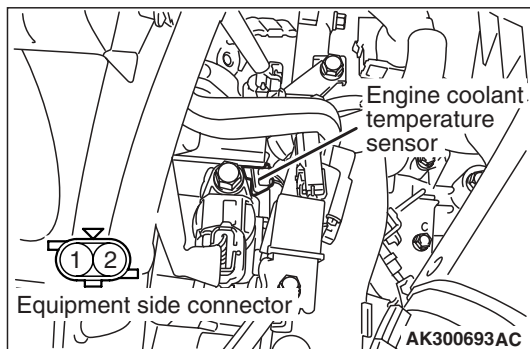
Tightening torque: 1.8 ± 0.6 N·m

ENGINE COOLANT TEMPERATURE SENSOR CHECK

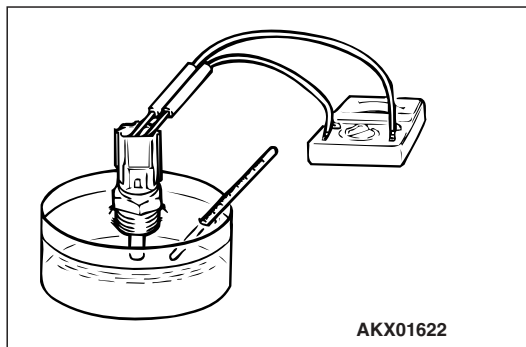
M1131003100700

⚠ 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 kΩ (at -20°C)

5.1 – 6.5 kΩ (at 0°C)

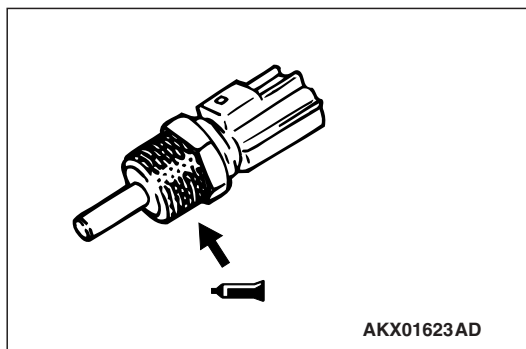
2.1 – 2.7 kΩ (at 20°C)

0.9 – 1.3 kΩ (at 40°C)

0.48 – 0.68 kΩ (at 60°C)

0.26 – 0.36 kΩ (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

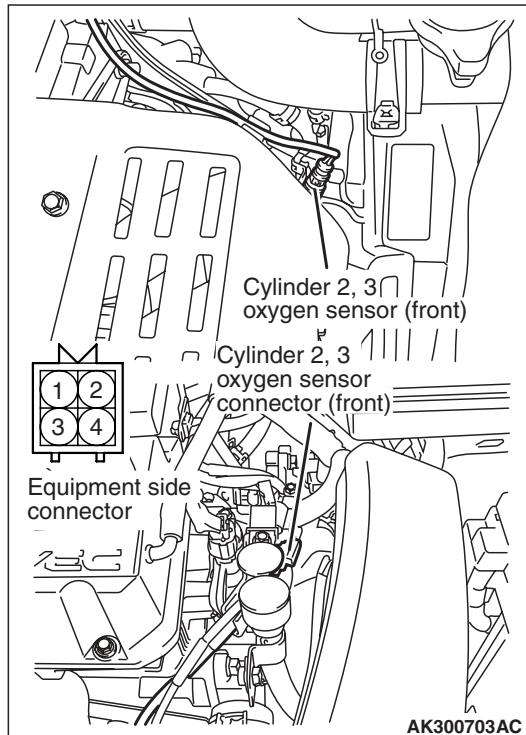
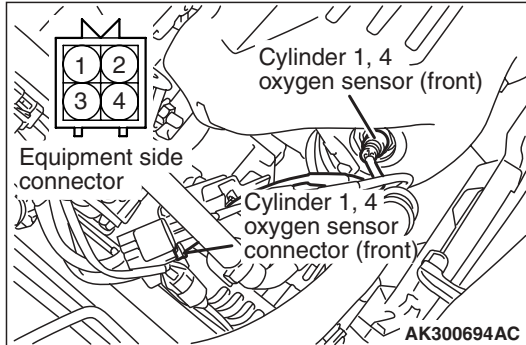
5. Install the engine coolant temperature sensor and tighten it to the specified torque.

