

GROUP 13A

MULTIPOINT FUEL INJECTION (MPI) <Except for HK, Singapore, Australia and N.Z.>

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GENERAL INFORMATION

M1131000102398

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 mix-

<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.

ture 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 motor, 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 SPEED 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 M.U.T.-III. In addition, the actuators can be force-driven under certain circumstances.

OTHER CONTROL FUNCTIONS**1. Fuel Pump Control**

Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.

2. A/C Relay Control

Turns the compressor clutch of the A/C ON and OFF.

3. 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.

4. Fan Motor Control

The revolutions of the radiator fan and condenser fan are controlled in response to the engine coolant temperature and vehicle speed.

5. 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.

6. Purge Control Solenoid Valve Control

(Refer to [P.17-40](#), GROUP 17 – Engine And Emission Control – Evaporative Emission Control System).

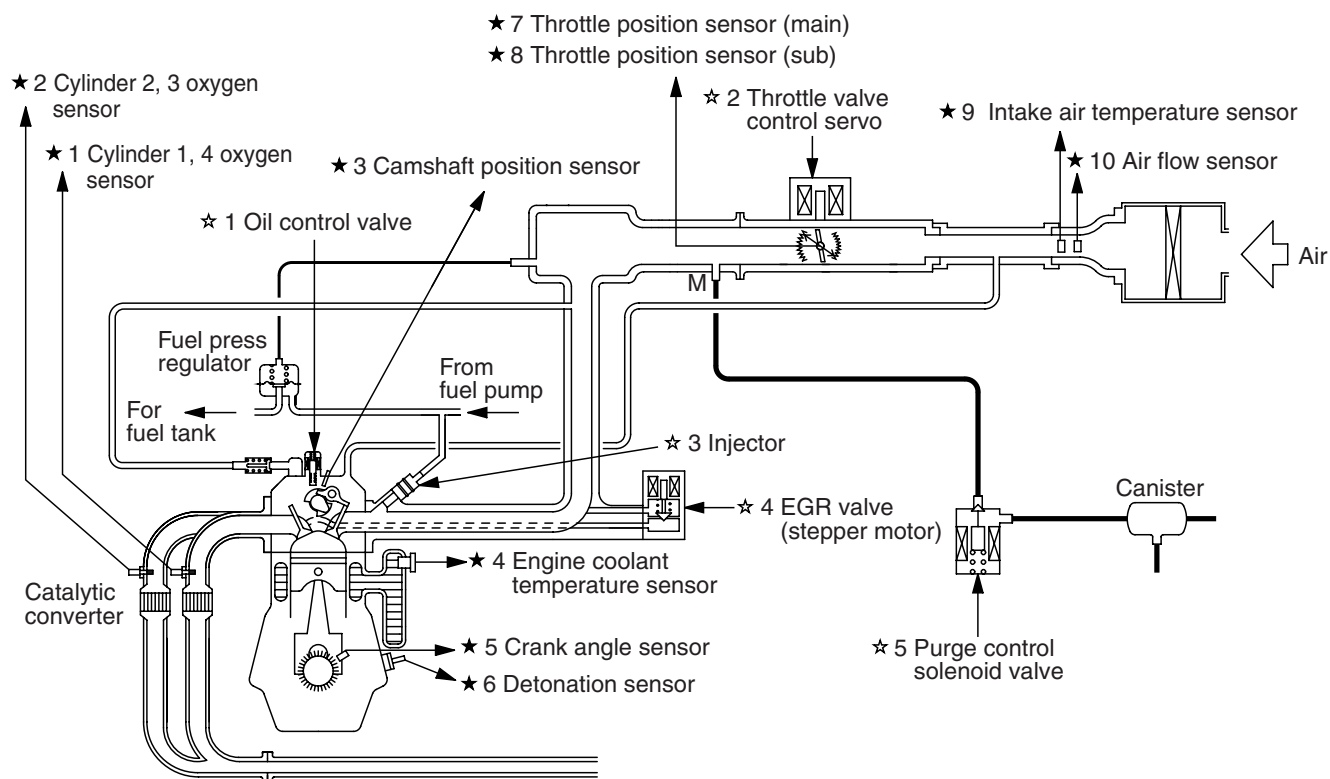
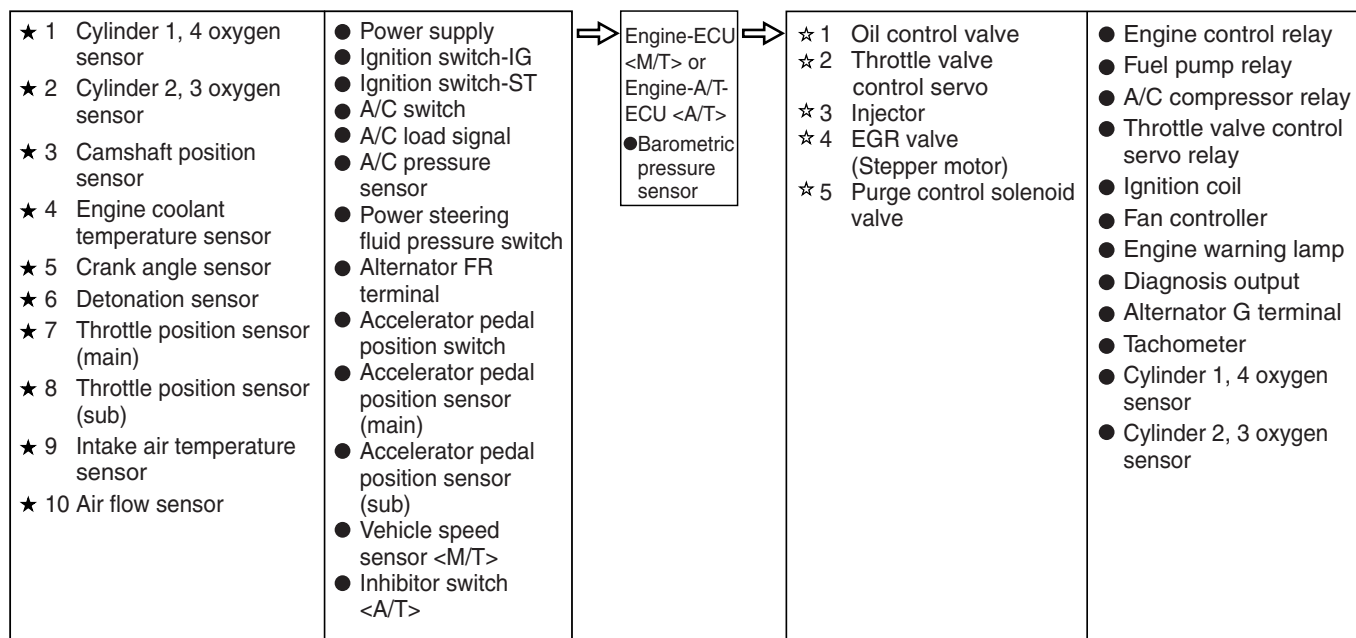
7. EGR Control Solenoid Valve Control

[Refer to [P.17-43](#), 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 brush
Engine-ECU <M/T>	Identification No.	E6T41878 <General Export> E6T41880 <GCC>
Engine-A/T-E CU <A/T>	Identification No.	E6T41877 <General Export> E6T41881 <GCC> E6T41887 <Brazil>
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
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 valve control 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

M1131000301010

Items		Specifications
Intake air temperature sensor resistance kΩ	-20°C	13 – 17
	0°C	5.3 – 6.7
	20°C	2.3 – 3.0
	40°C	1.0 – 1.5
	60°C	0.56 – 0.76
	80°C	0.30 – 0.45
Engine coolant temperature sensor resistance kΩ	-20°C	14 – 17
	0°C	5.1 – 6.5
	20°C	2.1 – 2.7
	40°C	0.9 – 1.3
	60°C	0.48 – 0.68
	80°C	0.26 – 0.36
Oxygen sensor output voltage (at racing) V		0.6 – 1.0
Oxygen sensor heater resistance (at 20°C) Ω		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 – 80
Oil control valve (at 20°C) Ω		6.9 – 7.9

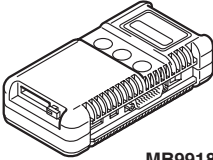
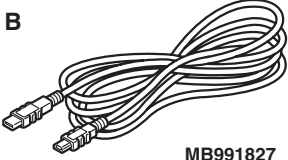
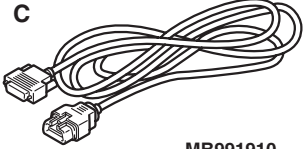
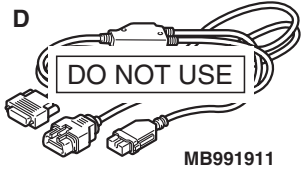
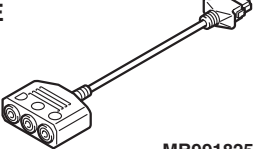
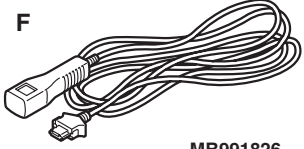


SEALANT


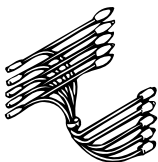
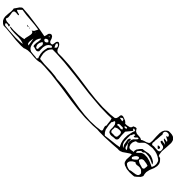


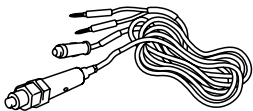
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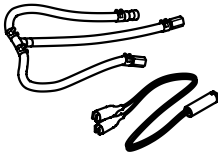
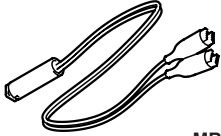
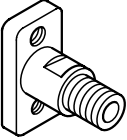
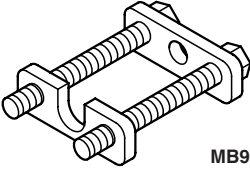
Item	Specified sealant	Remark
Engine coolant temperature sensor threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

SPECIAL TOOLS

M1131000601055

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>M.U.T.-III sub assembly</p> <p>A: Vehicle communication interface (V.C.I.)</p> <p>B: M.U.T.-III USB cable</p> <p>C: M.U.T.-III main harness A (Vehicles with CAN communication system)</p> <p>D: M.U.T.-III main harness B (Vehicles without CAN communication system)</p> <p>E: M.U.T.-III measurement adapter</p> <p>F: M.U.T.-III trigger harness</p>	<ul style="list-style-type: none"> • Reading diagnosis code • MPI system inspection • Measurement of fuel pressure <p>⚠ CAUTION</p> <p>For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-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

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

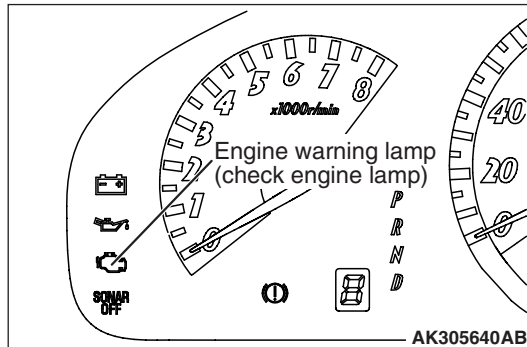
ENGINE WARNING LAMP (CHECK ENGINE LAMP)

M1131155501442

M1131150001000

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>
P0075*	Oil control valve system
P0100*	Air flow sensor system
P0105*	Barometric pressure sensor system
P0110*	Intake air temperature sensor system
P0115*	Engine coolant temperature sensor system
P0120*	Throttle position sensor (main) system
P0130*	Cylinder 1, 4 oxygen sensor system
P0135*	Cylinder 1, 4 oxygen sensor heater system
P0150*	Cylinder 2, 3 oxygen sensor system
P0155*	Cylinder 2, 3 oxygen sensor 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
P0220*	Accelerator pedal position sensor (main) system
P0225*	Throttle position sensor (sub) system
P0300*	Ignition coil (power transistor) system
P0325*	Detonation sensor system
P0335*	Crank angle sensor system

Code No.	Diagnosis item
P0340*	Camshaft position sensor system
P0403*	Exhaust gas recirculation control system
P0606*	Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction
P0638*	Throttle valve control servo circuit range/performance problem
P1121*	Throttle valve control servo power system
P1122*	Throttle valve control servo connector system
P1221*	Throttle valve position feedback system
P1223*	Communication line system with the throttle valve controller
P1225*	Accelerator pedal position sensor (sub) system
P1603*	Battery backup circuit malfunction
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 M.U.T.-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.
 - a. 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 M.U.T.-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 M.U.T.-III DATA LIST
AND ACTUATOR TESTING**

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

FAIL-SAFE FUNCTION REFERENCE TABLE

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

Malfunctioning item	Control contents during malfunction
Air flow sensor	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	Air/fuel ratio closed loop control is not performed.
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

M1131151001887

Code No.	Diagnosis item	Reference page
P0075*	Oil control valve circuit	P.13A-16
P0100*	Air flow sensor system	P.13A-22
P0105*	Barometric pressure sensor system	P.13A-27
P0110*	Intake air temperature sensor system	P.13A-28
P0115*	Engine coolant temperature sensor system	P.13A-35
P0120*	Throttle position sensor (main) system	P.13A-42
P0130*	Cylinder 1, 4 oxygen sensor system	P.13A-48
P0135*	Cylinder 1, 4 oxygen sensor heater system	P.13A-55
P0150*	Cylinder 2, 3 oxygen sensor system	P.13A-61
P0155*	Cylinder 2, 3 oxygen sensor heater system	P.13A-68
P0170*	Abnormal fuel system (cylinder 1, 4)	P.13A-74
P0173*	Abnormal fuel system (cylinder 2, 3)	P.13A-75
P0201*	No. 1 injector system	P.13A-78

Code No.	Diagnosis item	Reference page
P0202*	No. 2 injector system	P.13A-78
P0203*	No. 3 injector system	P.13A-78
P0204*	No. 4 injector system	P.13A-78
P0220*	Accelerator pedal position sensor (main) system	P.13A-83
P0225*	Throttle position sensor (sub) system	P.13A-90
P0300*	Ignition coil (power transistor) system	P.13A-96
P0325*	Detonation sensor system	P.13A-104
P0335*	Crank angle sensor system	P.13A-107
P0340*	Camshaft position sensor system	P.13A-117
P0403*	Exhaust gas recirculation control system	P.13A-126
P0500	Vehicle speed sensor system <M/T>	P.13A-132
	Vehicle speed signal system <A/T>	P.13A-134
P0513	Immobilizer malfunction <Australia, New Zealand and GCC>	P.13A-135
P0551	Power steering fluid pressure sensor system	P.13A-137
P0603	EEP ROM malfunction	P.13A-147
P0606*	Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction	P.13A-147
P0622	Alternator FR terminal system	P.13A-148
P0638*	Throttle valve control servo circuit range/performance problem	P.13A-152
P1121*	Throttle valve control servo power system	P.13A-155
P1122*	Throttle valve control servo connector system	P.13A-162
P1221*	Throttle valve position feedback system	P.13A-166
P1223*	Communication line system with the throttle valve controller	P.13A-169
P1225*	Accelerator pedal position sensor (sub) system	P.13A-170
P1603*	Battery backup circuit malfunction	P.13A-177
U1073	Bus off	P.13A-179
U1102	ABS-ECU time-out	P.13A-180
U1108*	Combination meter time-out	P.13A-182
U1110	A/C-ECU time-out	P.13A-183

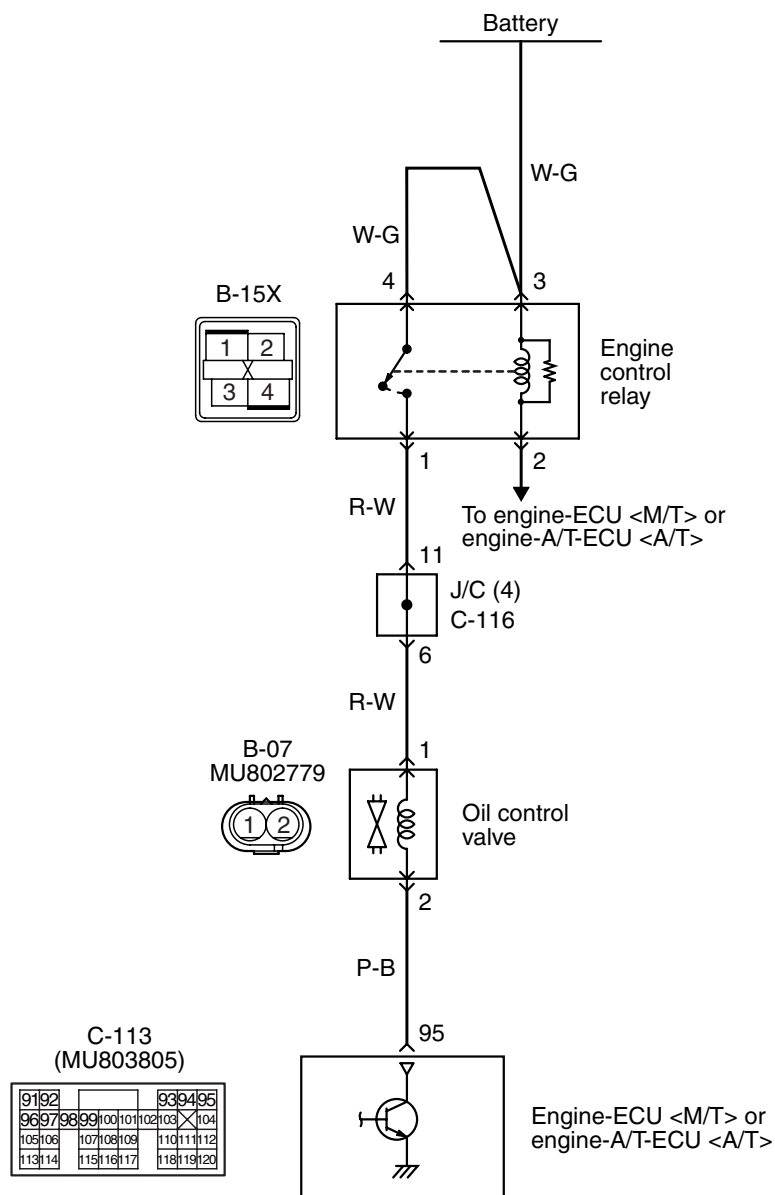
NOTE:

- 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 malfunction.

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. P0075: Oil Control Valve Circuit

Oil control valve circuit



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 Condition

- The oil control valve does not operate. (i.e. when the ignition switch is in ON position or the engine runs at the idle speed and so on)

Judgment Criterion

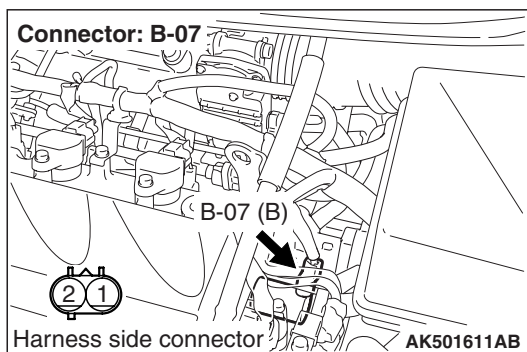
- The oil control valve drive terminal voltage of the engine-ECU <M/T> or engine-A/T-ECU <A/T> is not normal for 2 seconds or more.

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

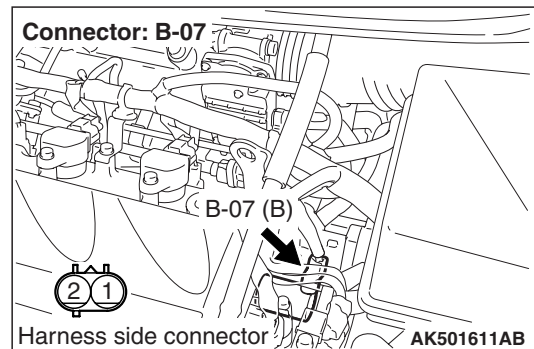
STEP 1. Connector check: B-07 oil control valve connector



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.

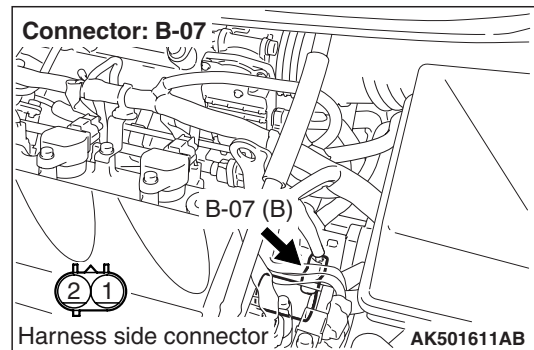


- Disconnect connector, and measure at control valve side.
- Resistance between terminal No. 1 and No. 2.
OK: 6.9 – 7.9 Ω (at 20°C)

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.

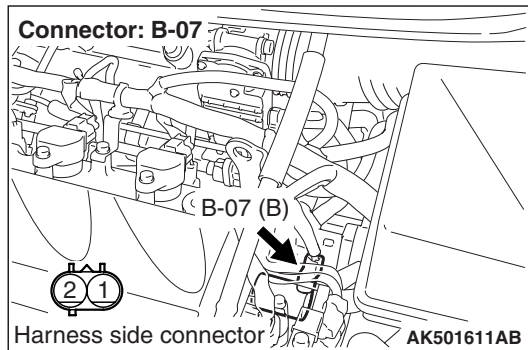
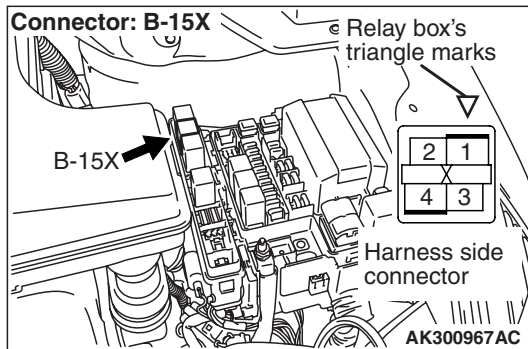


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

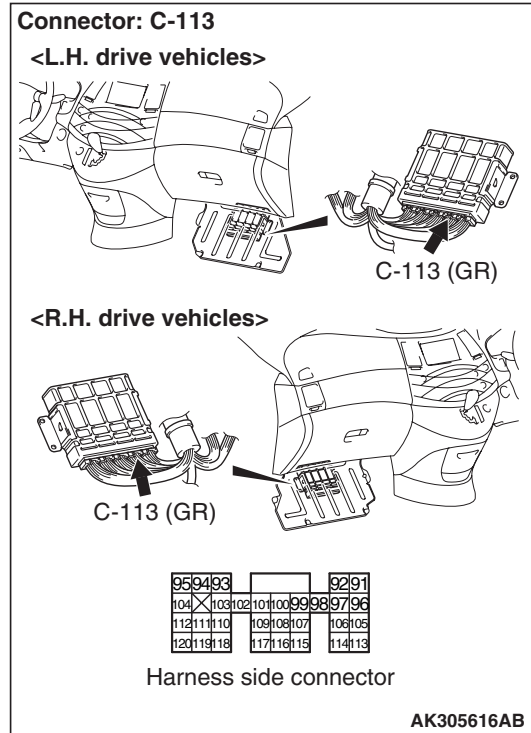
- YES** : Go to Step 5 .
NO : Go to Step 4 .

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.

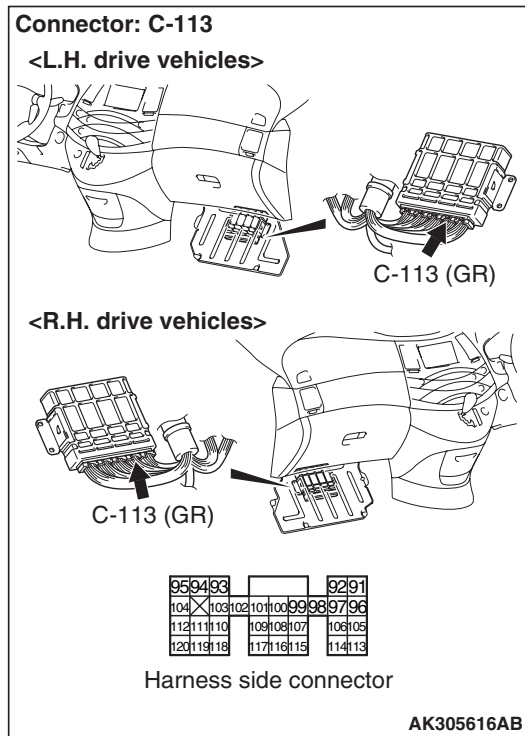
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 95 and earth.

OK: System voltage**Q: Is the check result normal?**

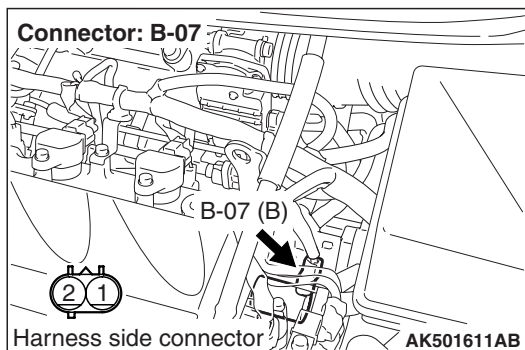
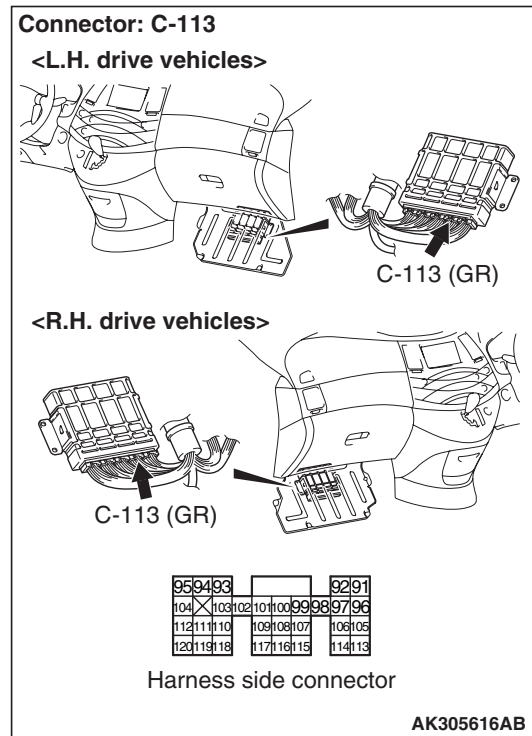
YES : Go to Step 7 .

NO : Go to Step 6 .

**STEP 6. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



**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.

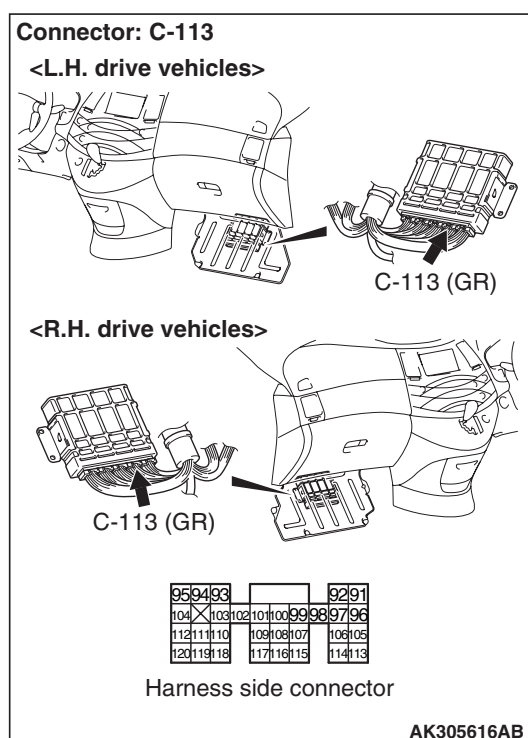
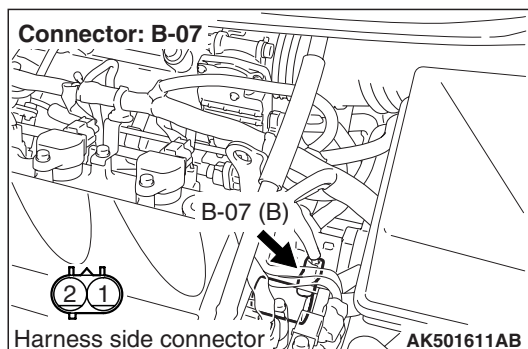
Q: Is the check result normal?

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 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.



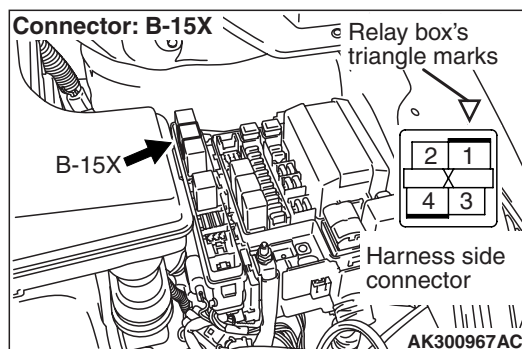
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Connector check: B-15X engine control relay connector.

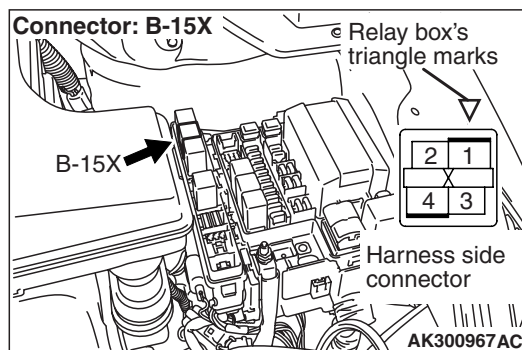
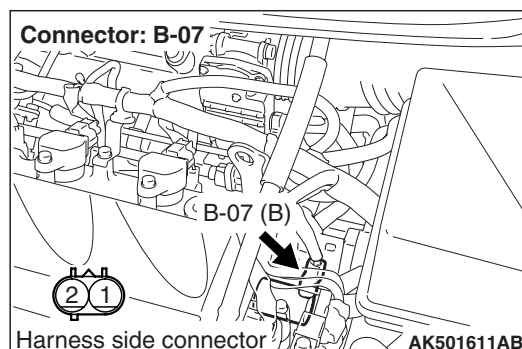


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. 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 C-116, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

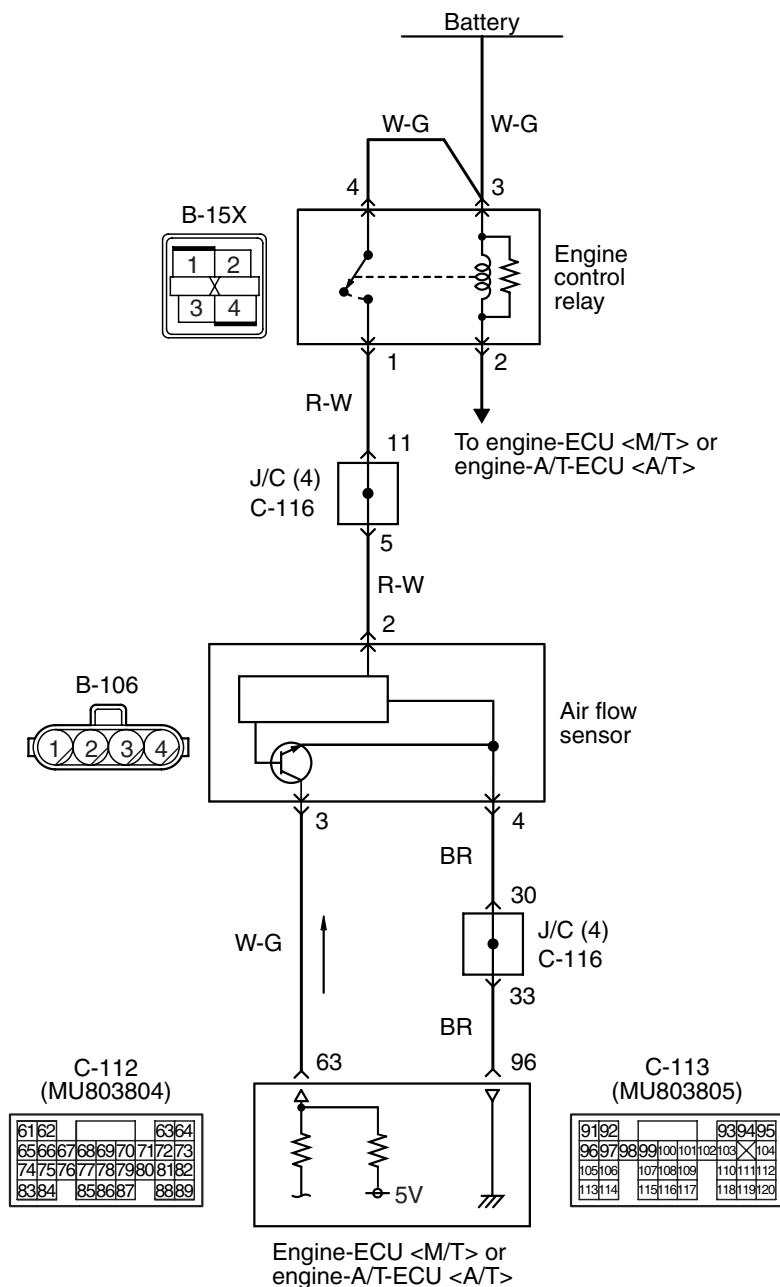
Q: Is the diagnosis code set?

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. 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

AK305548AB

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. M.U.T.-III data list

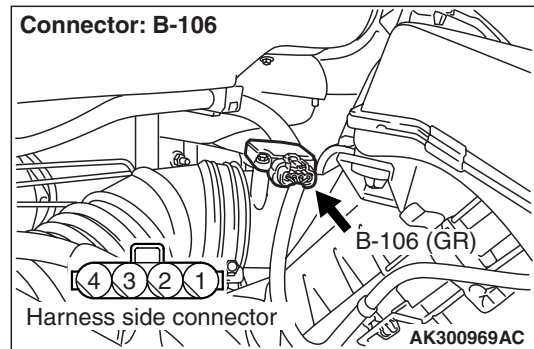
- Refer to Data List Reference Table [P.13A-284](#).
a. Item 12: Air flow sensor

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

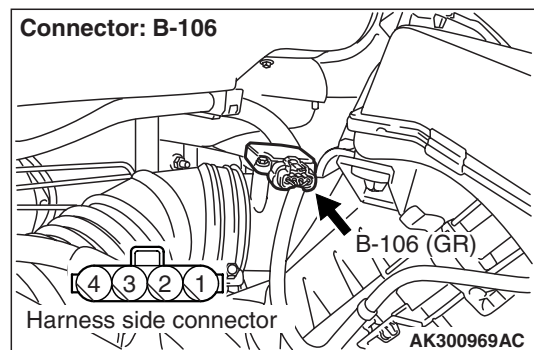


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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



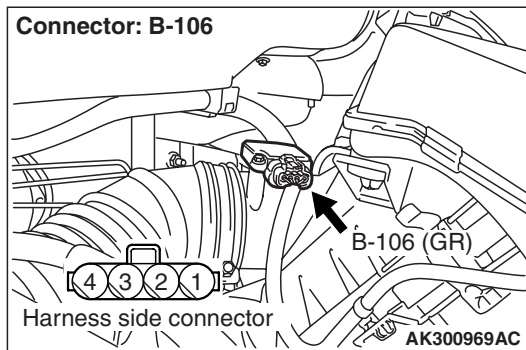
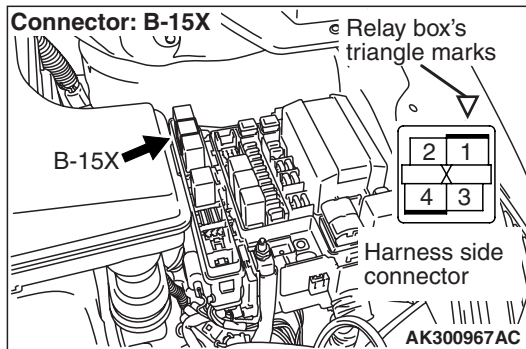
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

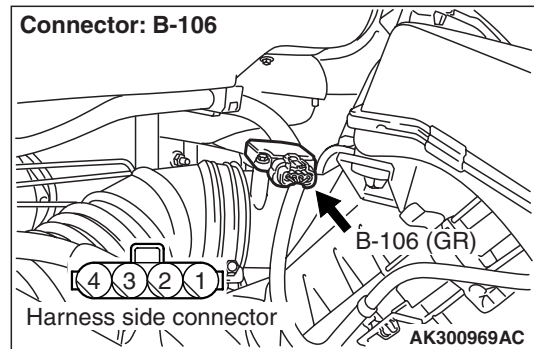
NO : Go to Step 4 .

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

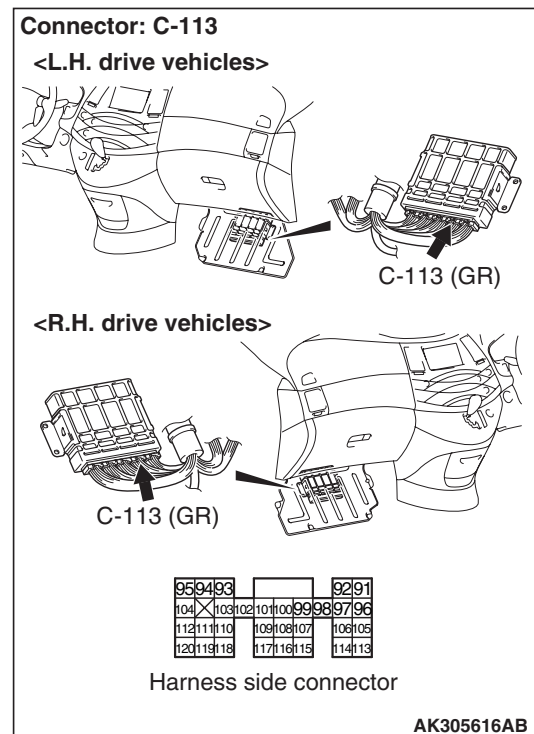
- Disconnect and measure at harness side.
- Resistance between terminal No. 4 and earth.

OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 9 .

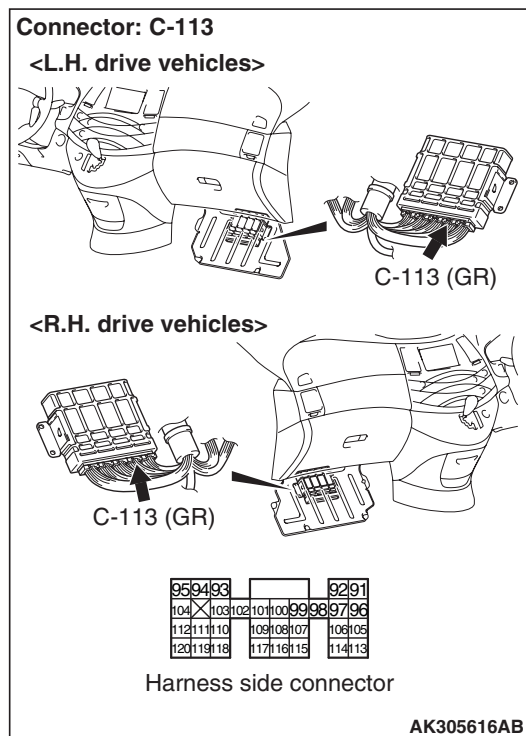
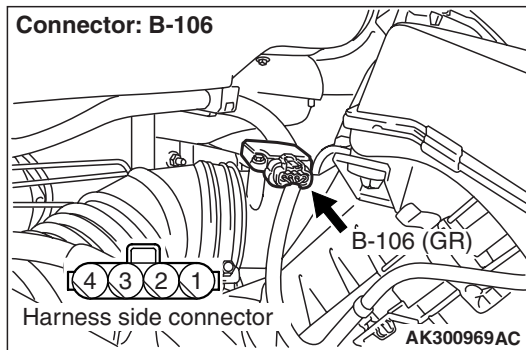
NO : Go to Step 6 .

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 and damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. M.U.T.-III data list

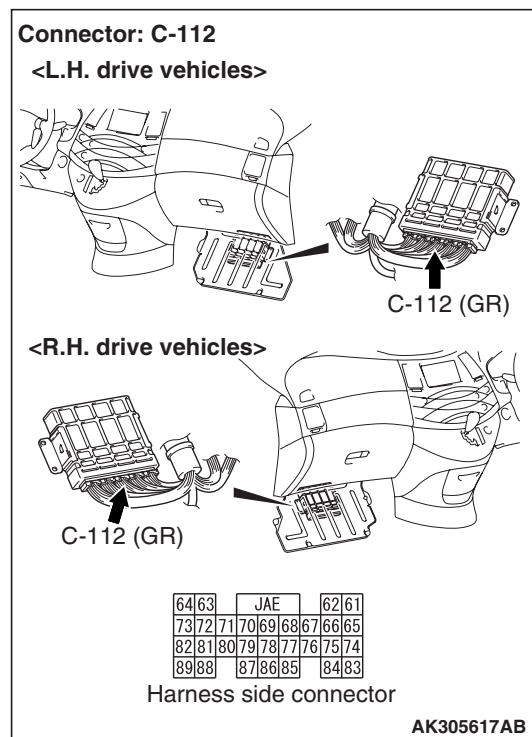
- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 12: Air flow sensor

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.

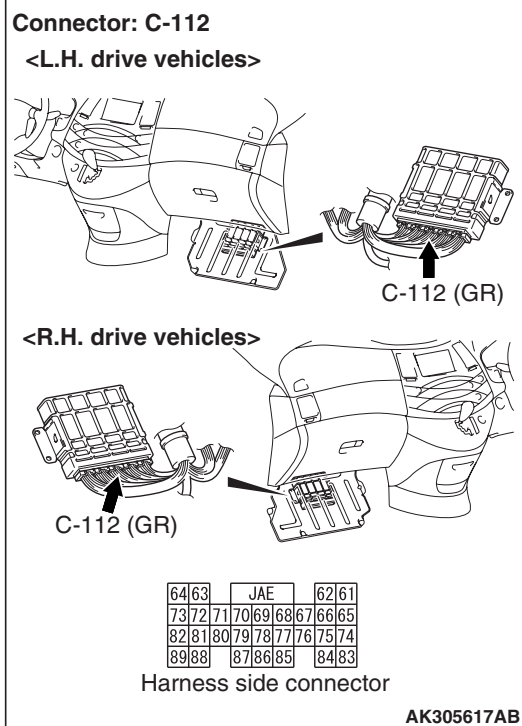
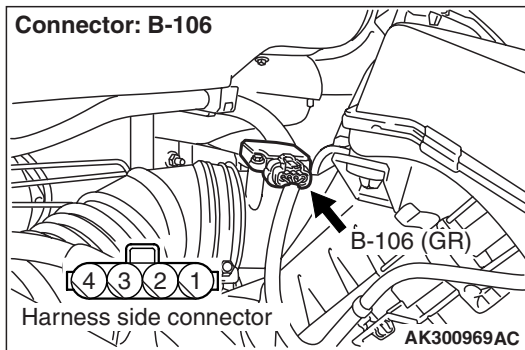


Q: Is the check result normal?

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.



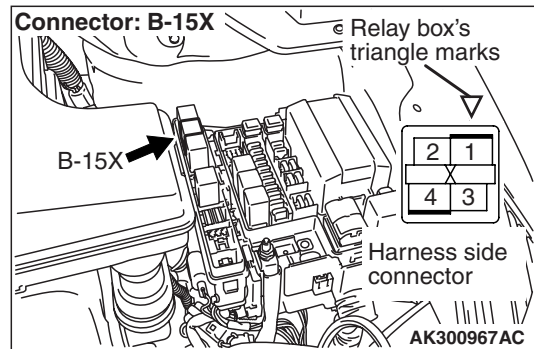
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

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

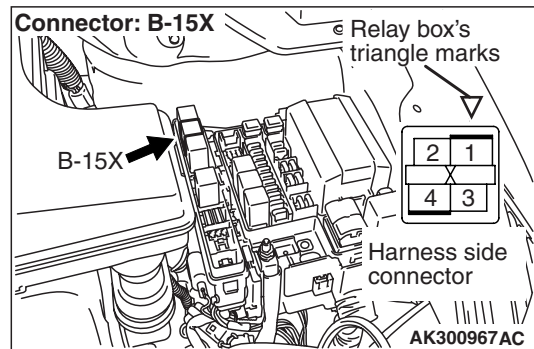
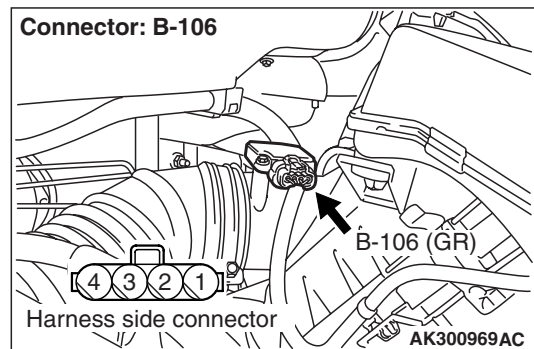


Q: Is the check result normal?

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. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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 air flow sensor. Then go to Step 14

STEP 14. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

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.

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 of 8 V or more.

Judgment Criteria

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

or

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

PROBABLE CAUSE

- Failed barometric pressure sensor

DIAGNOSIS PROCEDURE

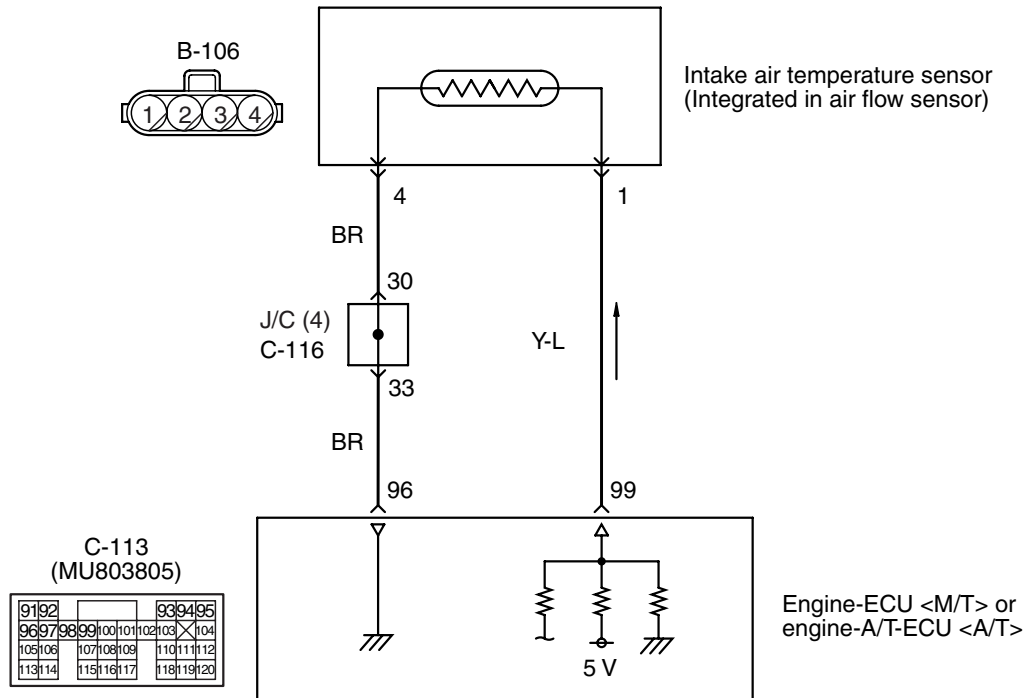
STEP 1. M.U.T.-III diagnosis code**Q: Is the diagnosis code set?**

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. 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

AK305601AB

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 Condition

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

Judgment Criteria

- The sensor output voltage is 4.6 V or more (intake air temperature of below -40°C or equivalent) for 4 seconds.
- or
- The sensor output voltage is 0.2 V or less (intake air temperature of above 120°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. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
a. Item 13: Intake air temperature sensor

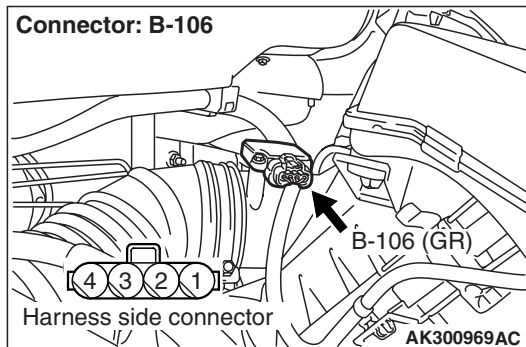
OK: At ambient temperature (atmospheric temperature) or equivalent.

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.

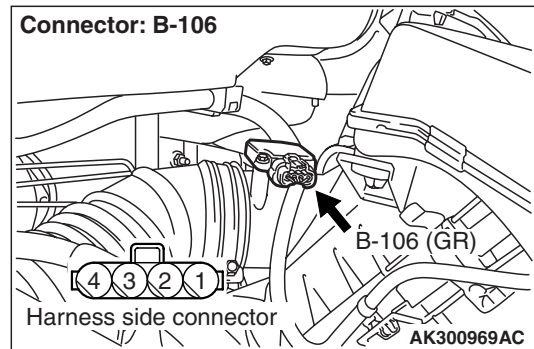
- Check intake air temperature sensor itself (Refer to [P.13A-314](#)).

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.

- Resistance between terminal No. 4 and earth.

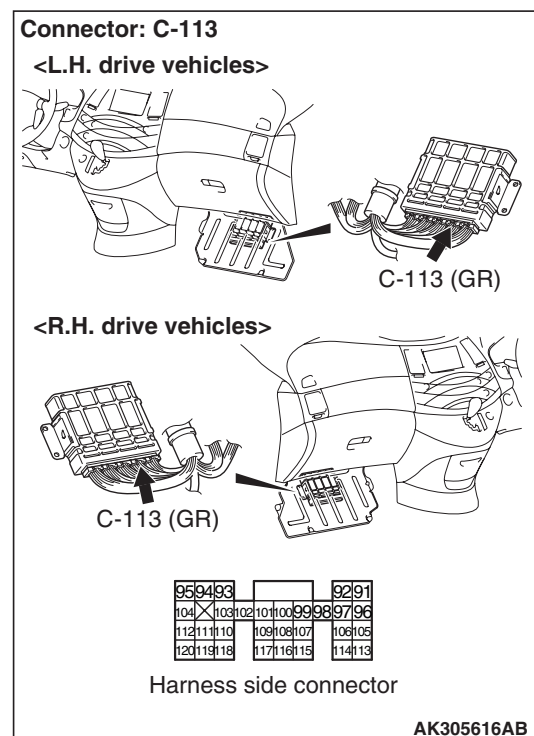
OK: 2 Ω or less

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

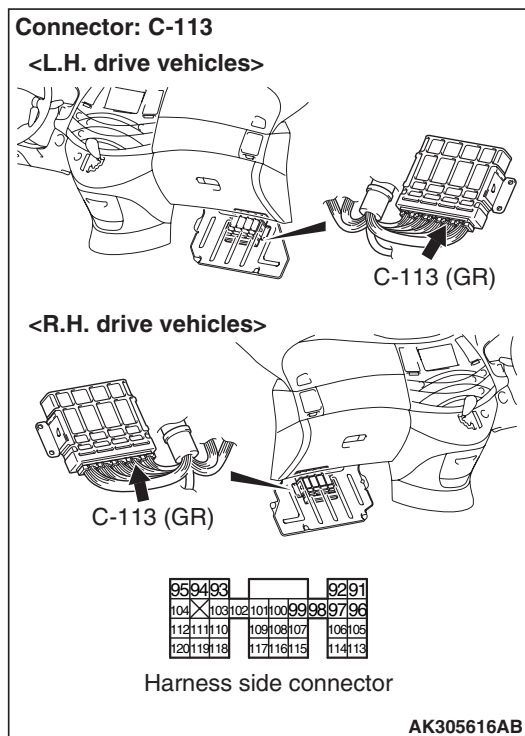
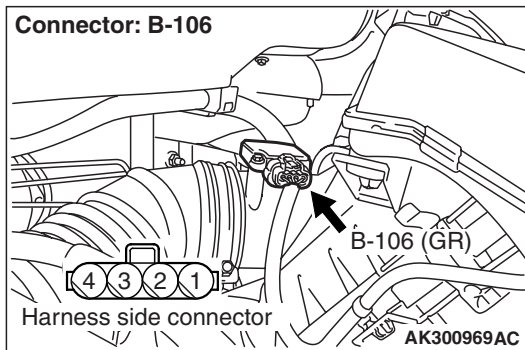


Q: Is the check result normal?

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. M.U.T.-III data list

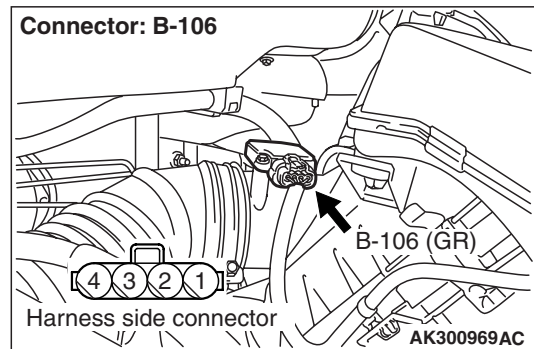
- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item No. 13: Intake air temperature sensor
OK: At ambient temperature (atmospheric temperature) or equivalent.

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.

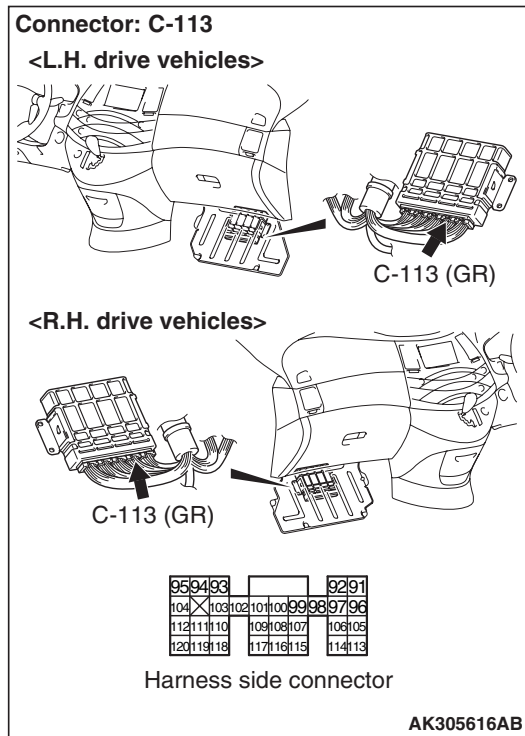
OK: 4.5 – 4.9 V

Q: Is the check result normal?