Tightening torque: 29 ± 10 N·m

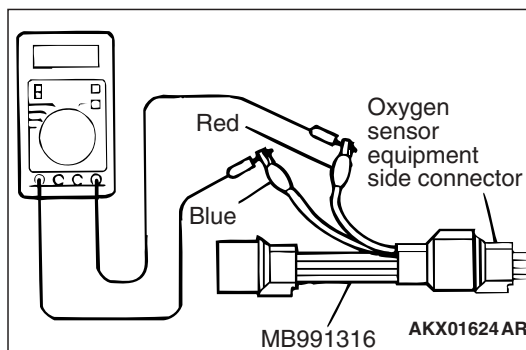
OXYGEN SENSOR CHECK

OXYGEN SENSOR (FRONT)

M1131005000947

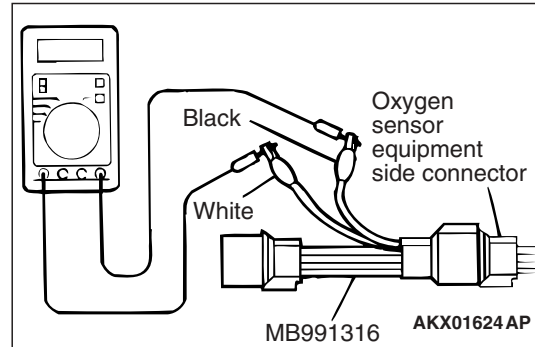


1. Disconnect the oxygen sensor connector and connect the special tool Test harness (MB991316) to the connector on the oxygen sensor side.



2. Make sure that there is continuity ($4.5 - 8.0 \Omega$ at 20°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°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.

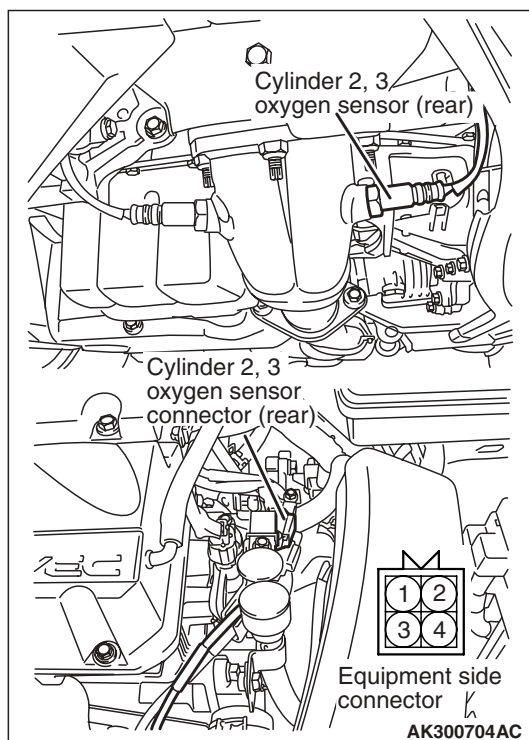
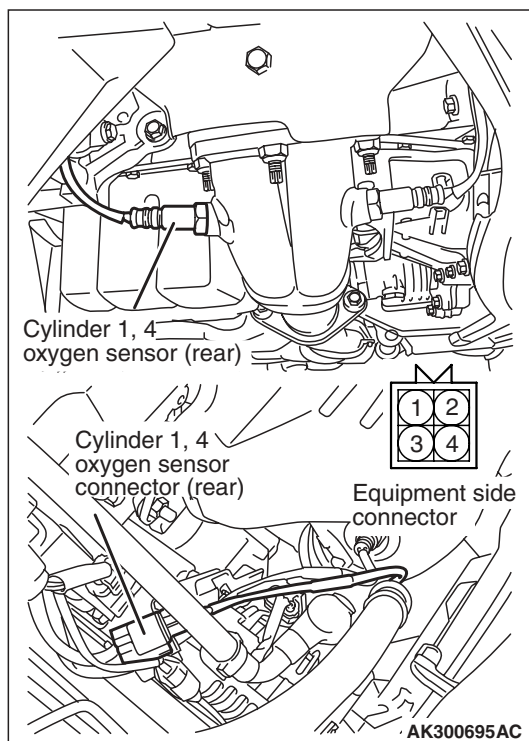
NOTE: If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 1 (red clip 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.

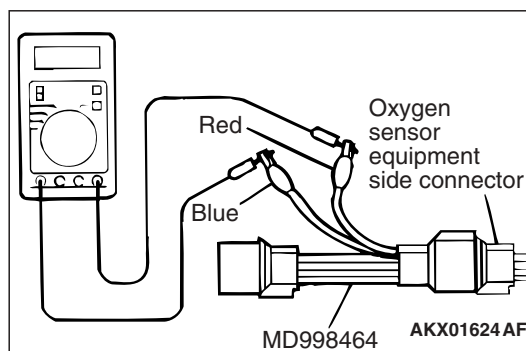
NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Manifold.

P.15-7.

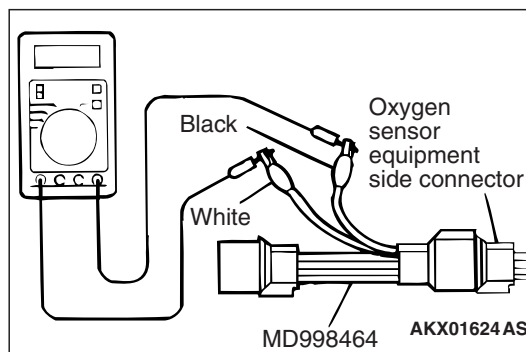
OXYGEN SENSOR (REAR)



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 ($11 - 18 \Omega$ at 20°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°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 12 V is applied to the oxygen sensor heater.

NOTE: If the sufficiently high temperature (of approximate 400 °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 12 V power supply respectively, then check again.

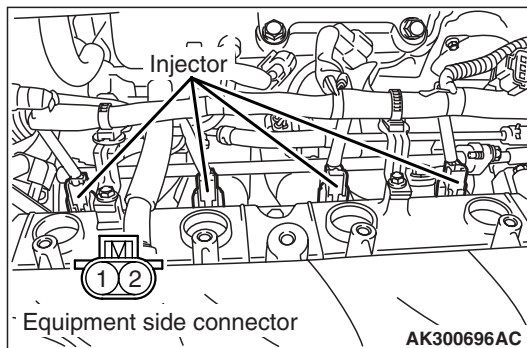
8. If the sensor is defective, replace the oxygen sensor.

NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler P.15-9.

INJECTOR CHECK

M1131005200792

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

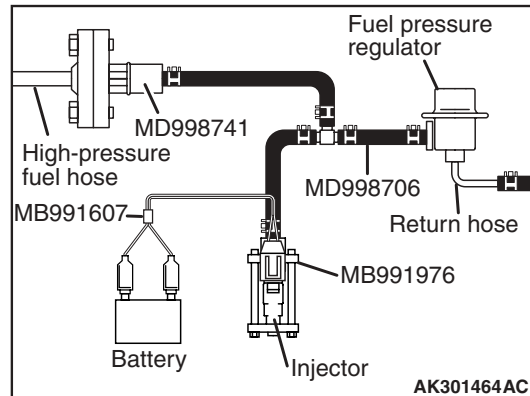
1. Disconnect the injector connector.
2. Measure the resistance between terminals.

Standard value: 10.5 – 13.5 Ω (at 20°C)

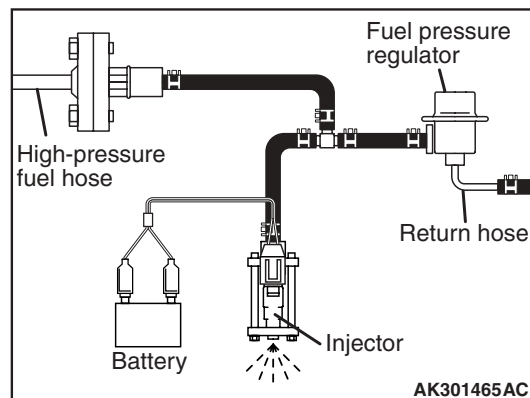
3. Connect the injector connector.

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-386).
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)
 - Injector test holder assembly (MB991976)
4. Connect the MUT-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 MUT-II/III actuator test to drive the fuel pump.



7. Activate the injector and check the atomized spray condition of the fuel.

The condition can be considered satisfactory unless it is extremely poor.

8. Stop the actuation of the injector, and check for leakage from the injector's nozzle.

Standard value: 1 drop or less per minute

9. Without the fuel pump operation, operate the injector to draw the fuel out.
10. If the spraying is extremely poor or the fuel leakage from the injector nozzle deviates from the standard value, replace the injector.
11. Disconnect the MUT-II/III.

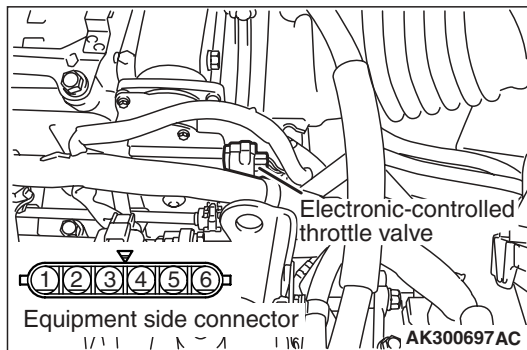
THROTTLE VALVE CONTROL SERVO CHECK

M1131051000177

OPERATION CHECK

1. Remove the air intake hose from the throttle body.
2. Turn the ignition switch to "ON" position.
3. Operate the accelerator pedal and confirm that the throttle valve is opening and closing accordingly.