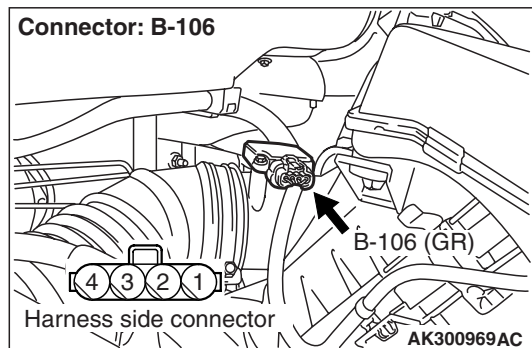
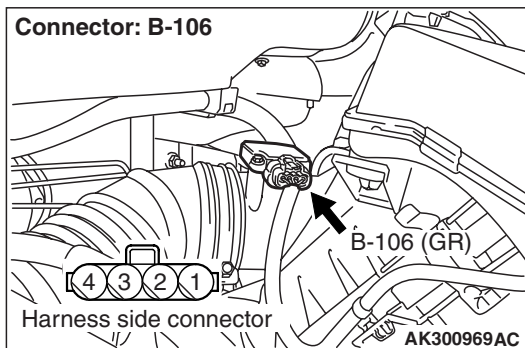
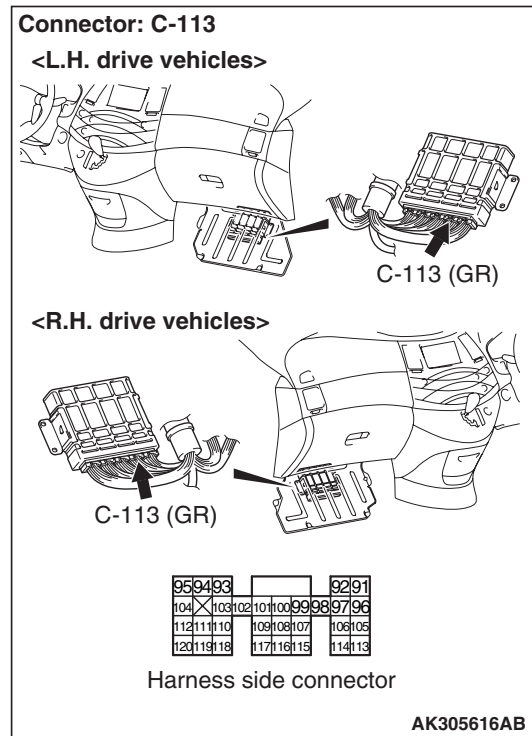
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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 .

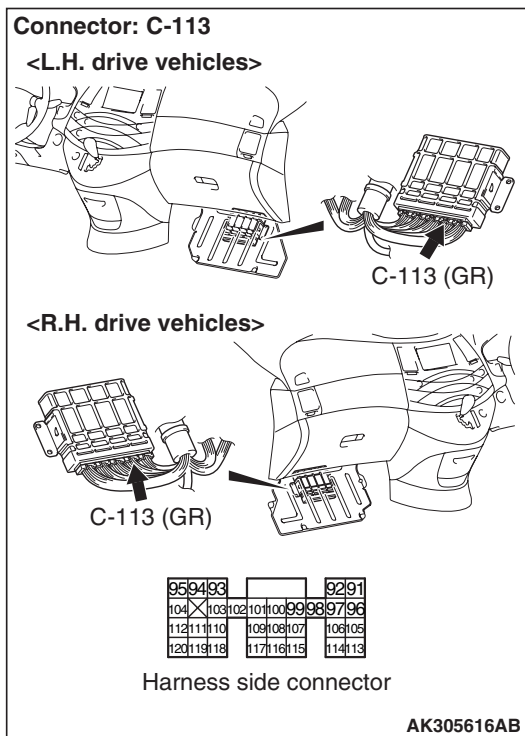
Q: Is the check result normal?

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



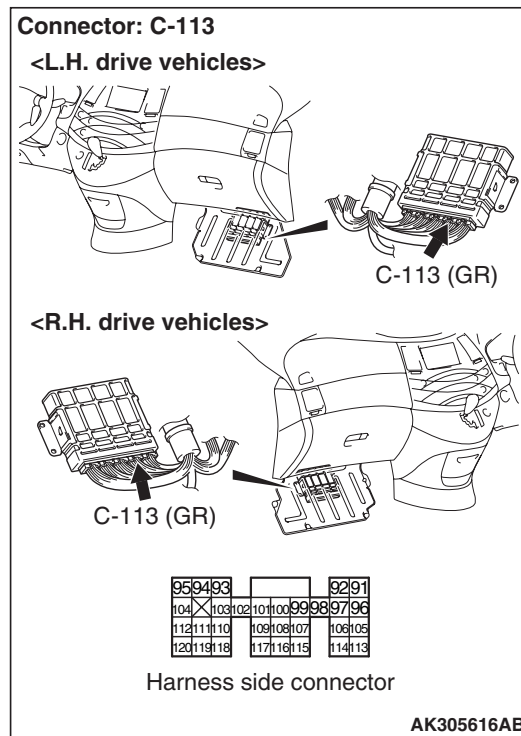
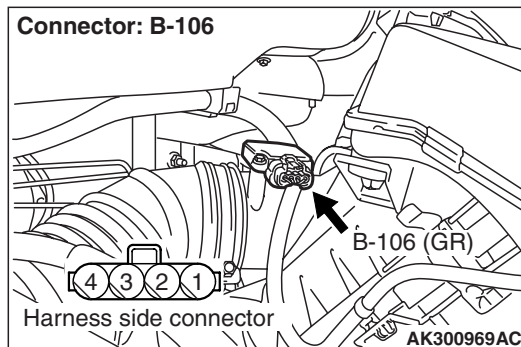
Q: Is the check result normal?

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.

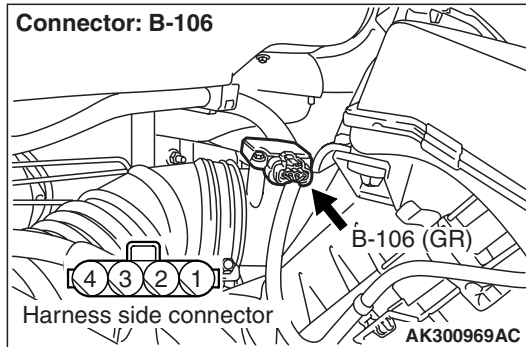


Q: Is the check result normal?

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. 4 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

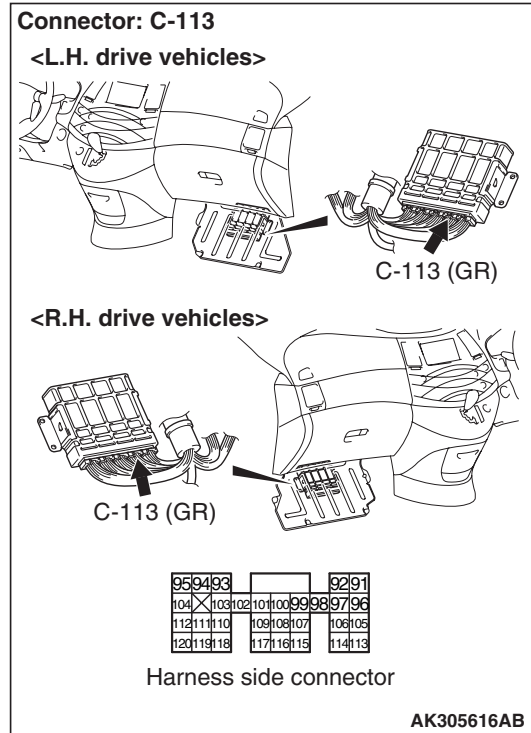
Ambient temperature at 80°C: 0.4 – 1.0 V

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

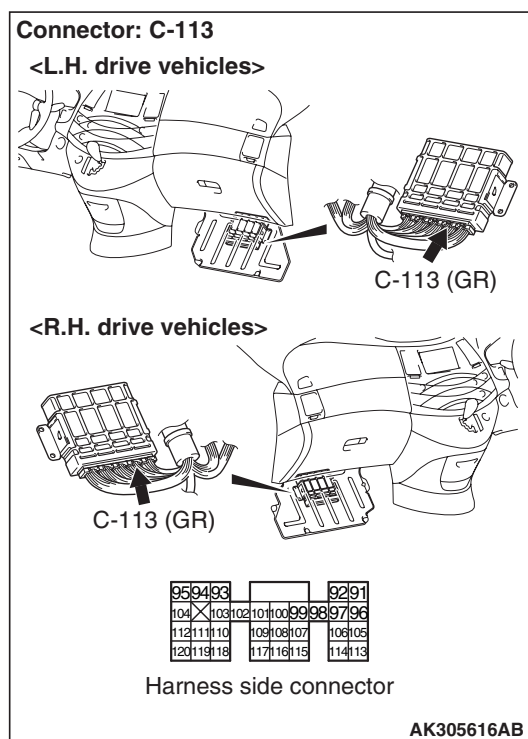
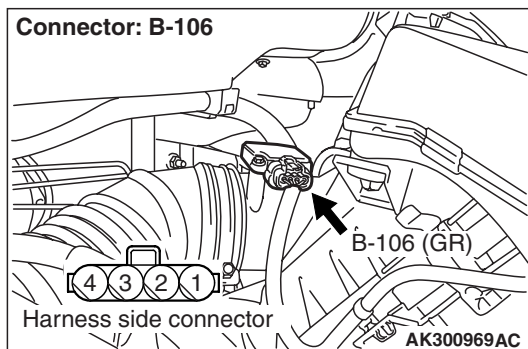


Q: Is the check result normal?

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.



- Check output line for damage.

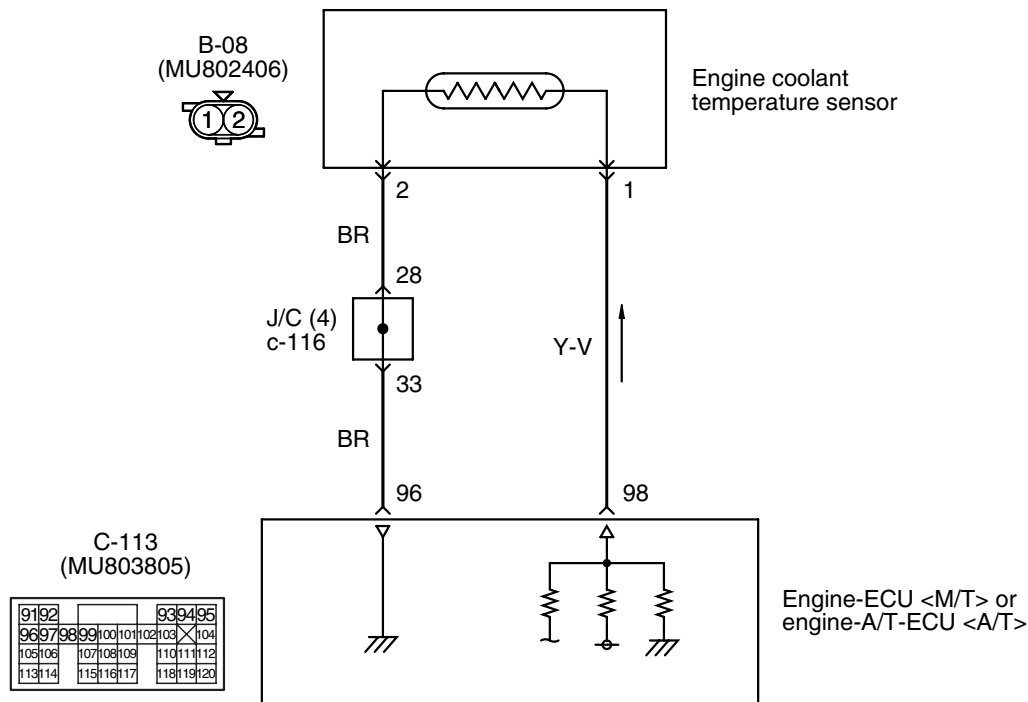
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

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 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 4.6 V or more (water temperature of below -45°C or equivalent) for 2 seconds.

or

- The sensor output voltage is 0.1 V or less (water temperature of above 140°C or equivalent) for 2 seconds.

Check Condition

- After the engine has started up.

Judgment Criterion

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

PROBABLE CAUSE

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

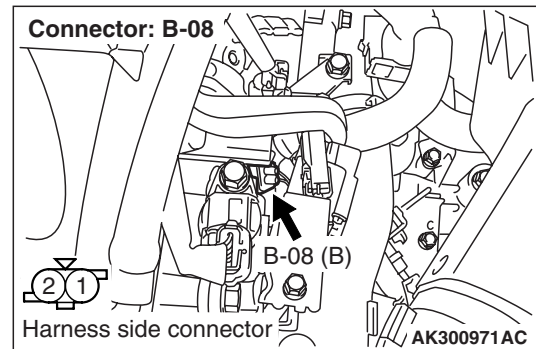
DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III data list**

- Refer to Data List Reference Table [P.13A-284](#).
 - Item 21: Engine coolant temperature sensor

OK:**Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.****Engine hot state: At $80 - 120^{\circ}\text{C}$** **Q: Is the check result normal?**

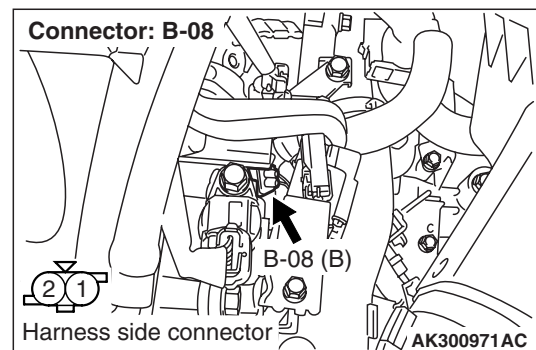
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

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.

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 : $14 - 17 \text{ k}\Omega$

Engine coolant temperature at 0°C : $5.1 - 6.5 \text{ k}\Omega$

Engine coolant temperature at 20°C : $2.1 - 2.7 \text{ k}\Omega$

Engine coolant temperature at 40°C : $0.9 - 1.3 \text{ k}\Omega$

Engine coolant temperature at 60°C : $0.48 - 0.68 \text{ k}\Omega$

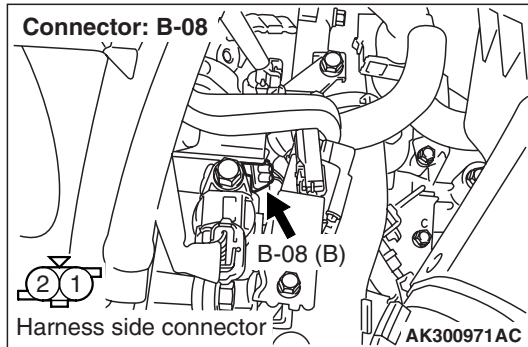
Engine coolant temperature at 80°C : $0.26 - 0.36 \text{ k}\Omega$

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace engine coolant temperature sensor.

STEP 4. Perform resistance measurement at B-08 engine coolant temperature sensor connector.



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

OK: 2 Ω or less

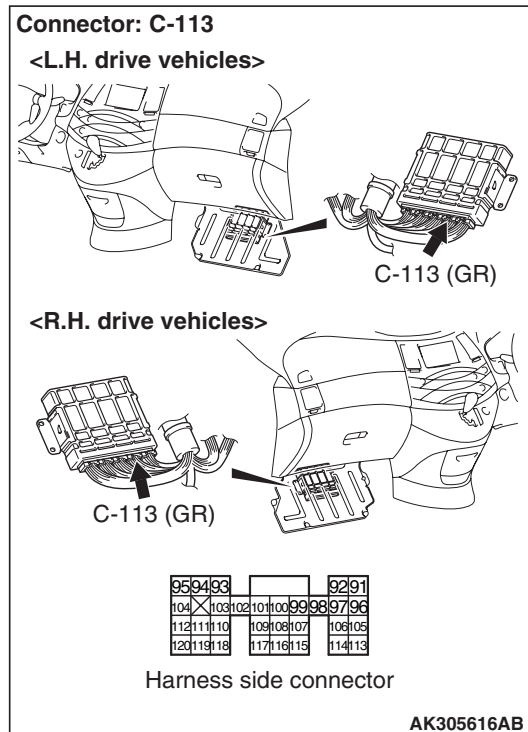
Q: Is the check result normal?

YES : Go to Step 8 .

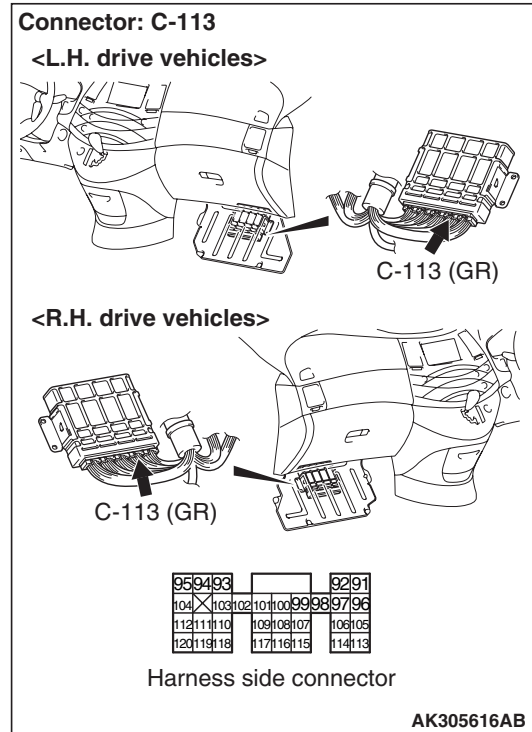
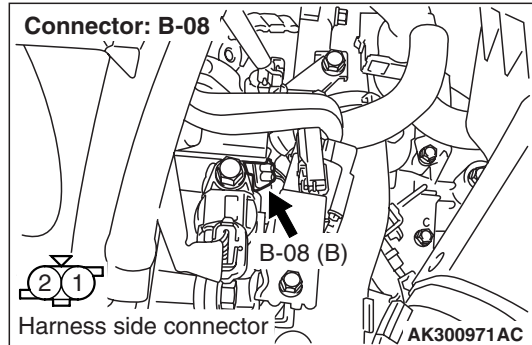
NO : Go to Step 5 .

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?



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.

YES : Go to Step 6 .

NO : Repair or replace.

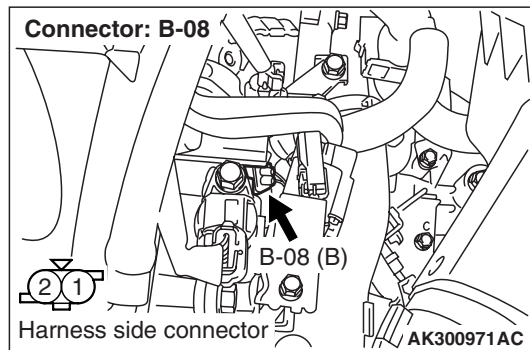
STEP 7. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - Item 21: Engine coolant temperature sensor

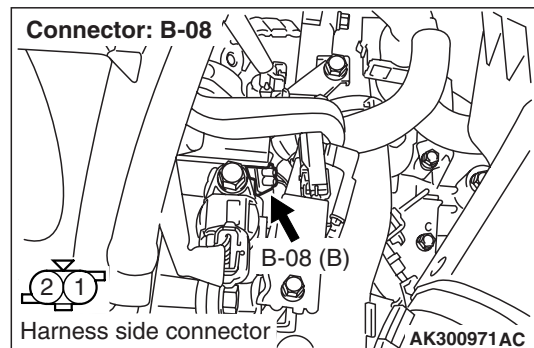
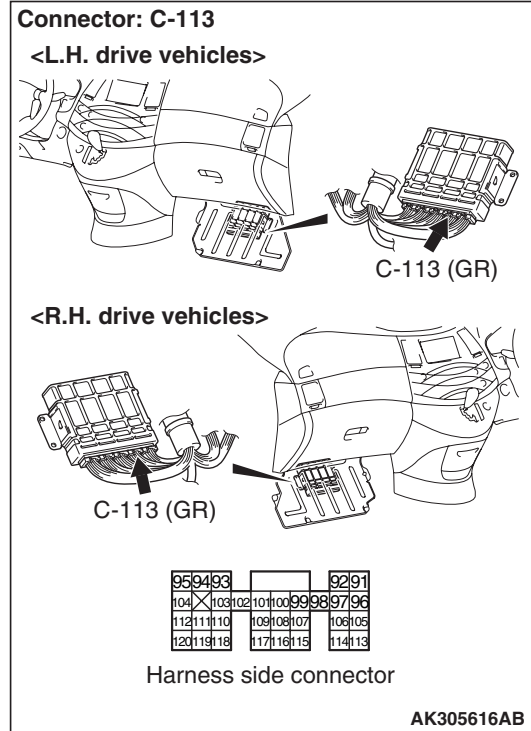
OK:**Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.****Engine hot state: At 80 – 120 °C****Q: Is the check result normal?**

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.

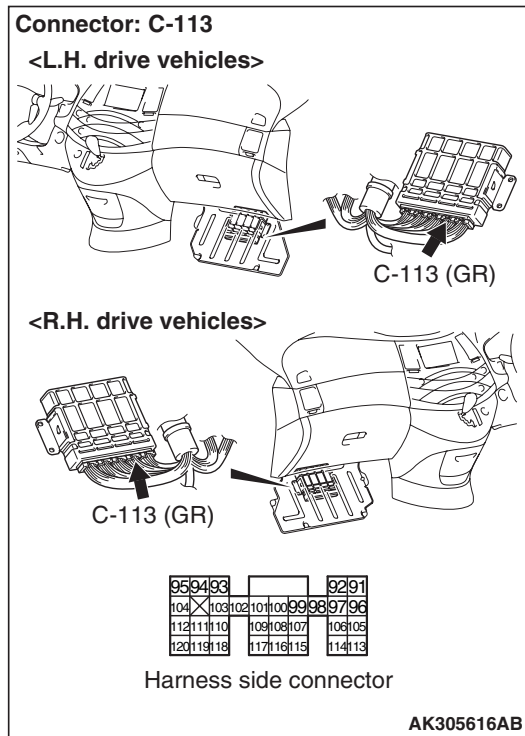
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

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.**

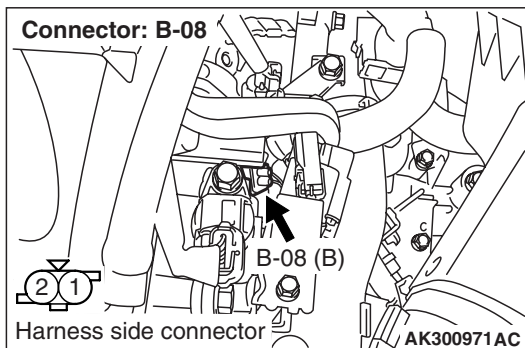
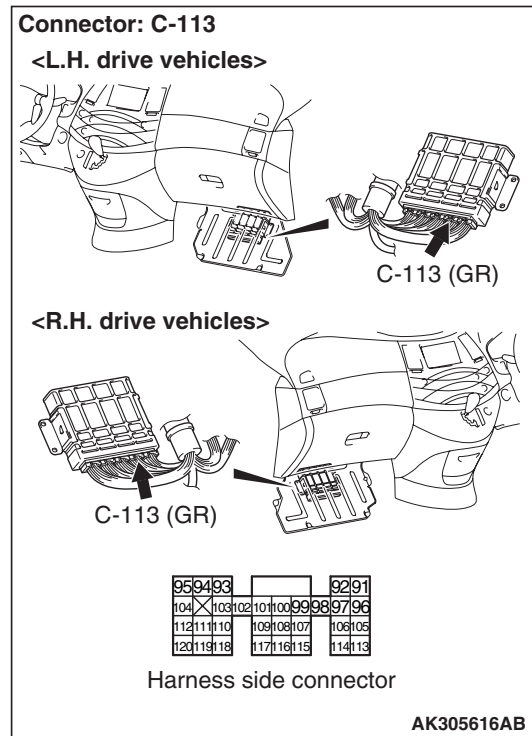
- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Disconnect B-08 engine coolant temperature sensor.
- Ignition switch: ON
- Voltage between terminal No. 98 and earth.

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**



**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.

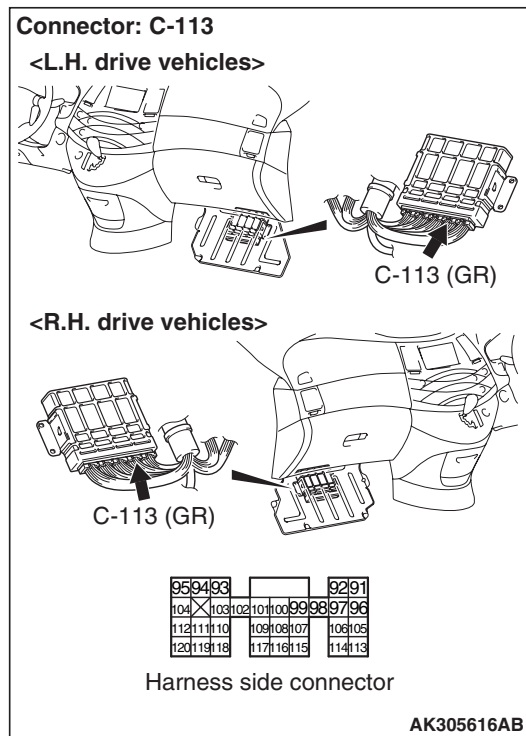
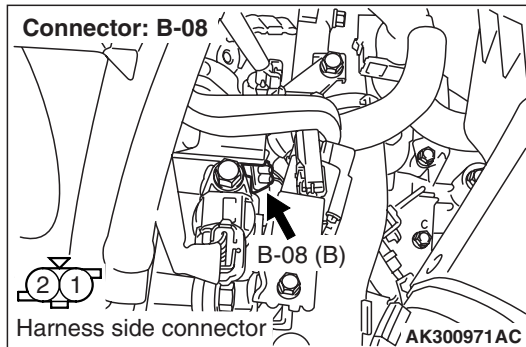
Q: Is the check result normal?

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 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



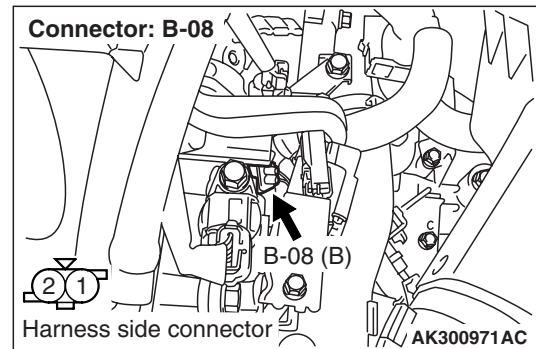
- Check output line for short circuit.

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

OK:

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

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

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

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

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

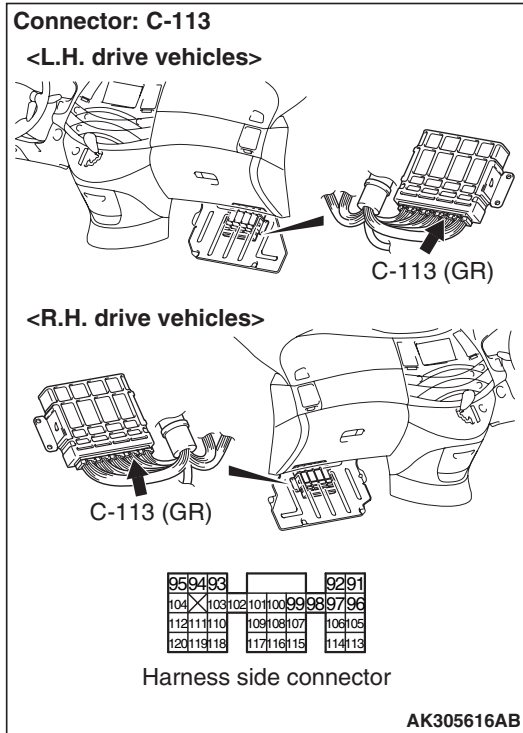
Engine coolant temperature at 80°C : 0.3 – 0.9 V

Q: Is the check result normal?

YES : Go to Step 7 .

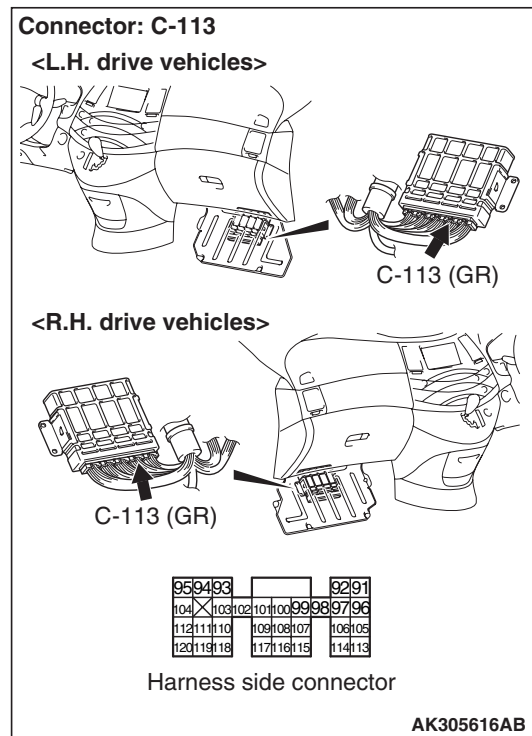
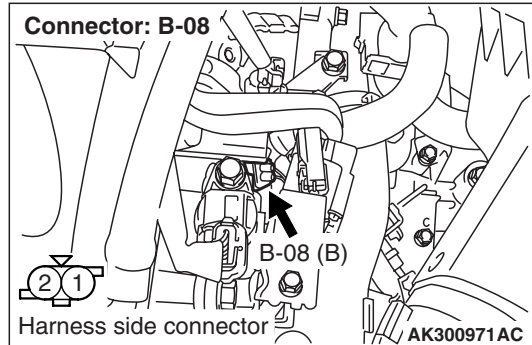
NO : Go to Step 14 .

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.

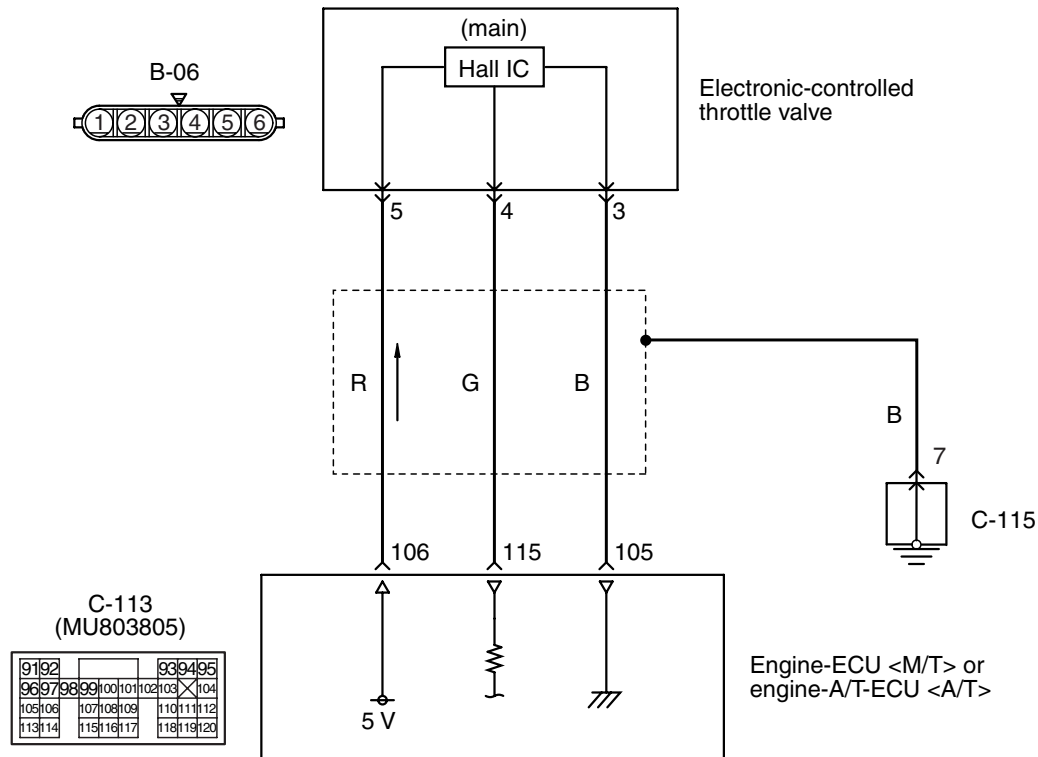


- Check output line for damage.

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

Code No. P0120: Throttle Position Sensor (Main) System

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

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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. 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 Criteria

- Throttle position sensor (main) output voltage is 0.3 V or less.

or

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

Check Conditions

- Ignition switch is in "ON" position.
- Throttle position sensor (main) output voltage is between 0.2 V and 4.8 V.
- Throttle position sensor (sub) output voltage is between 2.2 V and 4.8 V.

Judgment Criteria

- Throttle position sensor (main) output voltage is 2.5 V or more and throttle position sensor (sub) output voltage is 4.2 V or less.

or

- When throttle position sensor (main) output voltage is 2.5 V or less, voltage obtained with the formula given below is 0.3 V or more:

Throttle position sensor (main) output voltage –
[throttle position sensor (sub) output voltage – 2
V]

PROBABLE CAUSE

- Failed throttle position sensor
- Open/short circuit in throttle position sensor (main) circuit or loose connector contact
- Harness damaged 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. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

YES : Go to Step 2

NO : Go to Step 3 .

STEP 2. M.U.T.-III data list

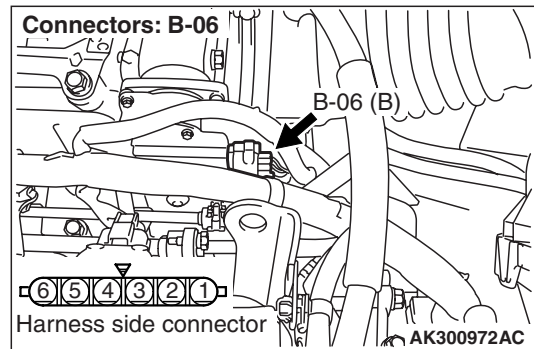
- Refer to Data List Reference Table [P.13A-284](#).
a. Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

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

NO : Check throttle position sensor (sub) system
(Refer to Code No. P0225 [P.13A-90](#)).

STEP 3. Connector check: B-06 electronic-controlled throttle valve connector

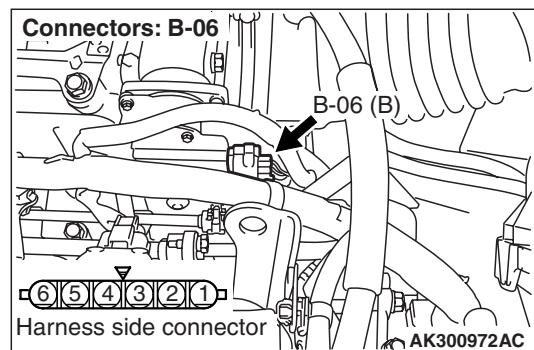


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. 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.

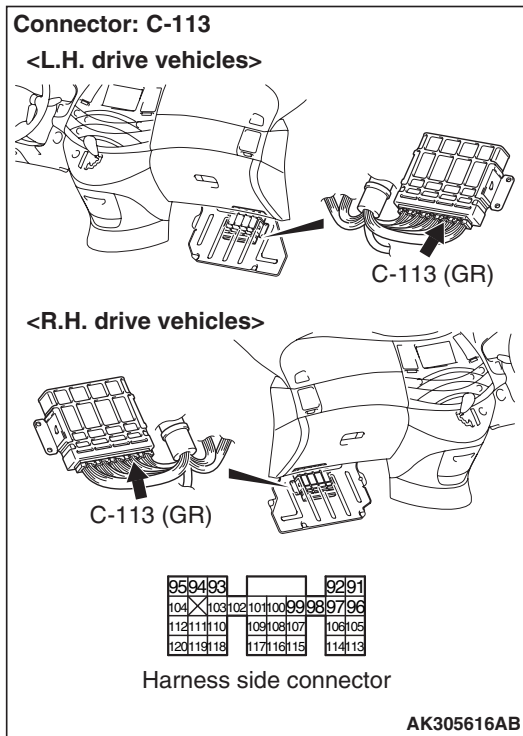
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 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

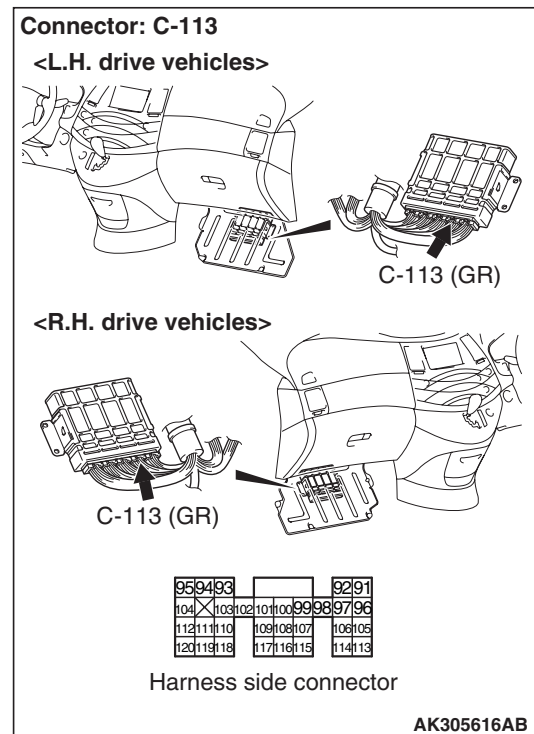
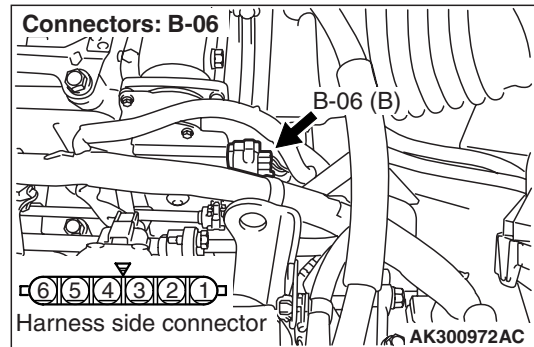


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check harness between B-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 7 .

NO : Repair.

STEP 7. M.U.T.-III data list

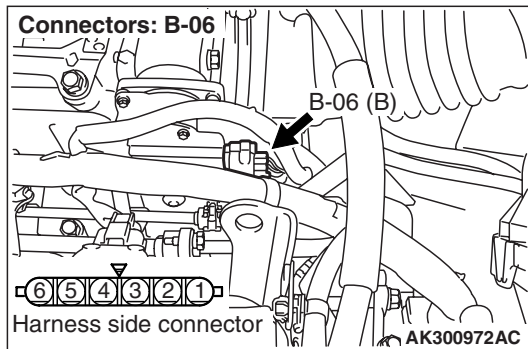
- Refer to Data List Reference Table [P.13A-284](#).
 - Item 79: Throttle position sensor (main)

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 8. 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.

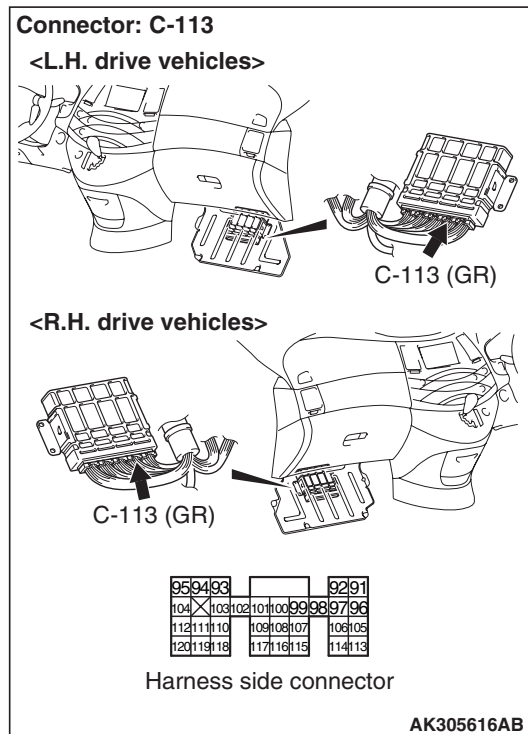
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 9 .

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

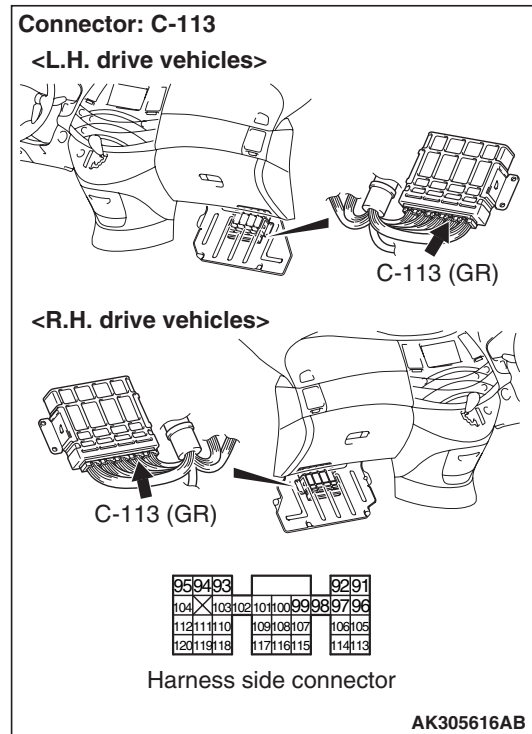
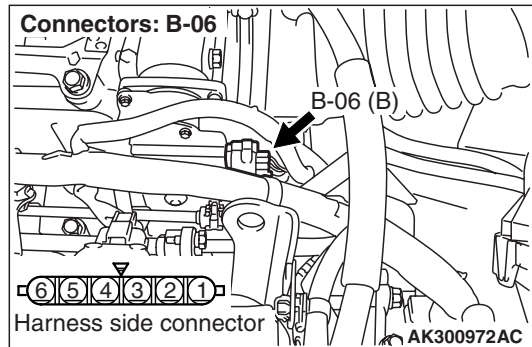


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. Check harness between 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 11 .

NO : Repair.

STEP 11. M.U.T.-III data list

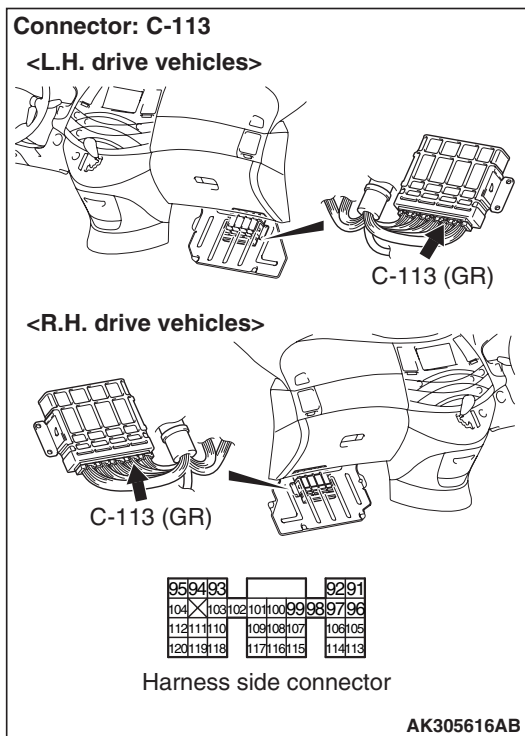
- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 79: Throttle position sensor (main)

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

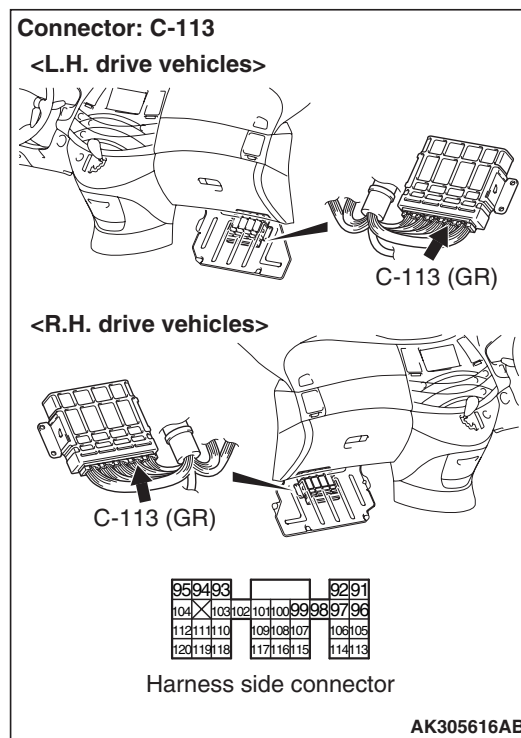
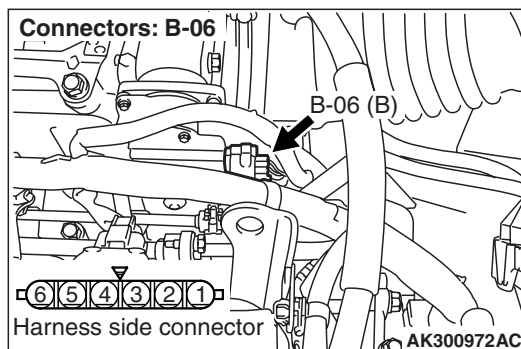


Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair or replace.

STEP 13. 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.



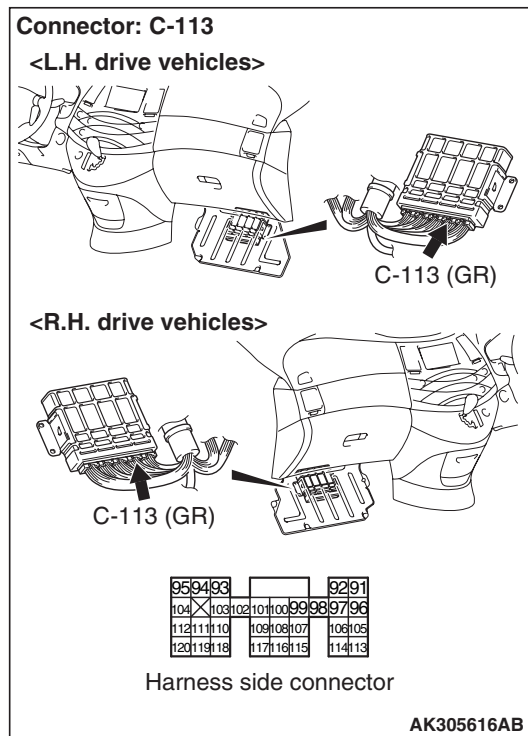
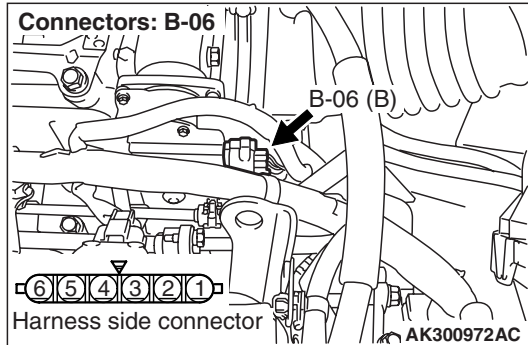
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14. 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 15 .

NO : Repair.

STEP 15. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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 throttle body assembly. Then go to Step 16 .

STEP 16. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

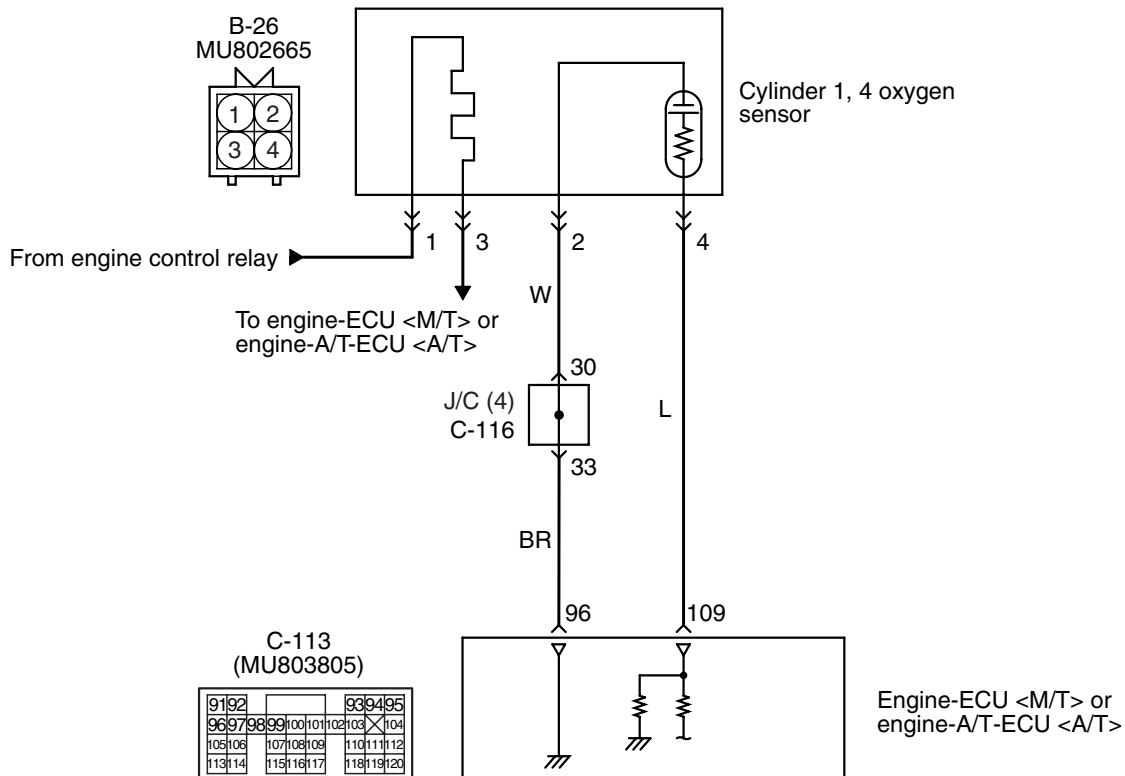
Q: Is the diagnosis code set?

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

NO : Check end.

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

Cylinder 1, 4 oxygen 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

AK501583AB

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 output terminal (terminal No. 4).
- The cylinder 1, 4 oxygen sensor (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 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 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 approximately 80°C or higher.
- The engine speed is 1200 r/min. or more.
- Volumetric efficiency 25% or more.
- During the run at the constant speed on the flat road.

Judgment Criterion

- When a power voltage of 5 V is applied to the cylinder 1, 4 oxygen sensor in the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the sensor output voltage is 4.5V or more.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

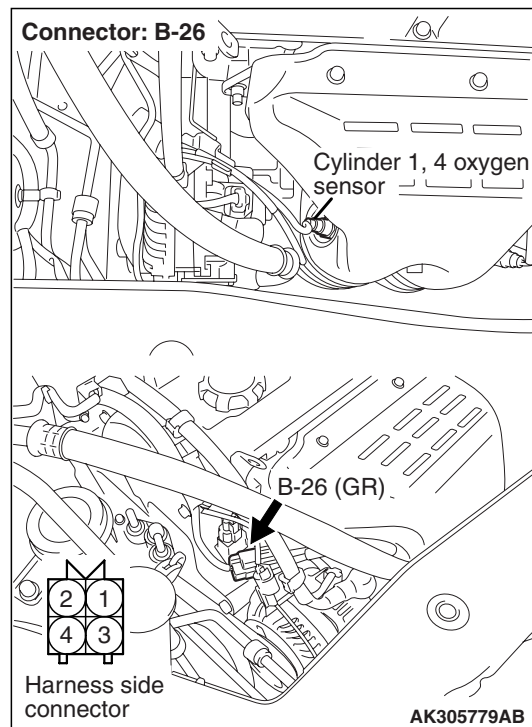
- Refer to Data List Reference Table [P.13A-284](#).
 - Item 11: Cylinder 1, 4 oxygen sensor

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-26 cylinder 1, 4 oxygen sensor connector

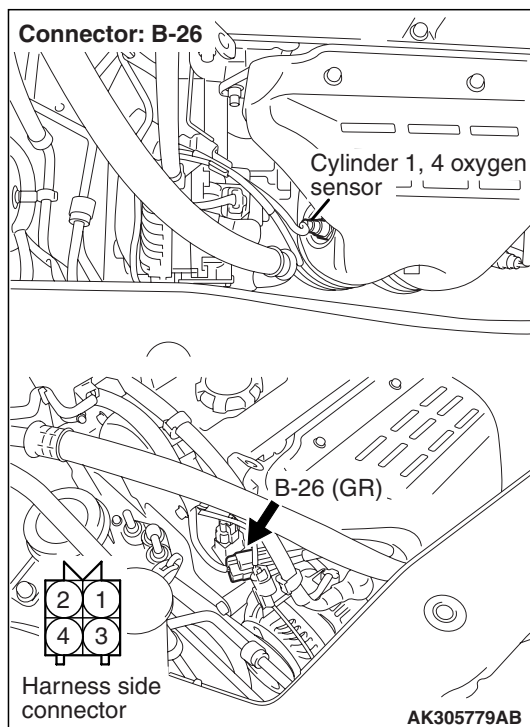


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at B-26 cylinder 1, 4 oxygen sensor connector.