CHECK THE COIL RESISTANCE



1. Disconnect the electronic-controlled throttle valve connector.
2. Measure the resistance between terminals No. 1 and No. 2 at the throttle valve control servo connector.

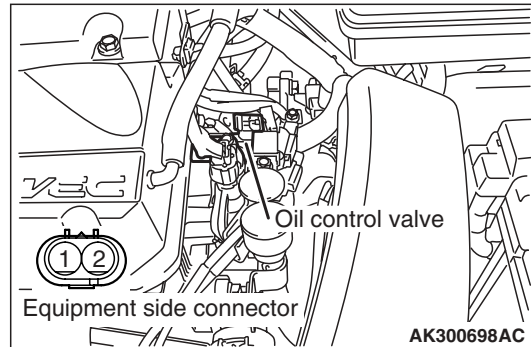
Standard value: 0.3 – 100 Ω (at 20°C)

3. If resistance is outside the standard value, replace the throttle body assembly.

OIL CONTROL VALVE CHECK

M1131053200111

OPERATION CHECK



1. Disconnect the oil control valve connector.

⚠ CAUTION

To prevent the coil from burning, keep the duration of the voltage application as short as possible.

2. Apply battery voltage to the terminals of the connector at the oil control valve, and make sure the oil control valve makes a clicking sound.

MEASUREMENT OF RESISTANCE BETWEEN TERMINALS

1. Disconnect the oil control valve connector.
2. Measure the resistance between the terminals of the connector at the oil control valve.

Standard value: 6.9 – 7.9 Ω (at 20°C)

3. If resistance is outside the standard value, replace the oil control valve.

INJECTOR

REMOVAL AND INSTALLATION

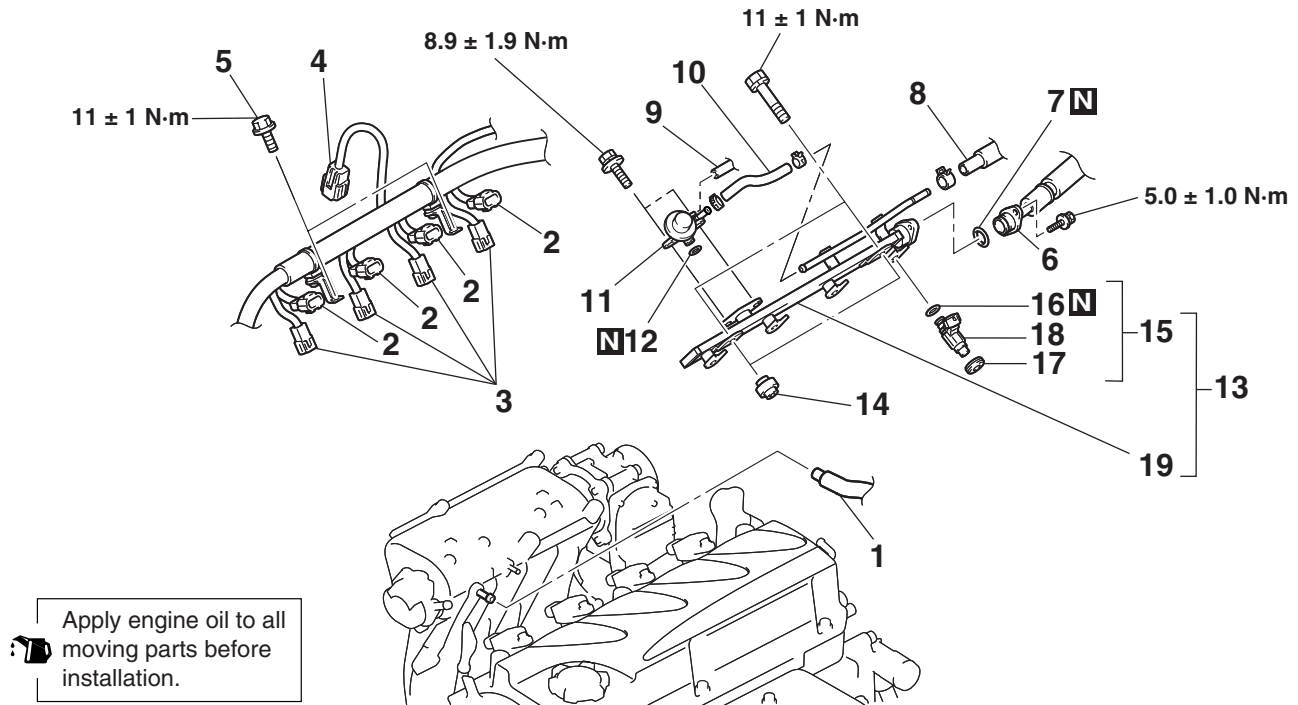
M1131007100865

Pre-removal Operation

- Fuel Line Pressure Reduction (Refer to P.13A-386).
- Engine Cover Removal (Refer to GROUP 11A, Camshaft and Valve Stem Seal P.11A-16).

Post-installation Operation

- Engine Cover Installation (Refer to GROUP 11A, Camshaft and Valve Stem Seal P.11A-16).
- Fuel Leakage Inspection.



AC301518AC

Removal steps

- PCV hose connection
- Ignition coil connector
- Fuel injector connector
- EGR valve connector
- Rocker cover bracket installation bolts

- >>B<< 6. Fuel high-pressure hose connection
- O-ring
 - Fuel return hose connection
 - Emission control equipment hose connection

- >>B<< 10. Fuel injector hose
- >>B<< 11. Fuel pressure regulator
- >>B<< 12. O-ring

- <<A>> 13. Fuel delivery pipe and fuel injector assembly
- <<A>> 14. Fuel injector insulator

Removal steps (Continued)

- >>B<< 15. Fuel injector assembly
- >>B<< 16. O-ring
- >>B<< 17. Fuel injector insulator
- >>A<< 18. Fuel injectors
- >>A<< 19. Fuel delivery pipe

REMOVAL SERVICE POINT

<<A>> FUEL DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY REMOVAL

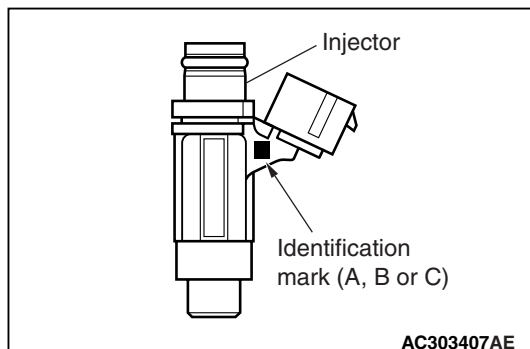
CAUTION

Do not drop the injector.

Remove the fuel delivery pipe with the fuel injector assembly attached to it.

INSTALLATION SERVICE POINT

>>A<< FUEL INJECTORS INSTALLATION

⚠ CAUTION

- The fuel injectors are classified into A, B and C by the injection quantity. When replacing one of fuel injectors, use a same identification mark fuel injector as the other fuel injectors.
- When replacing the fuel injectors of all cylinders, use the same identification mark fuel injectors.

>>B<< FUEL INJECTOR
ASSEMBLY/FUEL 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 fuel high-pressure hose. Be careful not to damage the O-ring. After installing, check that the item turns smoothly.
3. If it dose not turn smoothly, the O-ring may be trapped, remove the item, re-install it into the fuel delivery pipe and check again.
4. Tighten the fuel pressure regulator and fuel high-pressure hose to the specified torque.

Tightening torque:

- 8.9 ± 1.9 N·m <Fuel pressure regulator>**
5.0 ± 1.0 N·m <Fuel high-pressure hose>