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

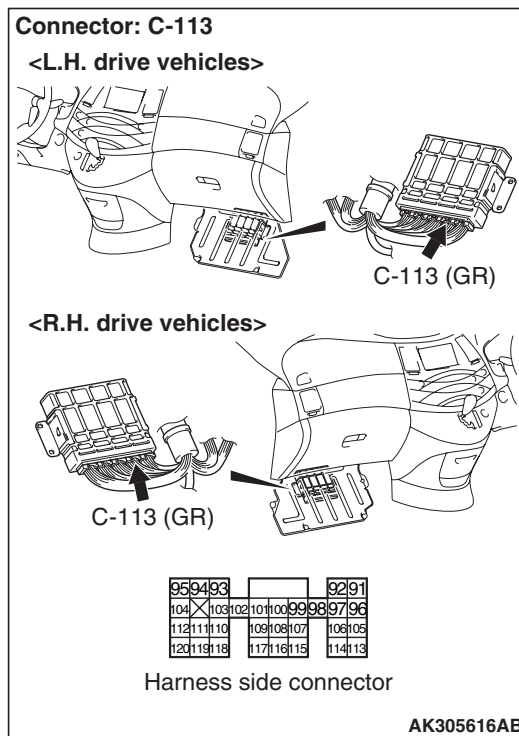
OK: 2 Ω or less

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

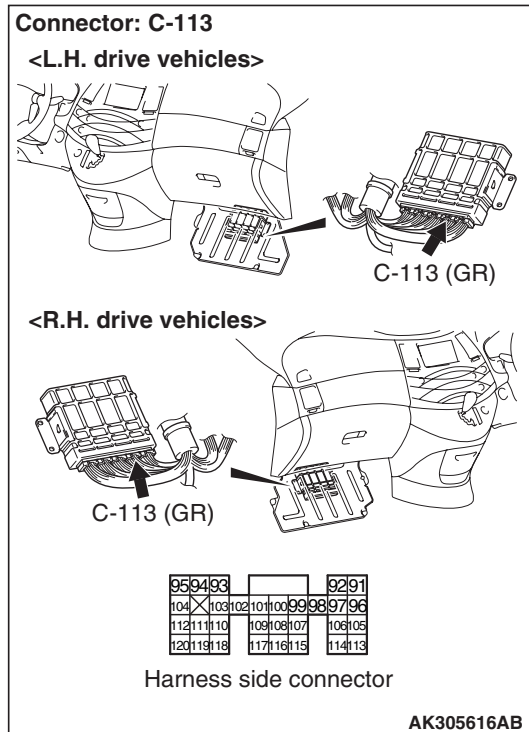
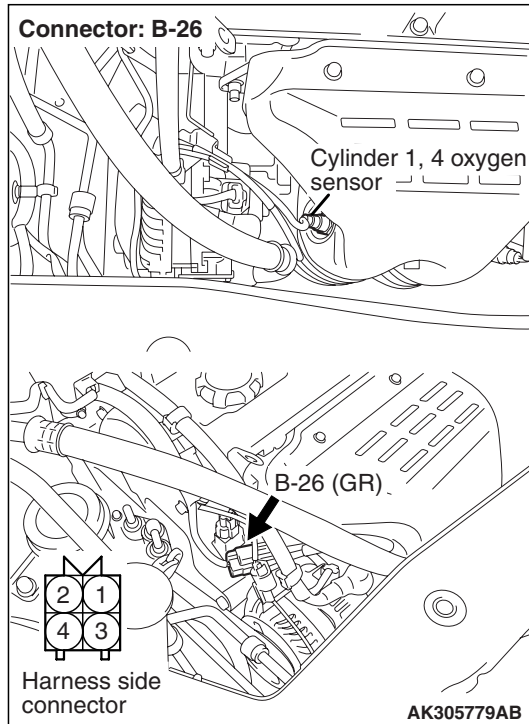


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-26 (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.



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 6 .
NO : Repair.

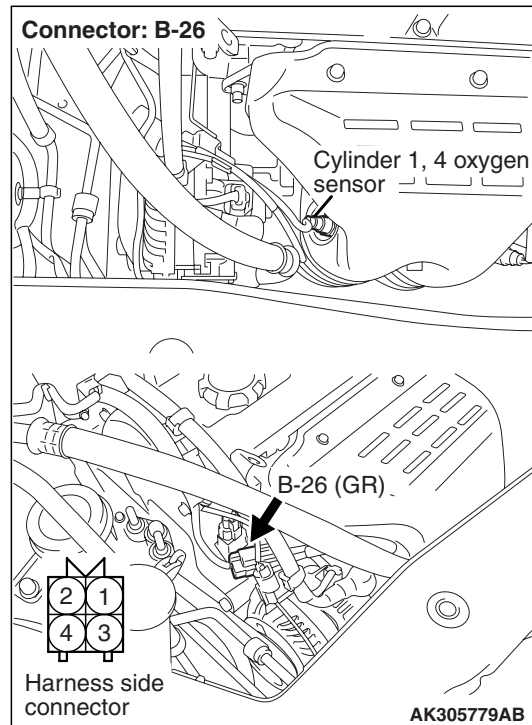
STEP 6. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
a. Item 11: Cylinder 1, 4 oxygen 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 7. Perform voltage measurement at B-26 cylinder 1, 4 oxygen sensor 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 0.4 V or less to 0.6 – 1.0 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 itself.

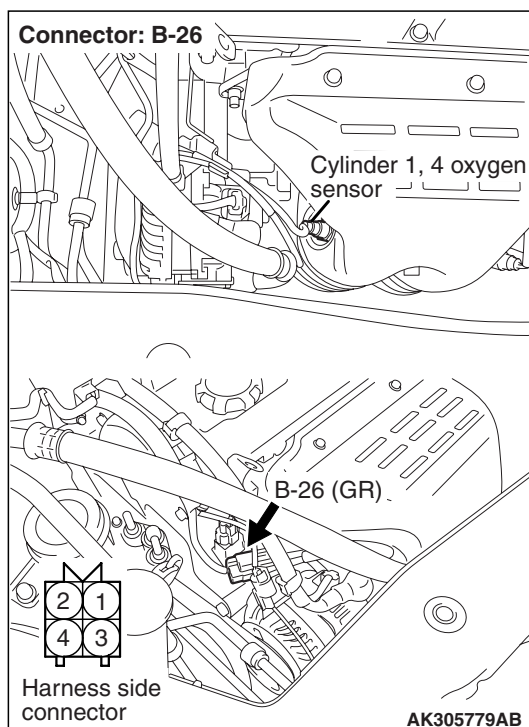
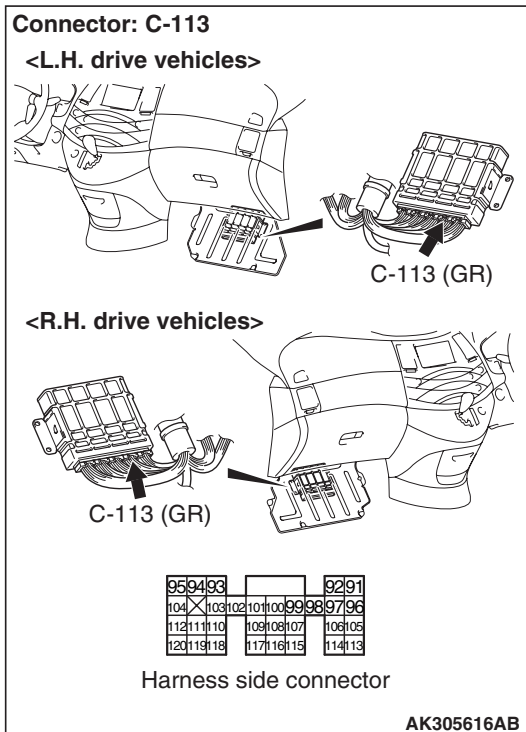
- Check cylinder 1, 4 oxygen sensor itself (Refer to P.13A-316).

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace cylinder 1, 4 oxygen sensor.

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



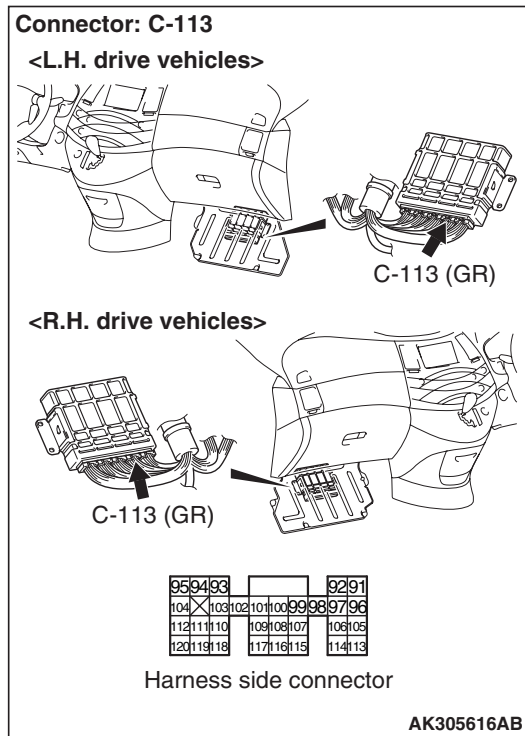
Q: Is the check result normal?

YES : Check and repair harness between B-26 (terminal No. 4) Cylinder 1, 4 oxygen sensor connector and C-113 (terminal No. 109) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

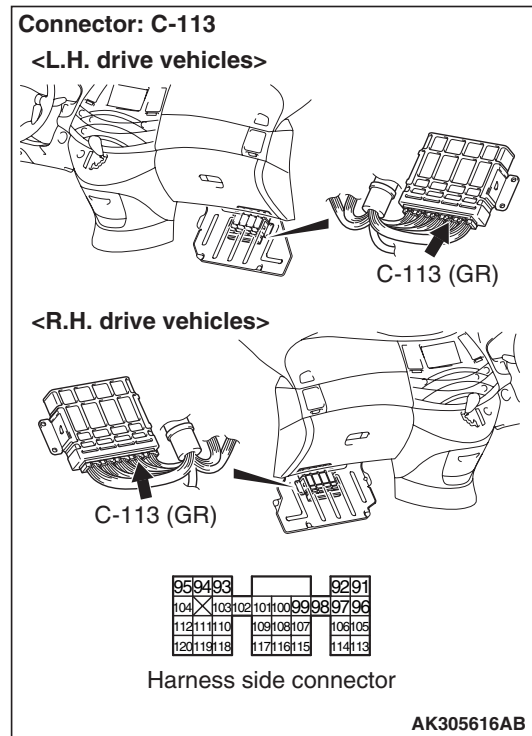
- Check output line for damage.

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.

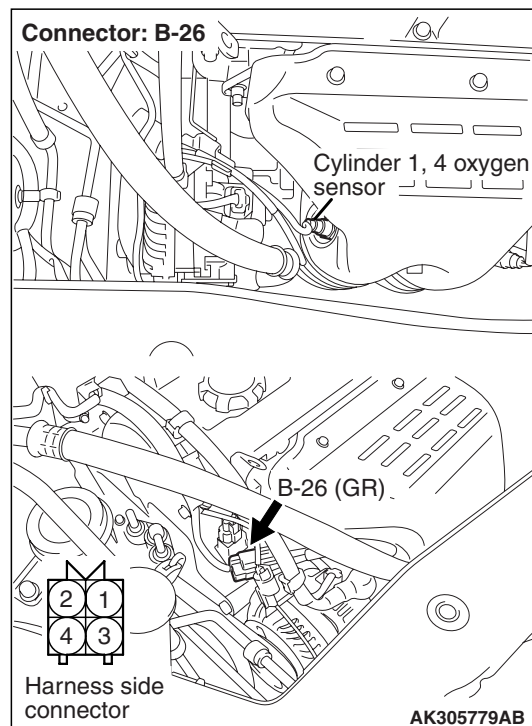
OK:

When the engine is 2,500 r/min., the output voltage should repeat 0.4 V or less to 0.6 – 1.0 V alternately.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .



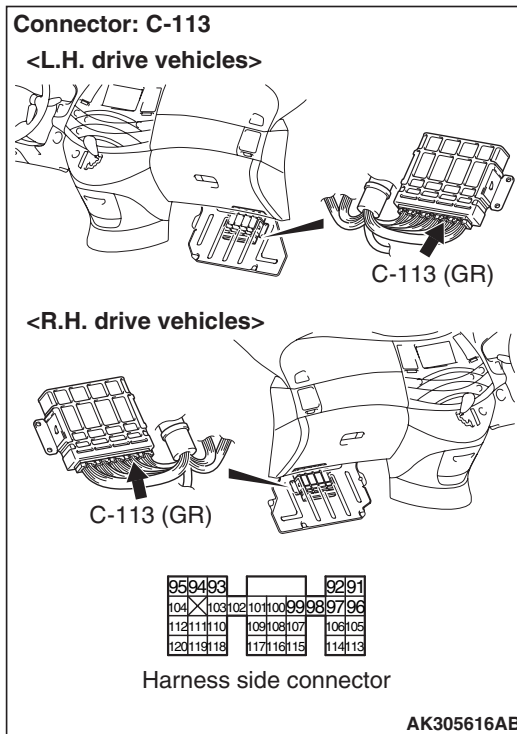
Q: Is the check result normal?

YES : Check and repair harness between B-26 (terminal No. 4) oxygen sensor 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



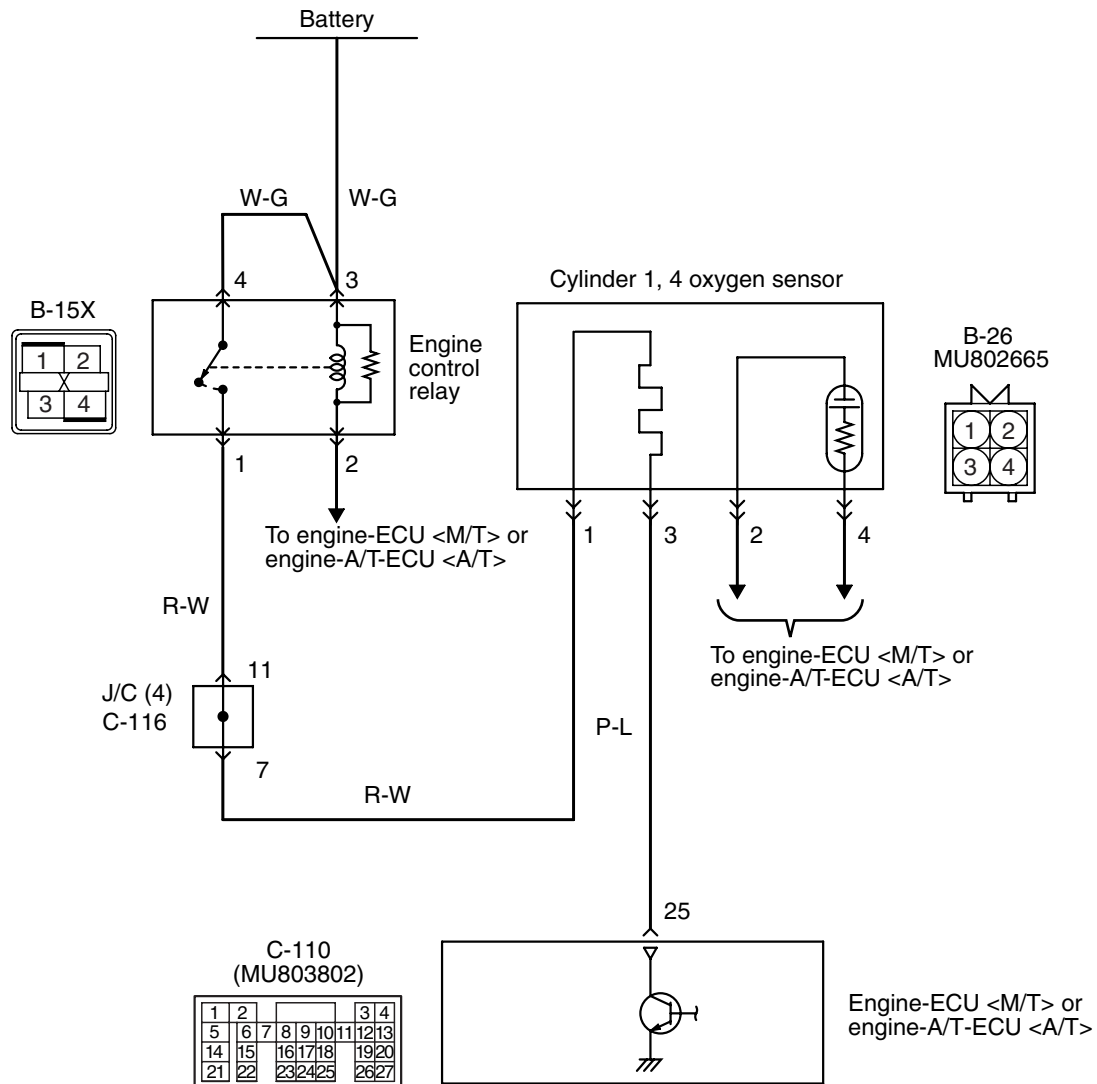
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

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

Cylinder 1, 4 oxygen sensor heater circuit



Wire colour code

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

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OPERATION

- Power is supplied to the heater power terminal (terminal No. 1) of the Cylinder 1, 4 oxygen sensor connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 3) of the Cylinder 1, 4 oxygen sensor 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 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 heater enables the cylinder 1, 4 oxygen sensor to provide good response even when the exhaust emission temperature is low.

TROUBLE JUDGMENT**Check Conditions**

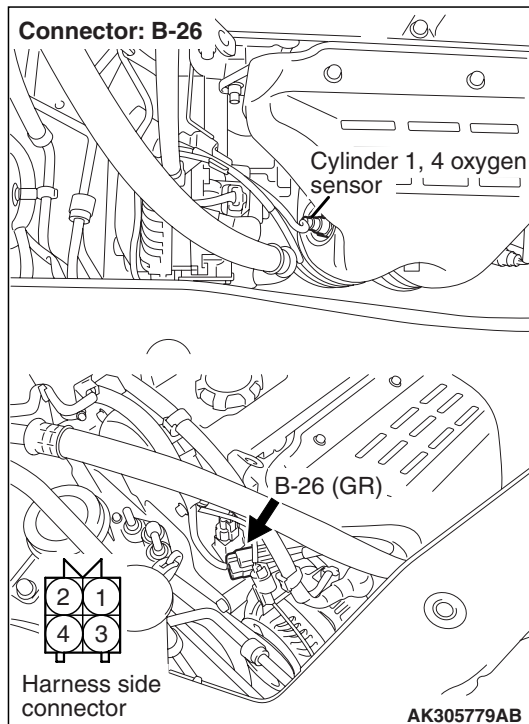
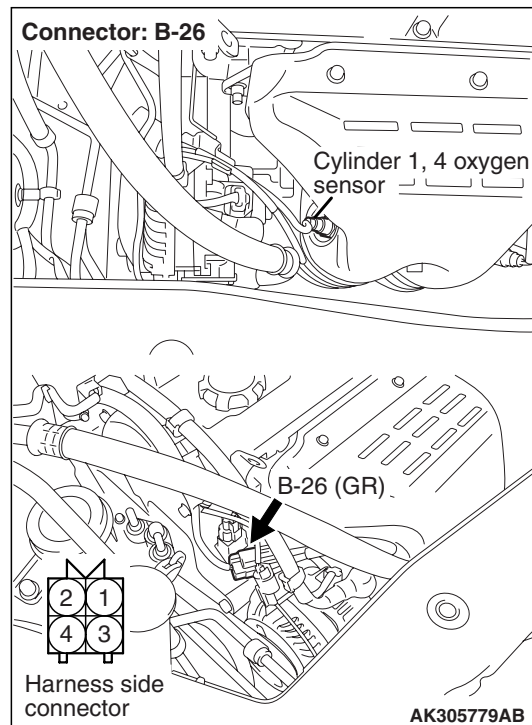
- Engine coolant temperature is 20°C or higher.
- While cylinder 1, 4 oxygen sensor (front) heater is on.
- Engine speed is approximately 50 r/min or more.
- Battery positive voltage is 11 – 16 V.

Judgment Criterion

- Cylinder 1, 4 oxygen sensor (front) heater current has continued to be 0.2 A or less, or 7.5 A or more for 4.3 seconds.

PROBABLE CAUSE

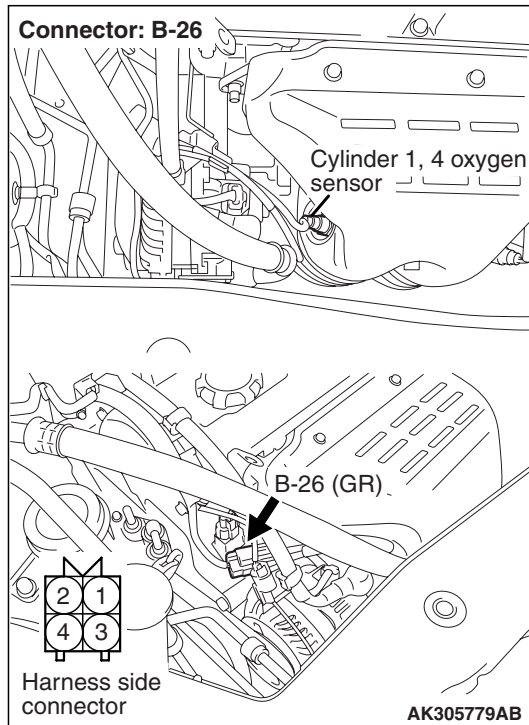
- Failed cylinder 1, 4 oxygen sensor heater
- Open/short circuit in cylinder 1, 4 oxygen sensor circuit heater or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. Connector check: B-26 cylinder 1, 4 oxygen sensor connector****Q: Is the check result normal?****YES :** Go to Step 2 .**NO :** Repair or replace.**STEP 2. Perform resistance measurement at B-26 cylinder 1, 4 oxygen sensor 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.

STEP 3. Perform voltage measurement at B-26 cylinder 1, 4 oxygen sensor connector.



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

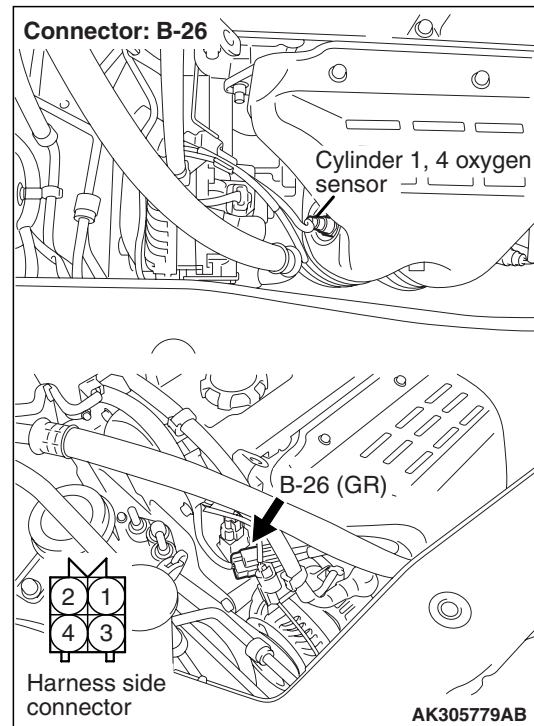
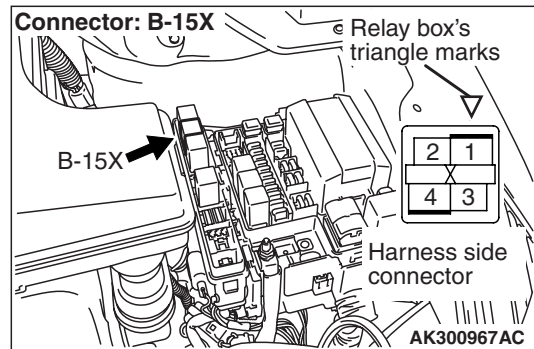
OK: System voltage

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



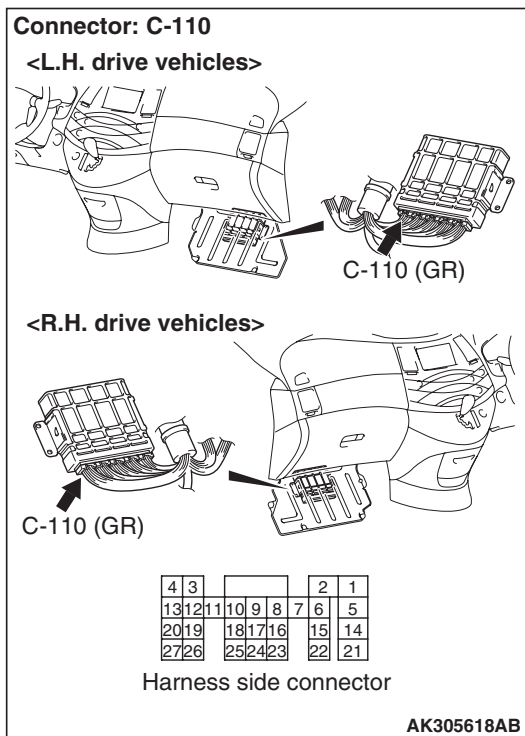
Q: Is the check result normal?

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-26 (terminal No. 1) cylinder 1, 4 oxygen 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. 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.

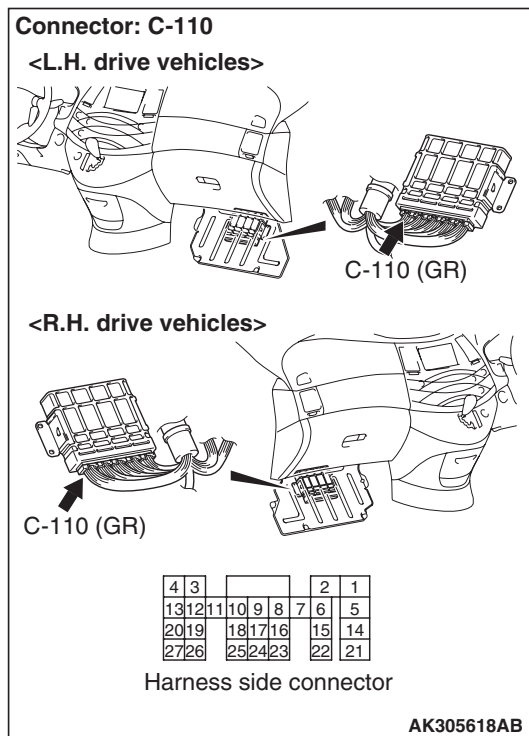
OK: System voltage

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

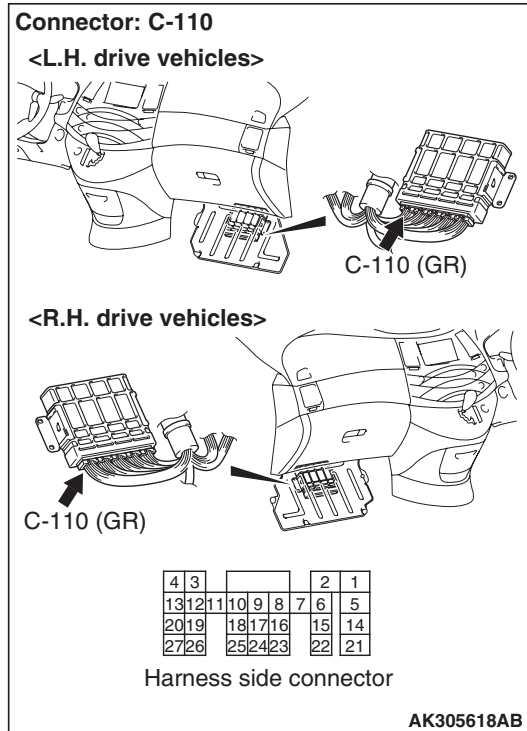
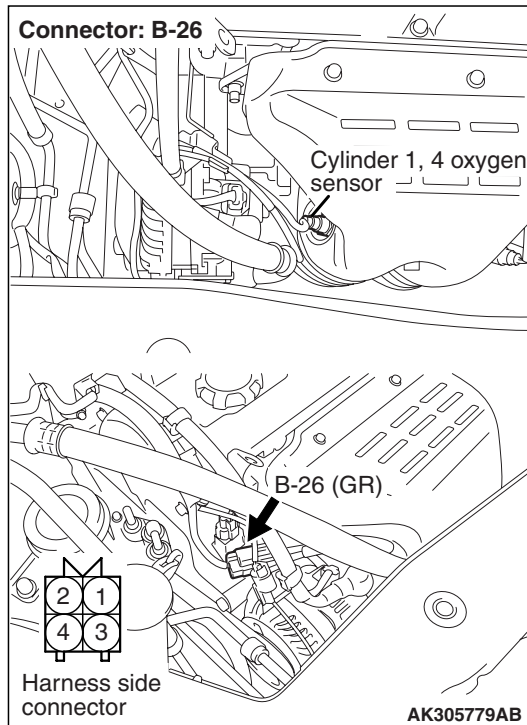


Q: Is the check result normal?

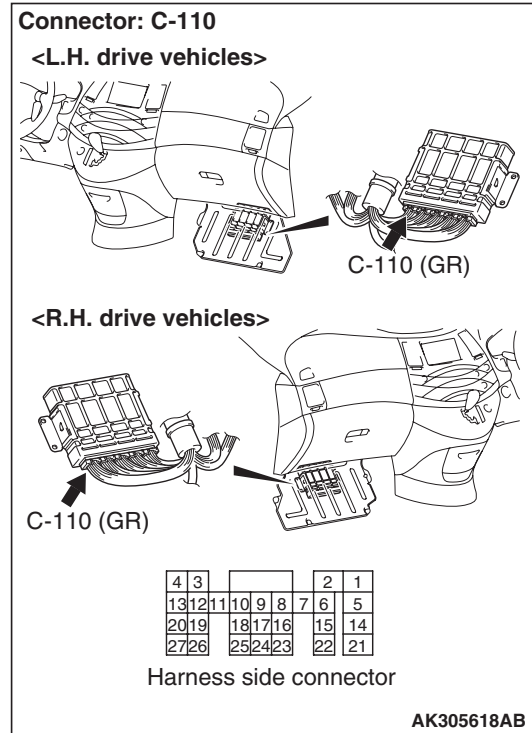
YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-26 (terminal No. 3) cylinder 1, 4 oxygen sensor connector and C-110 (terminal No. 25) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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.

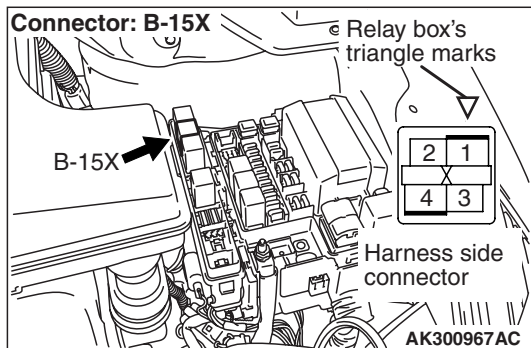
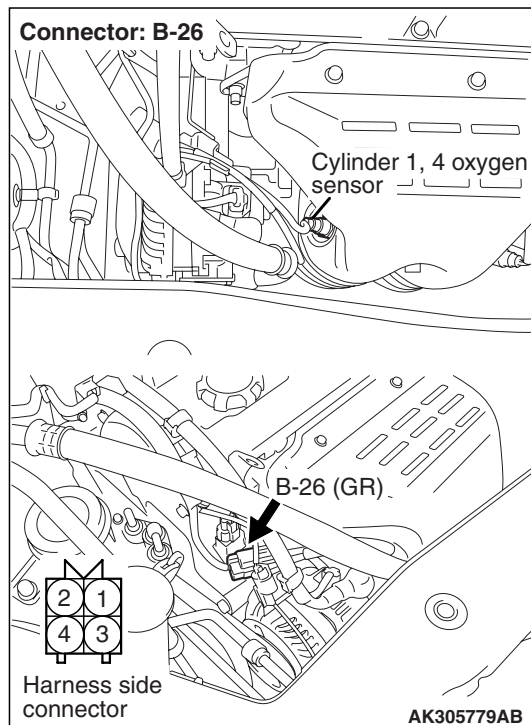
- Check earthing line for open/short circuit.

Q: Is the check result normal?

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

NO : Repair.

STEP 9. Check harness between B-26 (terminal No. 1) cylinder 1, 4 oxygen 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.

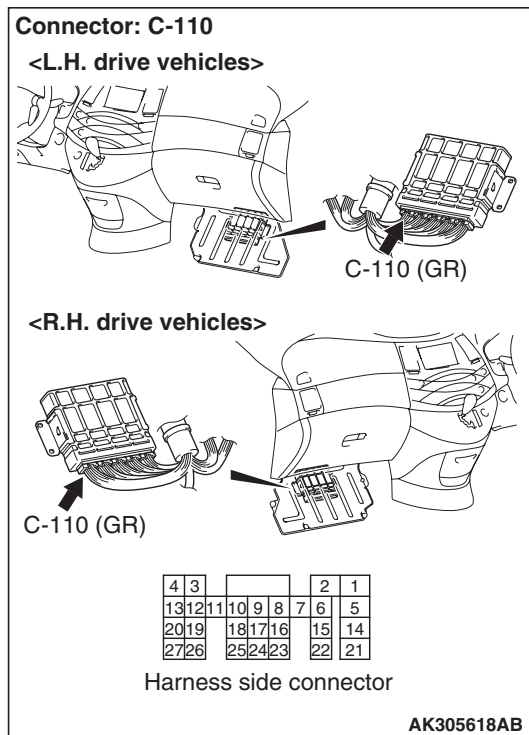
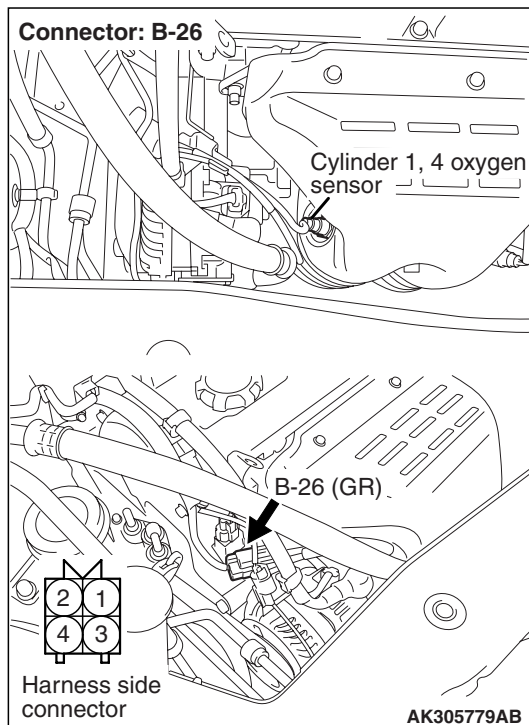
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Check harness between B-26 (terminal No. 3) cylinder 1, 4 oxygen sensor 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. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

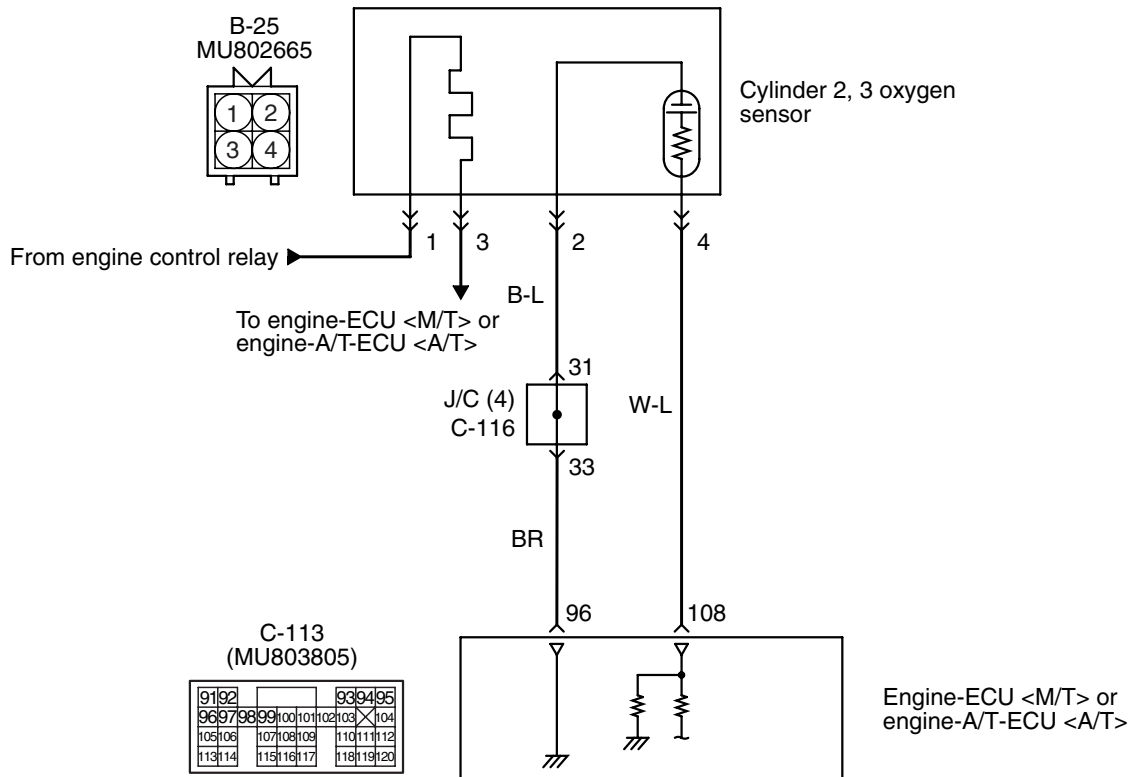
Q: Is the diagnosis code set?

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 System

Cylinder 2, 3 oxygen 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

AK501584 AB

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 output terminal (terminal No. 4).
- The front cylinder 2, 3 oxygen sensor (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 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 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 approximately 80°C or higher.
- The engine speed is 1200 r/min. or more.
- Volumetric efficiency is 25% or more.
- During the run at the constant speed on the flat road.

Judgment Criterion

- When a power voltage of 5 V is applied to the cylinder 2, 3 oxygen sensor, the sensor output voltage is 4.5V or more.

PROBABLE CAUSE

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

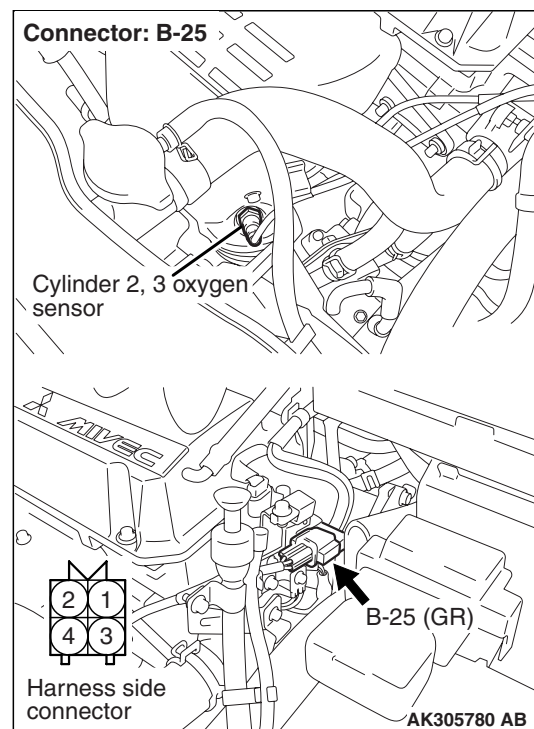
DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III data list**

- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 39: Cylinder 2, 3 oxygen sensor

Q: Is the check result normal?

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

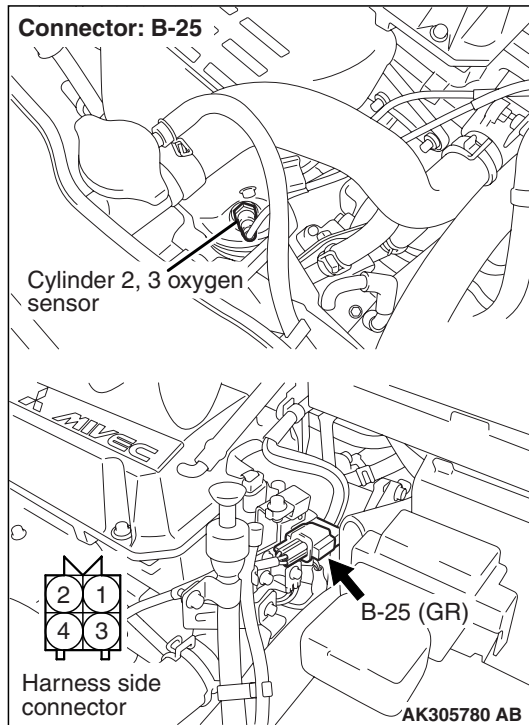
NO : Go to Step 2 .

STEP 2. Connector check: B-25 cylinder 2, 3 oxygen sensor connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at B-25 cylinder 2, 3 oxygen sensor connector.



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

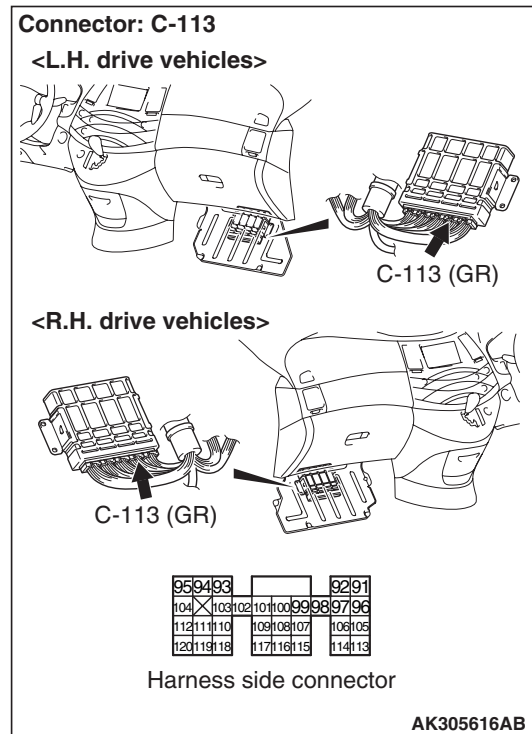
OK: 2 Ω or less

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

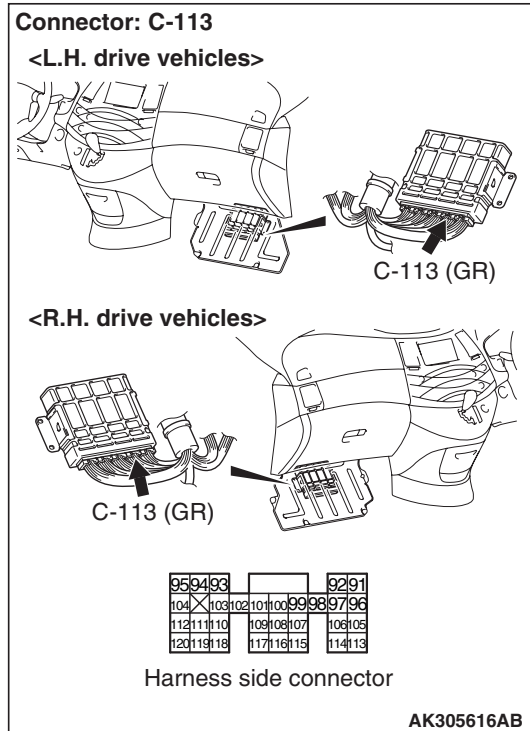
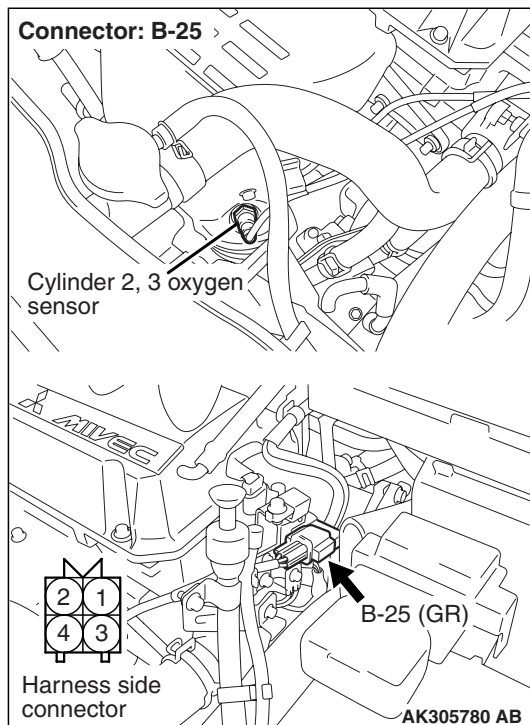


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-25 (terminal No. 2) cylinder 2, 3 oxygen 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 6 .

NO : Repair.

STEP 6. M.U.T.-III data list

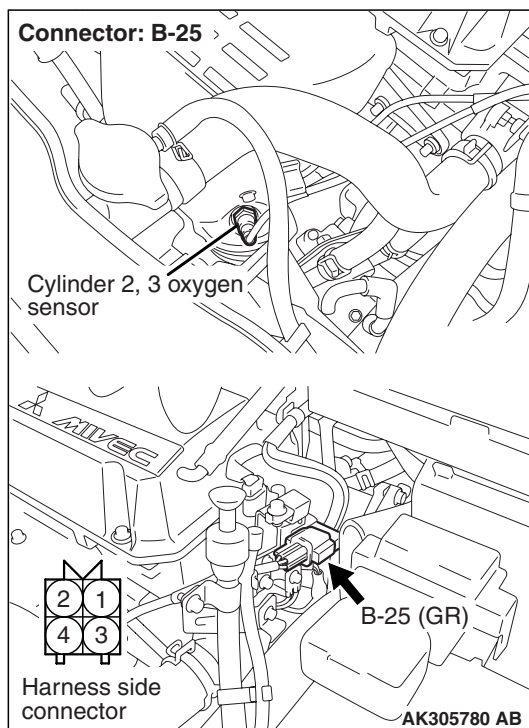
- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 39: Cylinder 2, 3 oxygen sensor

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 7. Perform voltage measurement at B-25 cylinder 2, 3 oxygen sensor 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 0.4 V or less to 0.6 – 1.0 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 itself

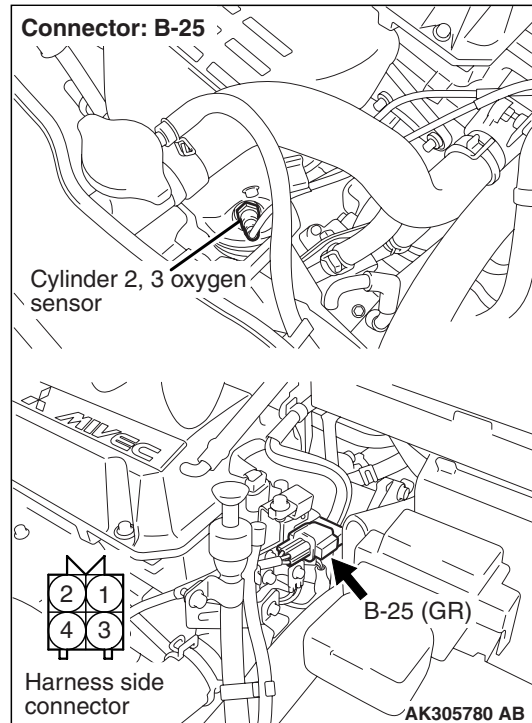
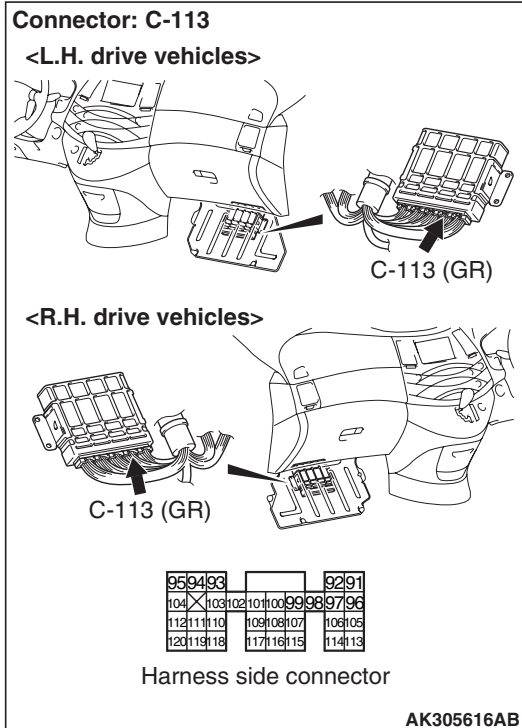
- Check cylinder 2, 3 oxygen sensor itself (Refer to P.13A-316).

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace cylinder 2, 3 oxygen sensor.

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



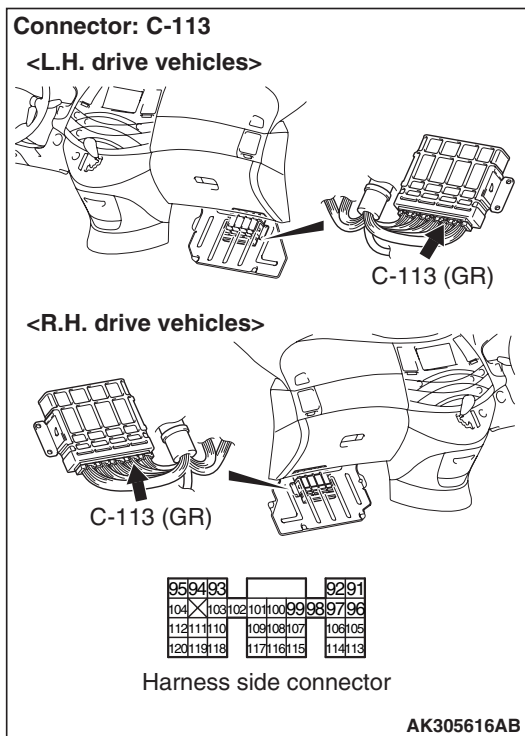
Q: Is the check result normal?

YES : Check and repair harness between B-25 (terminal No. 4) cylinder 2, 3 oxygen sensor connector and C-113 (terminal No. 108) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

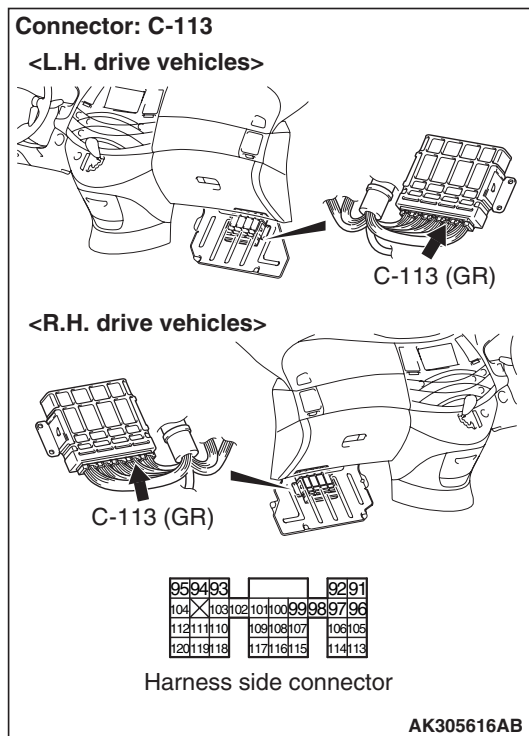
- Check output line for damage.

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.



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. 108 and earth.

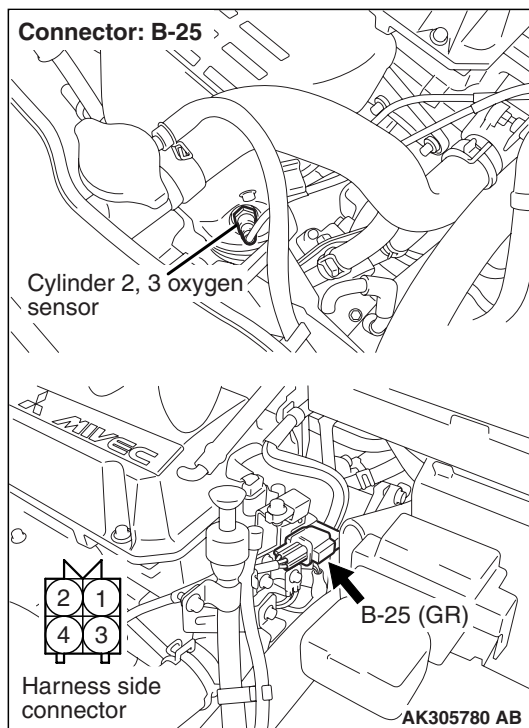
OK:

When the engine is 2,500 r/min., the output voltage should repeat 0.4 V or less to 0.6 – 1.0 V alternately.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .



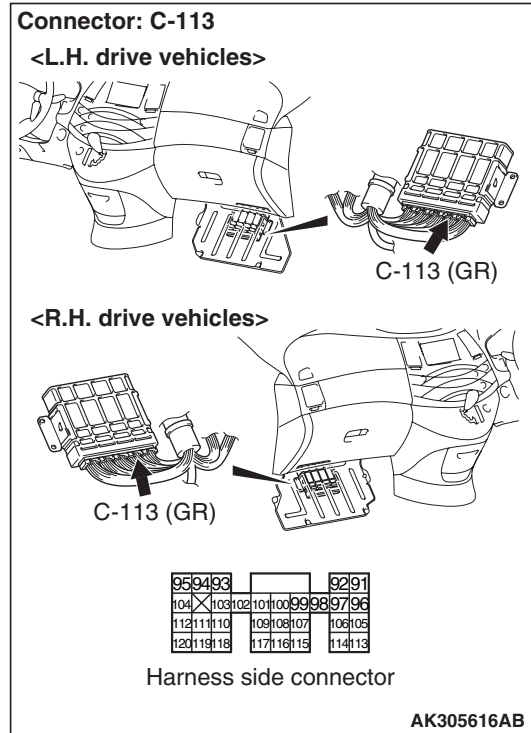
Q: Is the check result normal?

YES : Check and repair harness between B-25 (terminal No. 4) cylinder 2, 3 oxygen sensor 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



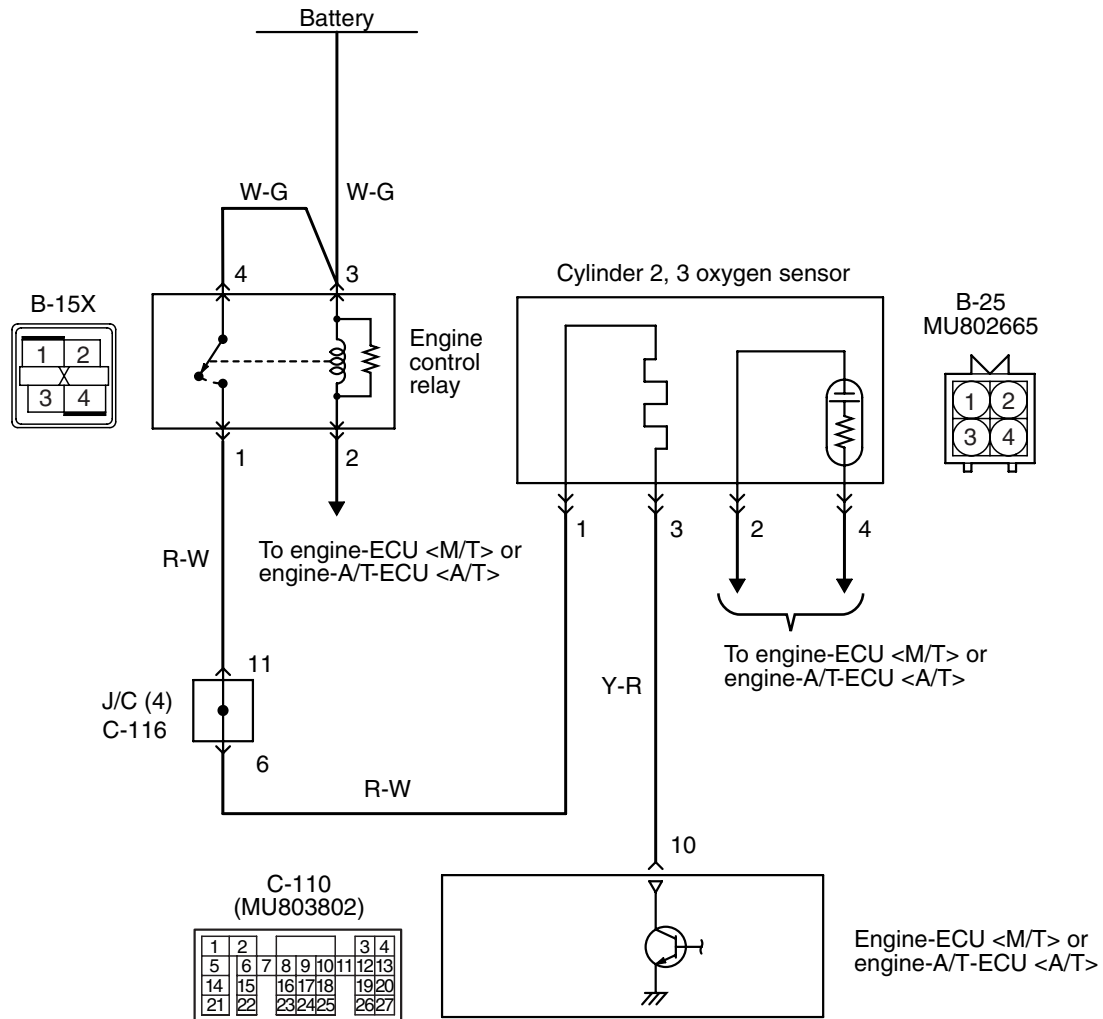
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

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

Cylinder 2, 3 oxygen sensor 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

AK305556AE

OPERATION

- Power is supplied to the heater power terminal (terminal No. 1) of the cylinder 2, 3 oxygen sensor connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 3) of the cylinder 2, 3 oxygen sensor 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 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 heater enables the cylinder 2, 3 oxygen sensor to provide good response even when the exhaust emission temperature is low.

TROUBLE JUDGMENT

Check Conditions

- Engine coolant temperature is 20°C or higher.
- While cylinder 2, 3 oxygen sensor (front) heater is on.
- Engine speed is approximately 50 r/min or more.
- Battery positive voltage is 11 – 16 V.

Judgment Criterion

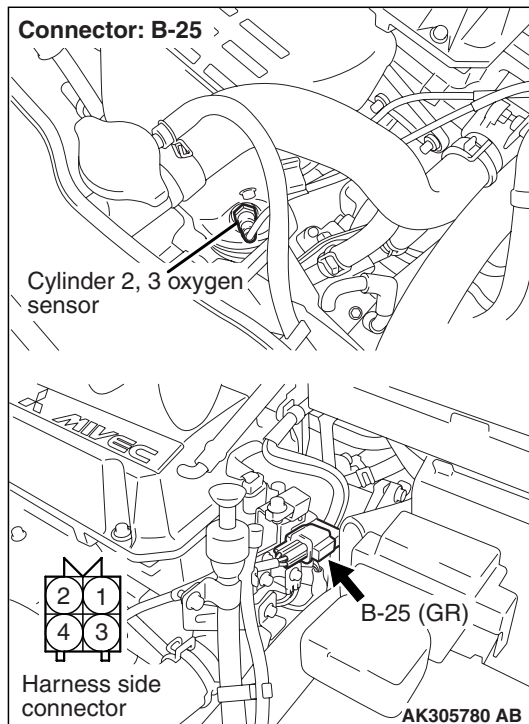
- Cylinder 2, 3 oxygen sensor (front) heater currents has continued to be 0.2 A or less, or 7.5 A or more for 4.3 seconds.

PROBABLE CAUSE

- Failed oxygen sensor heater
- Open/short circuit in cylinder 2, 3 oxygen sensor 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-25 cylinder 2, 3 oxygen sensor connector

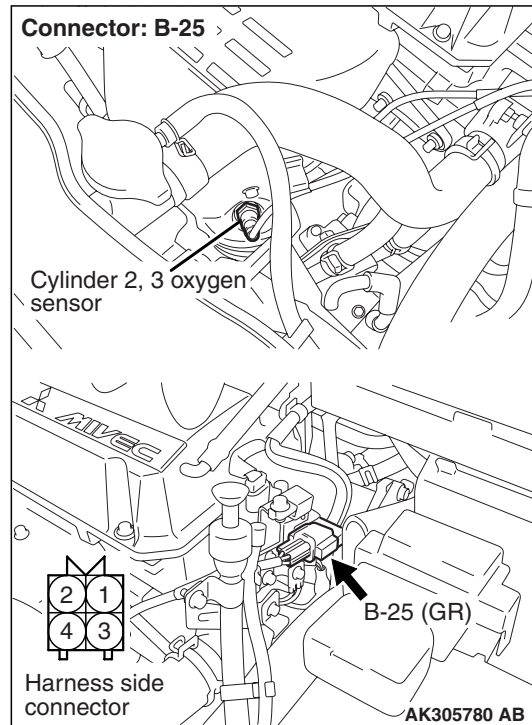


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-25 cylinder 2, 3 oxygen sensor connector.



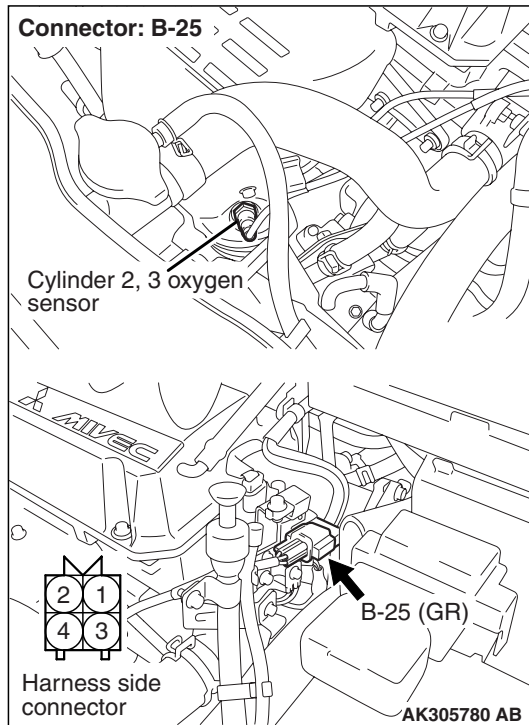
- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 3.

OK: 11 – 18 Ω

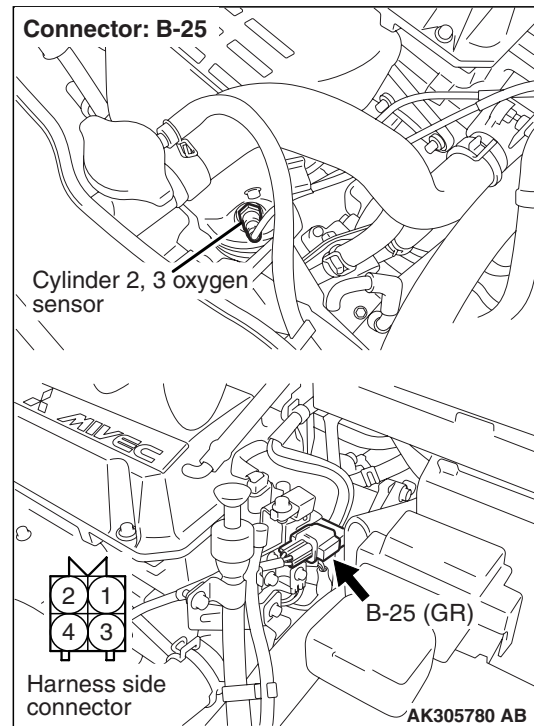
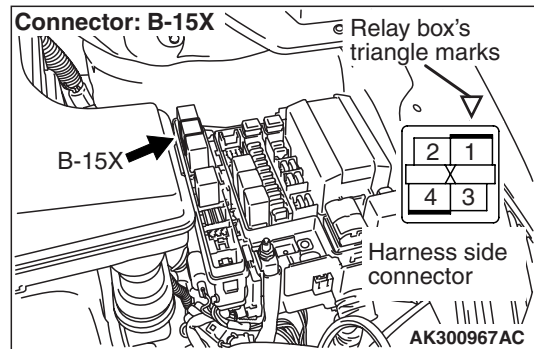
Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace cylinder 2, 3 oxygen sensor.

STEP 3. Perform voltage measurement at B-25 cylinder 2, 3 oxygen sensor connector.

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

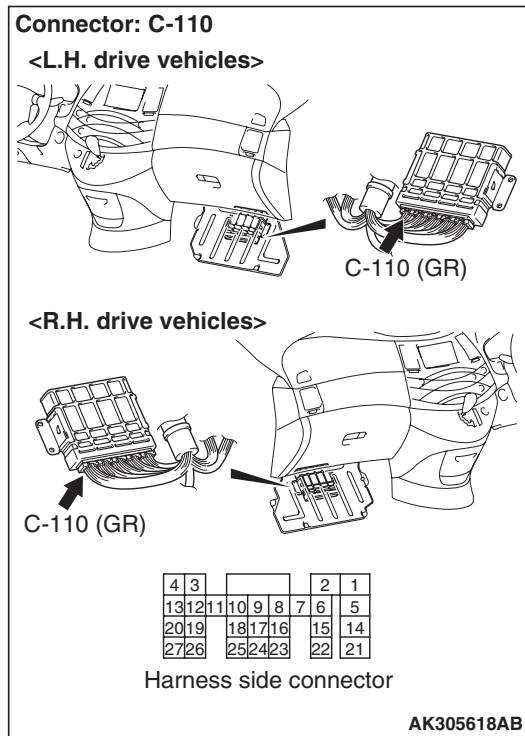
OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 5 .**NO :** Go to Step 4 .**STEP 4. Connector check: B-15X engine control relay connector****Q: Is the check result normal?**

YES : Check intermediate connector C-116, and repair if necessary. If intermediate connector is normal, check and repair harness between B-25 (terminal No. 1) cylinder 2, 3 oxygen sensor connector and B-15X (terminal No. 1) engine control relay connector.

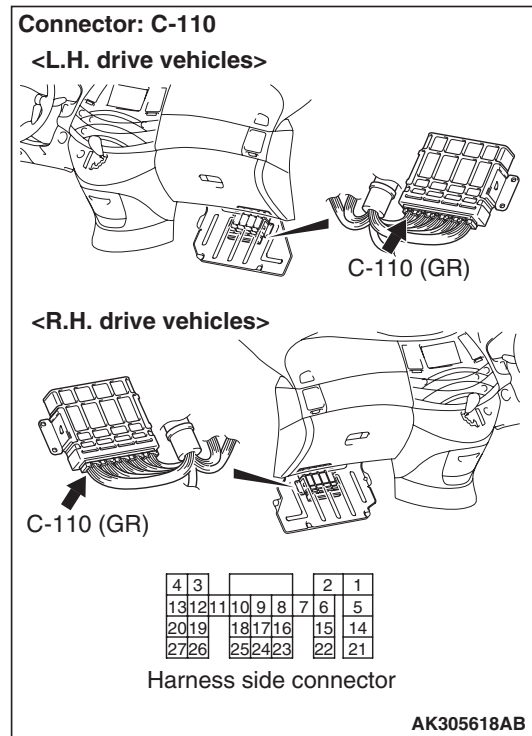
- Check power supply line for open/short circuit.

NO : Repair or replace.

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



STEP 6. Connector check: 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 .

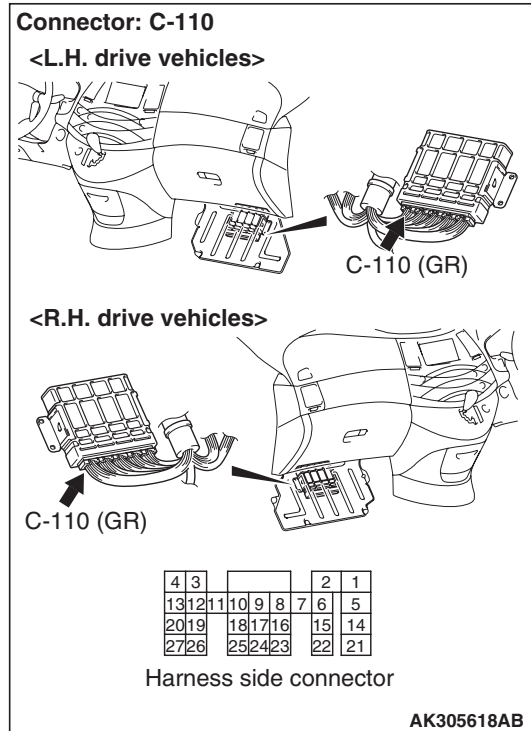
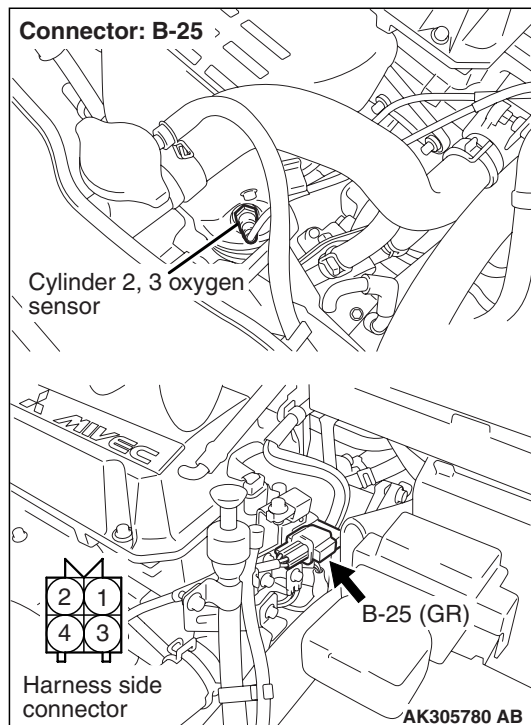
NO : Go to Step 6 .

Q: Is the check result normal?

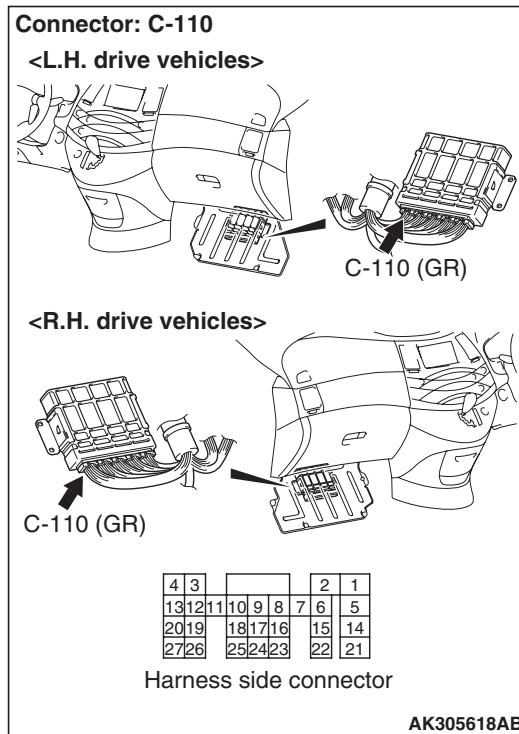
YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-25 (terminal No. 3) cylinder 2, 3 oxygen sensor connector and C-110 (terminal No. 10) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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.

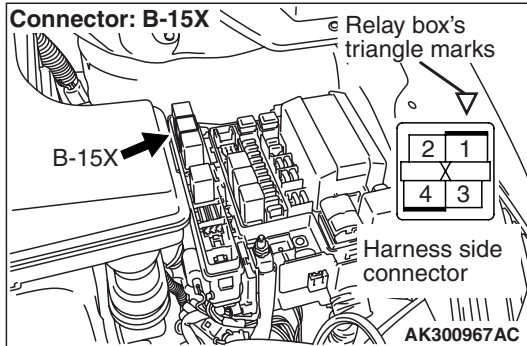
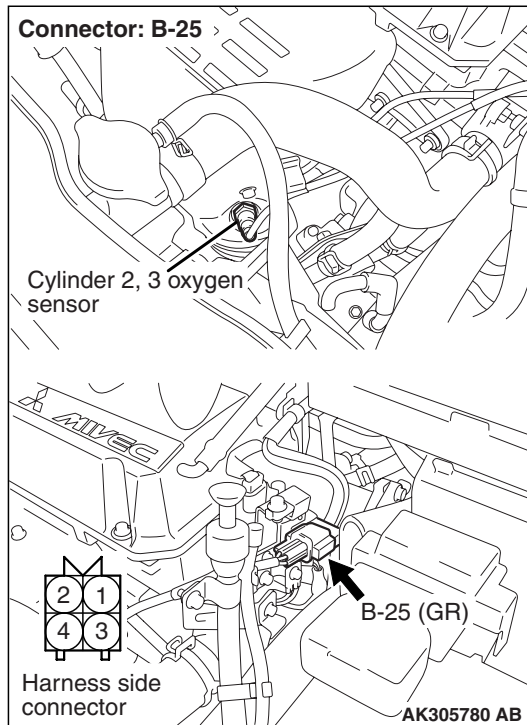
- Check earthing line for open/short circuit.

Q: Is the check result normal?

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

NO : Repair.

STEP 9. Check harness between B-25 (terminal No. 1) cylinder 2, 3 oxygen 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.

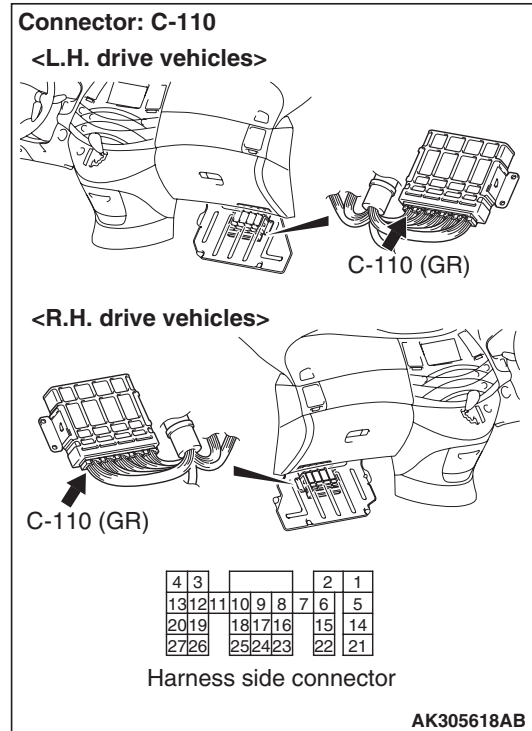
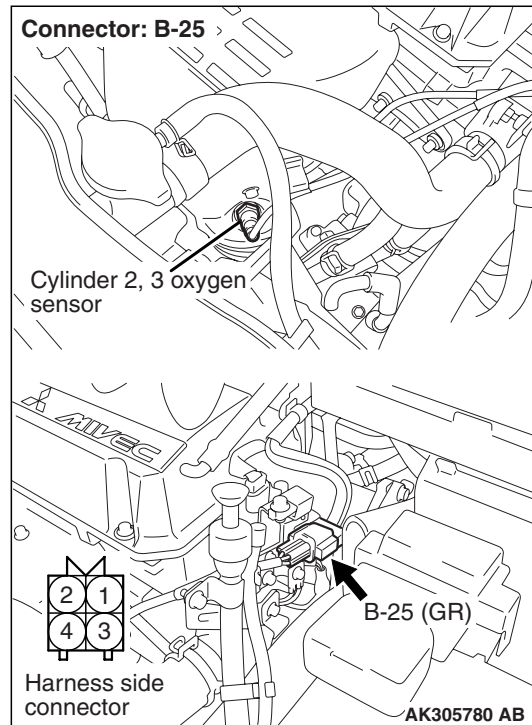
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Check harness between B-25 (terminal No. 3) cylinder 2, 3 oxygen sensor 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. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code?

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.13C-106](#).
- Refer to Code No. P0204: No. 4 Injector System [P.13C-118](#).

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

- The correction value of fuel injection amount is too low for 5 seconds or more.

or

- The correction value of fuel injection amount is too high for 5 seconds or more.

PROBABLE CAUSE

- Failed fuel supply system
- Failed cylinder 1, 4 oxygen sensor
- Failed intake air temperature sensor
- Failed engine coolant temperature sensor
- Failed air flow sensor
- Failed barometric pressure sensor
- Air drawn in from intake hose and inlet manifold
- Exhaust leak from exhaust manifold
- Contamination of throttle body (throttle valve portion)
- Failed No. 1 or No. 4 injector

- Failed purge control solenoid valve
- Failed EGR valve
- Failed fuel pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III diagnosis code****Q: Is any other diagnosis code than P0170 output?**

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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-14](#)).

STEP 3: M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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-307](#)).

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. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Check cylinder 1, 4 oxygen sensor system
(Refer to Code. No. P0130 [P.13A-48](#)).

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

- Check No. 1 and No. 4 Injector itself (Refer to [P.13A-317](#)).

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace injector.

STEP 9. Check purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System– Purge Control Solenoid Valve [P.17-42](#)).

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Replace purge control solenoid valve.

STEP 10. Check EGR valve itself.

- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (stepper motor) Check [P.17-44](#)).

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Replace EGR valve (stepper motor).

STEP 11. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-307](#)).

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.13C-110](#).
- Refer to Code No. P0203 No. 3 Injector System [P.13C-114](#).

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

- The correction value of fuel injection amount is too low for 5 seconds or more.

or

- The correction value of fuel injection amount is too high for 5 seconds or more.

PROBABLE CAUSE

- Failed fuel supply system
- Failed cylinder 2, 3 oxygen sensor
- Failed intake air temperature sensor
- Failed engine coolant temperature sensor
- Failed air flow sensor
- Failed barometric pressure sensor
- Air drawn in from intake hose and inlet manifold
- Exhaust leak from exhaust manifold
- Contamination of throttle body (throttle valve portion)
- Failed No. 2 or No. 3 injector
- Failed purge control solenoid valve
- Failed EGR valve
- Failed fuel pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III diagnosis code**

- Q: Is any other diagnosis code than P0173 output?**
YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).
NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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 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-14](#)).

STEP 3. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - a. 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-307](#)).

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. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 39: Cylinder 2, 3 oxygen sensor

- Q: Is the check result normal?**
YES : Go to Step 8 .
NO : Check cylinder 2, 3 oxygen sensor system (Refer to Code. No. P0150 [P.13A-61](#)).

STEP 8. Check No. 2 and No. 3 injector itself.

- Check No. 2 and No. 3 Injector itself (Refer to [P.13A-317](#)).

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

STEP 9. Check purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Evaporative Emission Control System– Purge Control Solenoid Valve [P.17-42](#)).

- Q: Is the check result normal?**
YES : Go to Step 10 .
NO : Replace purge control solenoid valve.

STEP 10. Check EGR valve itself.

- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (stepper motor) Check [P.17-44](#)).

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Replace EGR valve (stepper motor).

STEP 11. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-307](#)).

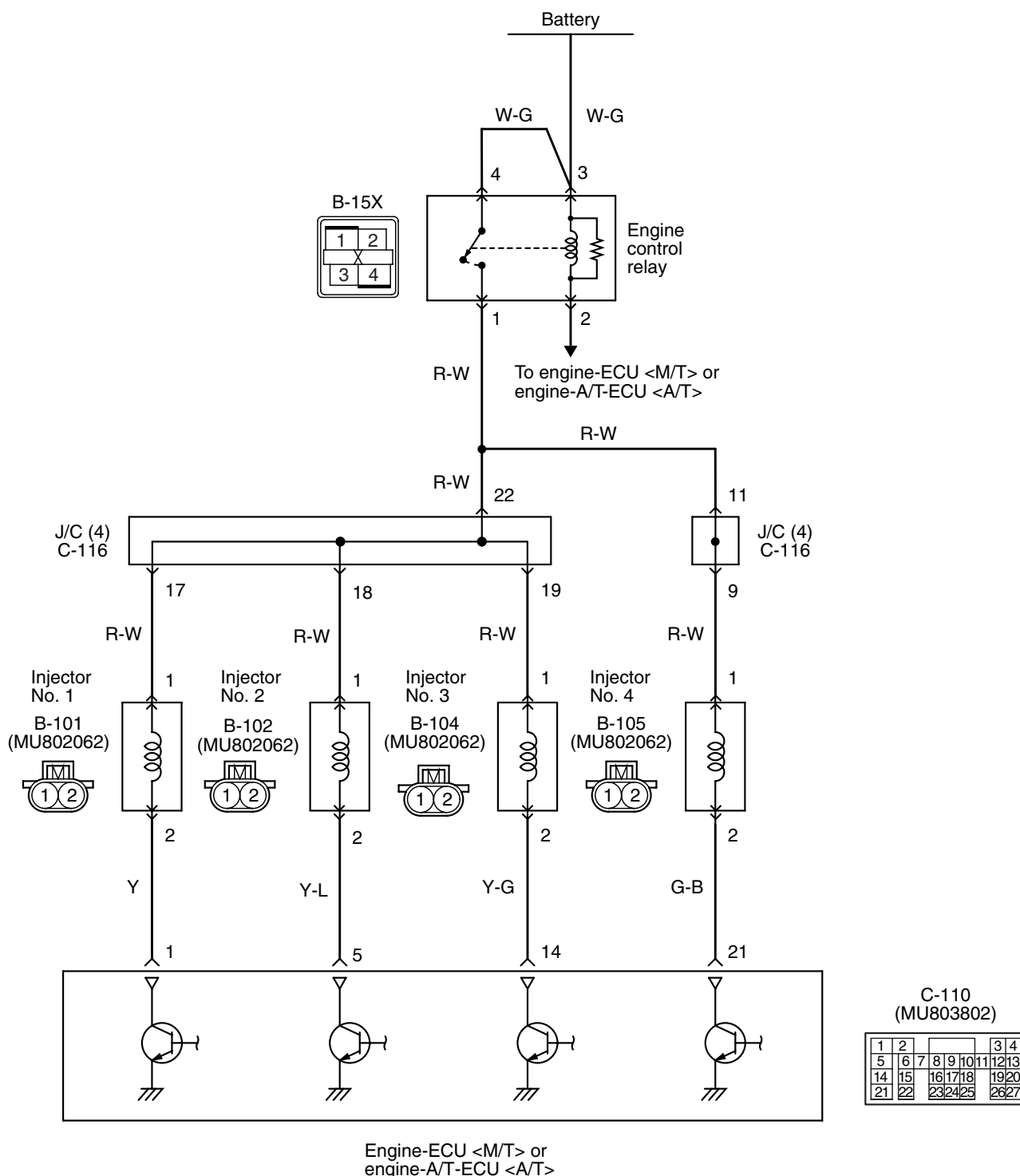
Q: Is the check result normal?

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

NO : Repair.

Code No. P0201: No. 1 Injector System, Code No. P0202: No. 2 Injector System, Code No. P0203: No. 3 Injector System, Code No. P0204: No. 4 Injector System

Injector 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 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, No. 5, No. 14 and 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> 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

- Injector operation (by carrying out actuator test) is not in progress.
- Engine speed is 50 – 1, 000 r/min.
- Throttle position sensor (main) output is 1.15 V or less.

Judgment Criterion

- Injector coil surge voltage (battery positive voltage +2 V) has not been detected for 4 seconds.

PROBABLE CAUSE

- Failed 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. M.U.T.-III actuator test

- Refer to Actuator Test Reference Table List [P.13A-293](#).
 - a. Item 01: No. 1 injector
 - b. Item 02: No. 2 injector
 - c. Item 03: No. 3 injector
 - d. Item 04: No. 4 injector

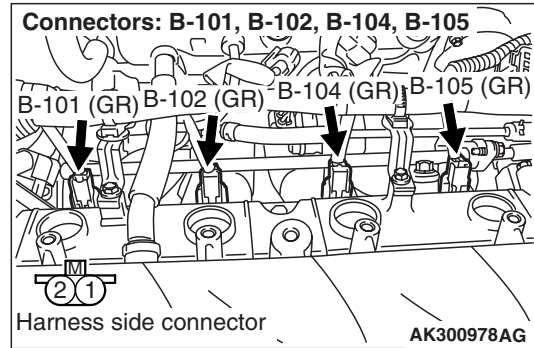
OK: Idling state varies.

Q: Are the check results normal?

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

NO : Go to Step 2 .

STEP 2. Check connector: Injector connector



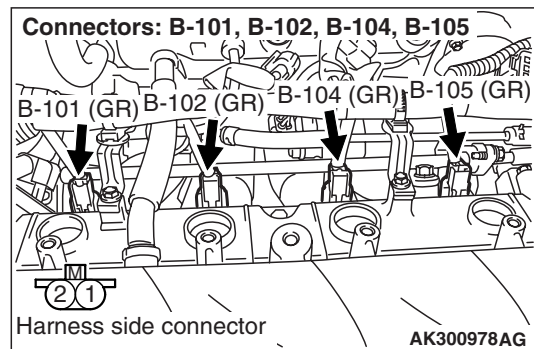
- a. B-101 (No. 1 injector connector)
- b. B-102 (No. 2 injector connector)
- c. B-104 (No. 3 injector connector)
- d. B-105 (No. 4 injector connector)

Q: Are the check results normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at injector connector.



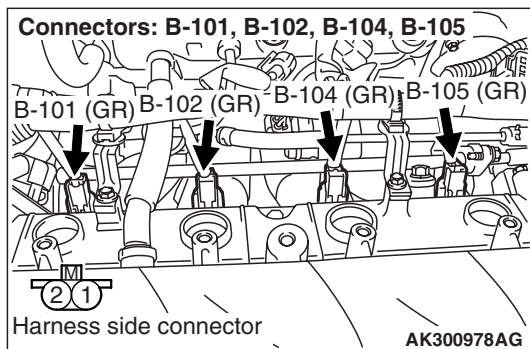
- a. B-101 (No. 1 injector connector)
- b. B-102 (No. 2 injector connector)
- c. B-104 (No. 3 injector connector)
- d. B-105 (No. 4 injector connector)
 - Disconnect connector, and measure at injector side.
 - Resistance between terminal No. 1 and No. 2.

OK: 10.5 – 13.5 Ω

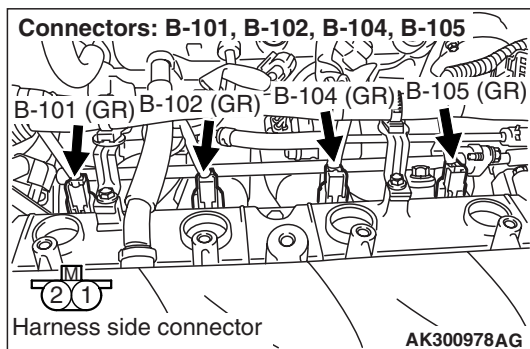
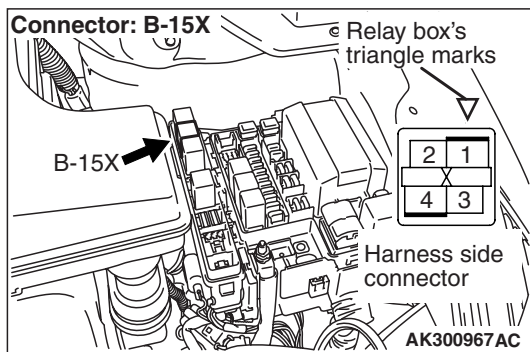
Q: Are the check results normal?

YES : Go to Step 4 .

NO : Replace injector.

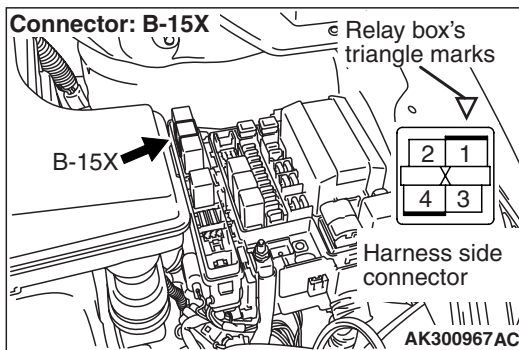
STEP 4. Perform voltage measurement at injector connector.

- B-101 (No. 1 injector connector)
- B-102 (No. 2 injector connector)
- B-104 (No. 3 injector connector)
- B-105 (No. 4 injector connector)
 - Disconnect connector, and measure at harness side.
 - Ignition switch: ON
 - Voltage between terminal No. 1 and earth.

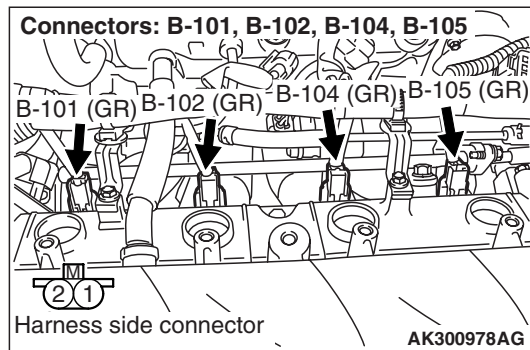
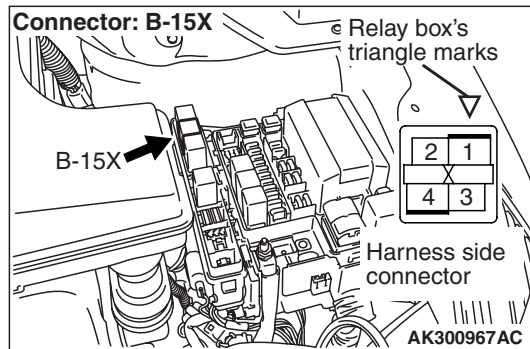
OK: System voltage**Q: Are the check results normal?****YES :** Go to Step 6 .**NO :** Go to Step 5 .**STEP 5. Check connector: B-15X engine control relay connector****Q: Is the check result normal?**

- 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 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 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 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.

NO : Repair or replace.**STEP 6. Check connector: 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 engine control relay connector and injector connector.



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

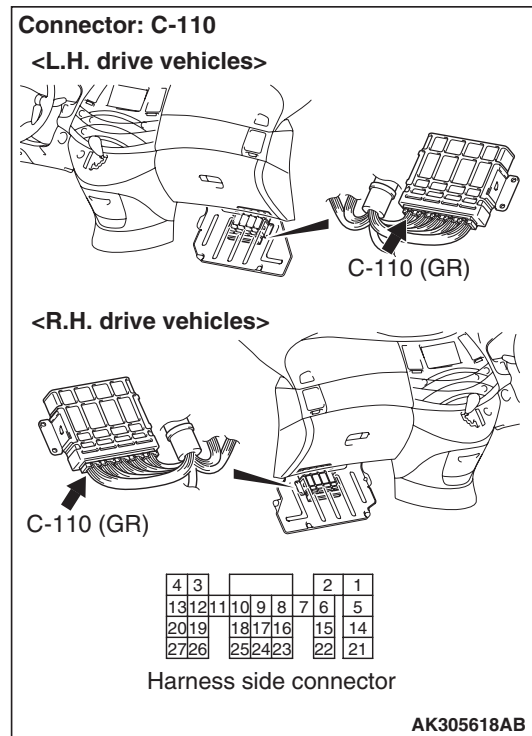
- Check harness between B-15X (terminal No. 1) engine control relay connector and B-101 (terminal No. 1) No. 1 injector connector.
- Check harness between B-15X (terminal No. 1) engine control relay connector and B-102 (terminal No. 1) No. 2 injector connector.
- Check harness between B-15X (terminal No. 1) engine control relay connector and B-104 (terminal No. 1) No. 3 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 8 .

NO : Repair.

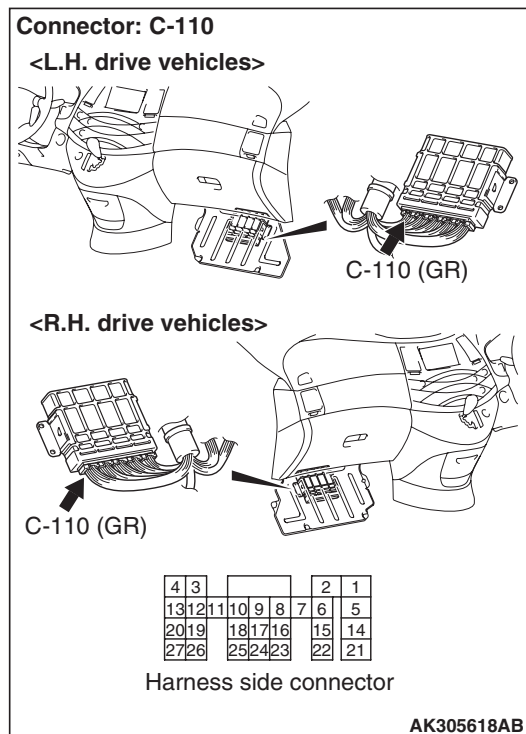
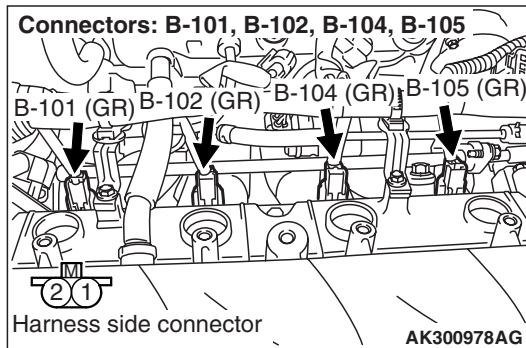
STEP 8. Check connector: C-110 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

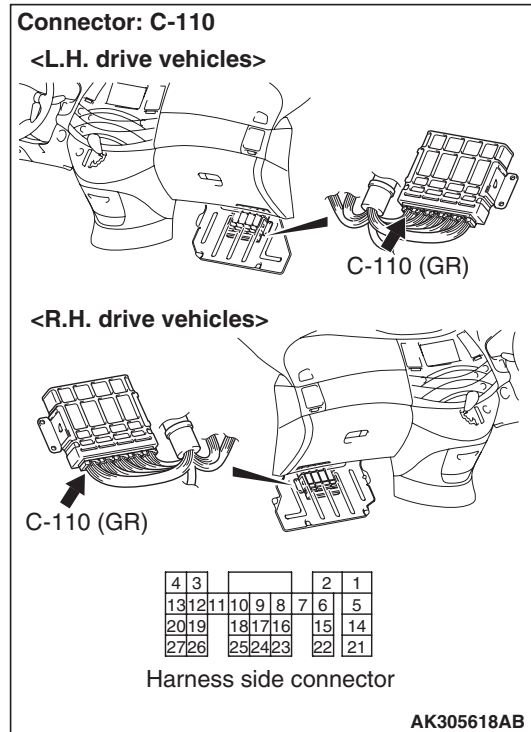
STEP 9. Check harness between injector connector and C-110 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

- Check harness between B-101 (terminal No. 2) No. 1 injector connector and C-110 (terminal No. 1) engine-ECU <M/T> 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> 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> 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> or engine-A/T-ECU <A/T> connector.
 - Check output line for open/short circuit and damage.

Q: Are the check results normal?

YES : Go to Step 10 .

NO : Repair.

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

- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
 - Voltage between terminal No. 1 and earth (No. 1 Injector)
 - Voltage between terminal No. 5 and earth (No. 2 Injector)
 - Voltage between terminal No. 14 and earth (No. 3 Injector)
 - Voltage between terminal No. 21 and earth (No. 4 Injector)

OK: Waveforms should be display on Inspection procedure using an oscilloscope (Refer to P.13A-300).

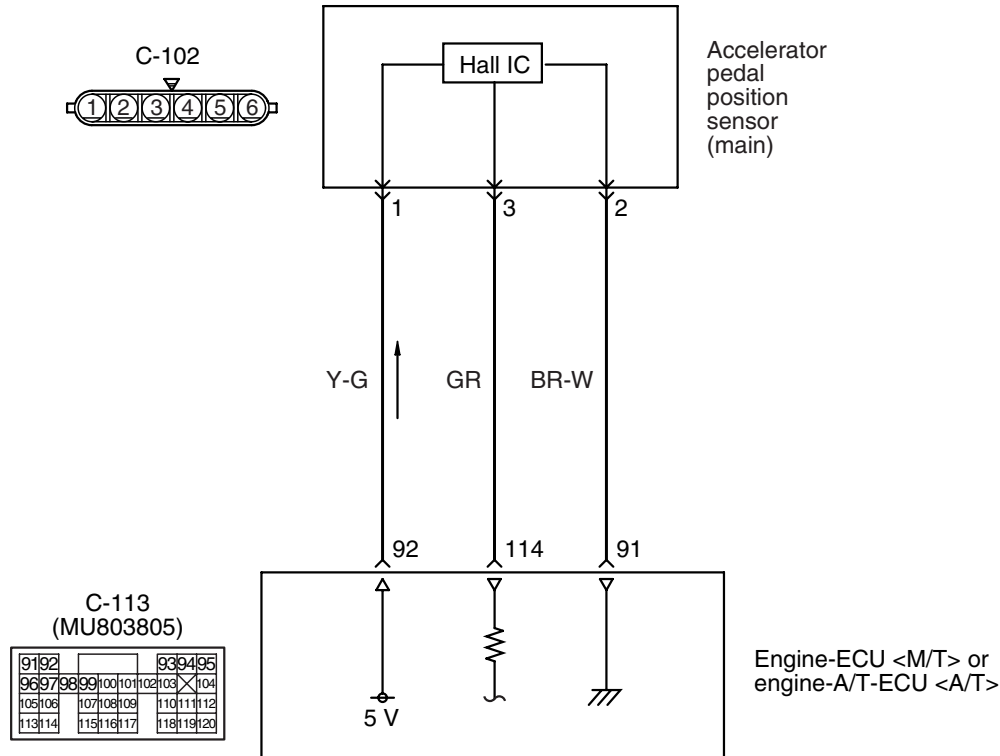
Q: Is the check result normal?

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>.

Code No. P0220: Accelerator Pedal Position Sensor (Main) System

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 outputs voltage signals corresponding to angles of the accelerator pedal 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> controls the opening of the throttle valve and the fuel injection rate as well, based on the accelerator pedal position sensor signals.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criteria

- Accelerator pedal position sensor (main) output voltage is 0.6 V or less.

or

- Accelerator pedal position sensor (main) output voltage is 4.8 V or more.

Check Conditions

- Ignition switch is in "ON" position.
- Accelerator pedal position sensor (main) output voltage is between 0.5 V and 4.5 V.
- Accelerator pedal position sensor (sub) output voltage is between 0.5 V and 4.5 V.

Judgment Criteria

- When the variation in the accelerator pedal-opened degree is small, the voltage obtained through the following equation is 1 V or more.

[Accelerator pedal position sensor (sub) output voltage + 0.3 V – Accelerator pedal position sensor (main) output voltage]

or

- When the variation in the accelerator pedal-opened degree is small, the voltage obtained through the following equation is 1 V or more.

[Accelerator pedal position sensor (main) output voltage – Accelerator pedal position sensor (sub) output voltage + 0.3 V]

PROBABLE CAUSE

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor (main) circuit or loose connector contact
- Harness damage in accelerator pedal position sensor (sub) circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

YES : Go to Step 2

NO : Go to Step 3 .

STEP 2. M.U.T.-III data list

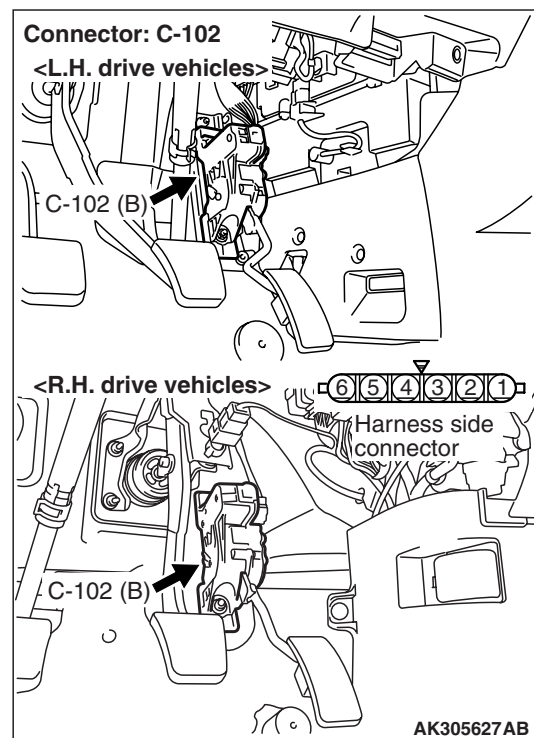
- Refer to Data List Reference Table [P.13A-284](#).
 - Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

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

NO : Check accelerator pedal position sensor (sub) system (Refer to Code No. P1225 [P.13A-170](#)).

STEP 3. Connector check: C-102 accelerator pedal position sensor connector

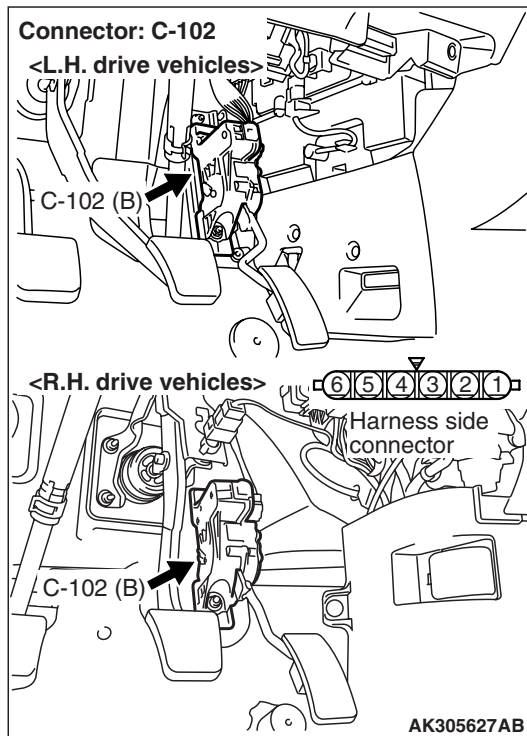


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. 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.

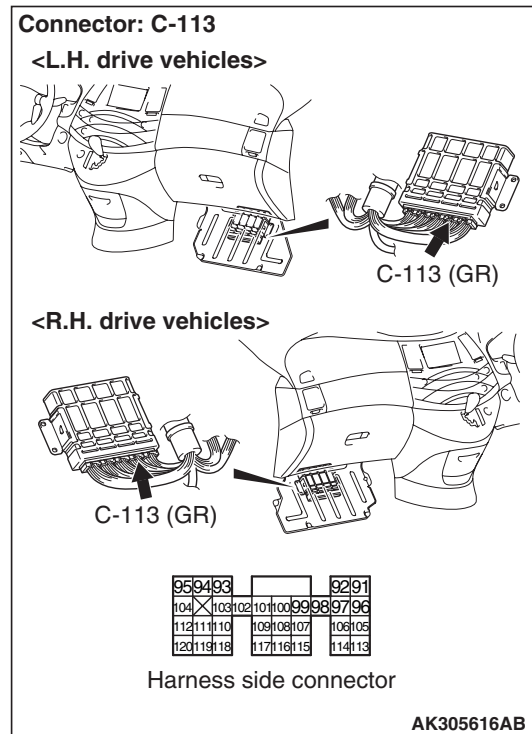
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 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

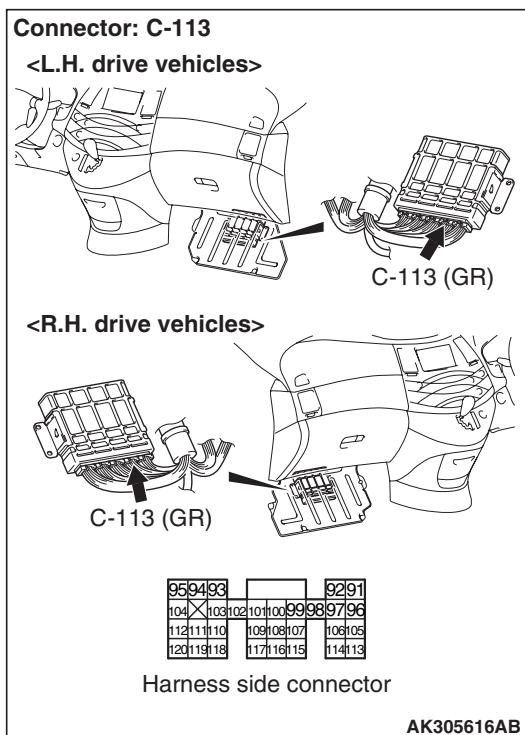
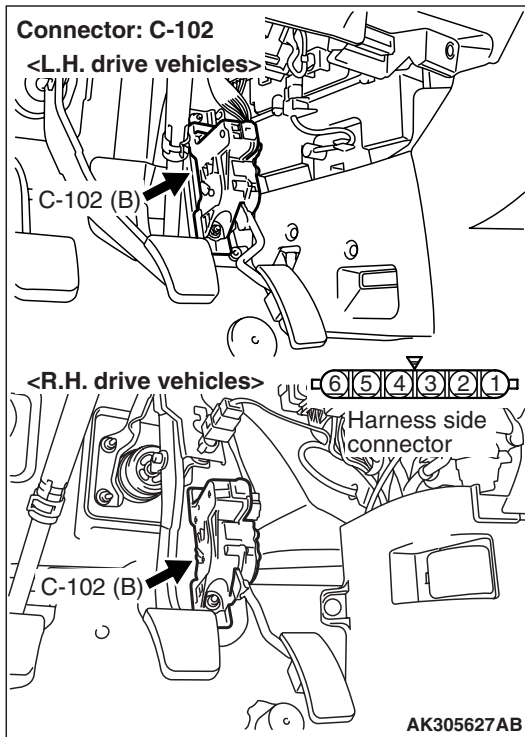


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check harness between 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 open/short circuit.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. M.U.T.-III data list

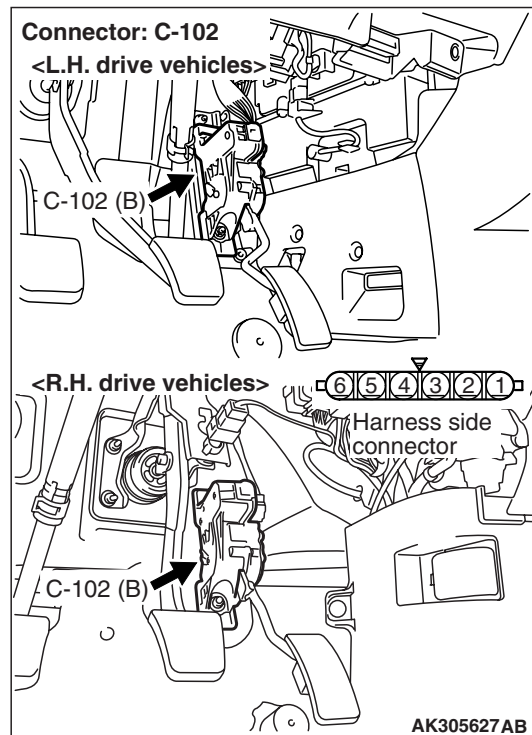
- Refer to Data List Reference Table [P.13A-284](#).
 - Item 78: Accelerator pedal position sensor (main)

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 8. 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.

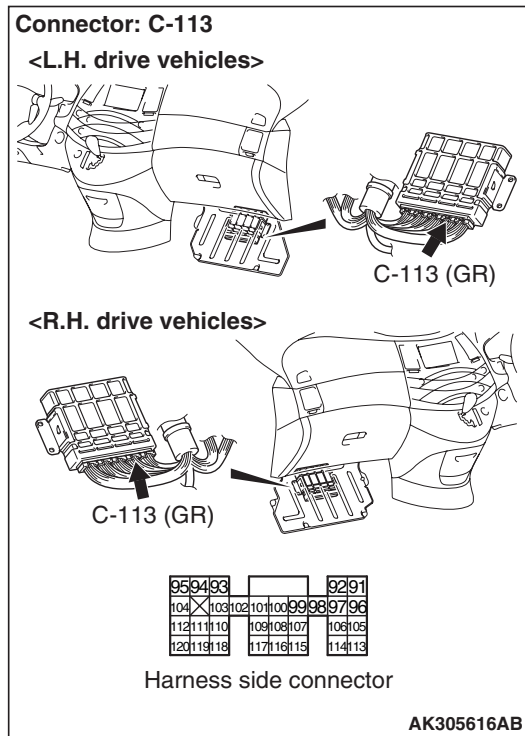
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 12 .