THROTTLE BODY ASSEMBLY

REMOVAL AND INSTALLATION

M1131007700760

CAUTION

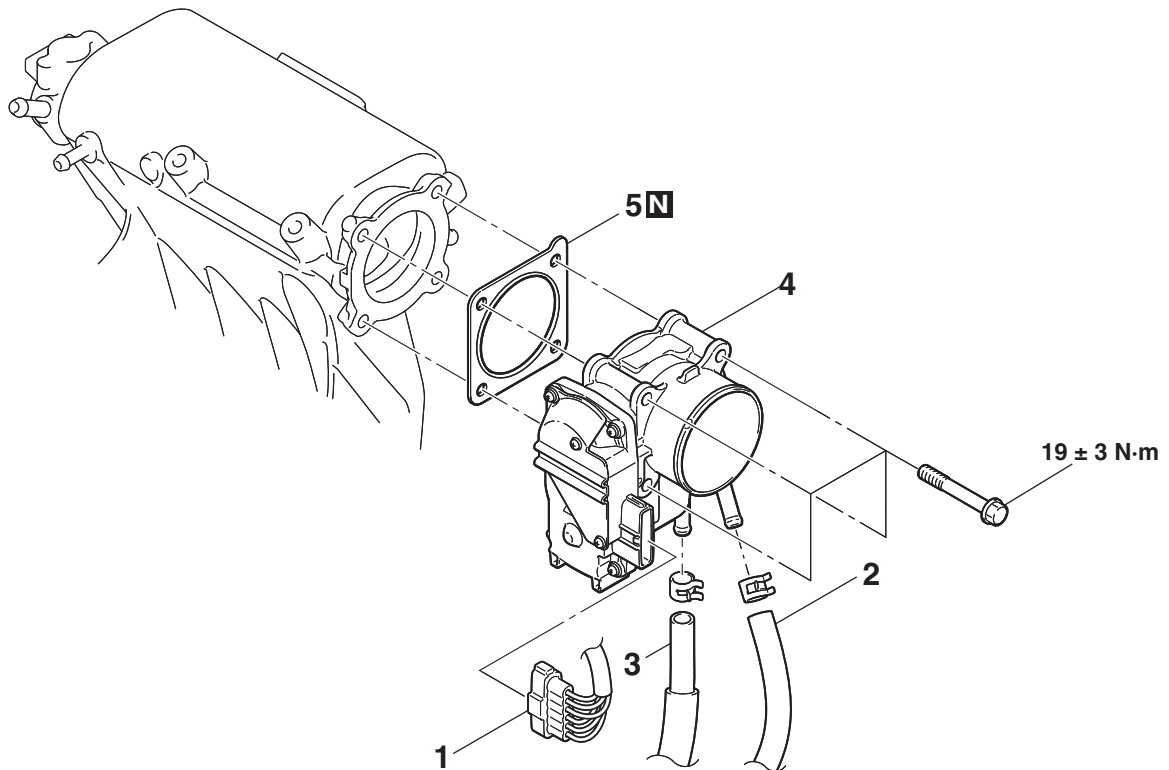
Do not loosen the fixing screws for the resin cover of throttle body assembly. If the screws are loosened, the sensor incorporated in the resin cover becomes misaligned and the throttle body can not work normally.

Pre-removal Operation

- Engine Cover Removal (Refer to GROUP 11A, Camshaft and Valve Stem Seal [P.11A-16](#)).
- 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.15-3](#)).

Post-installation Operation

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner [P.15-3](#)).
- Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement [P.14-17](#)).
- Engine Cover Installation (Refer to GROUP 11A, Camshaft and Valve Stem Seal [P.11A-16](#)).



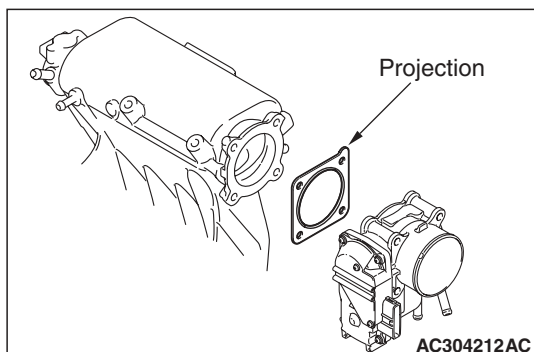
AC304161AF

- >>B<<**
- Removal steps**
- Initialization (Installation only)
1. Electronic-controlled throttle valve connector
 2. Water return hose connection

- >>A<<**
- Removal steps (Continued)**
3. Water feed hose connection
 4. Throttle body assembly (Electronic-controlled throttle valve)
 5. Throttle body gasket

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 its protrusion is in the direction shown.

>>B<< INITIALIZATION

When the throttle body is installed, removed or replaced, initialize the electronic-controlled throttle valve system according to the procedure below beforehand.

Turn the ignition switch to the ON position, and back to the "LOCK" (OFF) position. Then hold it in this position for approximately 10 seconds or more.