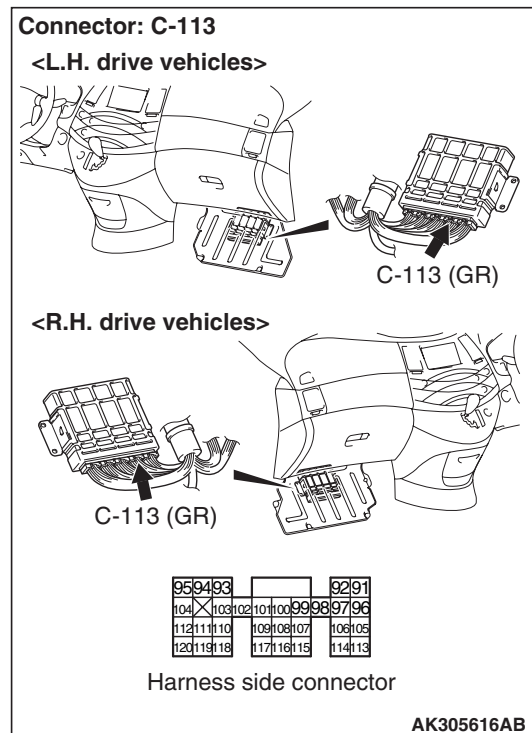
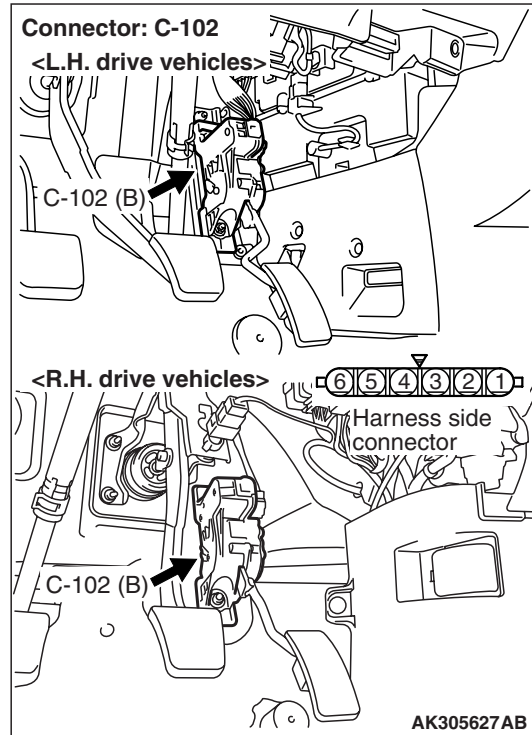
NO : Go to Step 9 .

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. 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 11 .
NO : Repair.

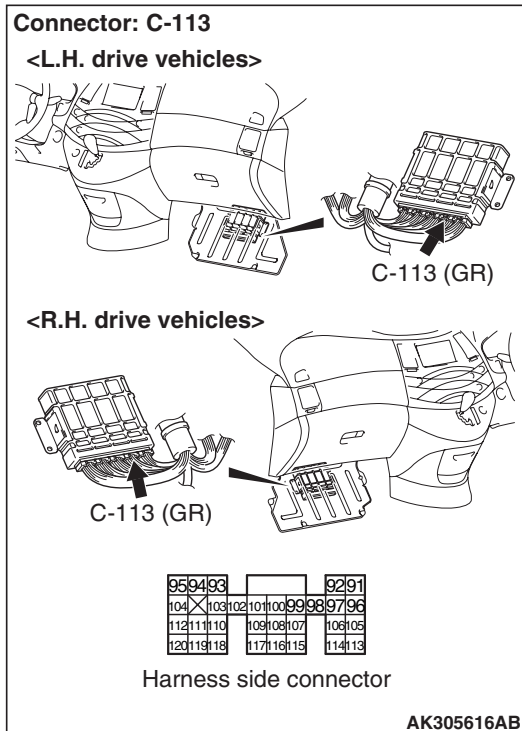
STEP 11. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

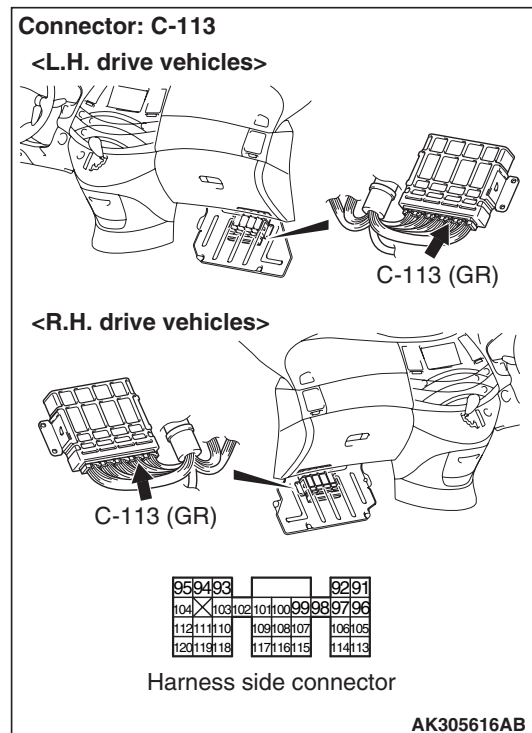
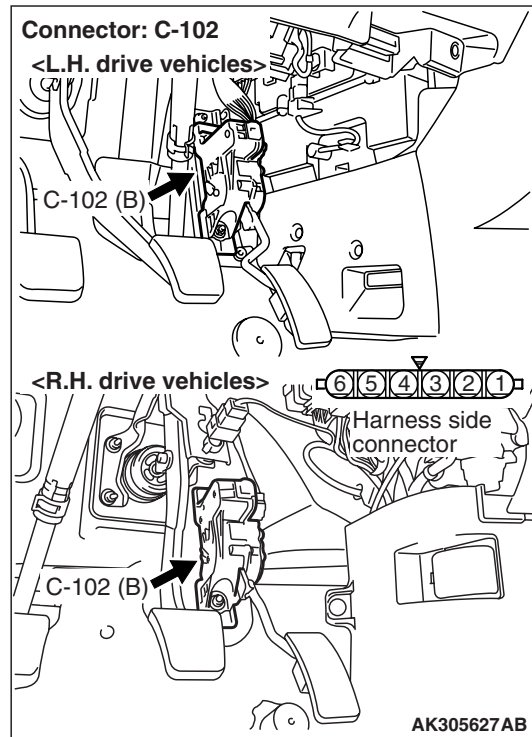
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

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

STEP 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 13 .

NO : Repair or replace.

STEP 13. 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.

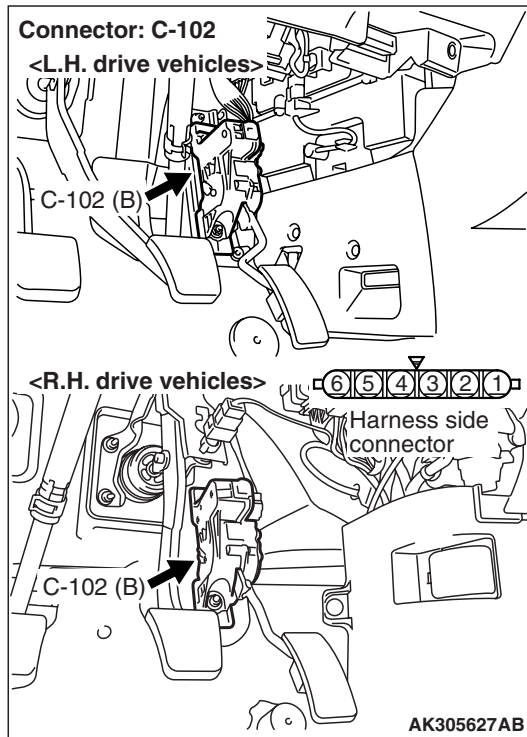
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14. 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.



Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

STEP 15. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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 accelerator pedal assembly. Then go to Step 16 .

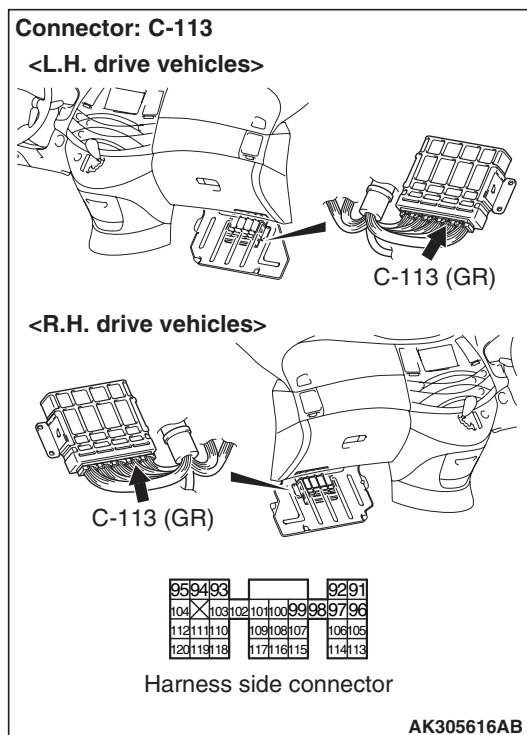
STEP 16. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

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

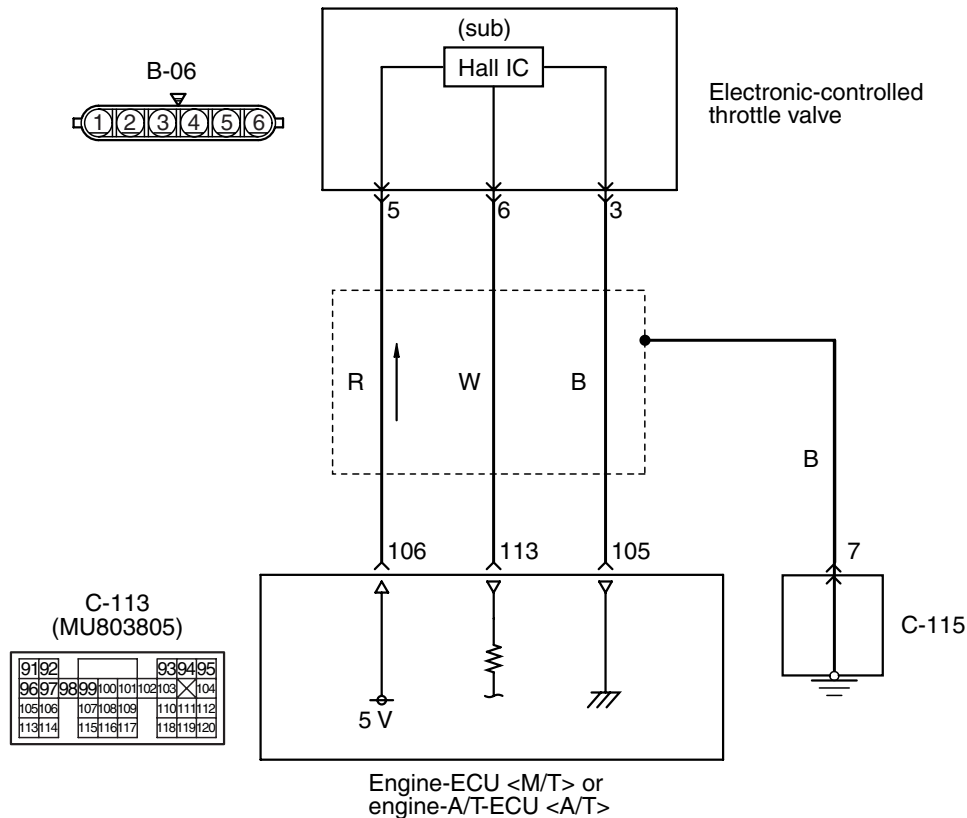
NO : Check end.



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

Code No. P0225 : Throttle Position Sensor (Sub) System

Throttle position sensor (sub) circuit



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 Criteria

- Throttle position sensor (sub) output voltage is 2.2 V or less.

or

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

Check Conditions

- Ignition switch is in the "ON" position.
- Throttle position sensor (main) output voltage is between 0.2 V and 4.8 V.
- Throttle position sensor (sub) output voltage is between 2.2 V and 4.8 V.

Judgment Criteria

- Throttle position sensor (main) output voltage is 2.5 V or more and throttle position sensor (sub) output voltage is 4.2 V or less.

or

- When throttle position sensor (main) output voltage is 2.5 V or less, voltage obtained with the formula given below is 0.3 V or more:

Throttle position sensor (main) output voltage –
[throttle position sensor (sub) output voltage – 2
V]

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
a. Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

YES : Go to Step 2

NO : Go to Step 3 .

STEP 2. M.U.T.-III data list

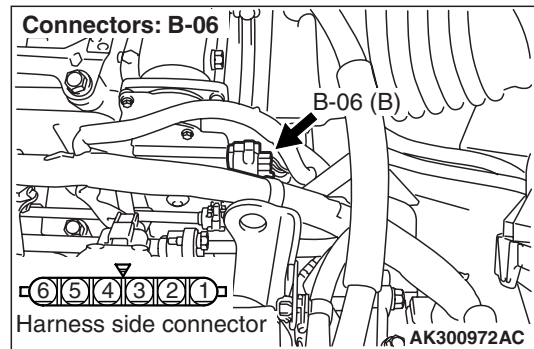
- Refer to Data List Reference Table [P.13A-284](#).
a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Check throttle position sensor (main)
system (Refer to Code No. P0120
[P.13A-42](#)).

STEP 3. Connector check: B-06 electronic-controlled throttle valve connector

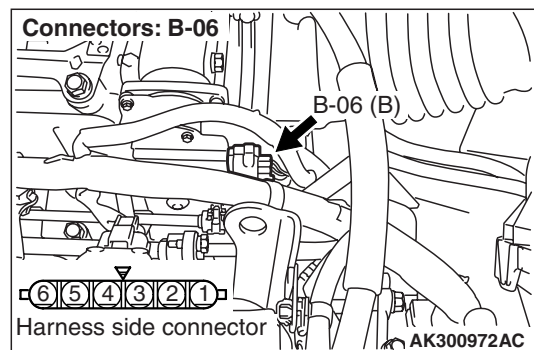


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. 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.

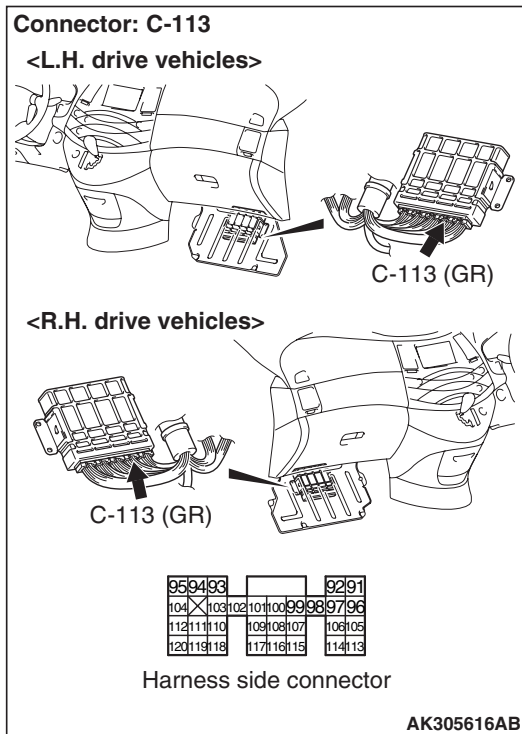
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 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

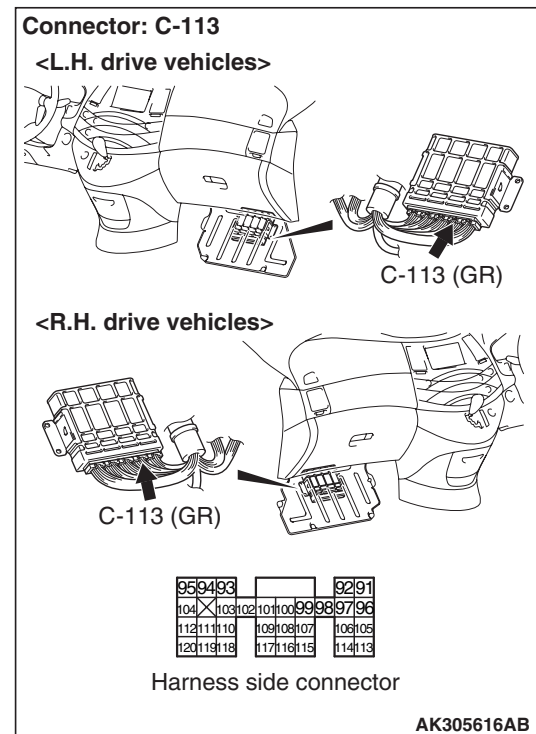
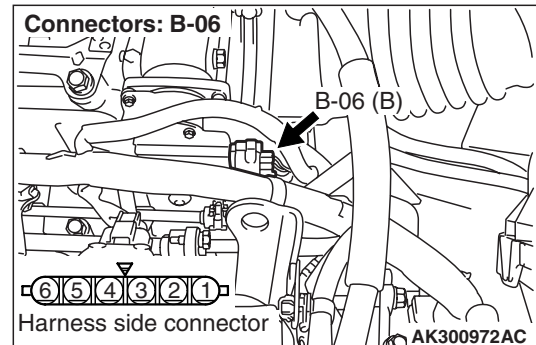


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check harness between B-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 7 .

NO : Repair.

STEP 7. M.U.T.-III data list

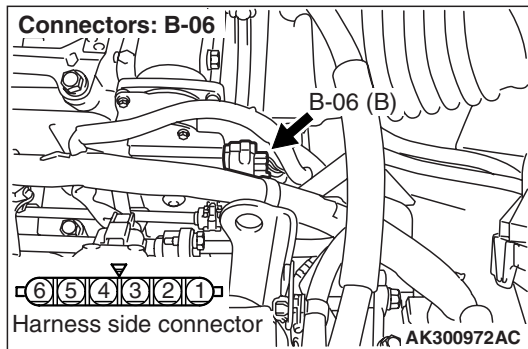
- Refer to Data List Reference Table [P.13A-284](#).
 - Item 14: Throttle position sensor (sub)

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 8. 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.

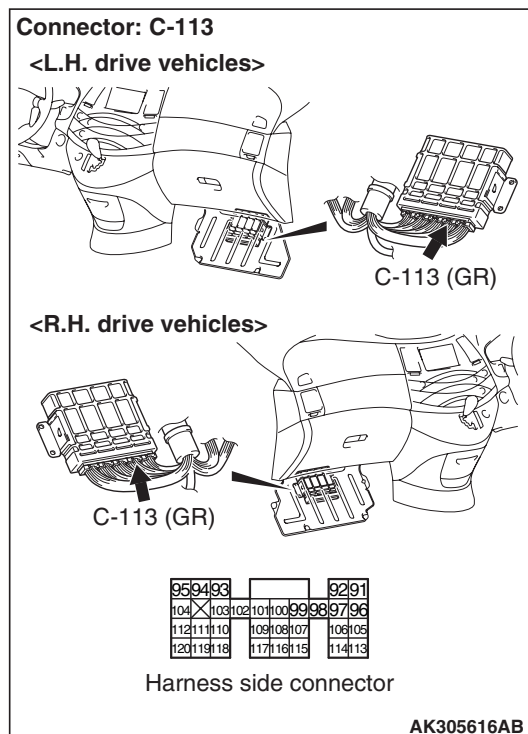
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 9 .

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

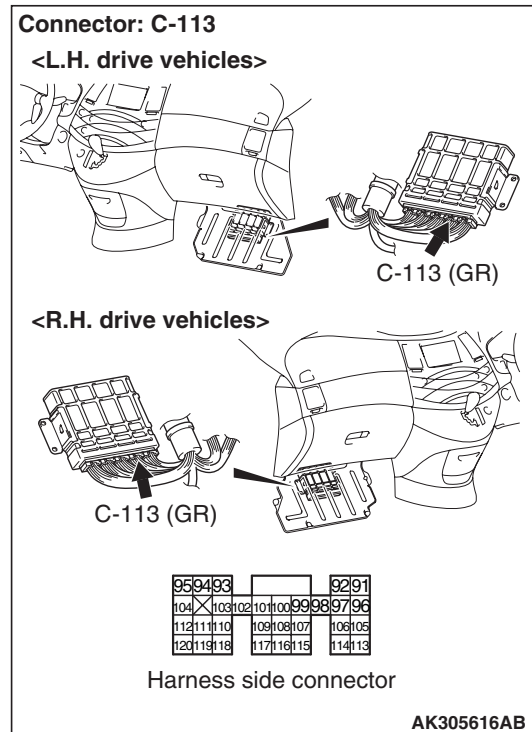
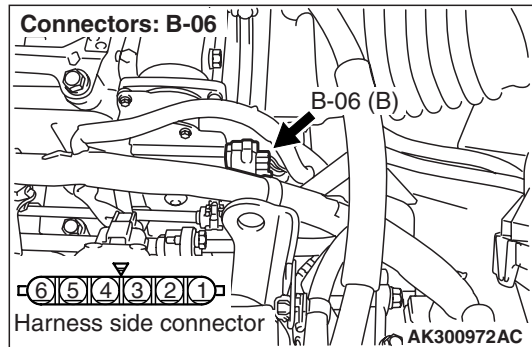


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. Check harness between 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 11 .

NO : Repair.

STEP 11. M.U.T.-III data list

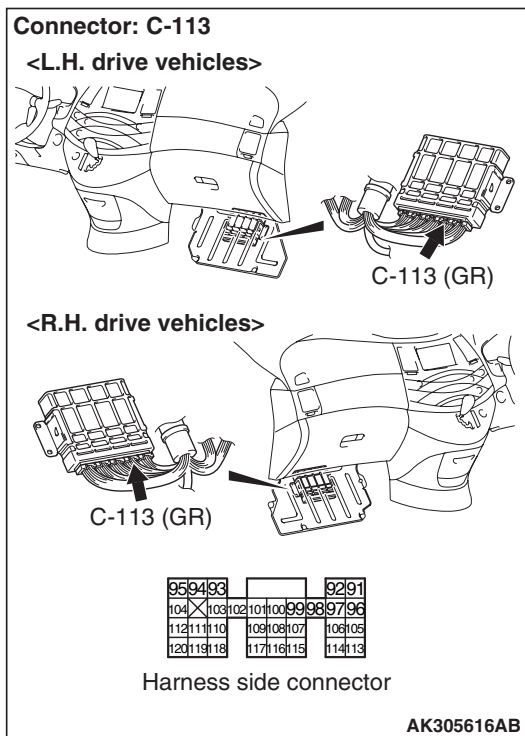
- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 14: Throttle position sensor (sub)

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

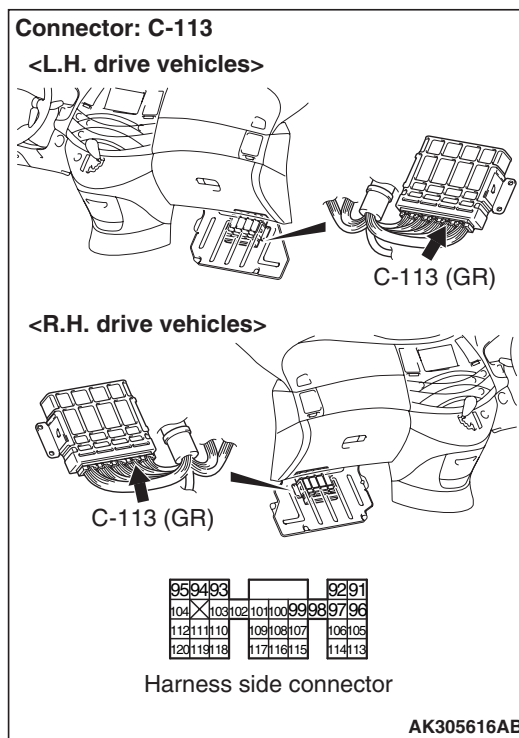
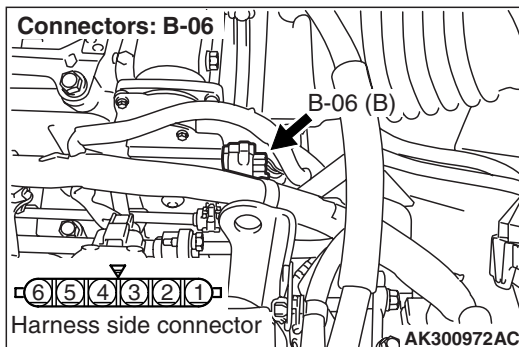


Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair or replace.

STEP 13. 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.



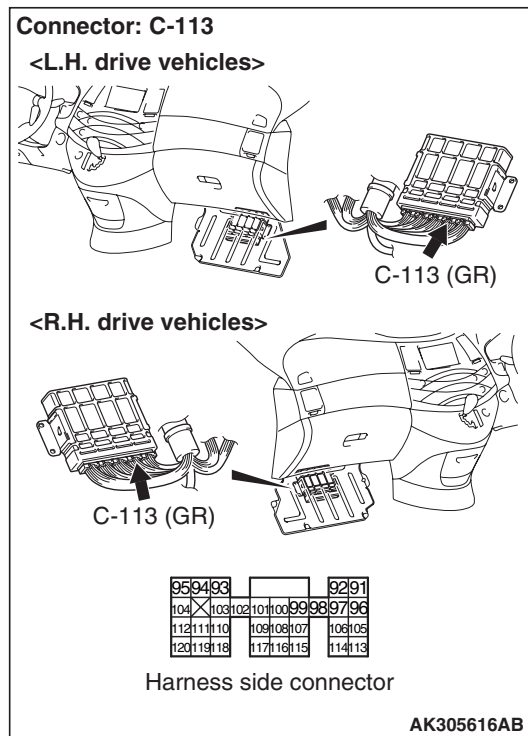
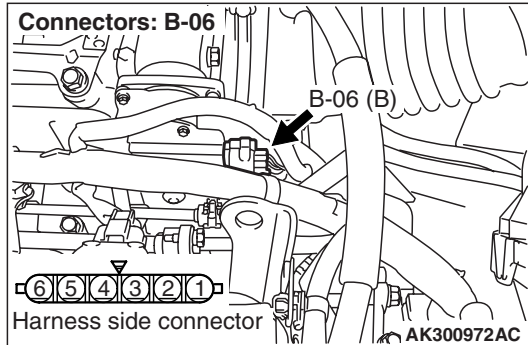
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14. 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 15 .

NO : Repair.

STEP 15. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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 throttle body assembly. Then go to Step 16 .

STEP 16. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

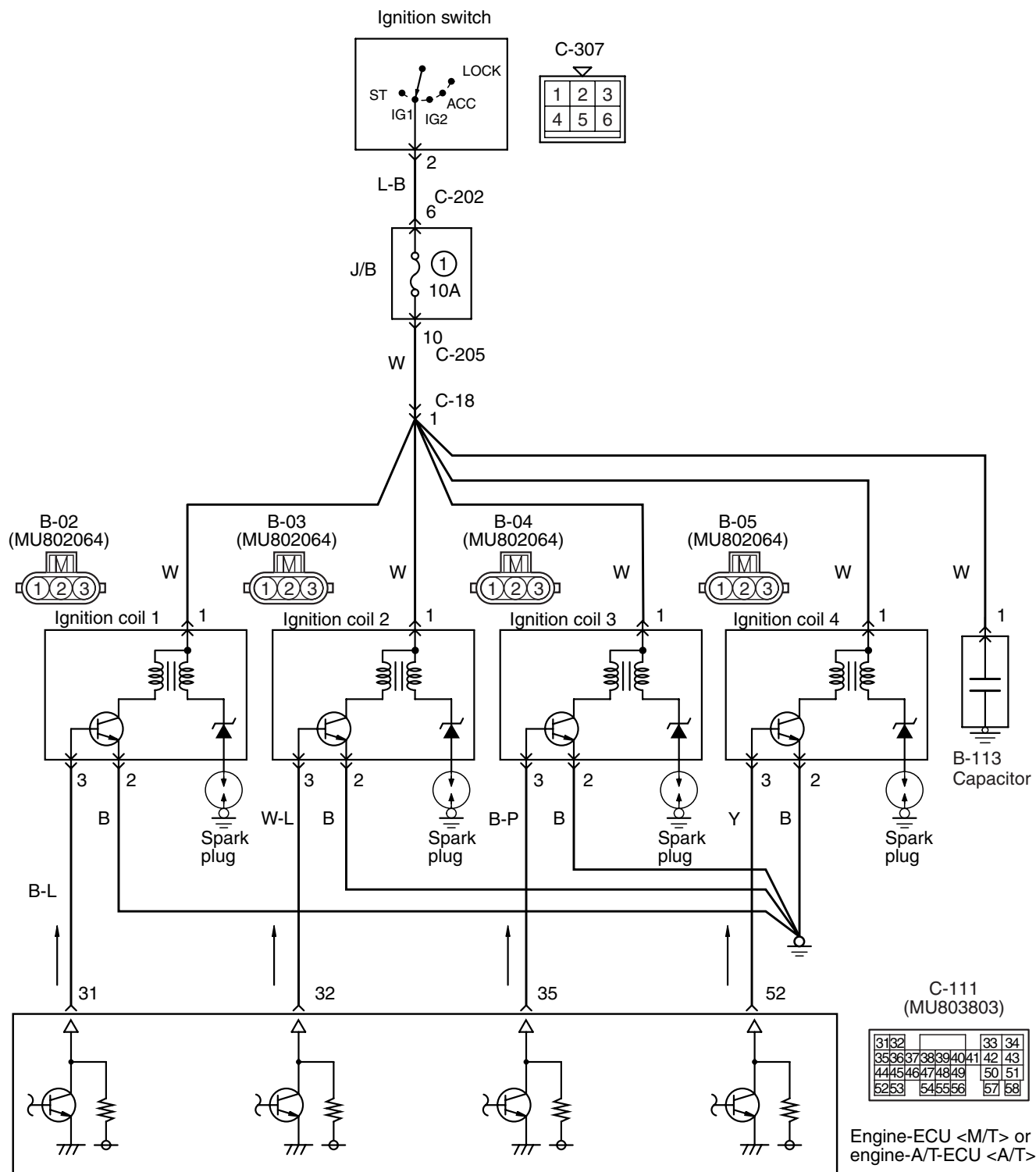
Q: Is the diagnosis code set?

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

NO : Check end.

Code No. P0300 Ignition Coil (Power Transistor) 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> (terminal 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.

TROUBLE JUDGMENT

Check Condition

- Engine speed is approximately 4,000 r/min or less.

Judgement Criterion

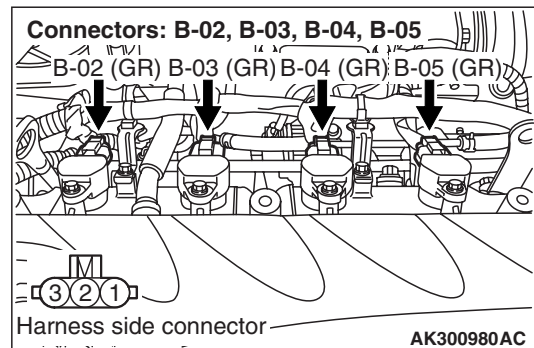
- The determination signal for the open circuit is continuously output from the confirmation signal circuit for the ignition built in the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

PROBABLE CAUSE

- Failed ignition coil
- 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. Connector check: B-02, B-03, B-04 and B-05 ignition coil connectors



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Check ignition coil itself.

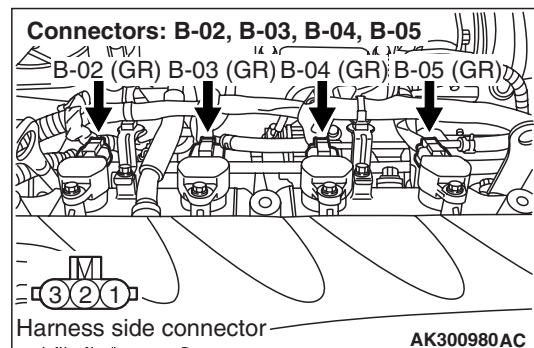
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service – Ignition coil check [P.16-29](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace ignition coil.

STEP 3. Perform voltage measurement at B-02, B-03, B-04 and B-05 ignition coil connectors.



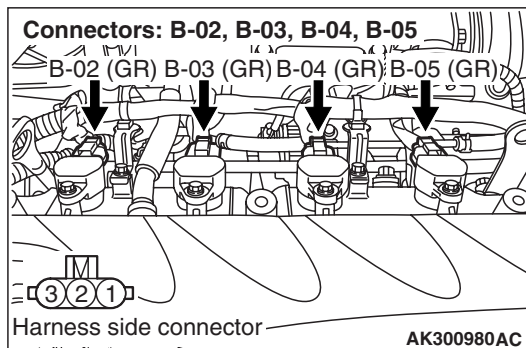
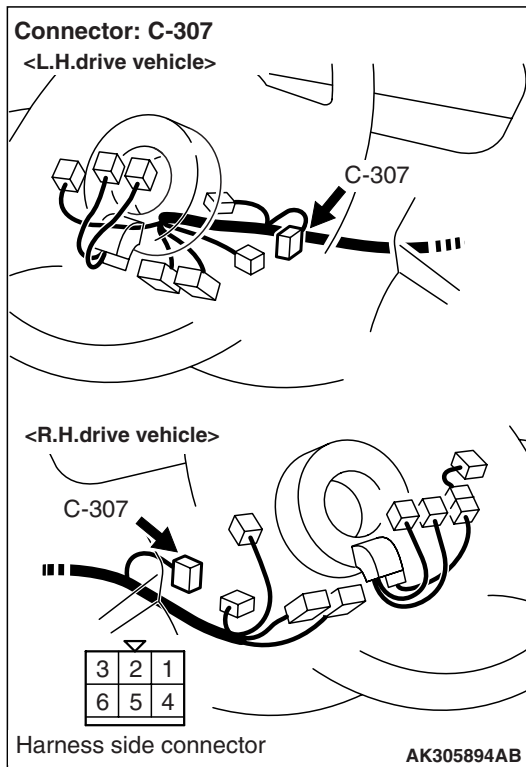
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

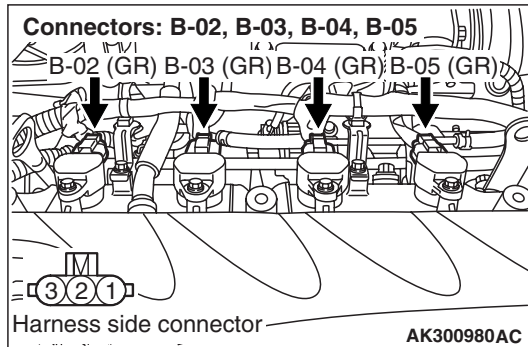
STEP 4. Connector check: C-307 ignition switch connector**Q: Is the check result normal?**

YES : Check intermediate connectors C-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 5. 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.

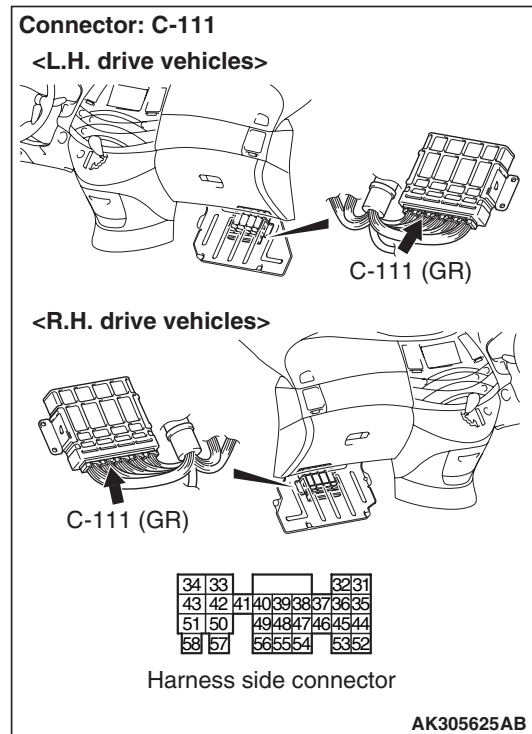
OK: 0.5 – 4.0 V

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 6 .

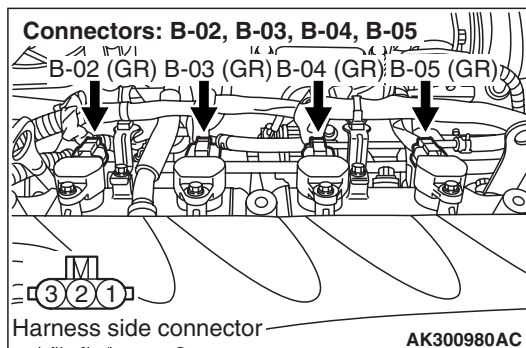
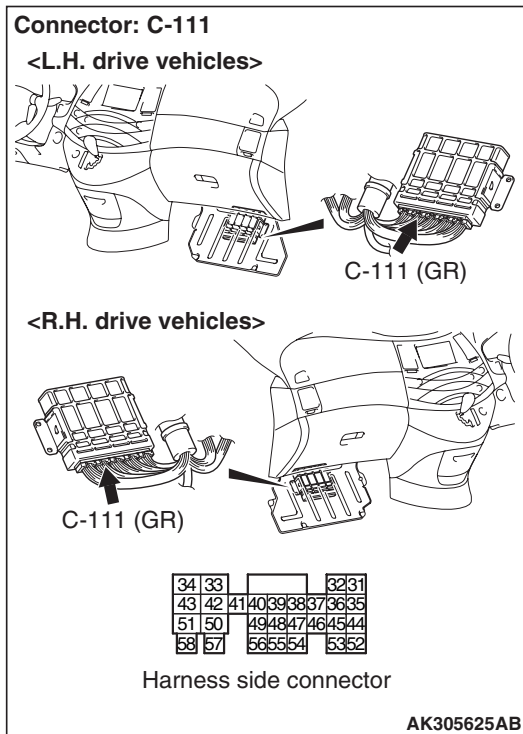
STEP 6. Connector check: C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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>.**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

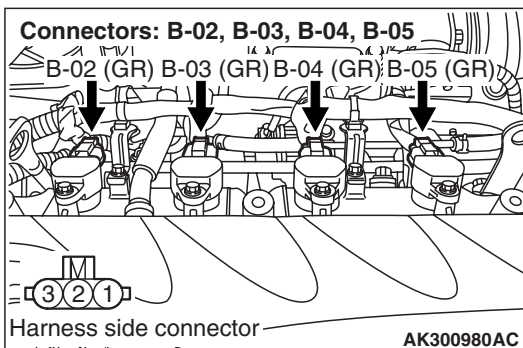
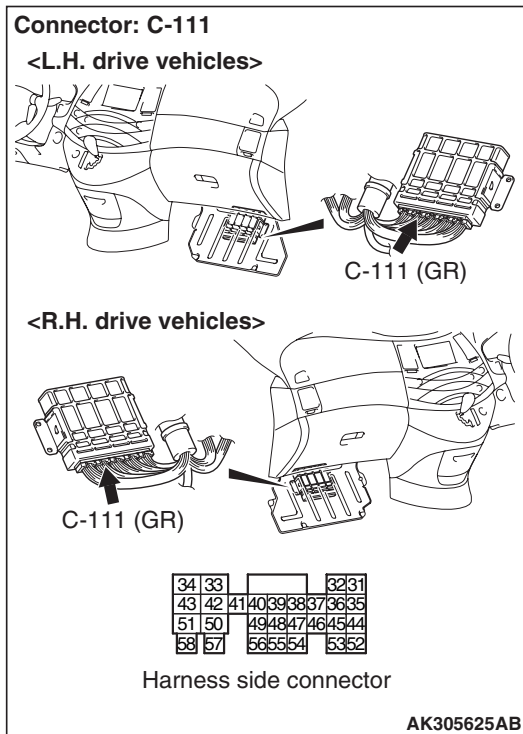
- Check and repair harness between B-02 (terminal No. 3) No. 1 ignition coil connector and C-111 (terminal No. 31) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-03 (terminal No. 3) No. 2 ignition coil connector and C-111 (terminal No. 32) engine-ECU <M/T> or 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 open circuit.

NO : Go to Step 8 .

- 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
 - Voltage between terminal No. 31 and earth (No. 1 Ignition coil).
 - Voltage between terminal No. 32 and earth (No. 2 Ignition coil).
 - Voltage between terminal No. 35 and earth (No. 3 Ignition coil).
 - Voltage between terminal No. 52 and earth (No. 4 Ignition coil).

OK: 0.5 – 4.0 V

STEP 8. 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: Is the check result normal?

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

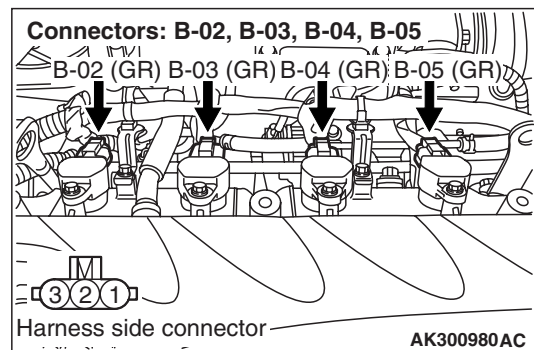
STEP 9. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

- 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-02, B-03, B-04 and B-05 ignition coil connectors.



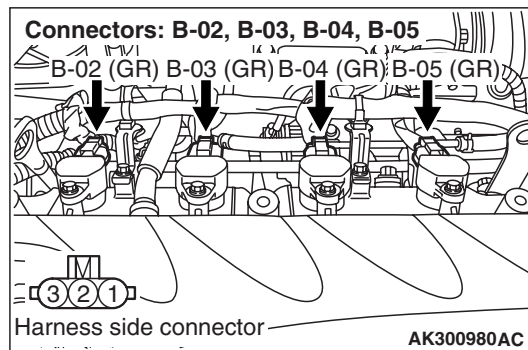
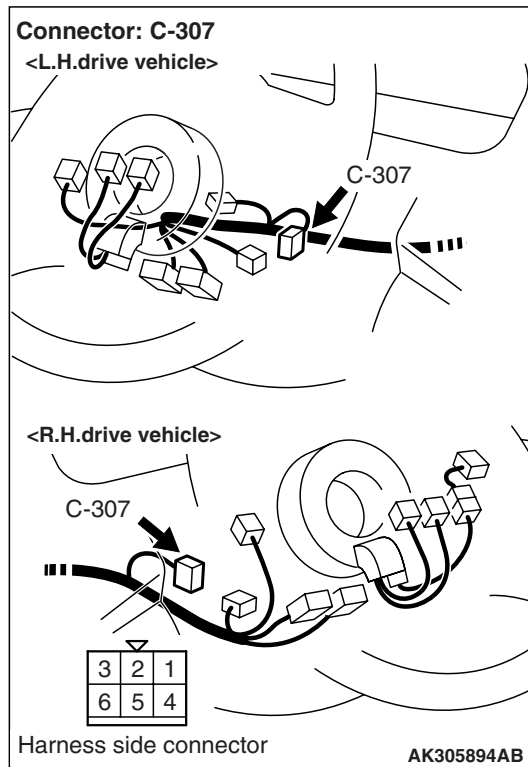
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

OK: 2 Ω or less

Q: Is the check result normal?

- YES :** Go to Step 11 .
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 11. Check harness between ignition switch connector and ignition coil connector.**Q: Is the check result normal?****YES :** Go to Step 12 .**NO :** Repair.

NOTE: Before checking harness, check intermediate connectors C-18, C-202 and C-205, and repair if necessary.

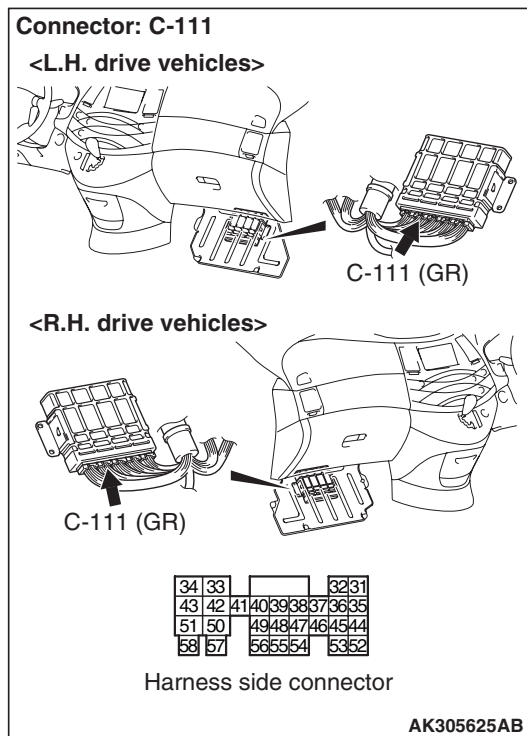
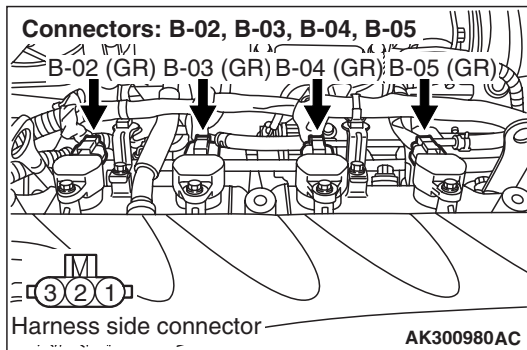
- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-02 (terminal No. 1) No. 1 ignition coil connector
 - Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-03 (terminal No. 1) No. 2 ignition coil connector
 - Check and repair 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 damage.

STEP 12. Check harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Q: Is the check result normal?

YES : Go to Step 9 .

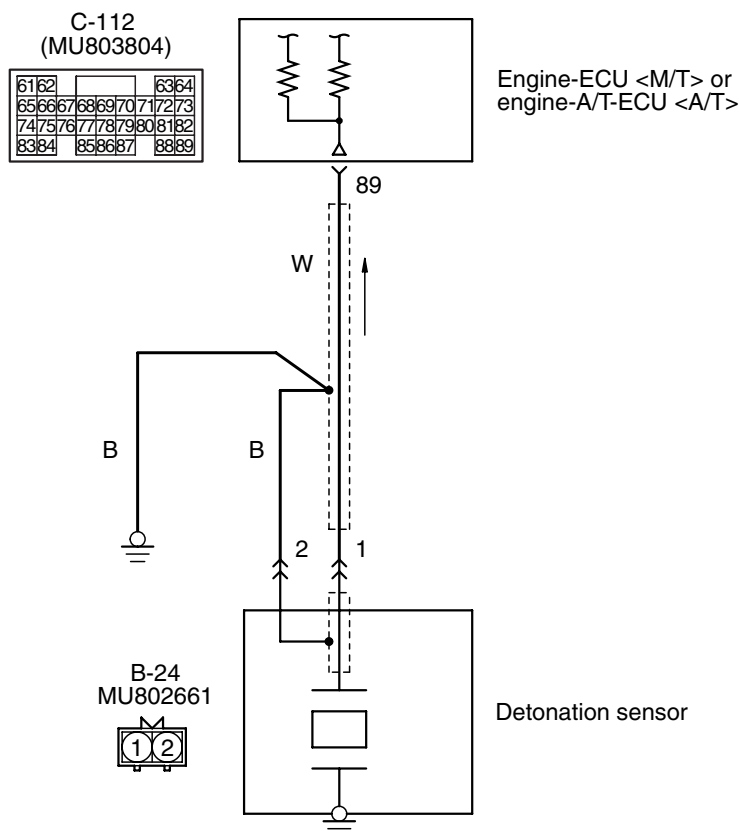
NO : Repair.



- 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.

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

Judgment Criterion

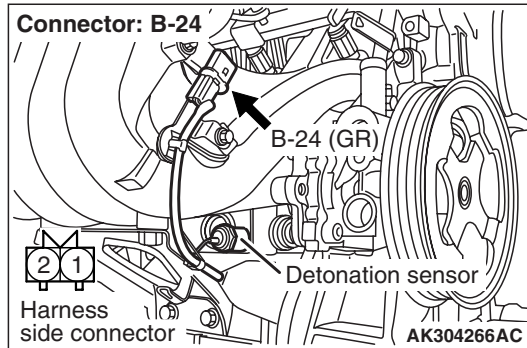
- Change of detonation sensor output voltage (detonation sensor peak voltage in each 1/2 turn of the crankshaft) has not been 0.06 V or more in the last consecutive 200 periods.

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

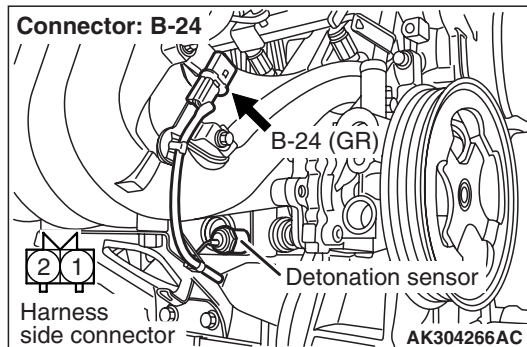


Q: Is the check result normal?

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 .

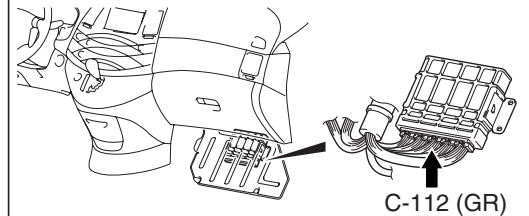
NO : Check and repair harness between B-24 (terminal No. 2) detonation sensor connector and body earth.

- Check earthing line for open circuit and damage.

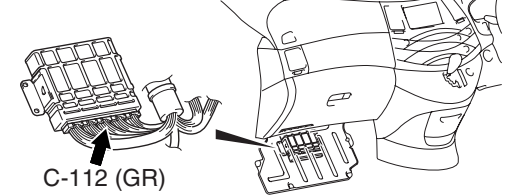
STEP 3. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

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

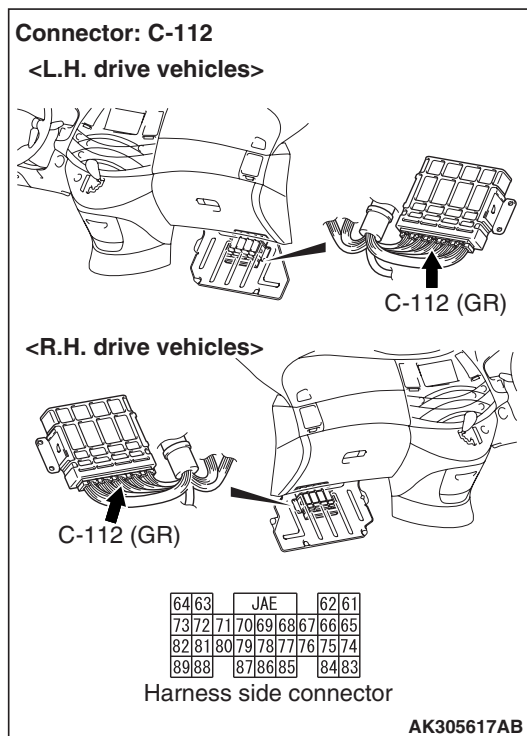
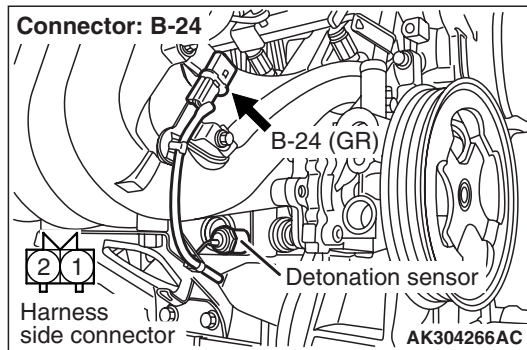
AK305617AB

Q: Is the check result normal?

YES : Go to Step 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 or replace.

STEP 5. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace detonation sensor. Then go to Step 6 .

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

STEP 6. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

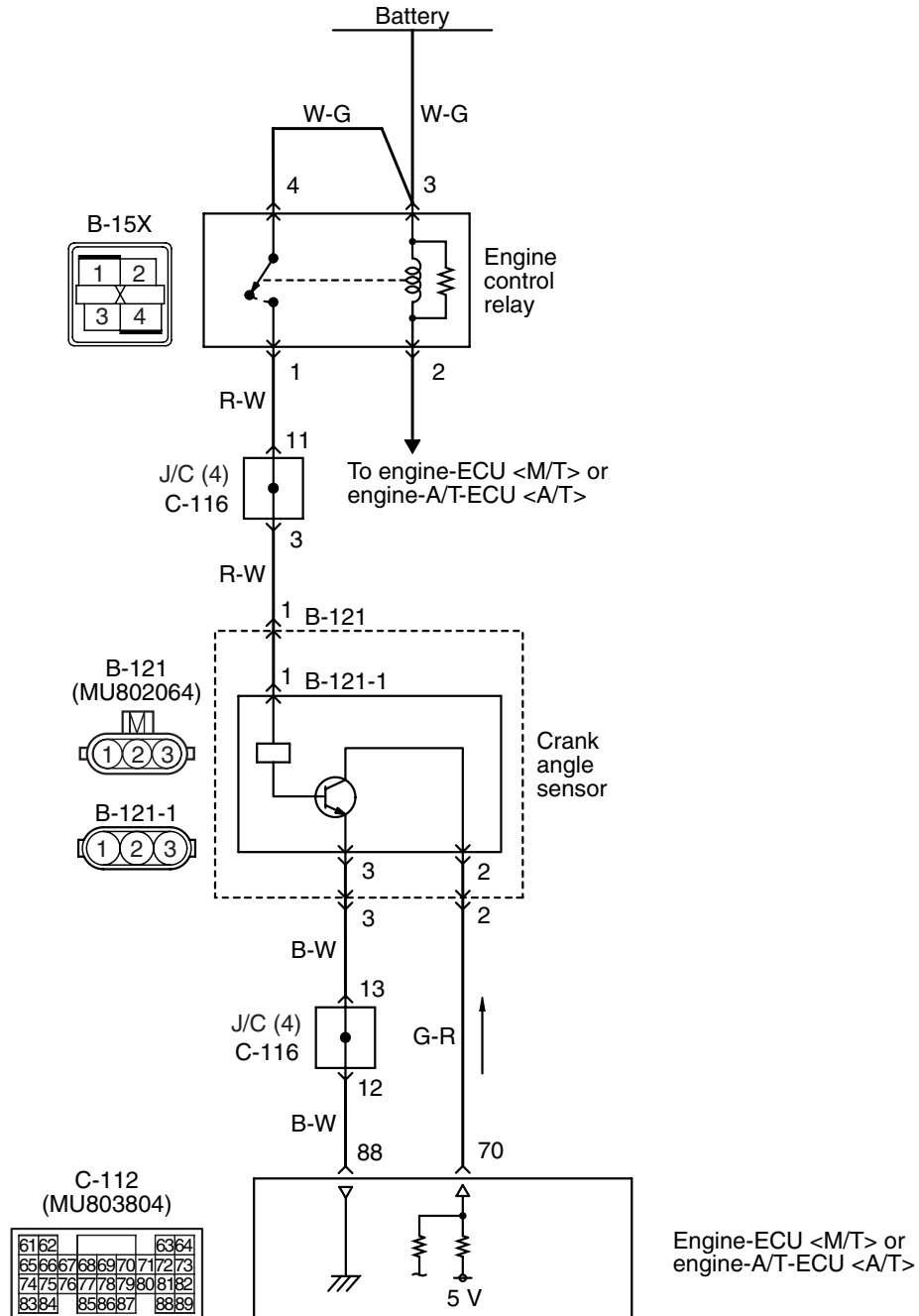
Q: Is the diagnosis code set?

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 Condition**

- While engine is being cranked.

Judgment Criterion

- 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>

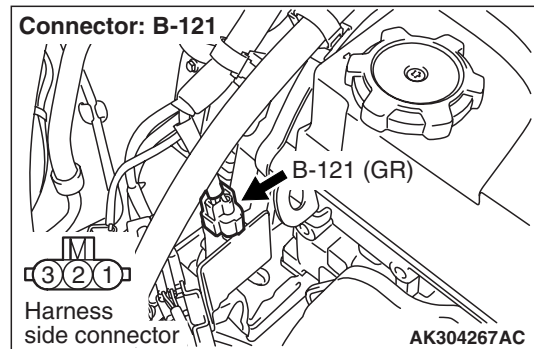
DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III data list**

- Refer to Data List Reference Table [P.13A-284](#).
 - Item 22: Crank angle sensor

Q: Is the check result normal?

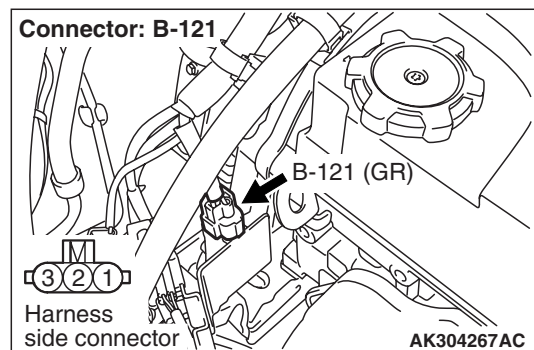
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

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.

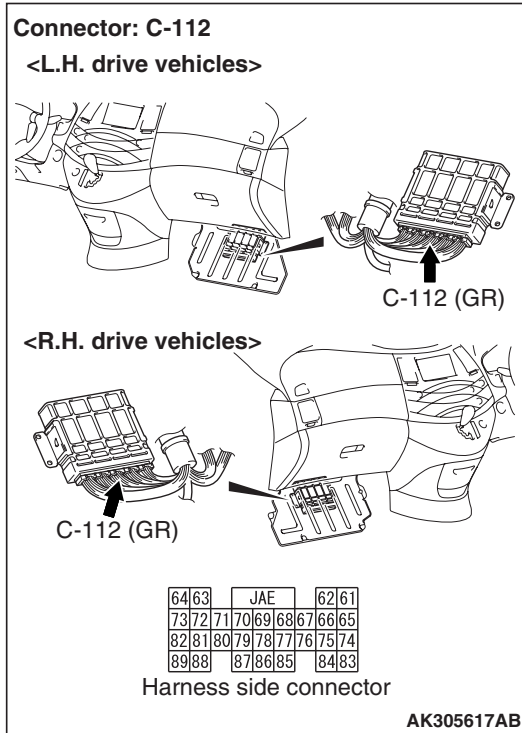
OK: 4.9 – 5.1 V

Q: Is the check result normal?

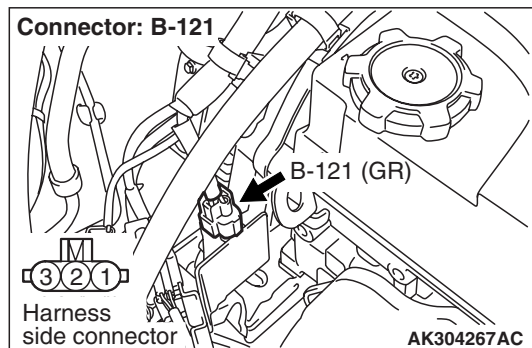
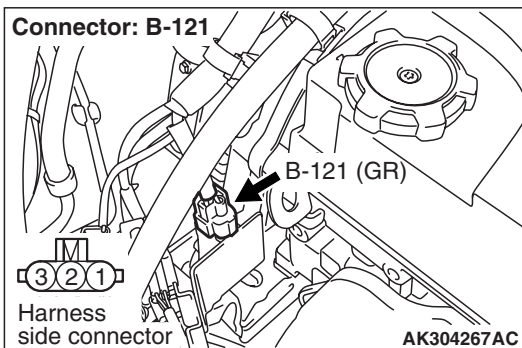
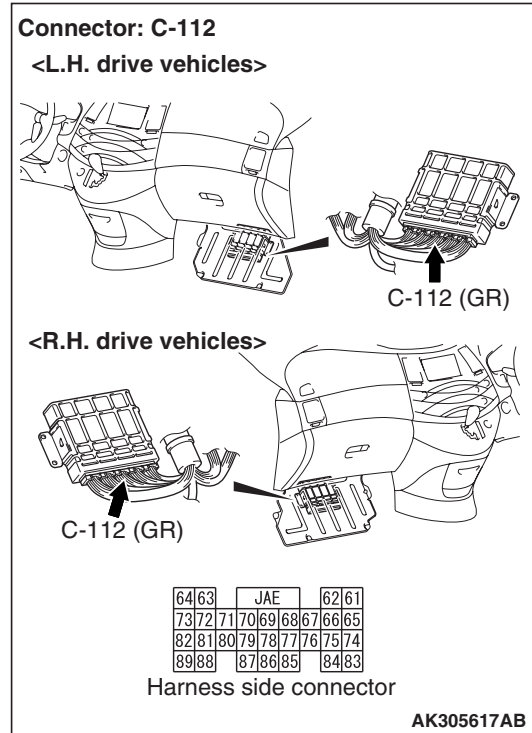
YES : Go to Step 9 .

NO : Go to Step 4 .

STEP 4. Perform voltage measurement at C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 5. Connector check: 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.
- 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 .

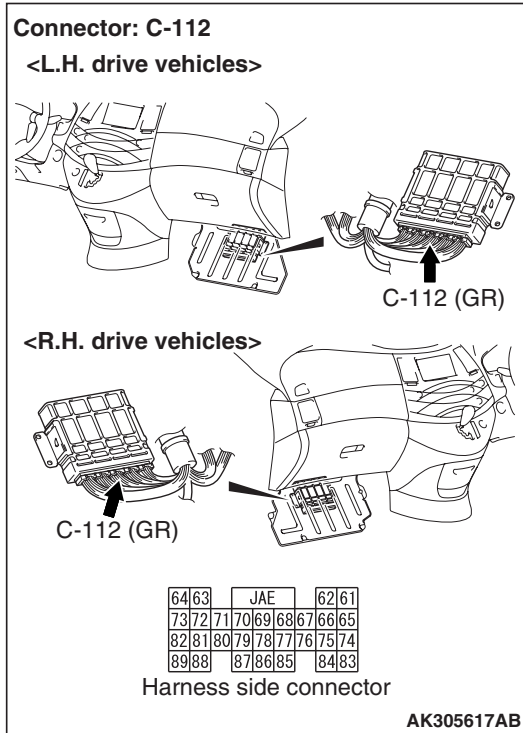
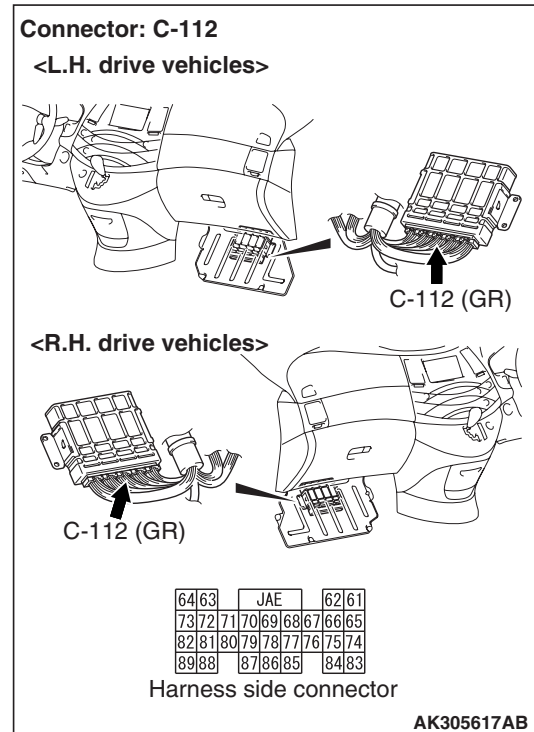
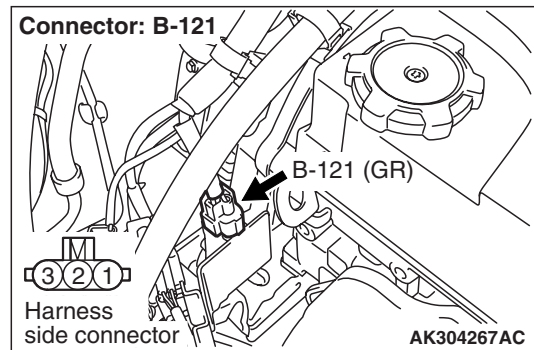
NO : Go to Step 6 .

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. M.U.T.-III data list**

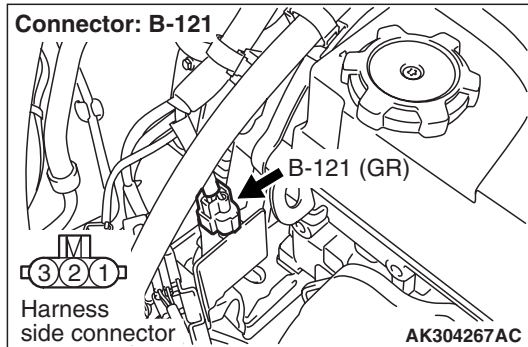
- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 22: Crank angle sensor

Q: Is the check result normal?

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

NO : Replace engine-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.

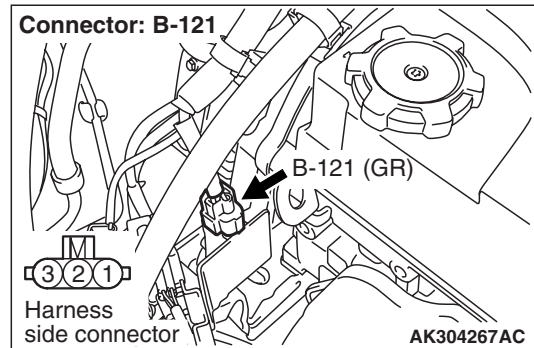
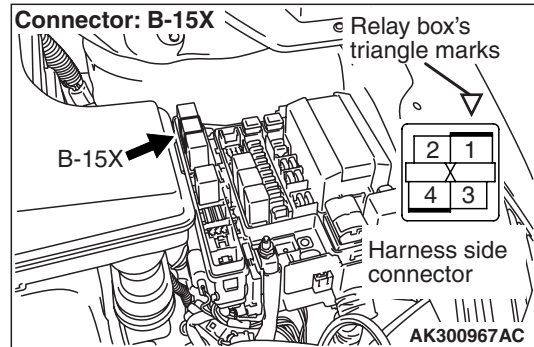
OK: System voltage

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



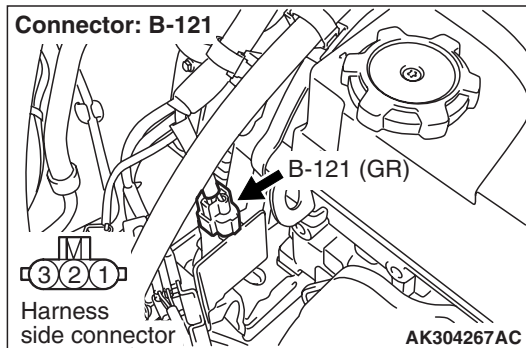
Q: Is the check result normal?

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.

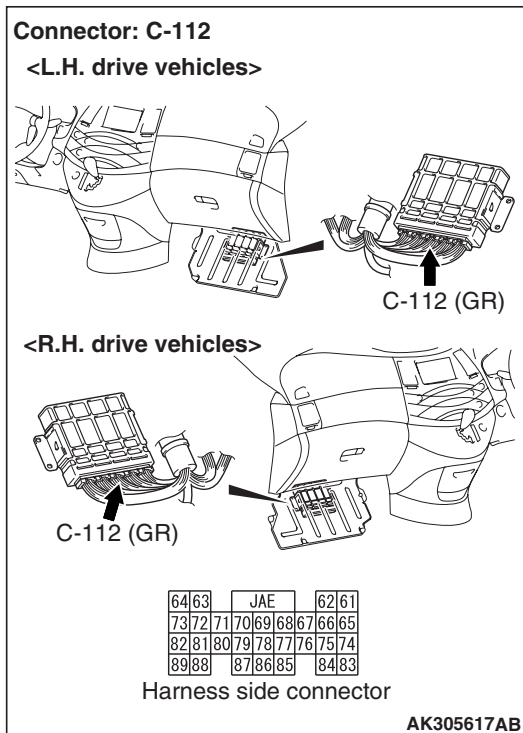
OK: 2 Ω or less

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

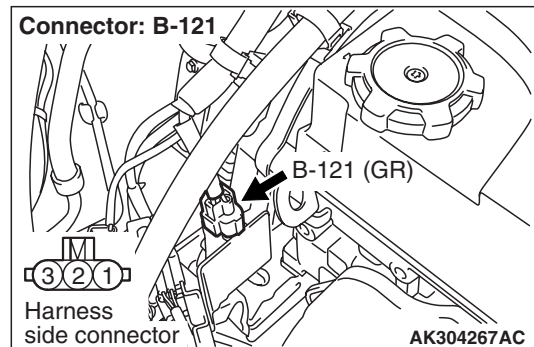


Q: Is the check result normal?

YES : Go to Step 13 .

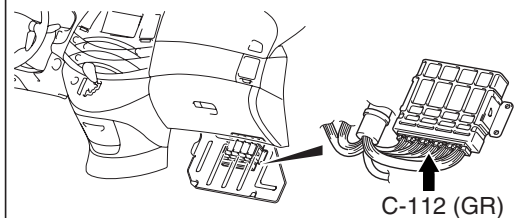
NO : Repair or replace.

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.

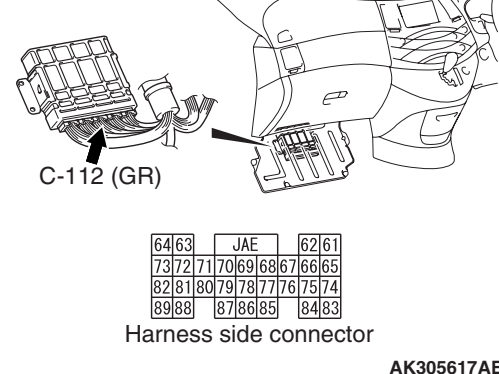


Connector: C-112

<L.H. drive vehicles>



<R.H. drive vehicles>



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

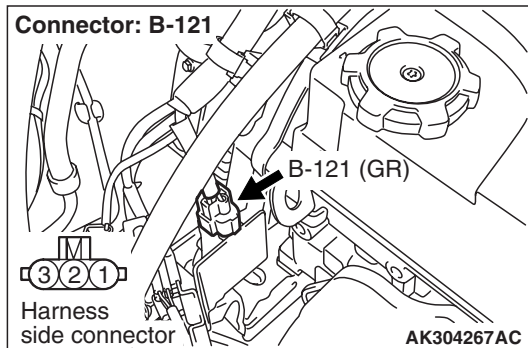
- Check earthing line for open circuit and damage.

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.

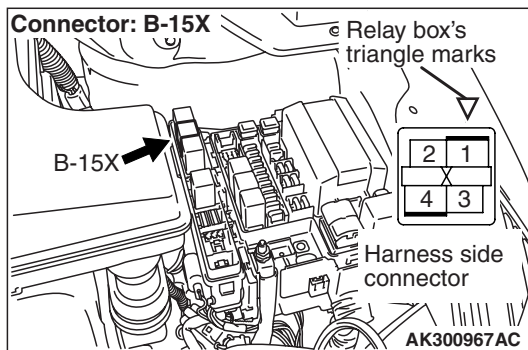
OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-300), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

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

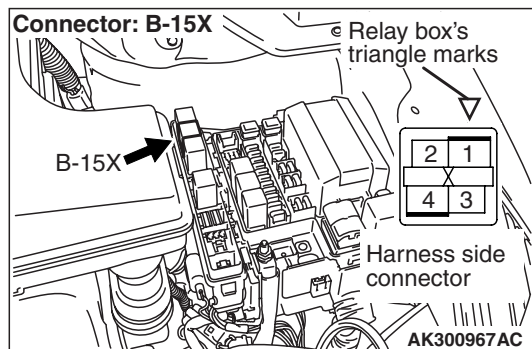
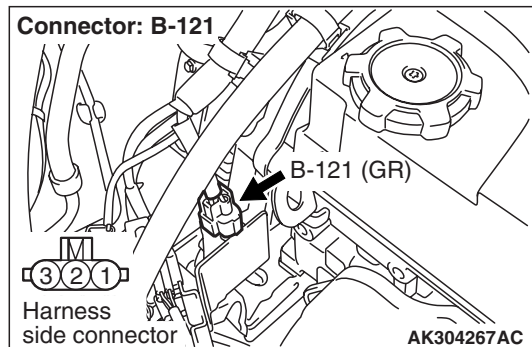


Q: Is the check result normal?

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.

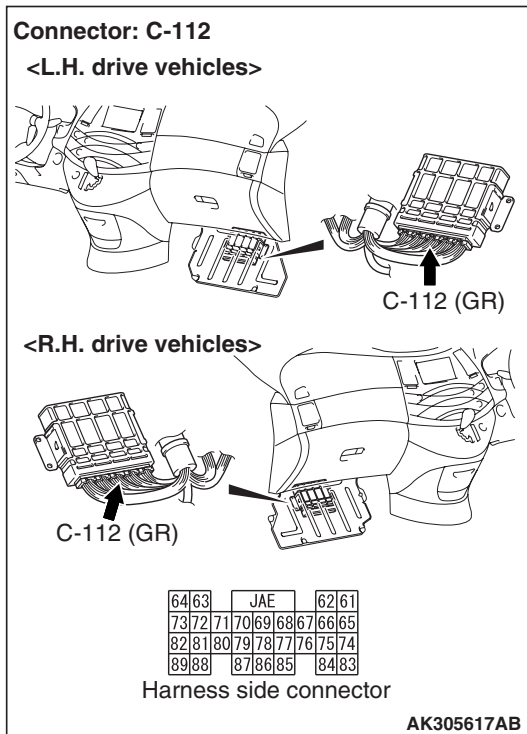
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

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

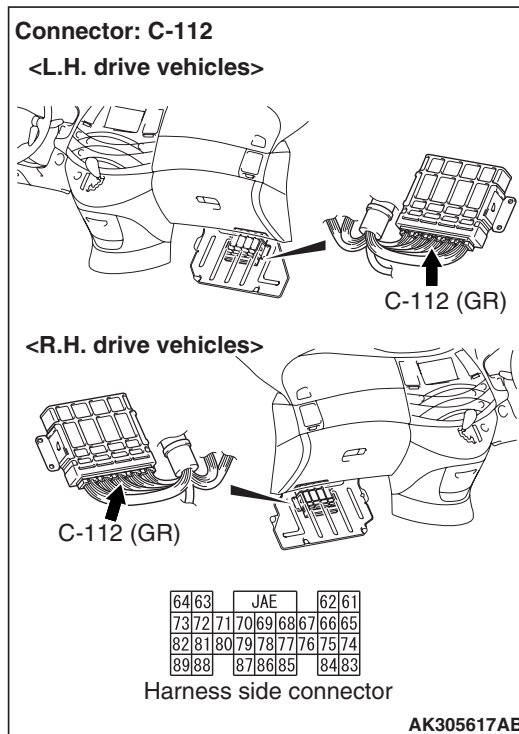
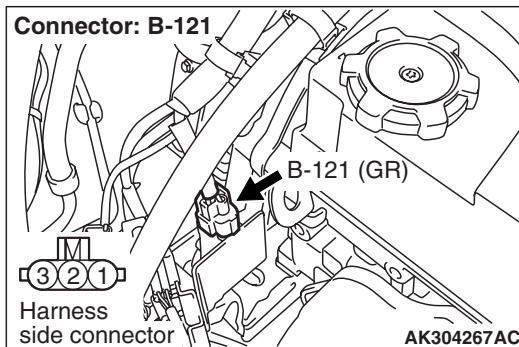


Q: Is the check result normal?

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.



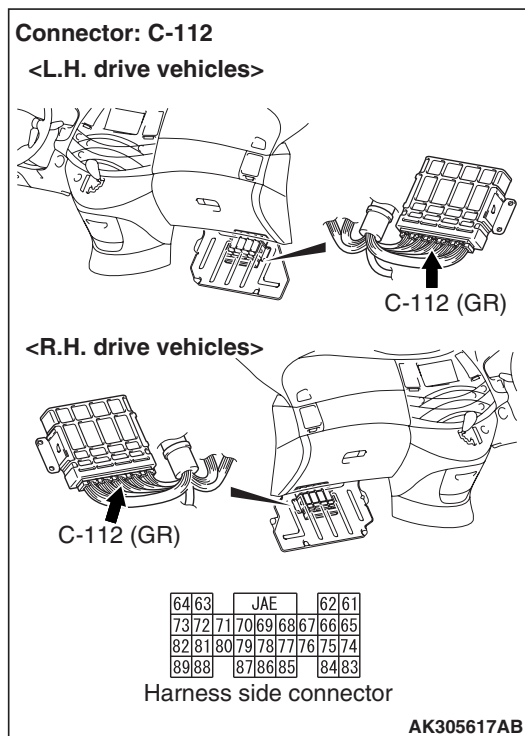
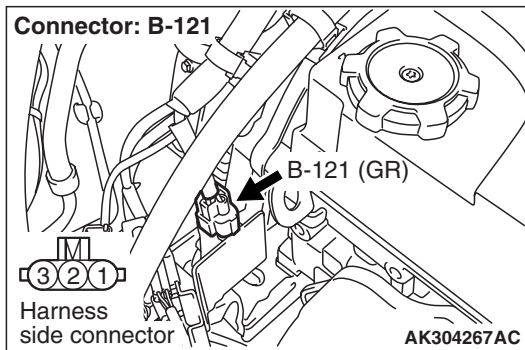
- Check output line for damage.

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.

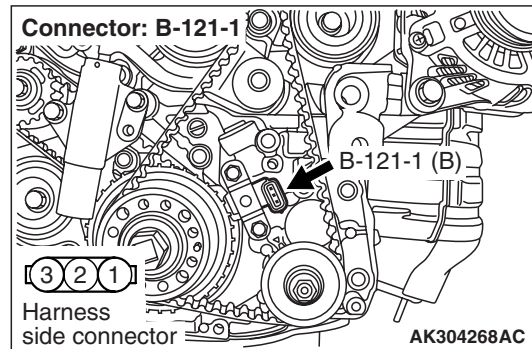
- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair.

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

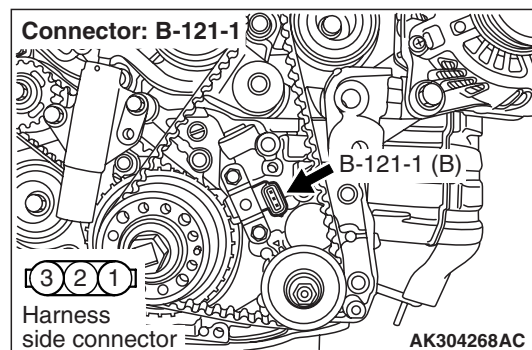
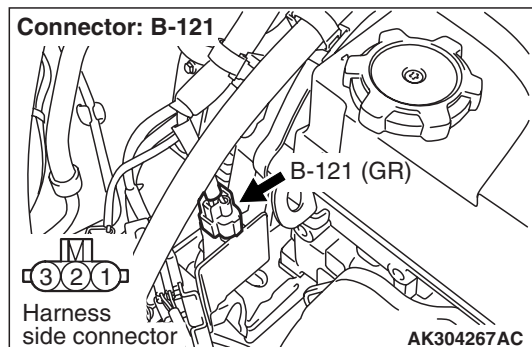


Q: Is the check result normal?

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 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: M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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.

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 centre 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 Conditions**

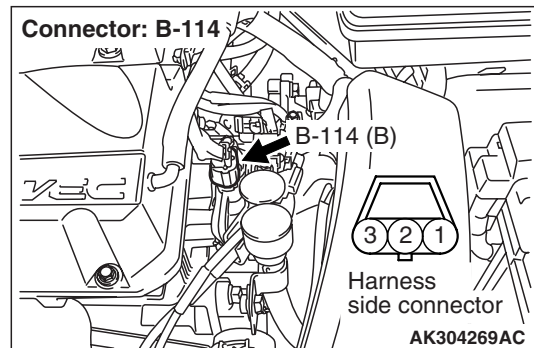
- 2 seconds later after the ignition switch has been in "ON" position or the engine has started up.
- Engine speed is 500 r/min. or more.

Judgment Criterion

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

PROBABLE CAUSE

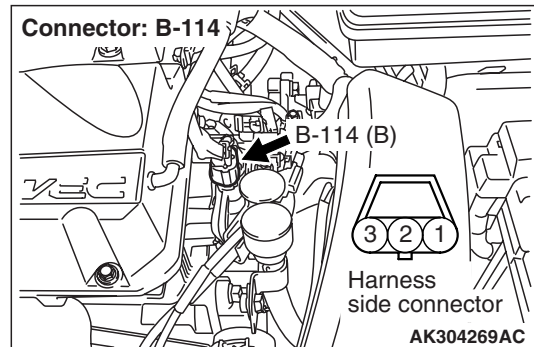
- Failed camshaft position sensor
- Open/short circuit in camshaft position sensor circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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.

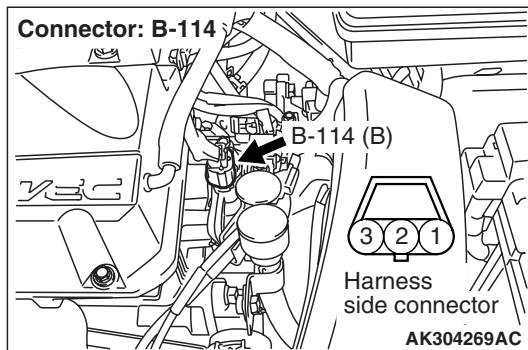
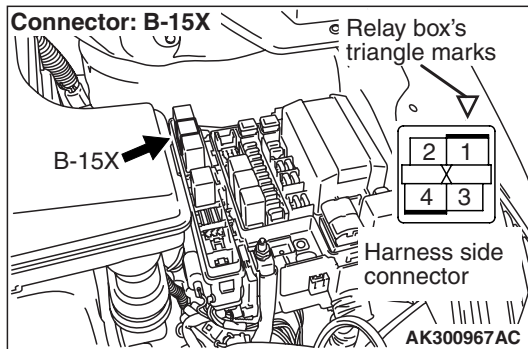
OK: System voltage

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



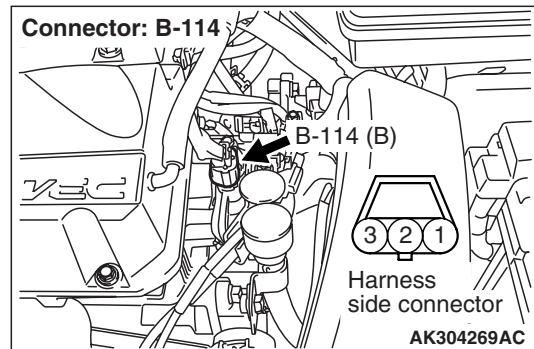
Q: Is the check result normal?

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.

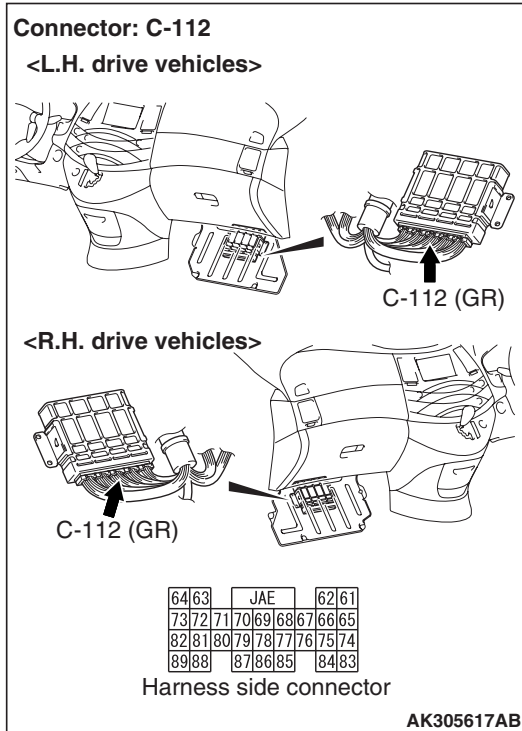
OK: 4.9 – 5.1 V

Q: Is the check result normal?

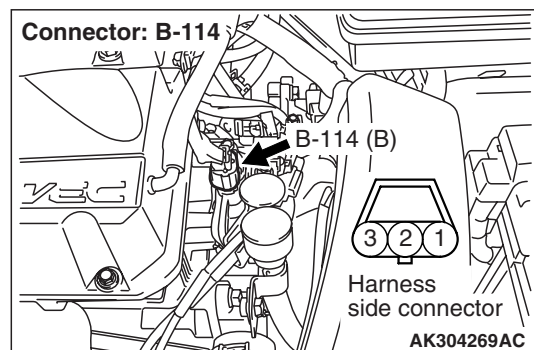
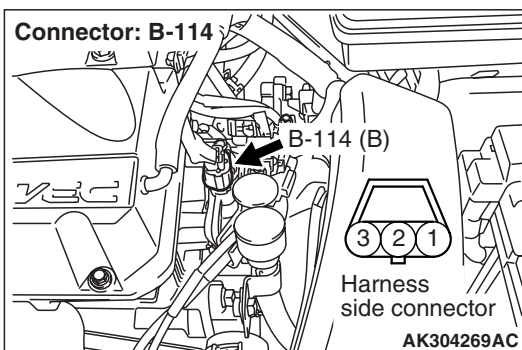
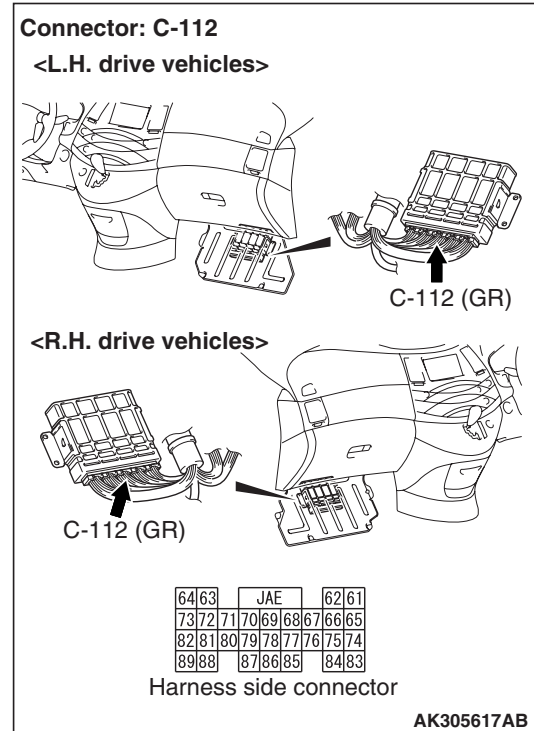
YES : Go to Step 10 .

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.



STEP 6. Connector check: 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.
- 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 .

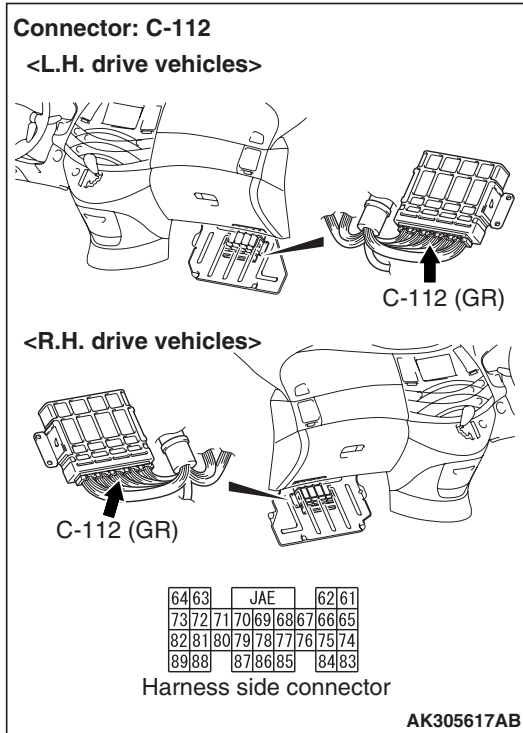
Q: Is the check result normal?

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.

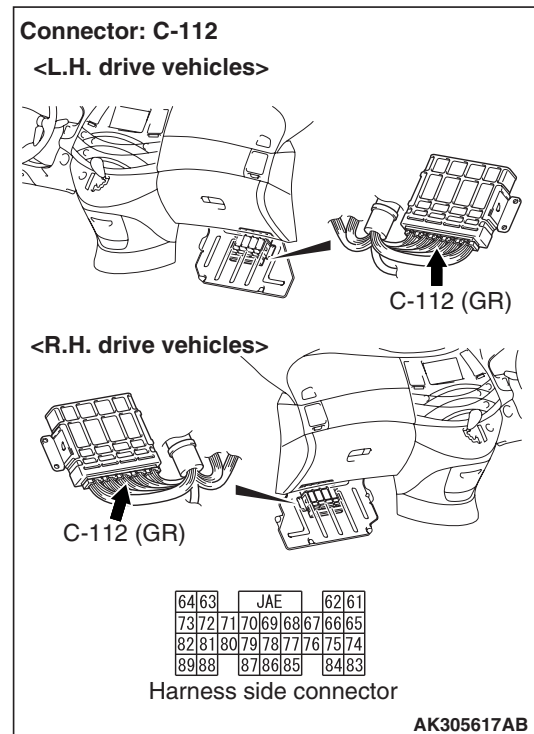
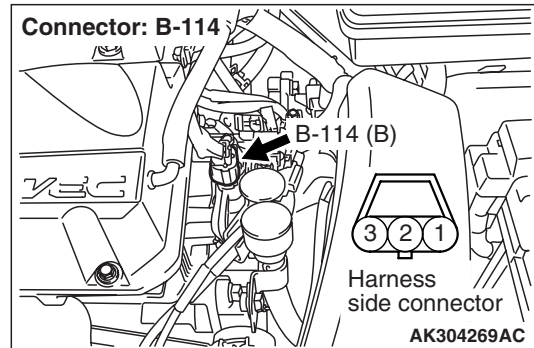
NO : Repair or replace.

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



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

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.

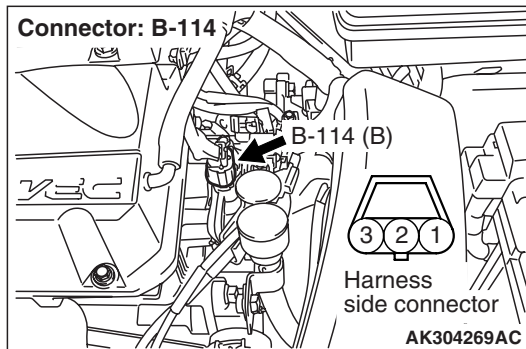
STEP 9. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

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.

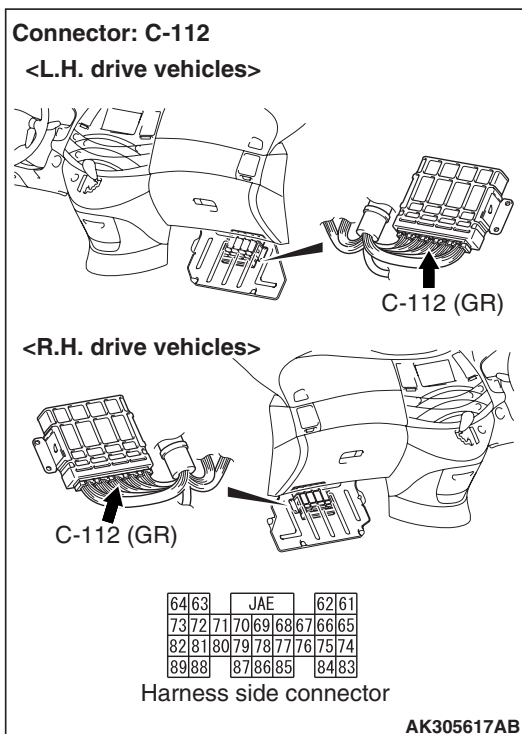
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 13 .

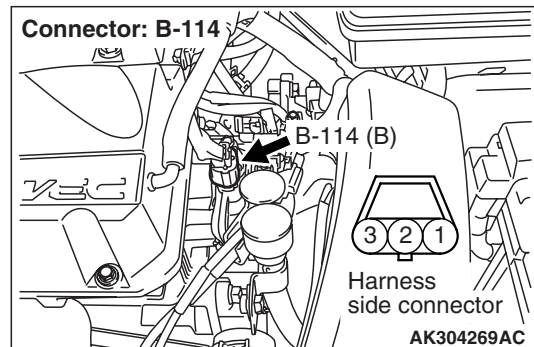
NO : Go to Step 11 .

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?

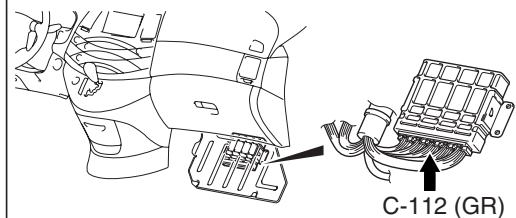
YES : Go to Step 12 .

NO : Repair or replace.

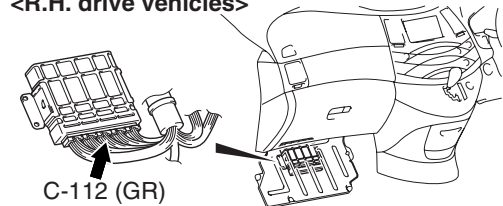
STEP 12. Check harness between B-114 (terminal No. 1) camshaft position sensor connector and C-112 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Connector: C-112

<L.H. drive vehicles>



<R.H. drive vehicles>



64/63	JAE	62/61
73/72	71/70	69/68
67/66	65/64	82/81
80/79	78/77	76/75
74/73	89/88	87/86
85/84	83/82	

Harness side connector

AK305617AB

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

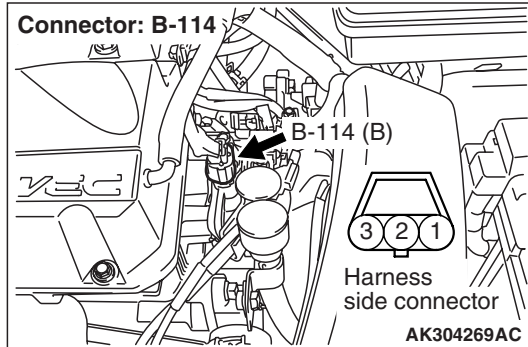
- Check earthing line for open circuit and damage.

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.

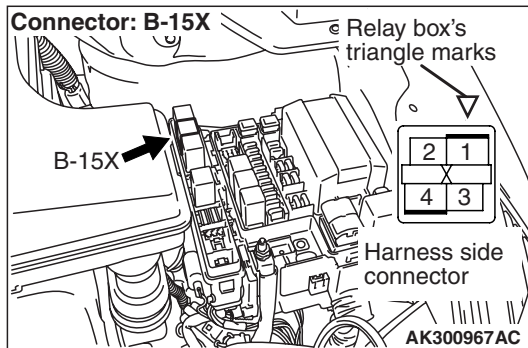
OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-300), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

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.

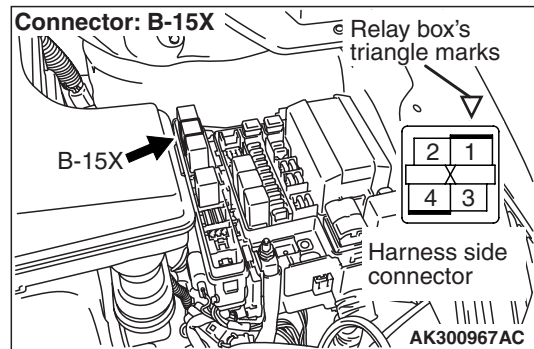
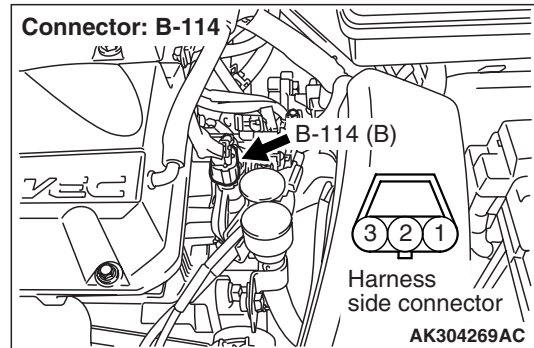


Q: Is the check result normal?

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.

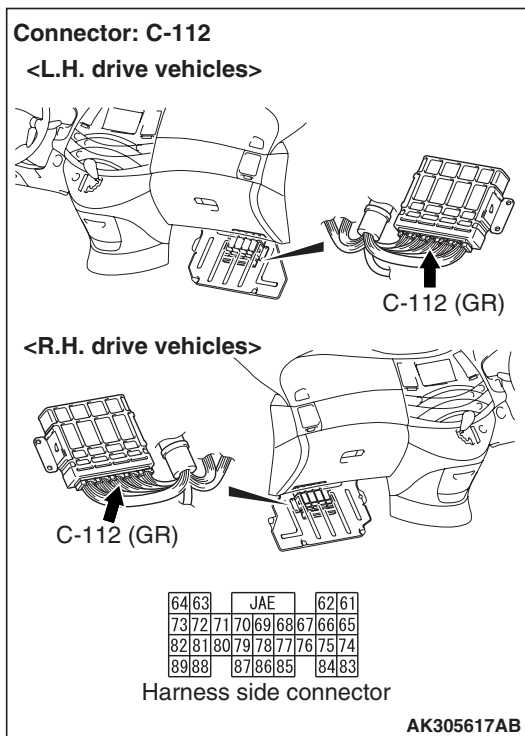
- Check power supply line for damage.

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

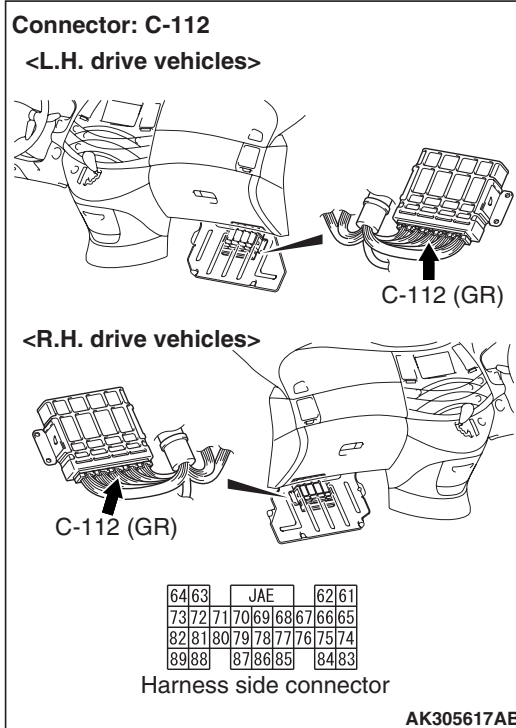
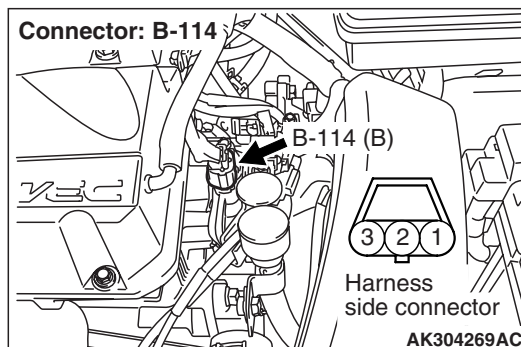


Q: Is the check result normal?

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.



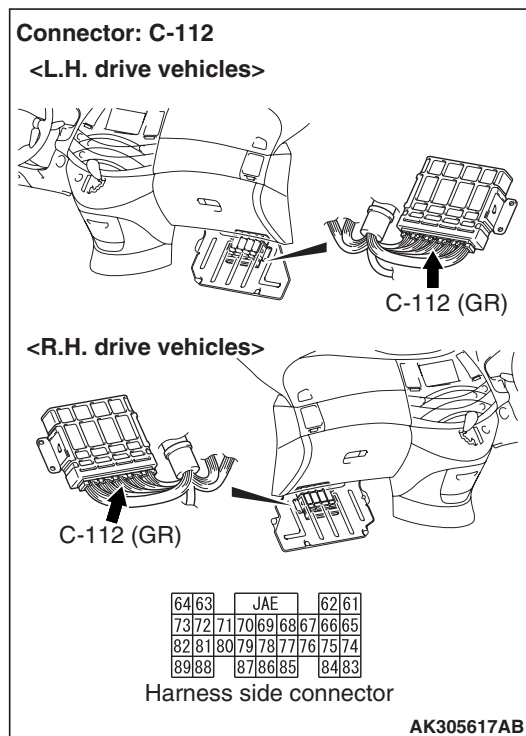
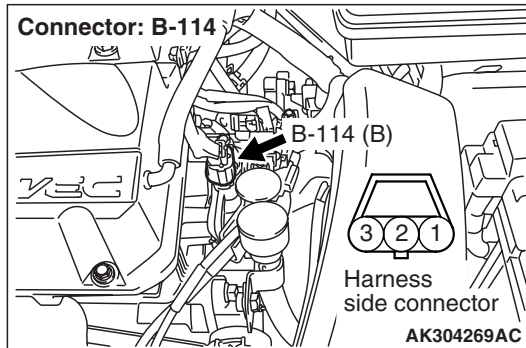
- Check output line for damage.

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. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

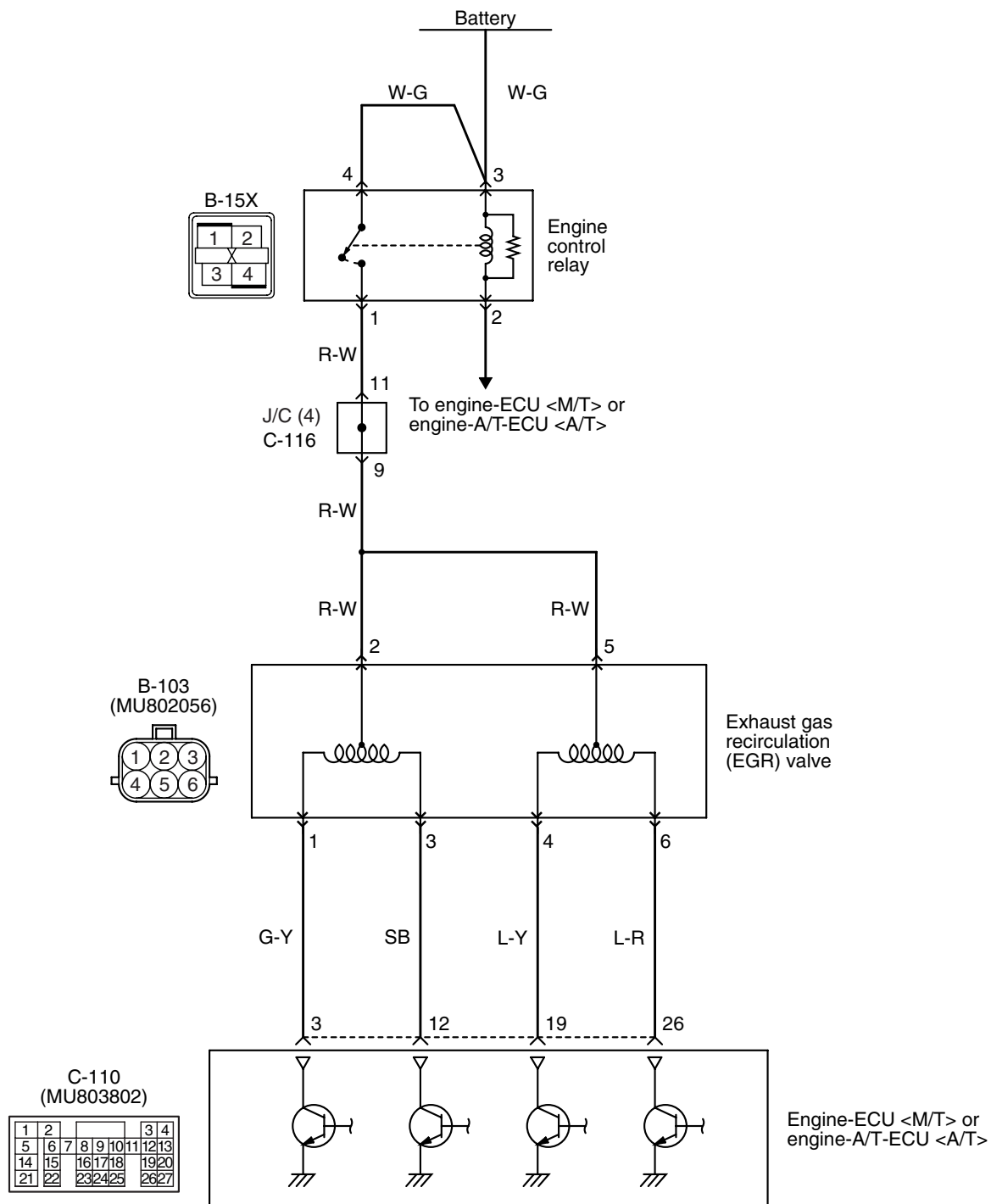
Q: Is the diagnosis code set?

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



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 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 Conditions

- When the ignition switch is turned to ON position from OFF position.

or

- EGR valve is in operation after the engine starting process is completed.

Judgment Criterion

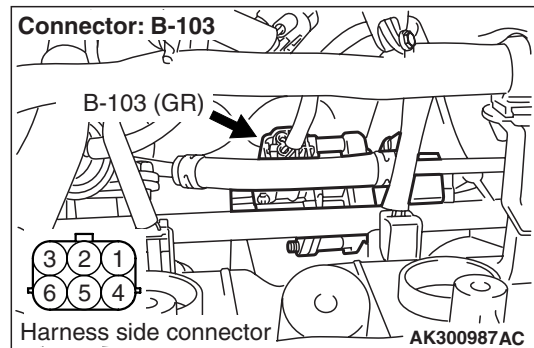
- Off-surge voltage is not generated from motor coil while the EGR valve motor is running.

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

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.

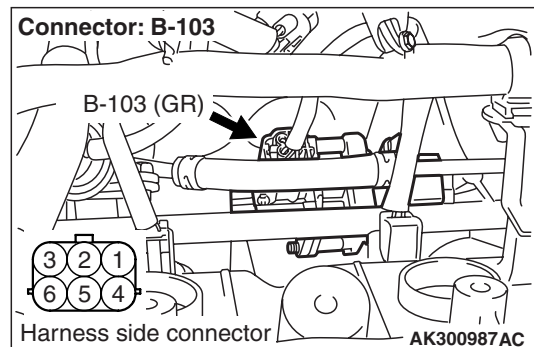
- Check EGR valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (stepper motor) Check [P.17-44](#).

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.

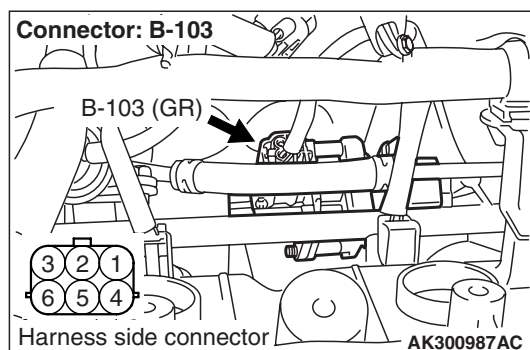
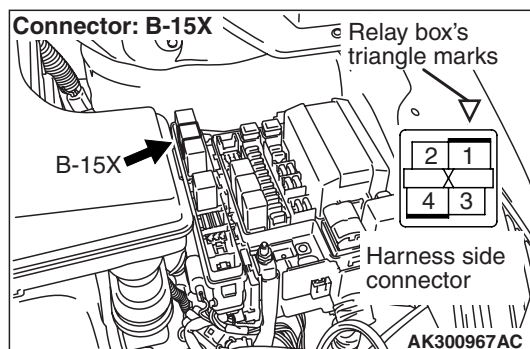
OK: System voltage

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



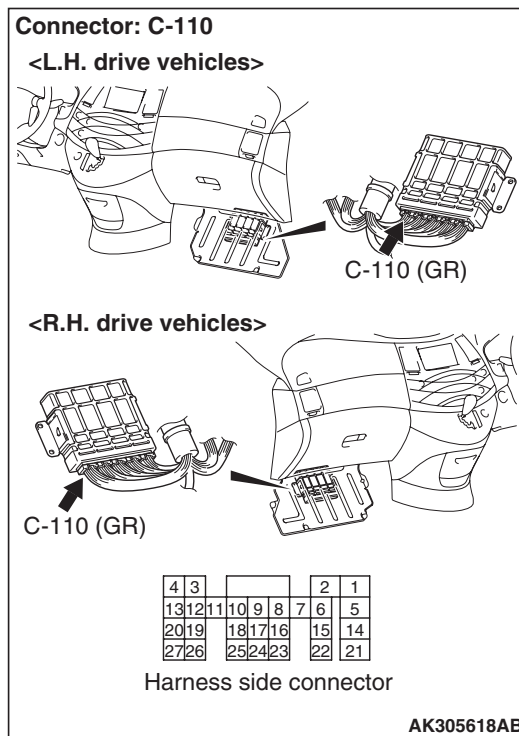
Q: Is the check result normal?