ENGINE-ECU AND ENGINE-A/T-ECU

REMOVAL AND INSTALLATION

M1131022500053

<L.H. drive vehicles>

CAUTION

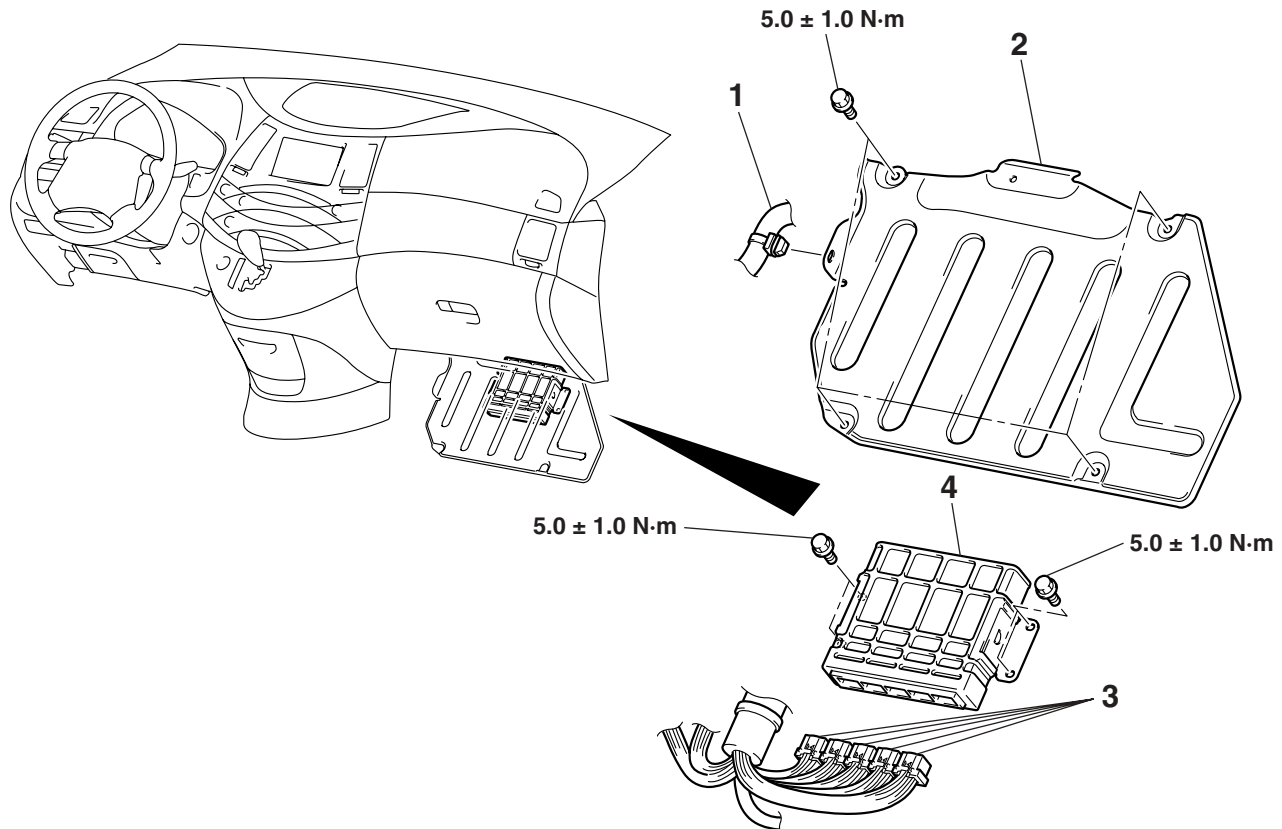
Always register the ignition key(s) when the engine-ECU <M/T> or the engine-A/T-ECU <A/T> is replaced (Refer to GROUP 54A, On-vehicle Service - Immobilizer ID Code Registration [P.54A-26](#)).

Pre-removal Operation

- Front Scuff Plate (RH), Cowl Side Trim (RH) Removal (Refer to GROUP 52A Trims [P.52A-10](#)).
- Console Side Cover (RH) Removal (Refer to GROUP 52A, Floor Console assembly [P.52A-9](#)).

Post-installation Operation

- Console Side Cover (RH) Installation (Refer to GROUP 52A, Floor Console assembly [P.52A-9](#)).
- Front Scuff Plate (RH), Cowl Side Trim (RH) Installation (Refer to GROUP 52A Trims [P.52A-10](#)).



AC310595 AB

REMOVAL STEPS

- >>A<<
- Initialization (Installation only)
 - Turn up the floor mat. <Front passenger's side>
 - 1. Wiring harness clamp connection
 - 2. Bracket
 - 3. Engine-ECU connector <M/T> or Engine-A/T-ECU connector <A/T>
 - 4. Engine-ECU <M/T> or Engine-A/T-ECU <A/T>

INSTALLATION SERVICE POINT

>>A<< INITIALIZATION

When the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> is replaced, initialize the electronic-controlled throttle valve system according to the procedure below beforehand.

Turn the ignition switch to the ON position, and back to the "LOCK" (OFF) position. Then hold it in this position for approximately 10 seconds or more.