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



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

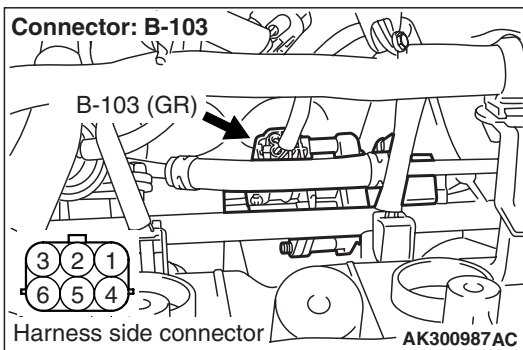
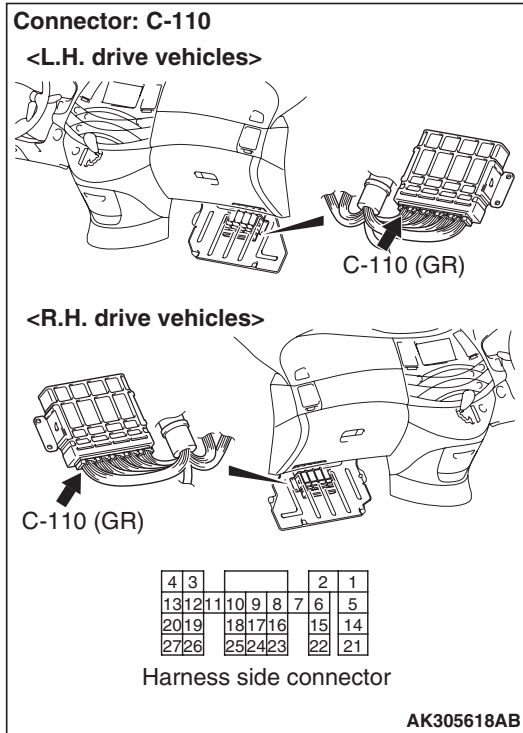
OK: System voltage

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>
connector**

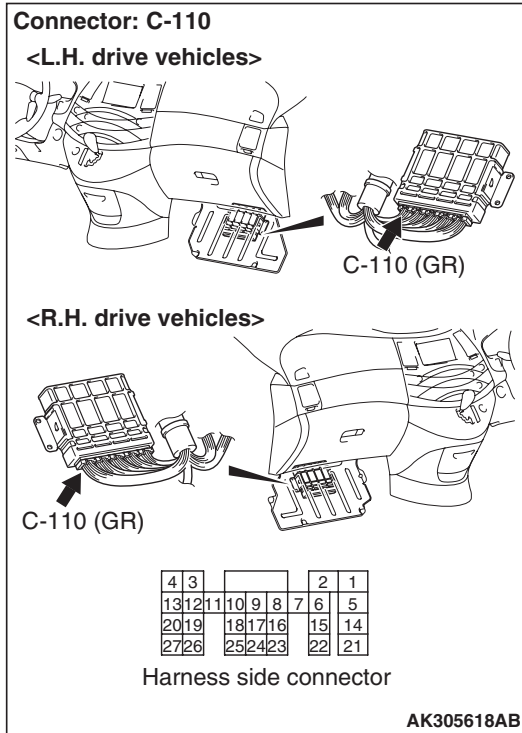
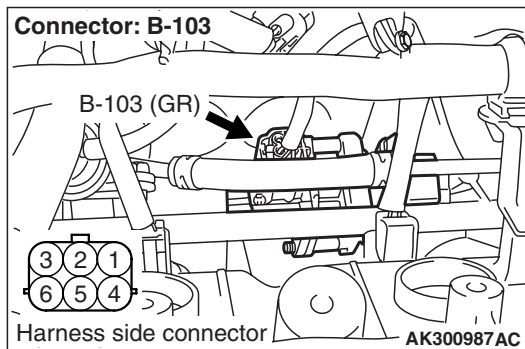


Q: Is the check result normal?

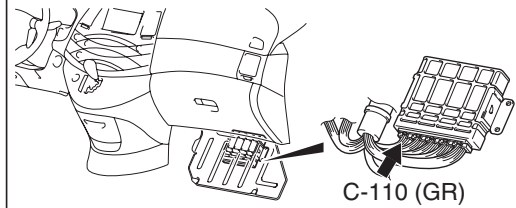
YES : Check and repair harness between B-103 EGR valve and C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- 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.

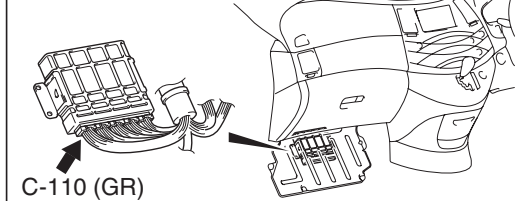
NO : Repair or replace.

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 :** Go to Step 8 .**NO :** Repair or replace.**STEP 8. Check harness between B-103 EGR valve and C-110 engine-ECU <M/T> or engine-A/T-ECU <A/T>.****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

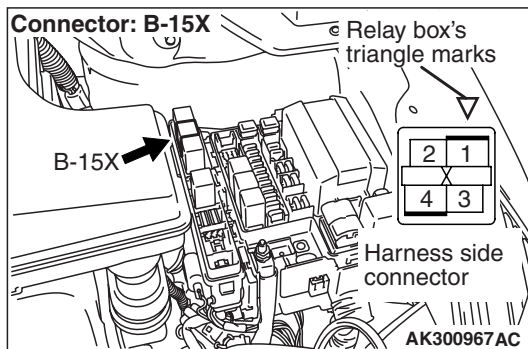
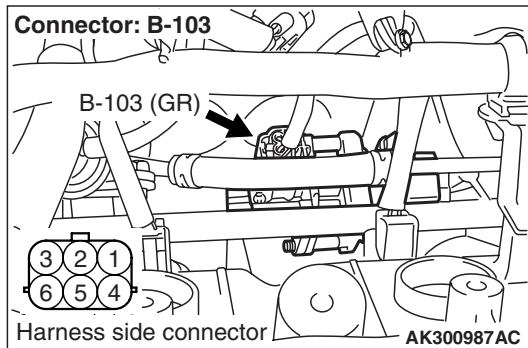
Harness side connector

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- 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.

Q: Is the check result 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.

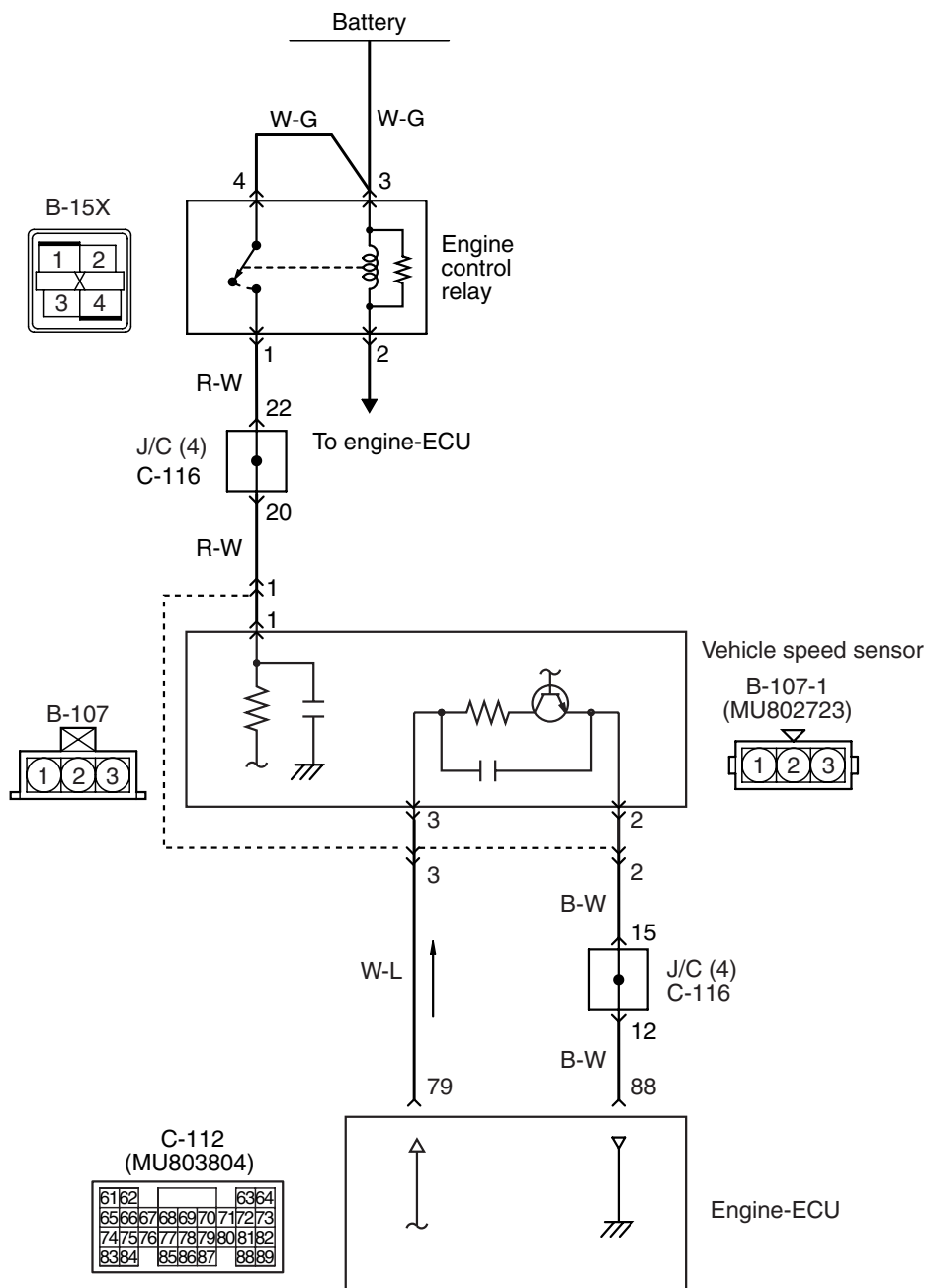
Q: Is the check result normal?

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

NO : Repair.

Code No. P0500: Vehicle Speed Sensor System <M/T>

Vehicle speed sensor circuit



Wire colour code

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

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 is 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 speedometer

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check the speedometer (Refer to GROUP 54A –Combination Meter – On-vehicle Service – Speedometer Check [P.54A-98](#)).

STEP 2. M.U.T.-III data list

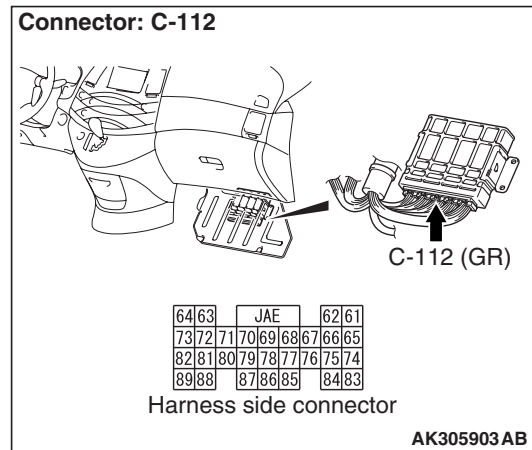
- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 24: Vehicle speed sensor

Q: Is the check result normal?

YES : Go to Step 3 .

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

STEP 3. Check connector: C-112 engine-ECU connector

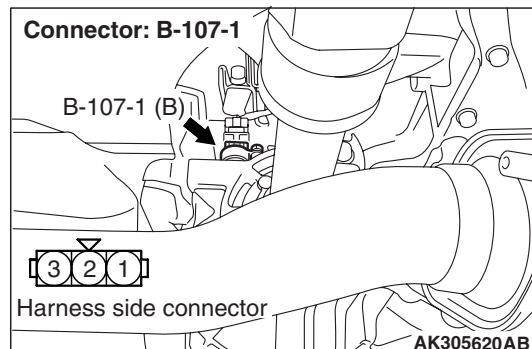
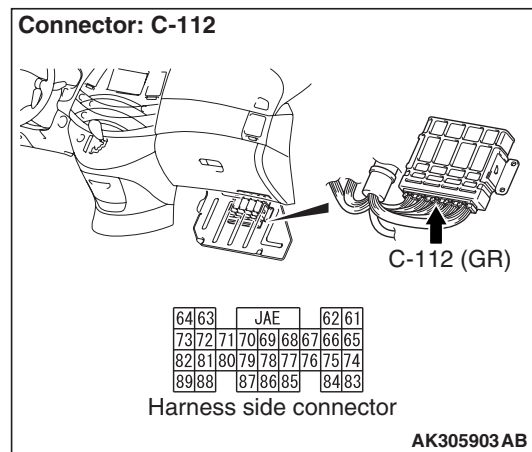


Q: Is the check result normal?

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.



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?

YES : Go to Step 5 .

NO : Repair.

STEP 5. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace engine-ECU.

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

Code No. P0500: Vehicle Speed Signal System <A/T>

FUNCTION

- Receives the signal from the output shaft 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 speedometer.

TROUBLE JUDGMENT**Check Conditions**

- After 2 seconds pass from when the engine has completed the starting.
- The engine speed is 2, 500 – 4, 000 r/min.
- Under the high load operation.

Judgment Criterion

- The output shaft speed sensor output voltage does not vary for 4 seconds (The plus signal is not input).

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III other system diagnosis codes

- Confirm whether the diagnosis codes are output from A/T system.

Q: Is the diagnosis code output for A/T system?

YES : Check A/T system (Refer to GROUP 23A – Troubleshooting – Check chart for diagnosis code [P.23A-17](#)).

NO : Go to Step 2 .

STEP 2. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

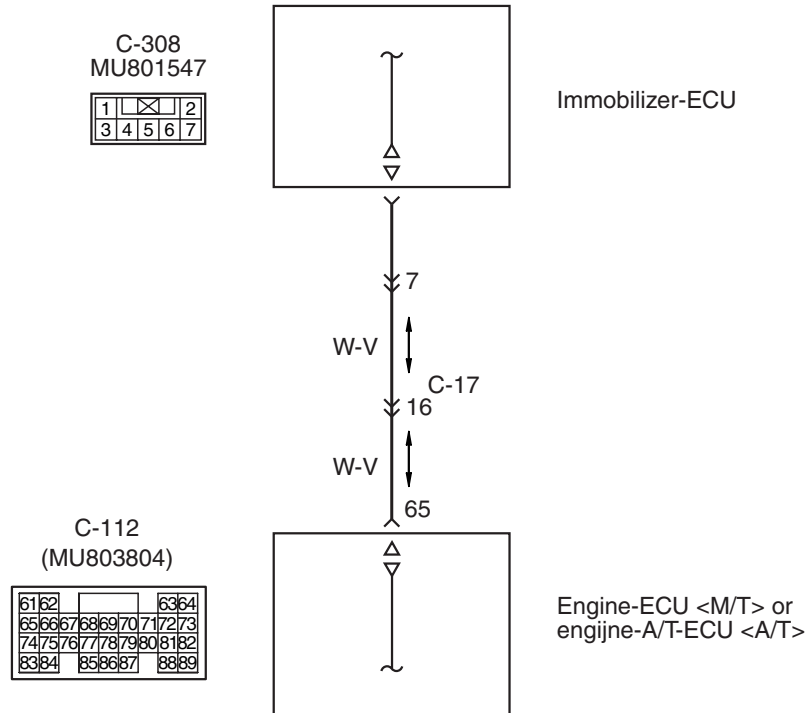
Q: Is the diagnosis code set?

YES : Replace engine-A/T-ECU.

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

Code No. P0513: Immobilizer Malfunction <Australia, New Zealand and GCC>

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

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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

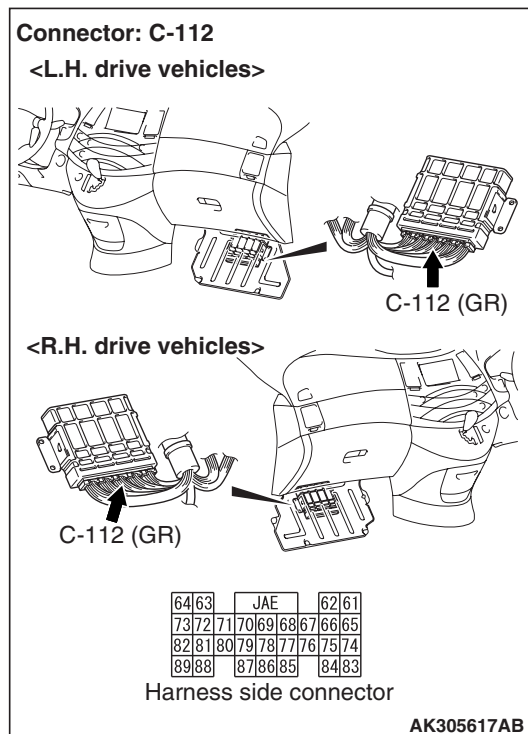
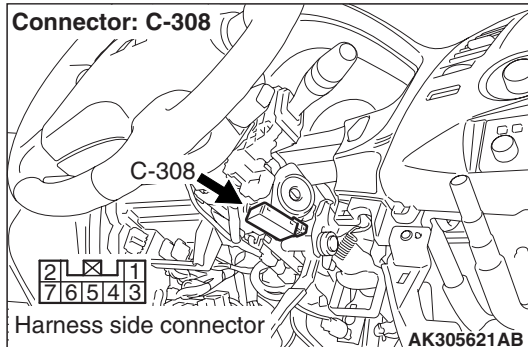
- Communication error between engine-ECU <M/T> or engine-A/T-ECU <A/T> and the immobilizer-ECU.

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.

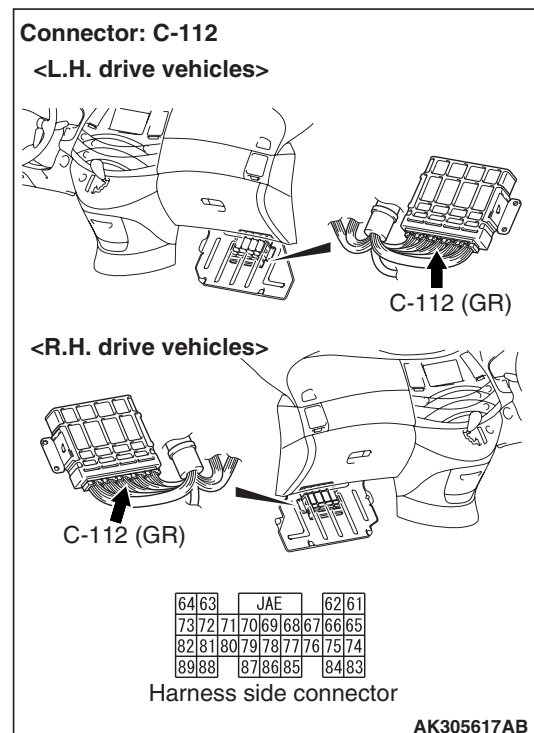
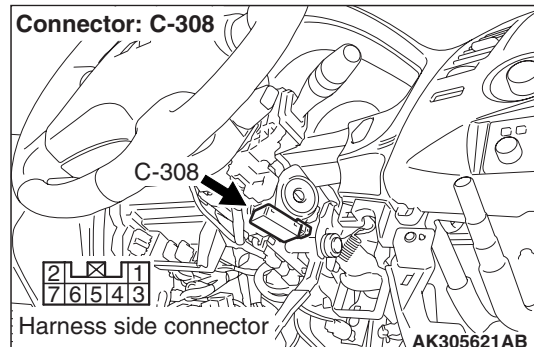


Q: Is the check result normal?

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.



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

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

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace immobilizer-ECU. Then go to Step 4 .

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

STEP 4. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

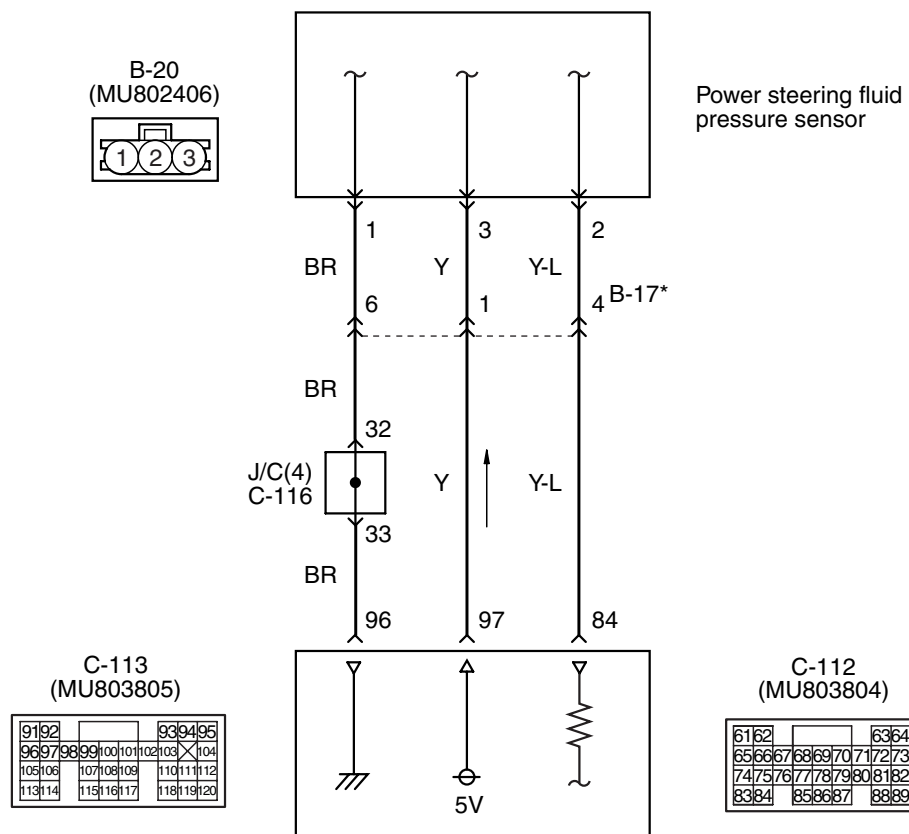
Q: Is the diagnosis code set?

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

NO : Check end.

Code No. P0551: Power Steering Fluid Pressure Sensor System

Power steering fluid pressure sensor circuit



NOTE

*: 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

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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. M.U.T.-III data list**

- Refer to Data List Reference Table [P.13A-284](#)
 - Item B4: Power steering fluid pressure sensor

Q: Is the check result normal?

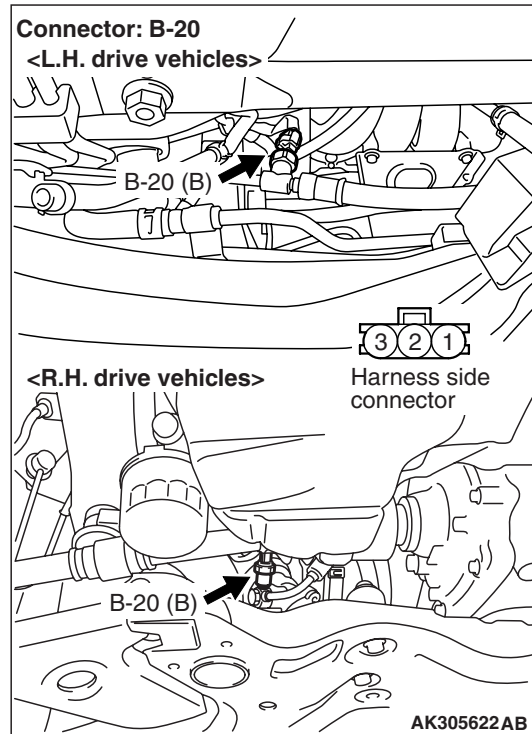
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#))

NO : Go to Step 2 .

STEP 2. Check for stationary steering effort (Refer to [P.37-11](#)).**Q: Is the check result normal?**

YES : Go to Step 3 .

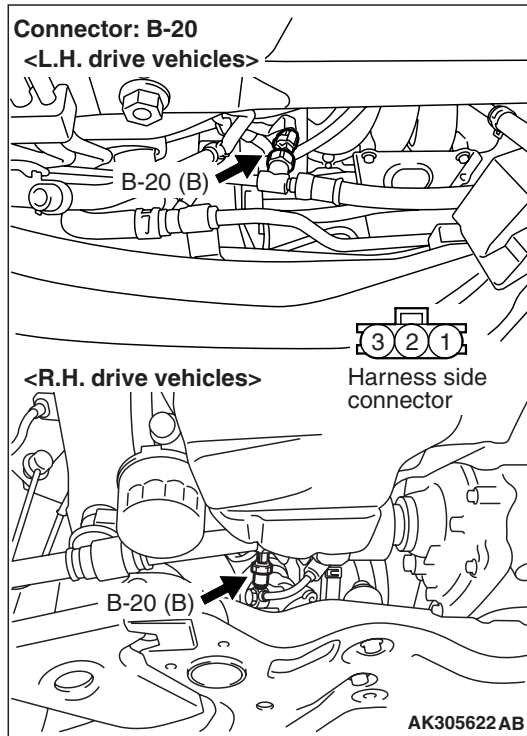
NO : Repair.

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.

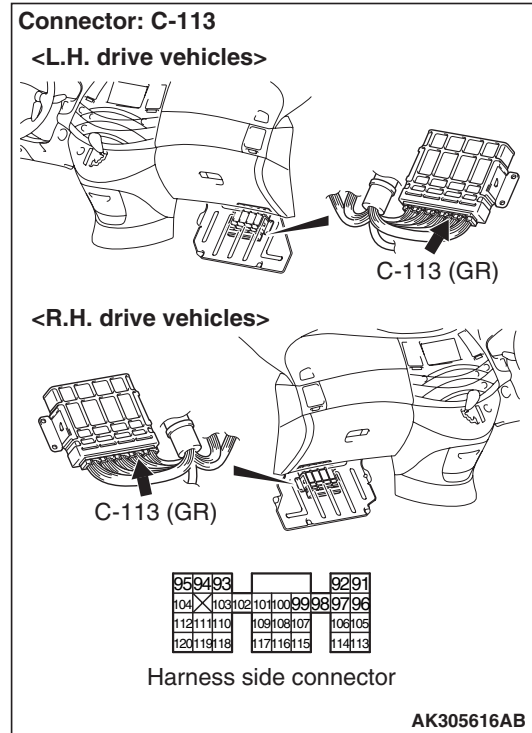
OK: 4.9 – 5.1V

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.



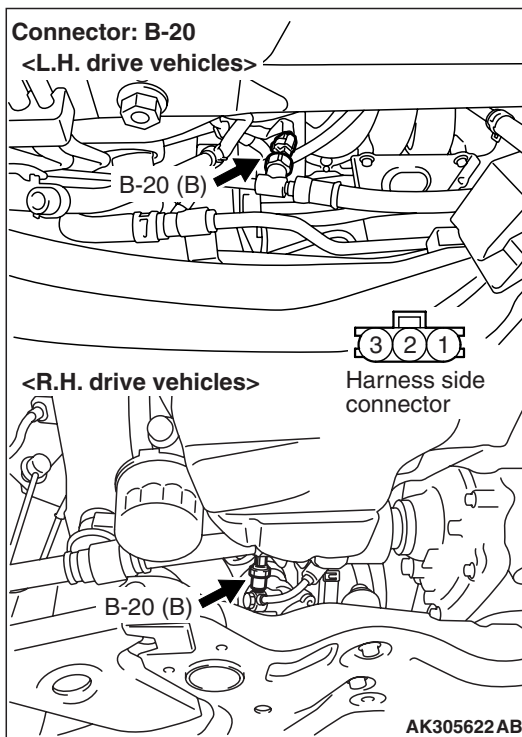
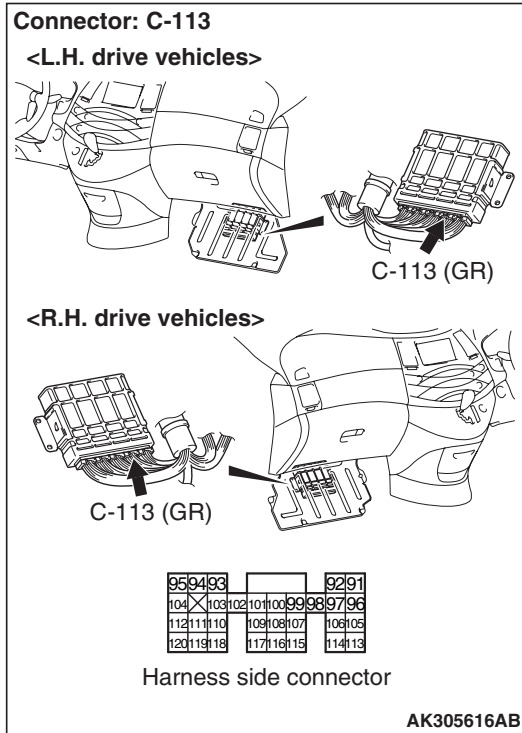
- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No.97 and earth.

OK: 4.9 – 5.1V

Q: Is the check result normal?

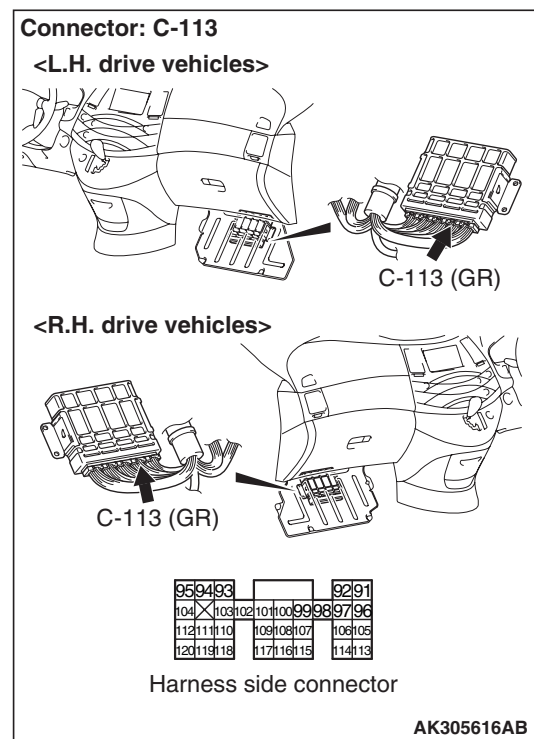
YES : Go to Step 6 .

NO : Go to Step 7

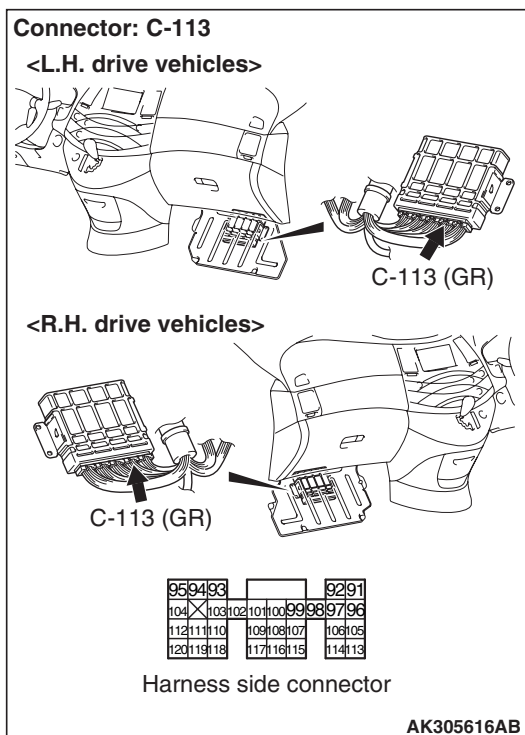
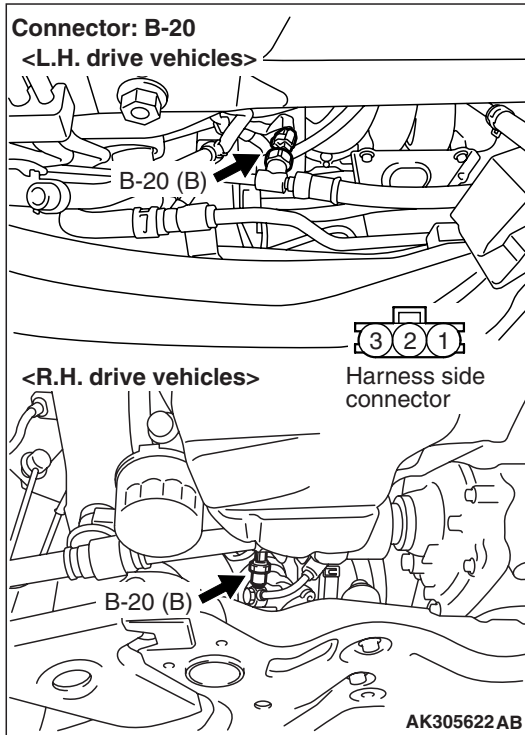
**STEP 6. Connector check: C-113 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector****Q: Is the check result normal?**

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.

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.



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#)
 - a. Item B4: Power steering fluid pressure sensor

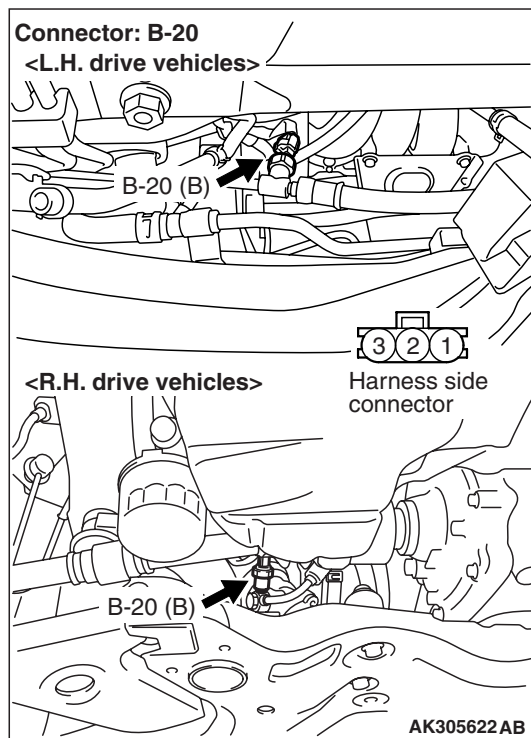
Q: Is the check result normal?

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

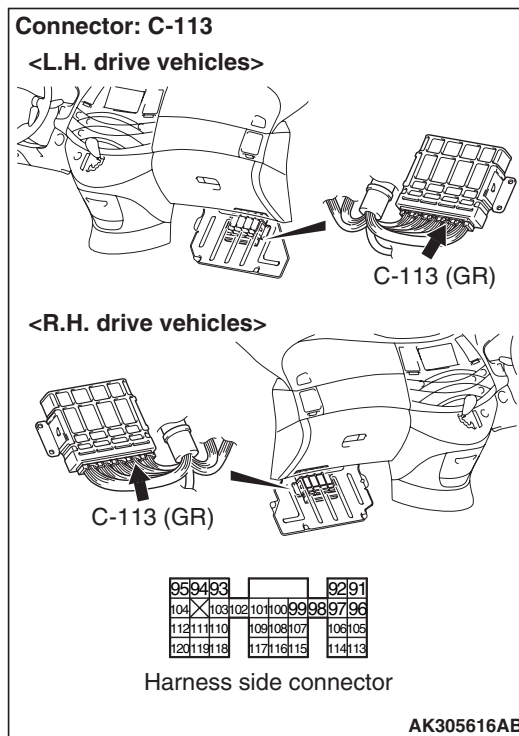
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NOTE: Before checking harness, check intermediate connector B-17, and repair if necessary (R. H. drive vehicles).

- Check power supply line for short circuit.

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

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.

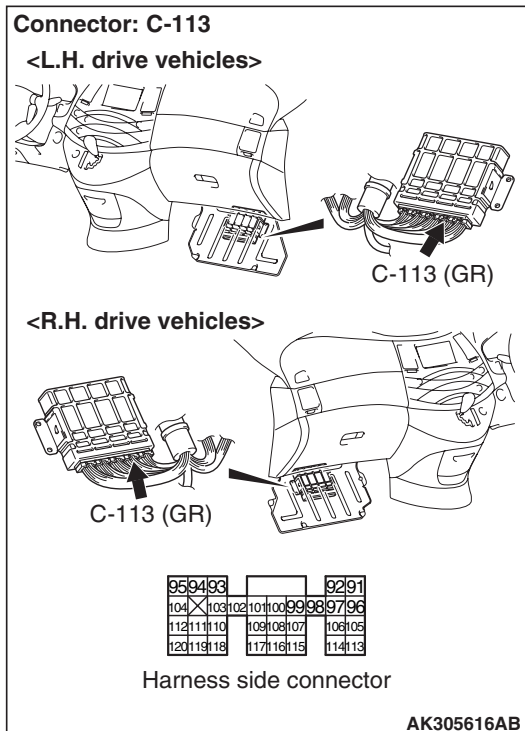
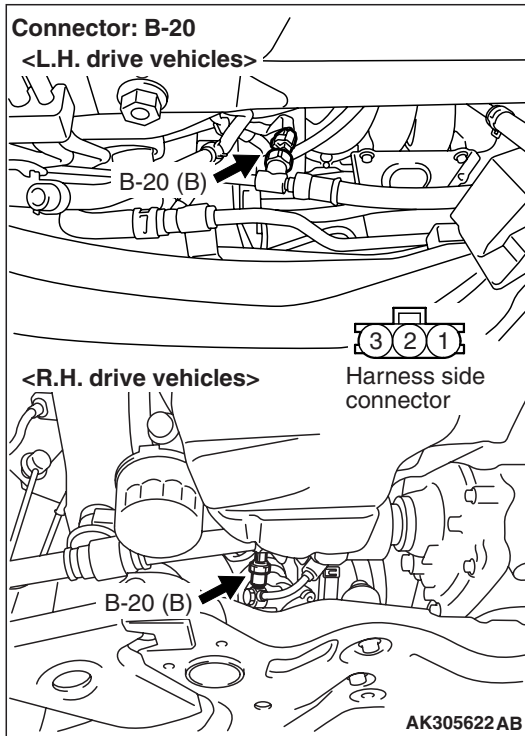
NOTE: Before checking harness, check intermediate connector B-17 (R. H. drive vehicles) and C-116, and repair if necessary.

- Check earthing line for open circuit and damage.

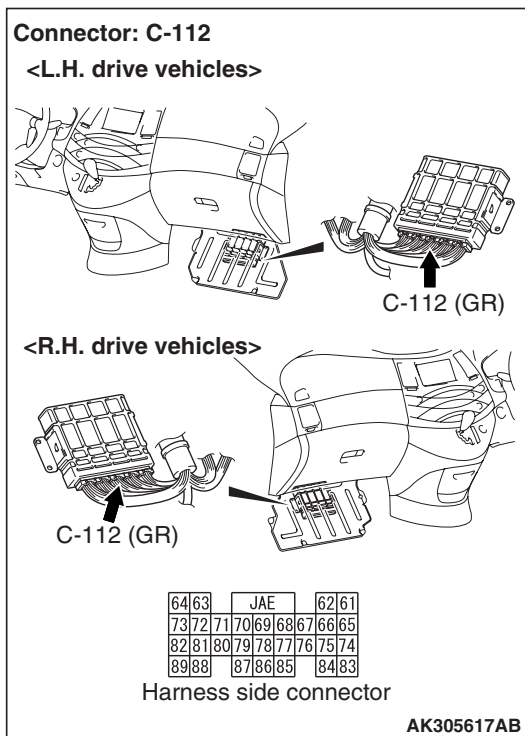
Q: Is the check result normal?

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.



- 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)

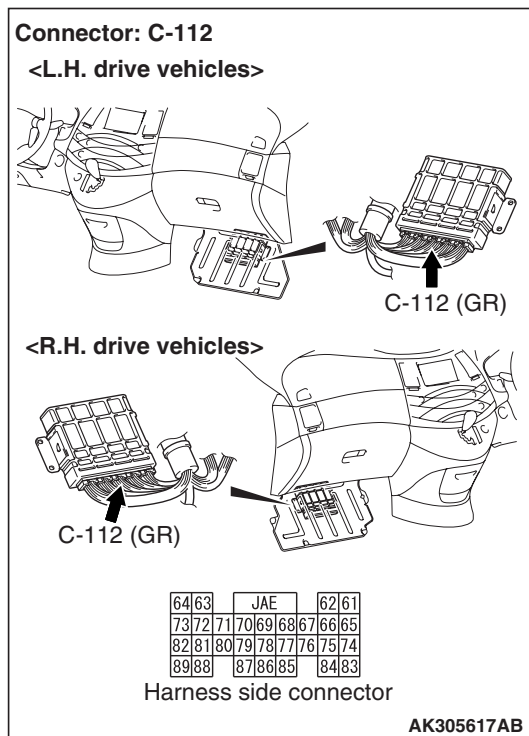
Voltage rises (Steering wheel: Operated)

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



Q: Is the check result normal?

YES : Go to Step 15 .

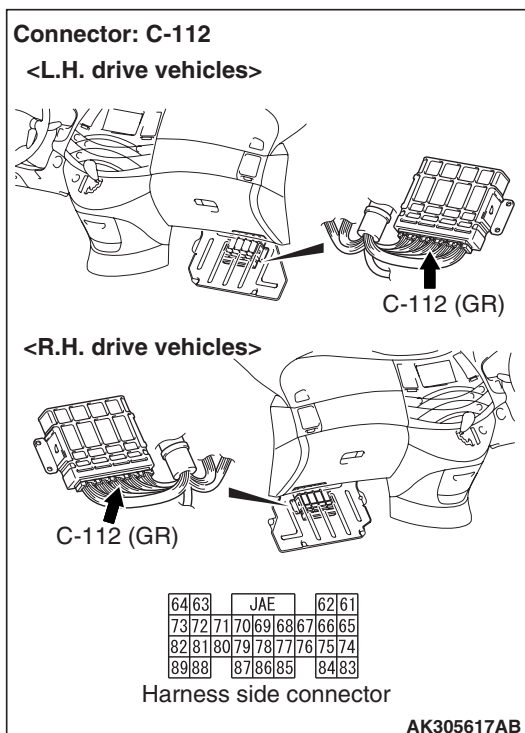
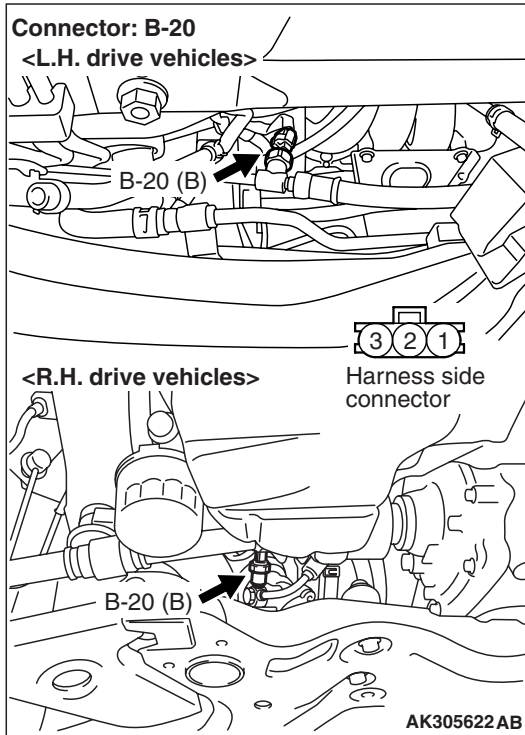
NO : Repair or replace.

STEP 15. Check harness between B-20 (terminal No. 2) 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 .

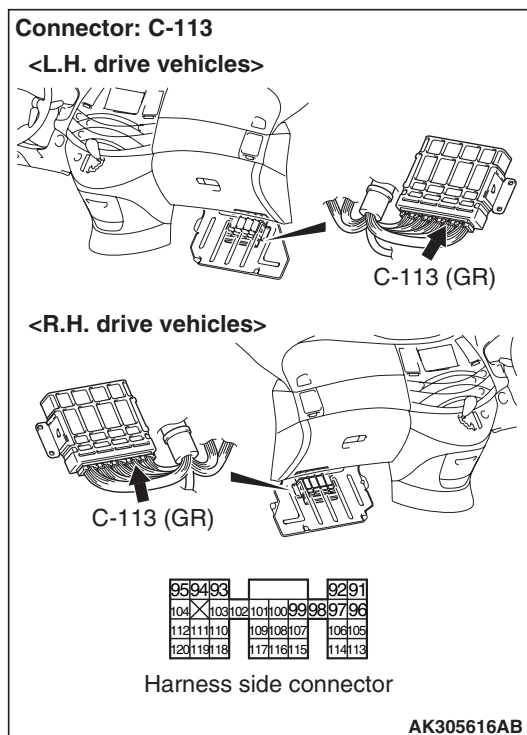
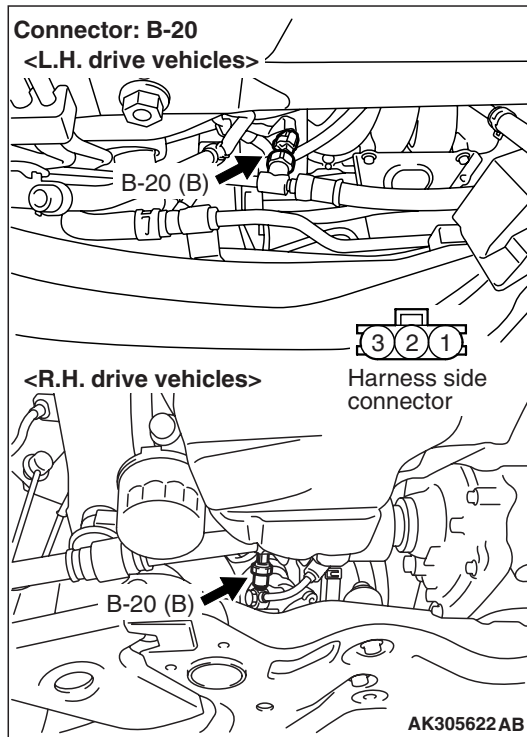
NO : Repair.



NOTE: Before checking harness, check intermediate connector B-17, and repair if necessary (R. H. drive vehicles).

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

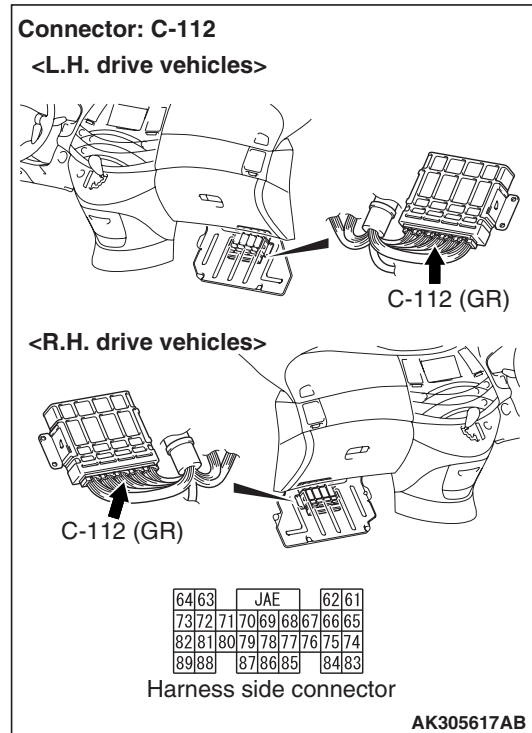
STEP 16. Check harness between B-20 (terminal No. 3) power steering fluid pressure sensor connector and C-113 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

TROUBLE JUDGMENT

Check Condition

- 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. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

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

- The engine-ECU <M/T> or engine-A/T-ECU <A/T> check whether the microcomputer, which performs the drive control of the throttle valve, is normal.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is ON position.

Judgment Criterion

- Malfunction of the microcomputer.

Check Conditions

- Ignition switch is in ON position.
- Battery voltage is 6.3 V or more.

Judgment Criteria

- Throttle position sensor output voltage is 4.1 V or less.

or

- Malfunction of the main microcomputer basic voltage.

Check Conditions

- Ignition switch is ON position.
- Throttle position sensor (main) output voltage is between 0.4 and 4.8 V.

Judgment Criterion

- Malfunction of the throttle position sensor (main) input interface.

PROBABLE CAUSE

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

DIAGNOSIS

STEP 1. Check the trouble symptoms.

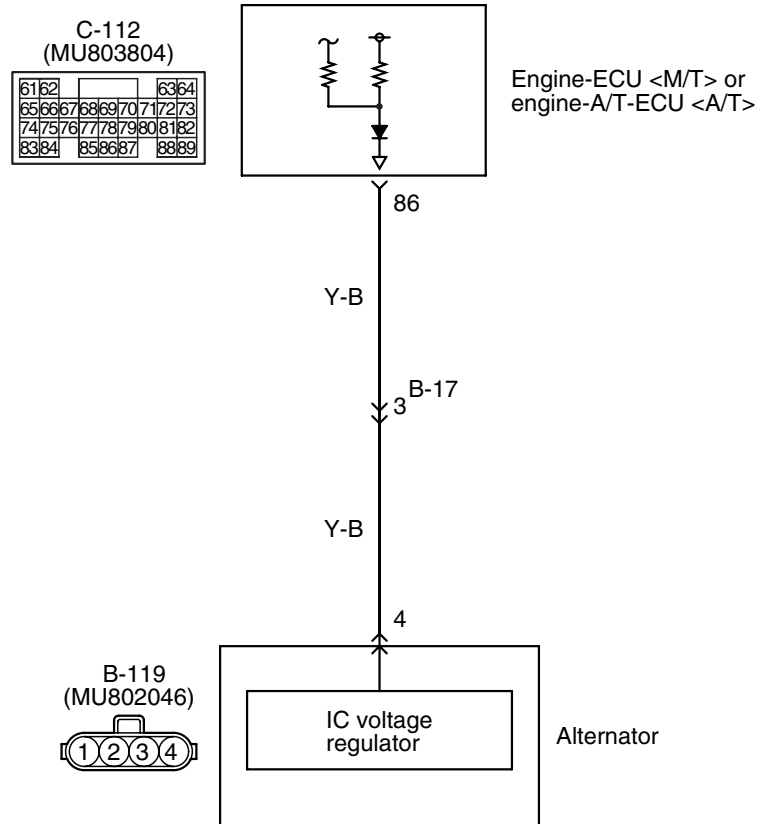
Q: Does trouble symptom persist?

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

- After the start.

Judgment Criterion

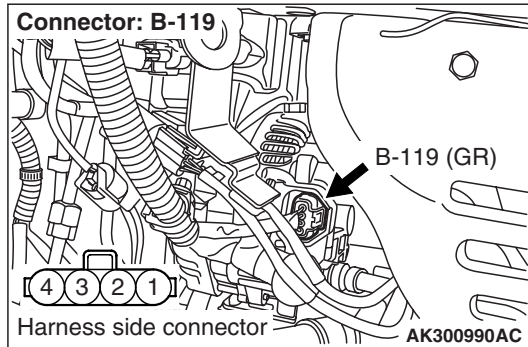
- Input voltage from the alternator FR terminal is system voltage for 20 seconds.

PROBABLE CAUSE

- Failed alternator
- Open/short circuit in alternator FR terminal circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-119 alternator connector

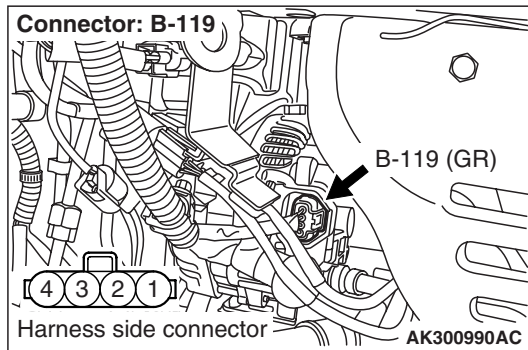


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform voltage measurement at B-119 alternator connector.



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

OK: System voltage

Q: Is the check result normal?

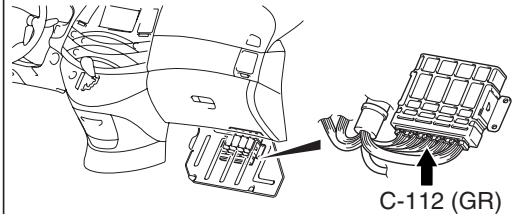
YES : Go to Step 6 .

NO : Go to Step 3 .