<R.H. drive vehicles>

⚠ CAUTION

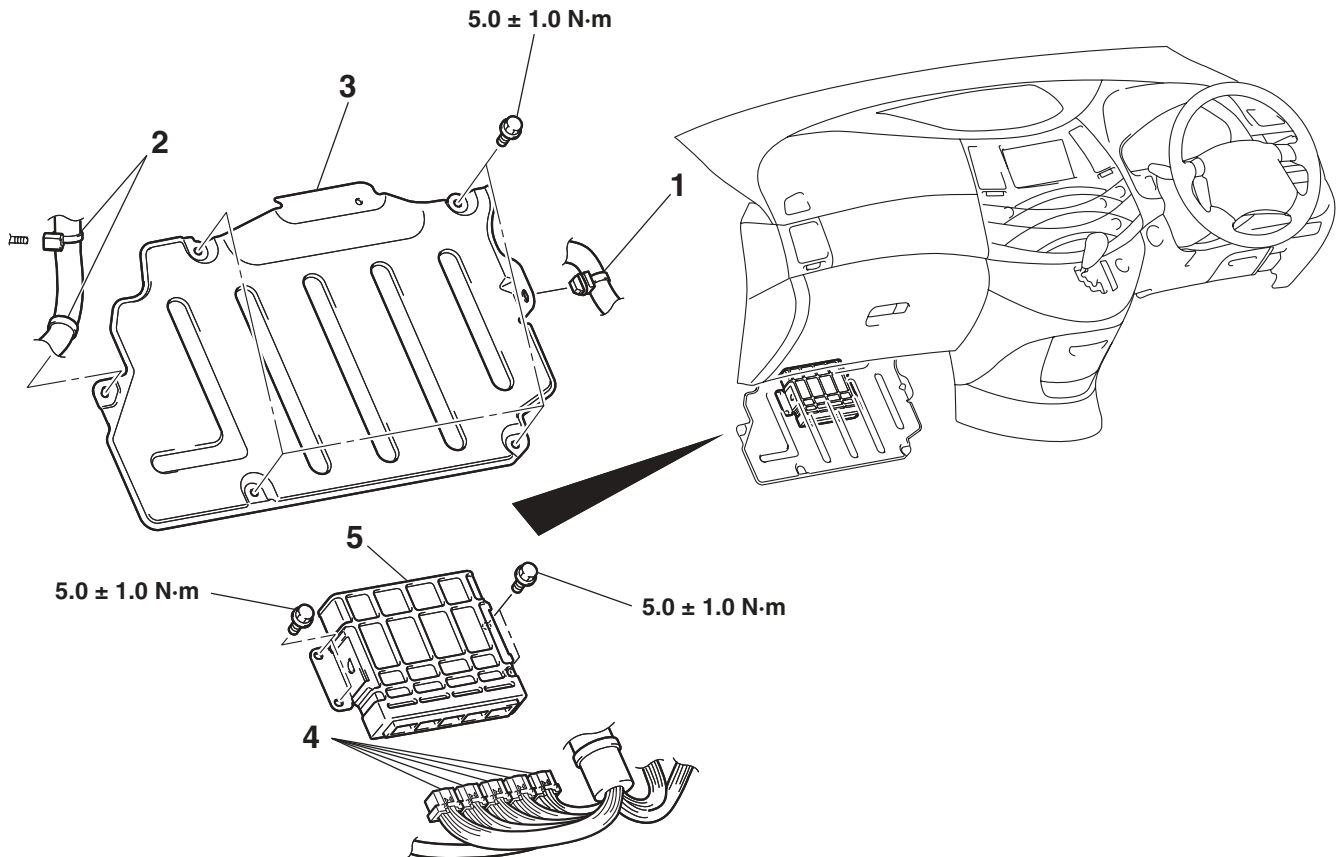
Always register the ignition key(s) when the engine-ECU <M/T> or the engine-A/T-ECU <A/T> is replaced (Refer to GROUP 54A, On-vehicle Service - Immobilizer ID Code Registration [P.54A-26](#)).

Pre-removal Operation

- Front Scuff Plate (LH), Cowl Side Trim (LH) Removal (Refer to GROUP 52A Trims [P.52A-10](#)).
- Console Side Cover (LH) Removal (Refer to GROUP 52A, Floor Console assembly [P.52A-9](#)).

Post-installation Operation

- Console Side Cover (LH) Installation (Refer to GROUP 52A, Floor Console assembly [P.52A-9](#)).
- Front Scuff Plate (LH), Cowl Side Trim (LH) Installation (Refer to GROUP 52A Trims [P.52A-10](#)).



AC301810AC

REMOVAL STEPS

- >>A<<
- Initialization (Installation only)
 - Turn up the floor mat. <Front passenger's side>
1. Wiring harness clamp connection
 2. Wiring harness clamp connection
 3. Bracket
 4. Engine-ECU connector <M/T> or Engine-A/T-ECU connector <A/T>
 5. Engine-ECU <M/T> or Engine-A/T-ECU <A/T>

INSTALLATION SERVICE POINT**>>A<< INITIALIZATION**

When the Engine-ECU <M/T> or Engine-A/T-ECU <A/T> is replaced, initialize the electronic-controlled throttle valve system according to the procedure below beforehand.

Turn the ignition switch to the ON position, and back to the "LOCK" (OFF) position. Then hold it in this position for approximately 10 seconds or more.