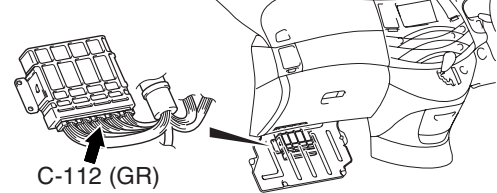
STEP 3. Connector check: C-112 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

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

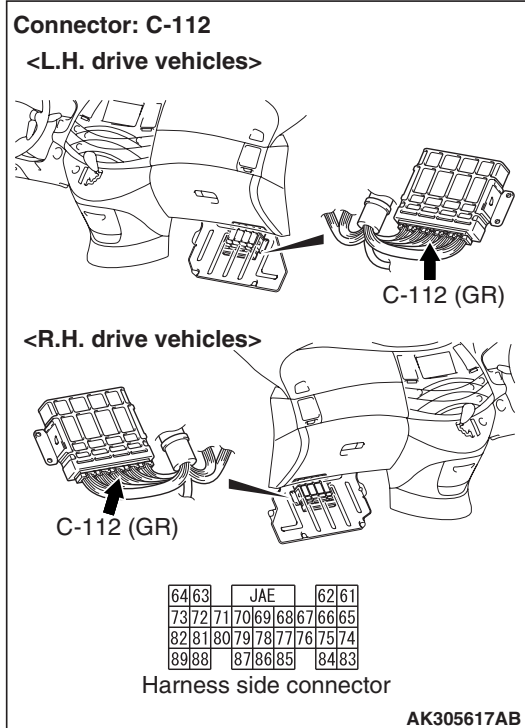
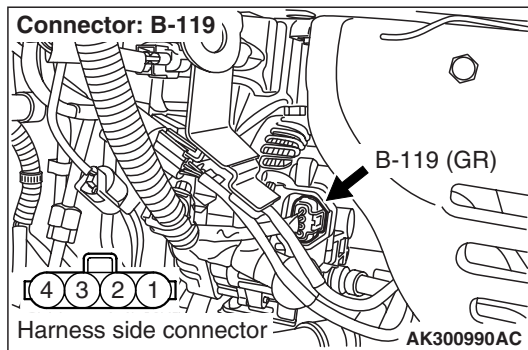
AK305617AB

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. M.U.T.-III diagnosis code

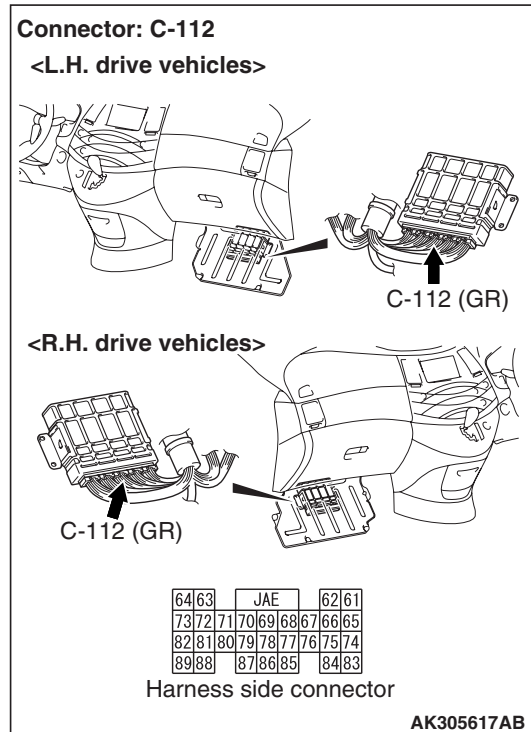
- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

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.

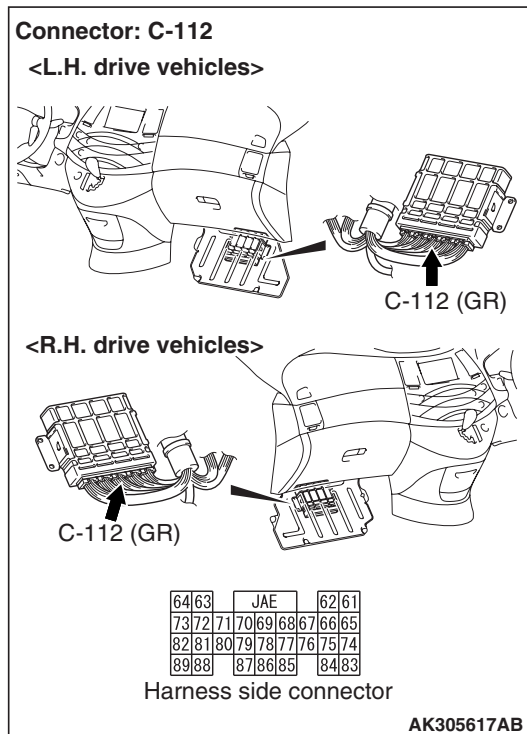
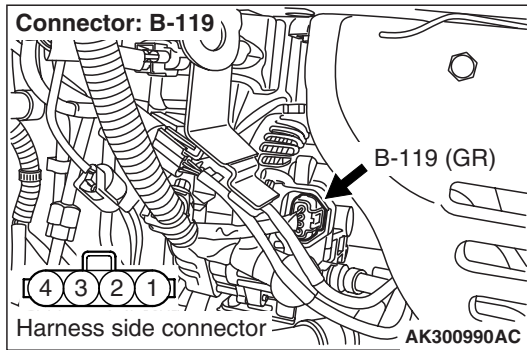
OK: Switching the headlamps to ON from OFF causes the voltage to fall.

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.



STEP 8. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

YES : Replace alternator.

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-17, and repair if necessary.

- Check output line for damage.

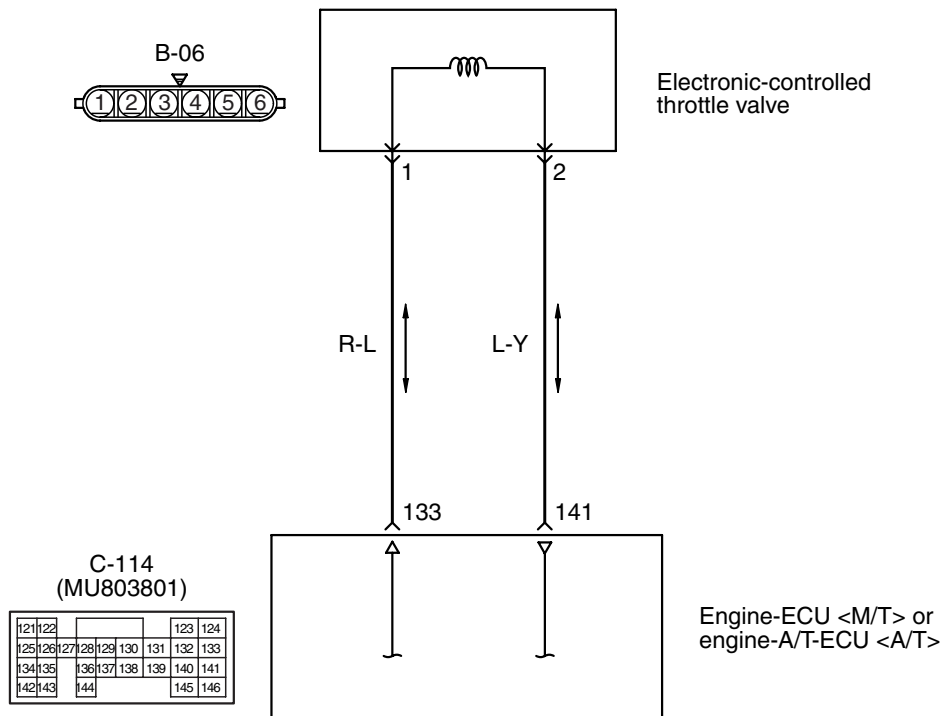
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

Code No. P0638: Throttle Valve Control Servo Circuit Range/Performance Problem

Throttle valve control servo circuit



AK304137AC

OPERATION

- The electric current from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 133 and No. 141) to the throttle valve control servo (terminal No. 1 and No. 2) is controlled.

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 more.
- Ignition switch is in ON position.

Judgement Criteria

- The drive current of the throttle valve control servo is not normal.

or

- The temperature in the drive circuit of the throttle valve control servo is not normal.

Check Conditions

- Ignition switch is in ON position.
- Throttle position sensor (main) is normal.

Judgement Criterion

- Throttle position sensor (main) mid opening learning value is 4.0 V or more.

PROBABLE CAUSE

- Failed throttle valve return spring.
- Failed throttle valve operation.
- Failed throttle valve control servo.
- 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>.

DIAGNOSIS

STEP 1. Check throttle body.

- Check whether the throttle valve return spring is normal.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Replace throttle body assembly.

STEP 2. Check throttle valve control servo relay itself.

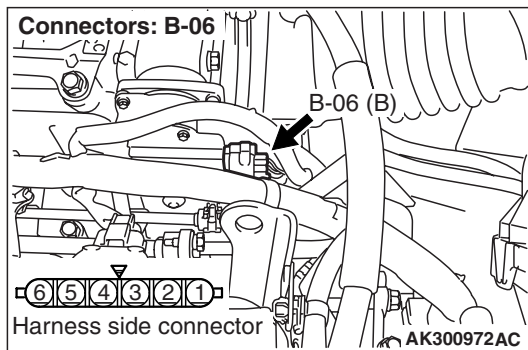
- Check throttle valve control servo (Refer to [P.13A-318](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace throttle body assembly.

STEP 3. Connector check: B-06 electronic-controlled throttle valve connector

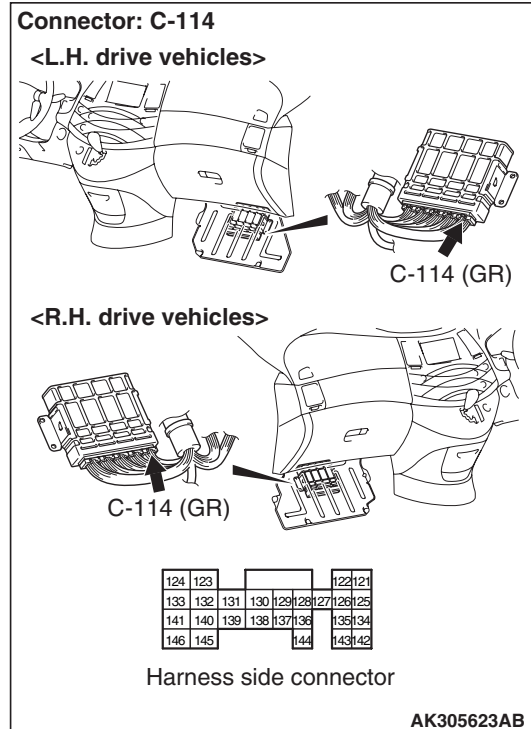


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Connector check: C-114 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector

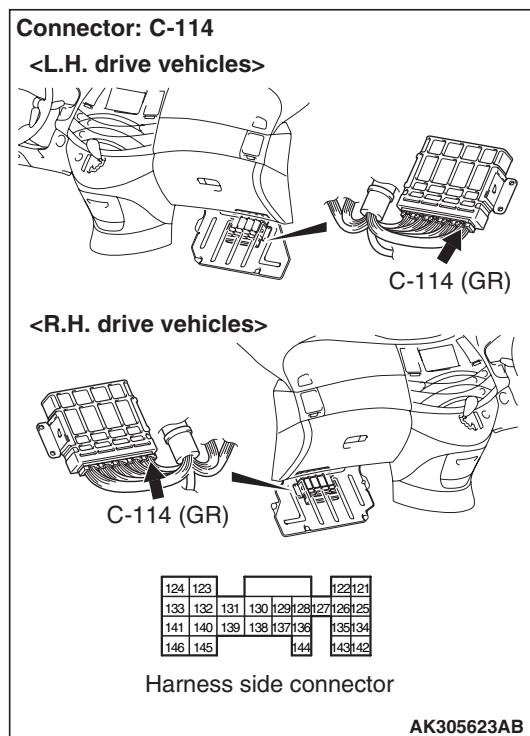
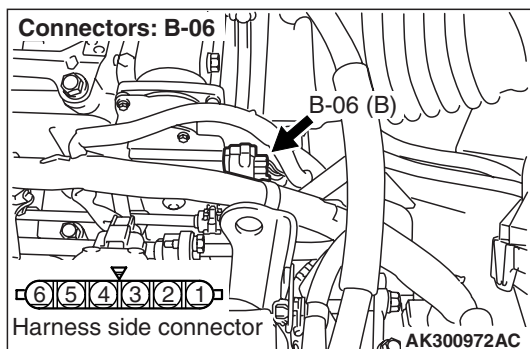


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-06 (terminal No. 2) electronic-controlled throttle valve connector and C-114 (terminal No. 141) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.



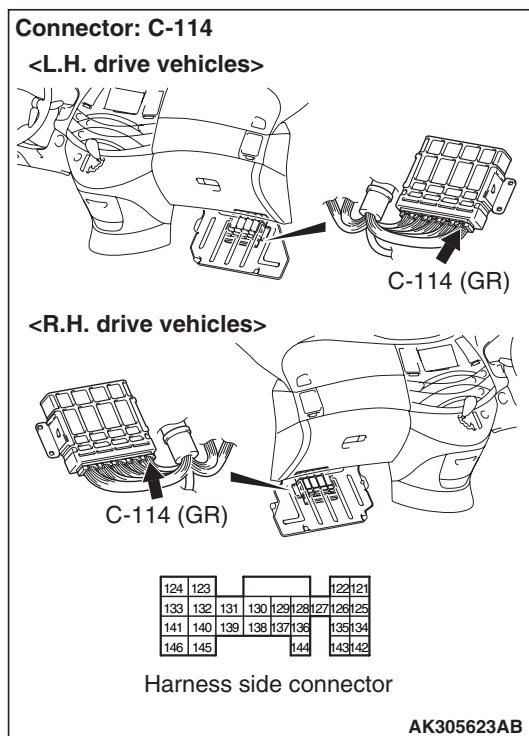
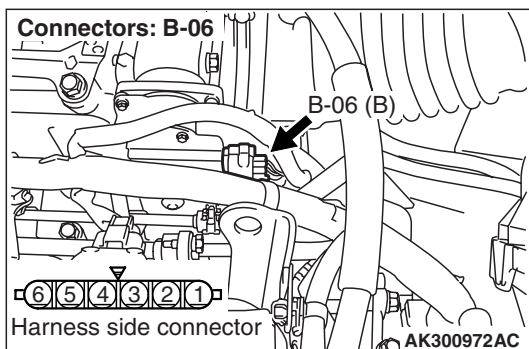
- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-06 (terminal No. 1) electronic-controlled throttle valve connector and C-114 (terminal No. 133) engine-ECU <M/T> 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 7 .

NO : Repair.

STEP 7. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

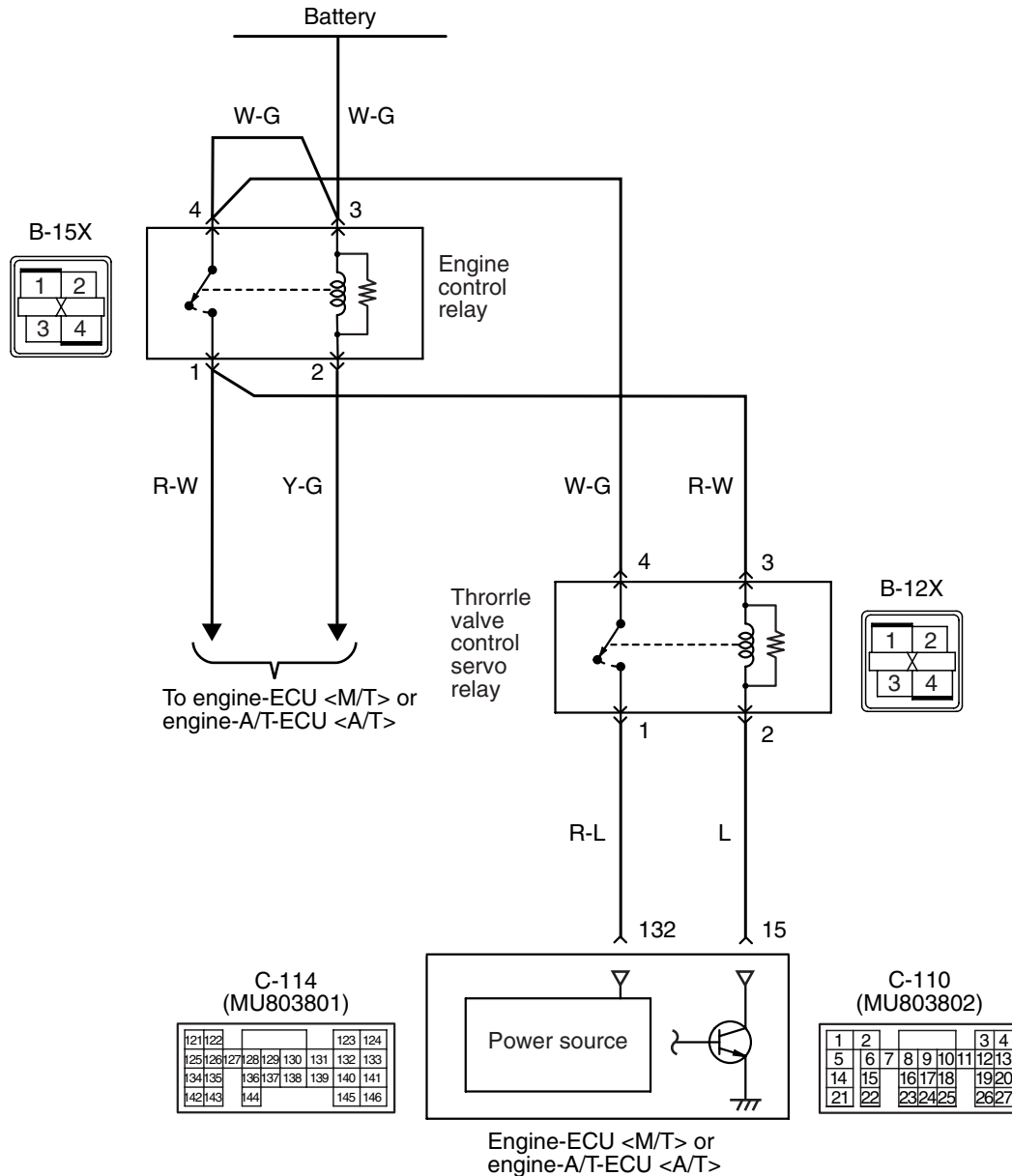
Q: Is the diagnosis code set?

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. P1121: Throttle Valve Control Servo Power System

Throttle valve control servo power 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

AK305852AC

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.

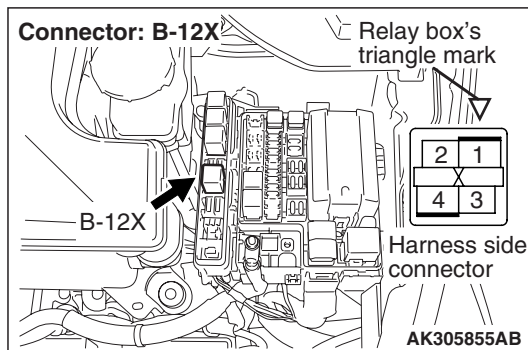
- When the throttle valve control servo relay turns ON, battery voltage is supplied by the throttle valve control servo relay (terminal No. 1) to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 132).

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-314](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace throttle valve control servo relay.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in ON position.

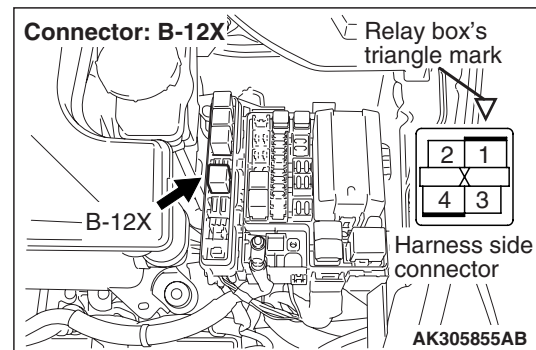
Judgement Criterion

- The voltage to detect a short circuit to the earth is 4.0 V or less.

PROBABLE CAUSE

- Failed throttle valve control servo relay
- 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

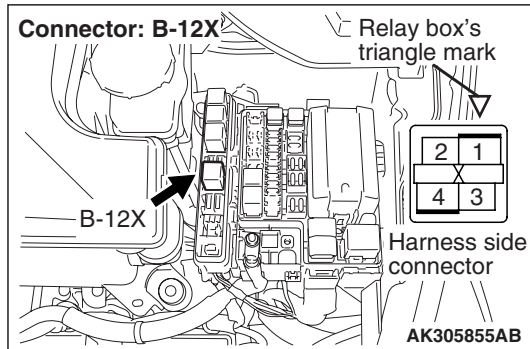
Q: Is the check result normal?

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.

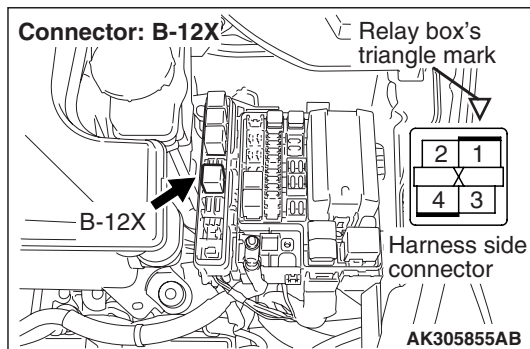
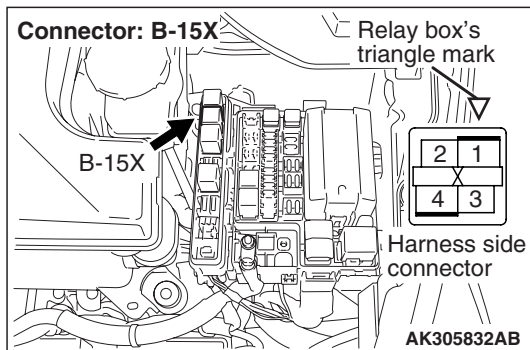
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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



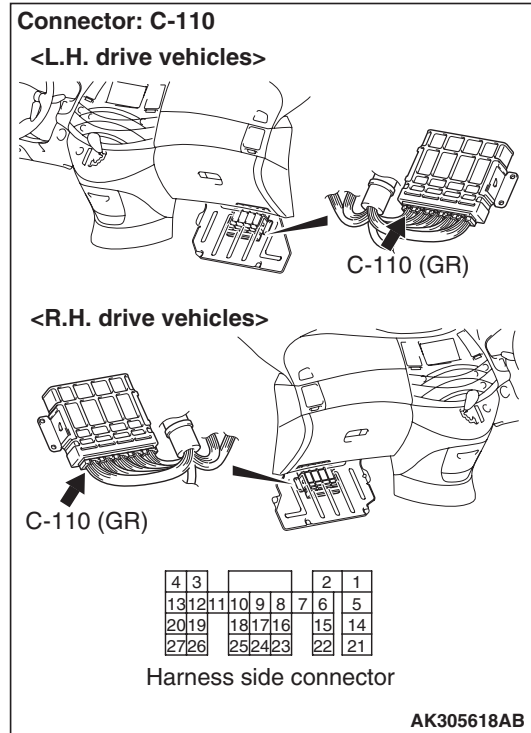
Q: Is the check result normal?

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

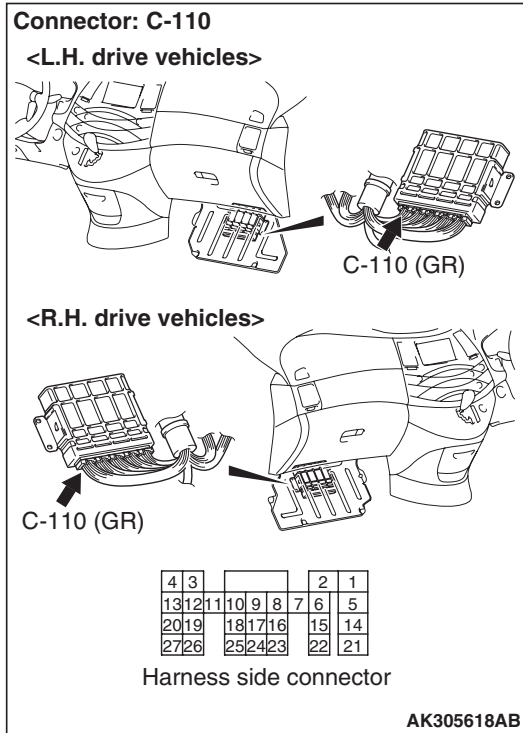


Q: Is the check result normal?

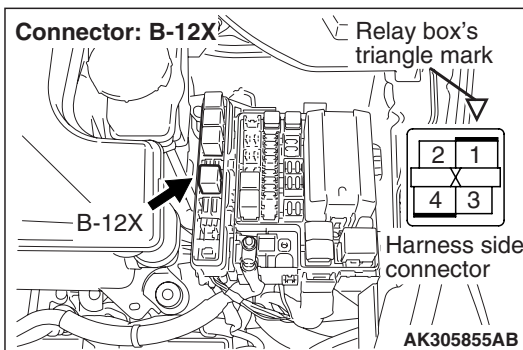
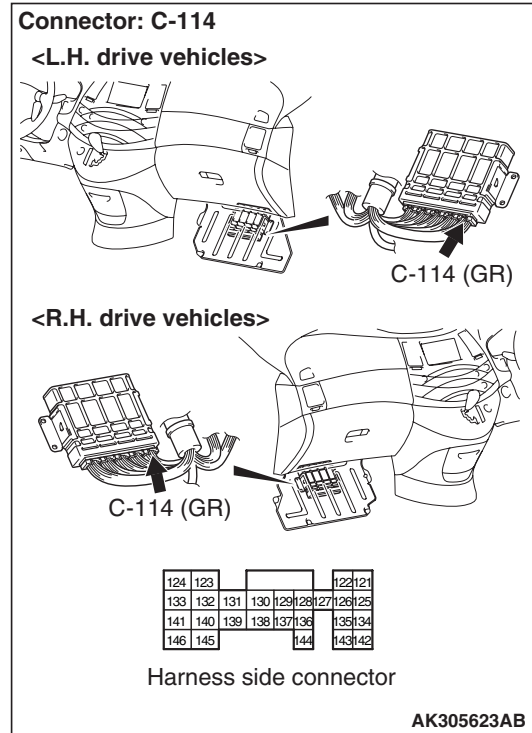
YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Perform voltage measurement at C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 8. 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 9 .

NO : Repair or replace.

- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 15 and earth.

OK: System voltage

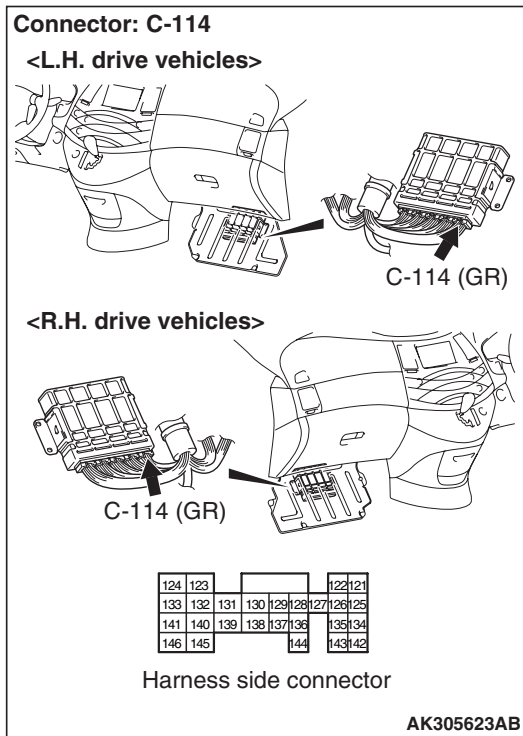
Q: Is the check result normal?

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 9. 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.

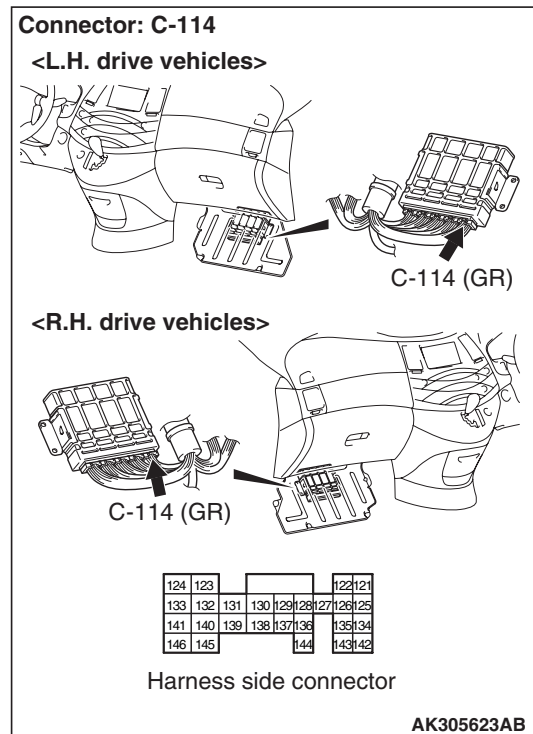
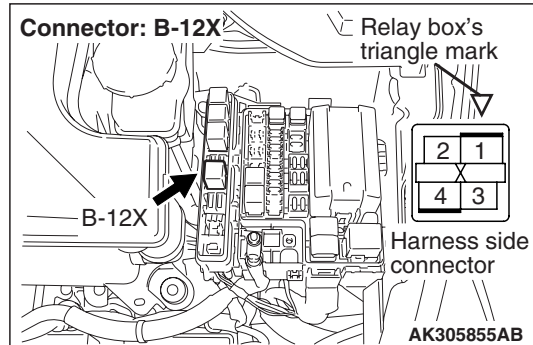
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 10 .

STEP 10. 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.



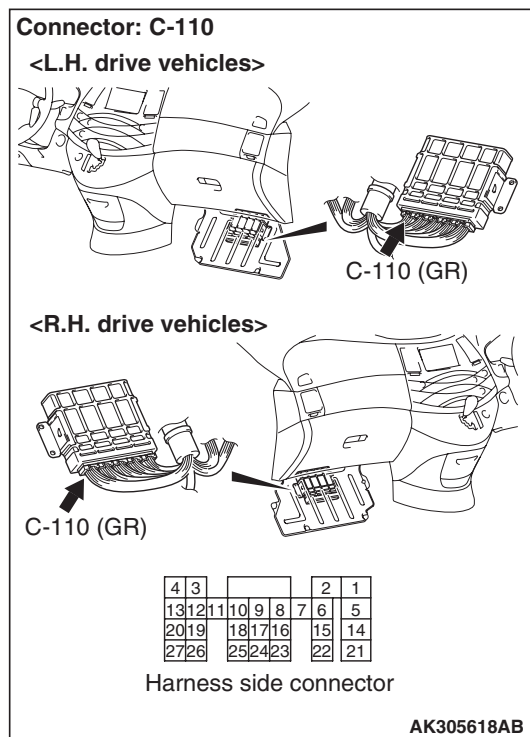
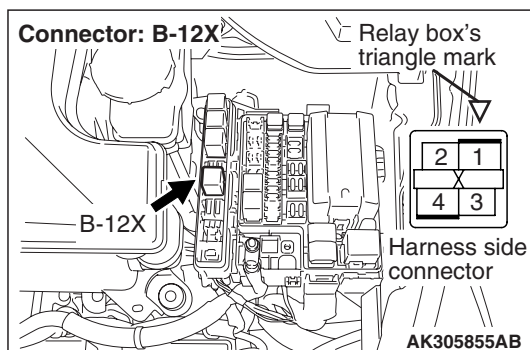
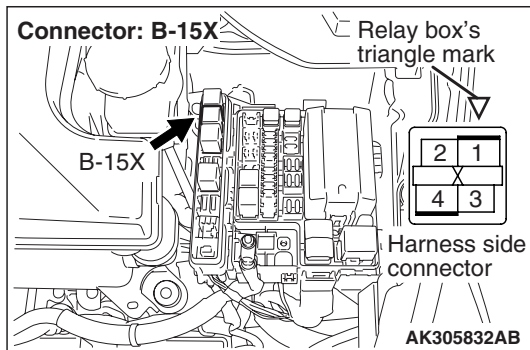
- Check output line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. Check harness between B-15X (terminal No. 1) engine control relay connector and B-12X (terminal No. 3) throttle valve control servo relay connector.



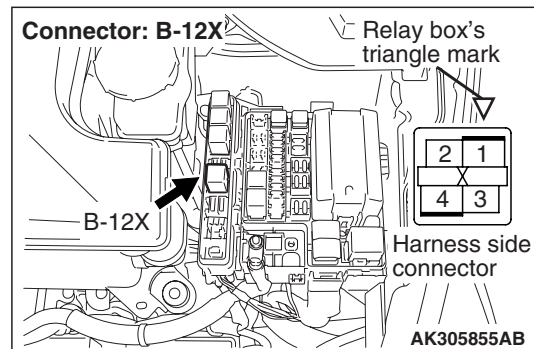
Q: Is the check result normal?

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 damage.

NO : Repair.

STEP 12. Check harness between B-12X (terminal No. 4) throttle valve control servo relay connector and battery.



- Check power supply line for damage.

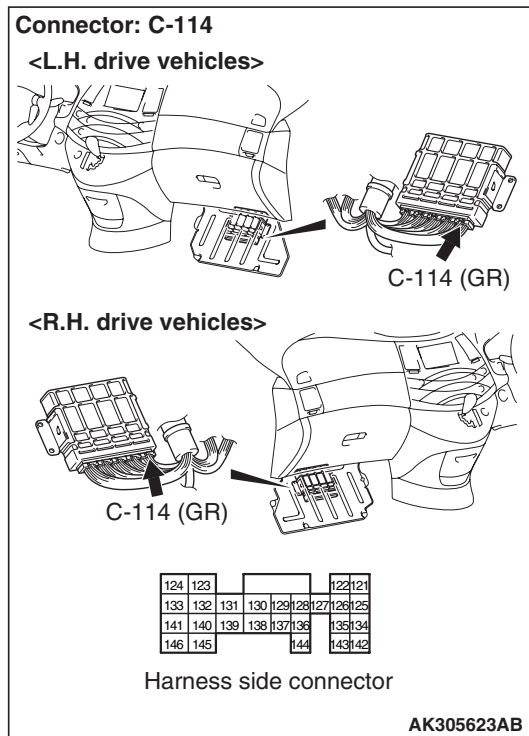
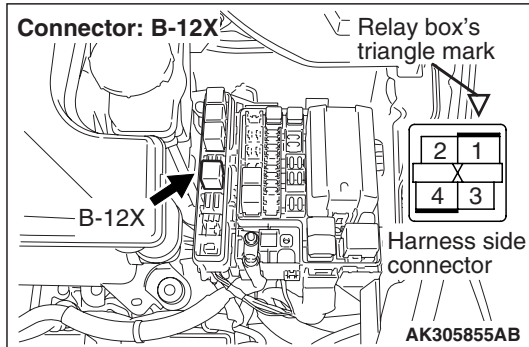
Q: Is the harness connector in good condition?

YES : Go to Step 13 .

NO : Repair.

- Check output line for damage.

STEP 13. 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.



STEP 14. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code

Q: Is the diagnosis code set?

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 power supply line for damage.

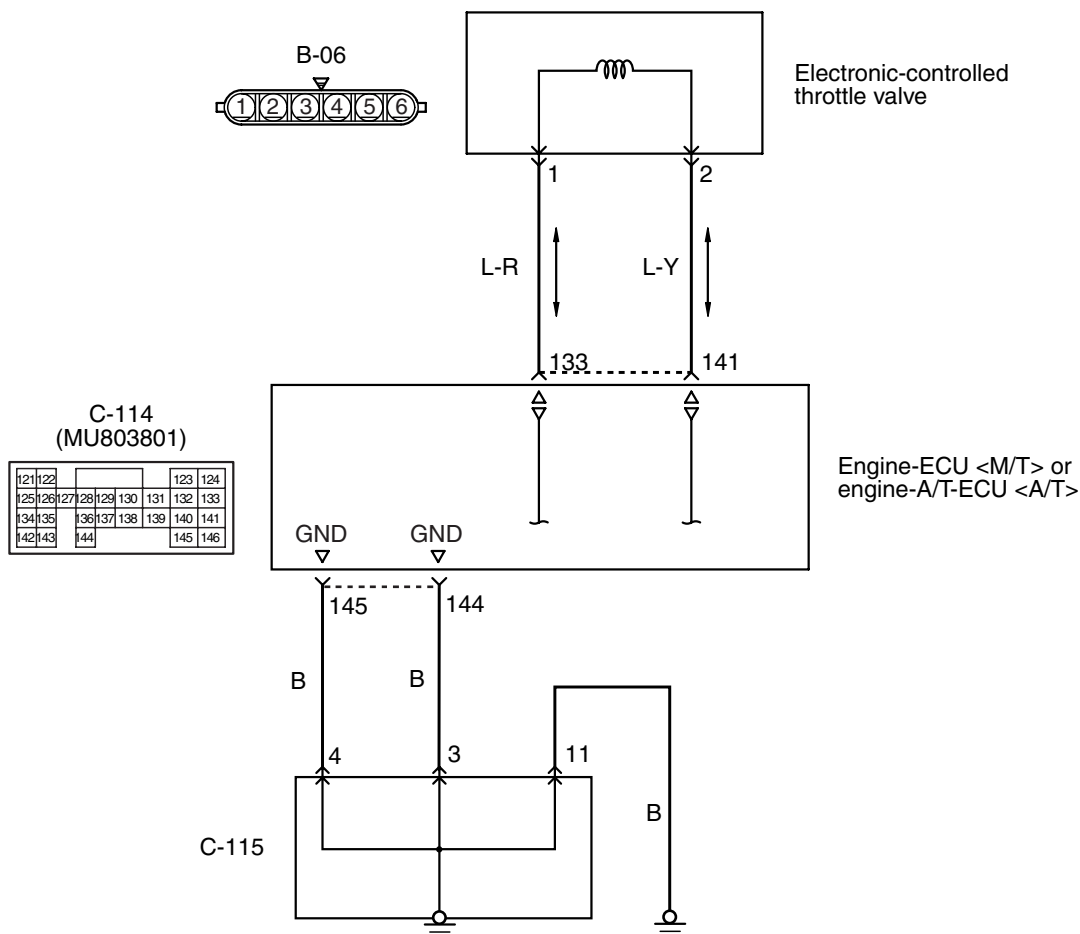
Q: Is the harness connector in good condition?

YES : Go to Step 14 .

NO : Repair.

Code No. P1122: Throttle Valve Control Servo Connector System

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

AK305853AC

OPERATION

- The electric current from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 133 and No. 141) to the throttle valve control servo (terminal No. 1 and No. 2) is controlled.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 144 and No. 145) earths the voltage applied on the throttle valve control servo to the vehicle body.

FUNCTION

- The engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the throttle valve-opened degree by varying the direction and the amount in the electric current going through the servo coil.

TROUBLE JUDGMENT

Check Conditions

- Battery voltage is 8.3 V or more.
- Ignition switch is in ON position.

Judgment Criterion

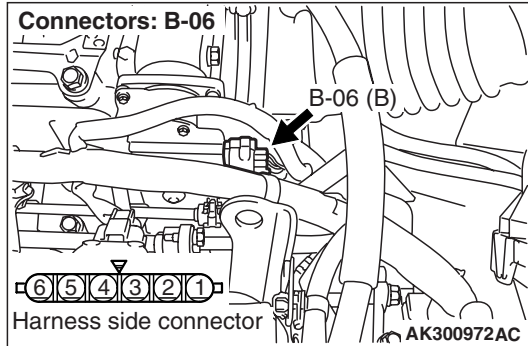
- The drive current of the throttle valve control servo is not normal.

PROBABLE CAUSE

- Failed throttle valve control servo
- 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>

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. Check throttle valve control servo

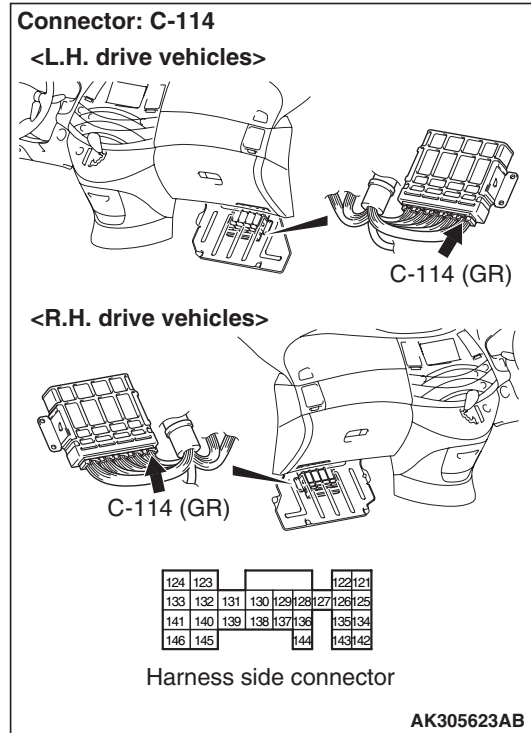
- Check throttle valve control servo (Refer to [P.13A-318](#)).

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

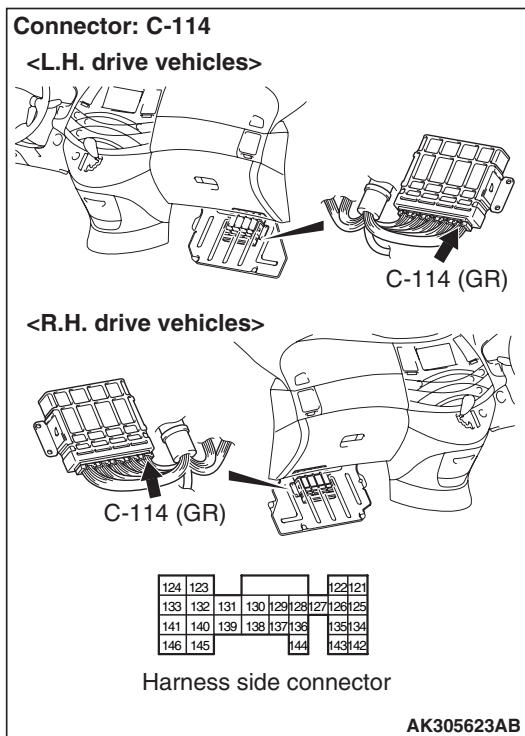


Q: Is the check result normal?

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 and earth, also between terminal No. 145 and earth.

OK: 2 Ω or less

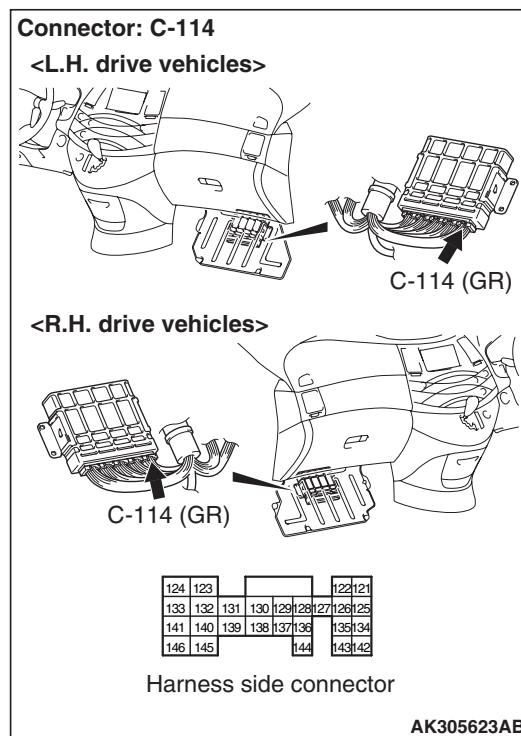
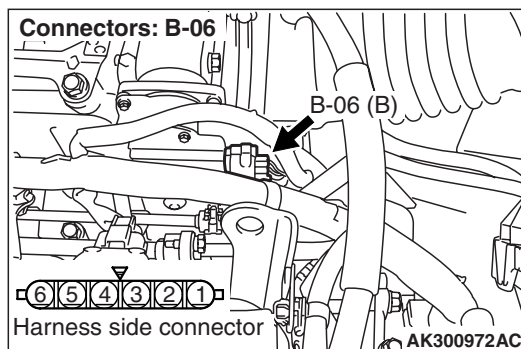
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check intermediate connector C-115 and repair if necessary. If intermediate connector is normal, check and repair harness between C-114 (terminal No. 144 and No. 145) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and body earth.

- Check earthing line for open circuit and damage.

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.



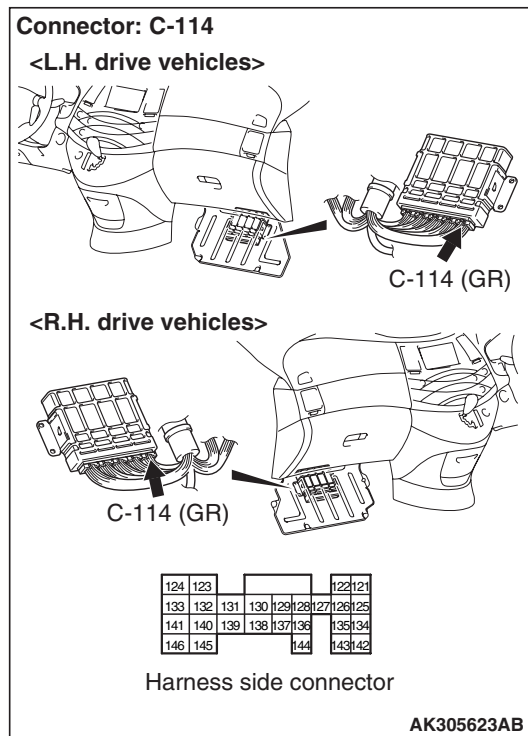
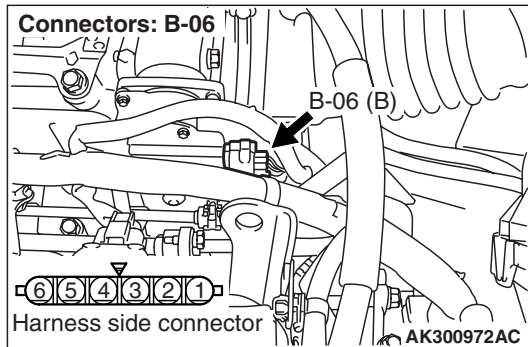
- Check output line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. 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.



STEP 7. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

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 open circuit and damage.

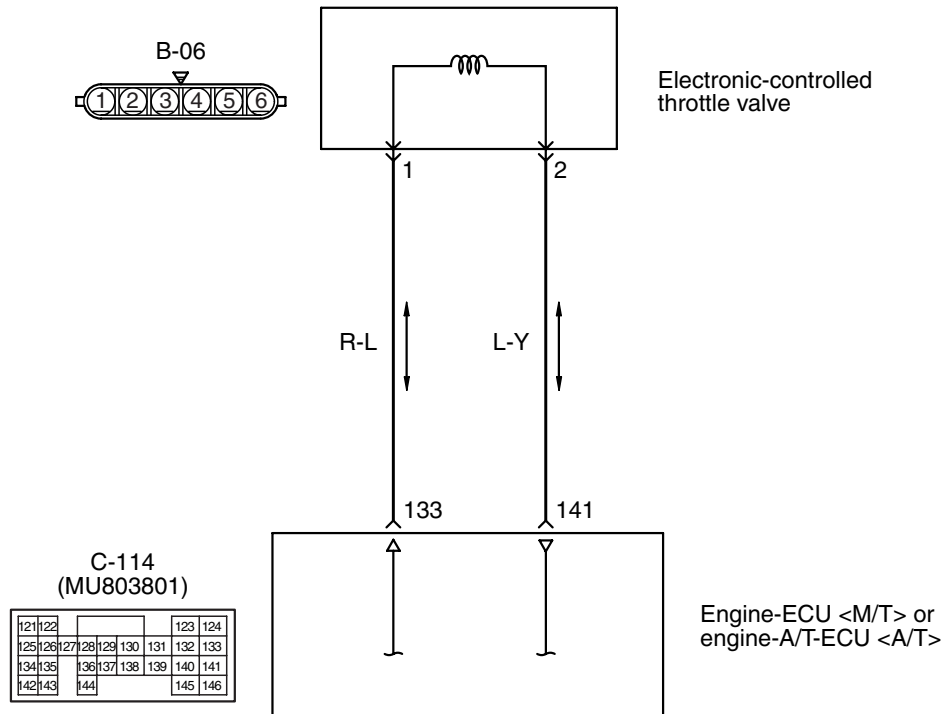
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

Code No. P1221: Throttle Valve Position Feedback System

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

AK304137AC

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

- The engine-ECU <M/T> or the engine-A/T-ECU <A/T> controls the throttle valve-opened degree to become the designed open degree.

TROUBLE JUDGMENT**Check Conditions**

- Ignition switch is in "ON" position.
- The battery voltage is 8.3 V or more
- While the electric currents are going through the throttle valve servo

- The output voltage of the throttle position sensor (main) is 0.2 V or more, and 4.8 V or less.

Judgment Criteria

- When the variation in the throttle valve-opened degree is small.

or

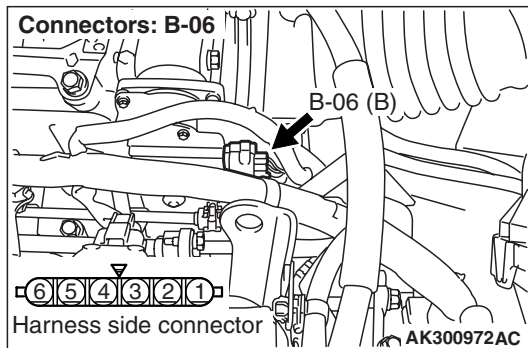
- The difference between the throttle position sensor (main) output voltage and the designed one is 0.5 V or more.

PROBABLE CAUSE

- Failed throttle valve operation
- Failed throttle valve control servo
- 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>

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. Check throttle valve control servo.

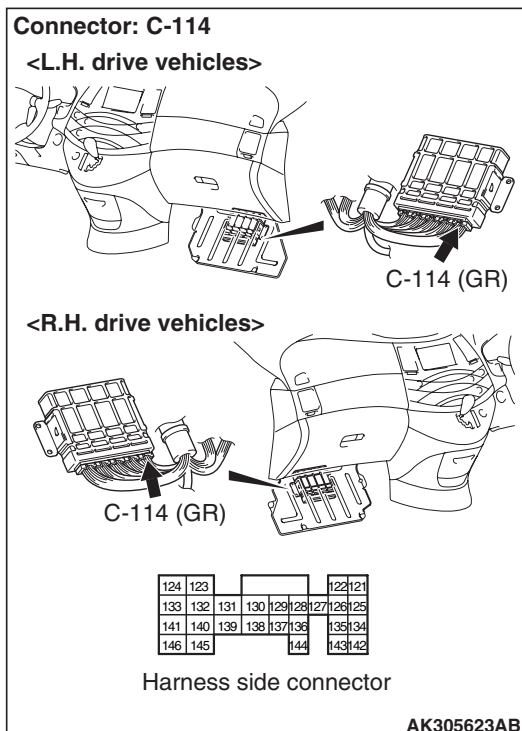
- Check throttle valve control servo (Refer to [P.13A-318](#)).

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

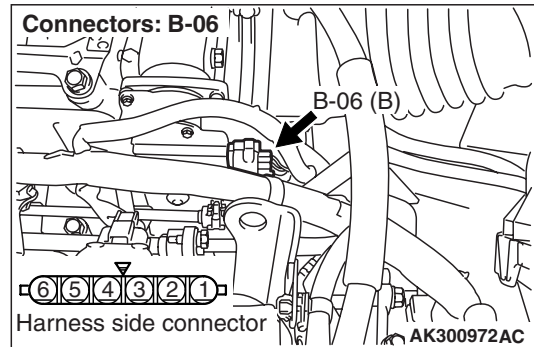


Q: Is the check result normal?

YES : Go to Step 4 .

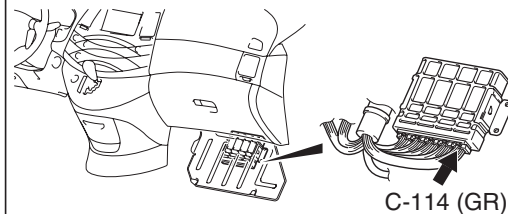
NO : Repair or replace.

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.

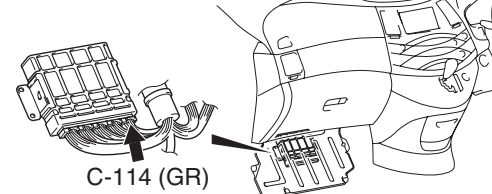


Connector: C-114

<L.H. drive vehicles>



<R.H. drive vehicles>



124	123			122	121
133	132	131	130	129	128
141	140	139	138	137	136
146	145			144	143

Harness side connector

AK305623AB

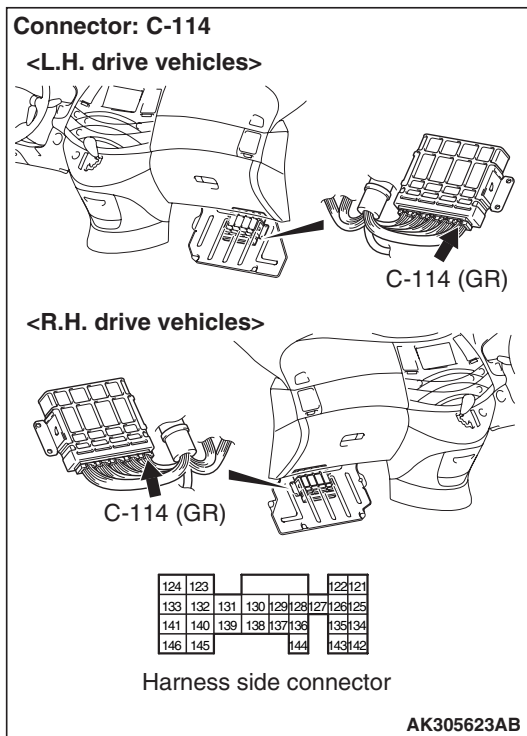
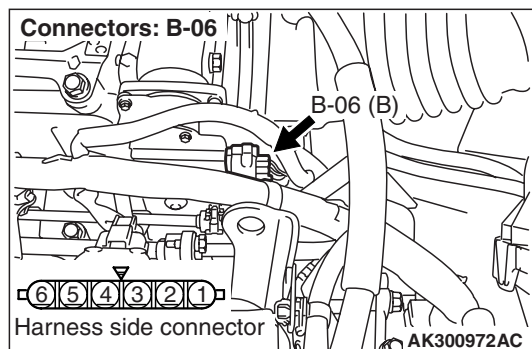
- Check output line for damage.

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.



STEP 6. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

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

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?

YES : Go to Step 6 .

NO : Repair.

Code No. P1223: Communication Line System with The Throttle Valve Controller

FUNCTION

- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the communication to the throttle valve controller is normal.

TROUBLE JUDGMENT

Check Conditions

- Battery voltage is 6.3 V or more.
- Not the communication error is from the throttle valve controller to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Judgment Criterion

- The communication error is from the engine-ECU <M/T> or engine-A/T-ECU <A/T> to the throttle valve controller.

Check Conditions

- Battery voltage is 6.3 V or more.
- During not the engine cranking

Judgment Criterion

- The communication error is from the throttle valve controller to the 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 PROCEDURE

STEP 1. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

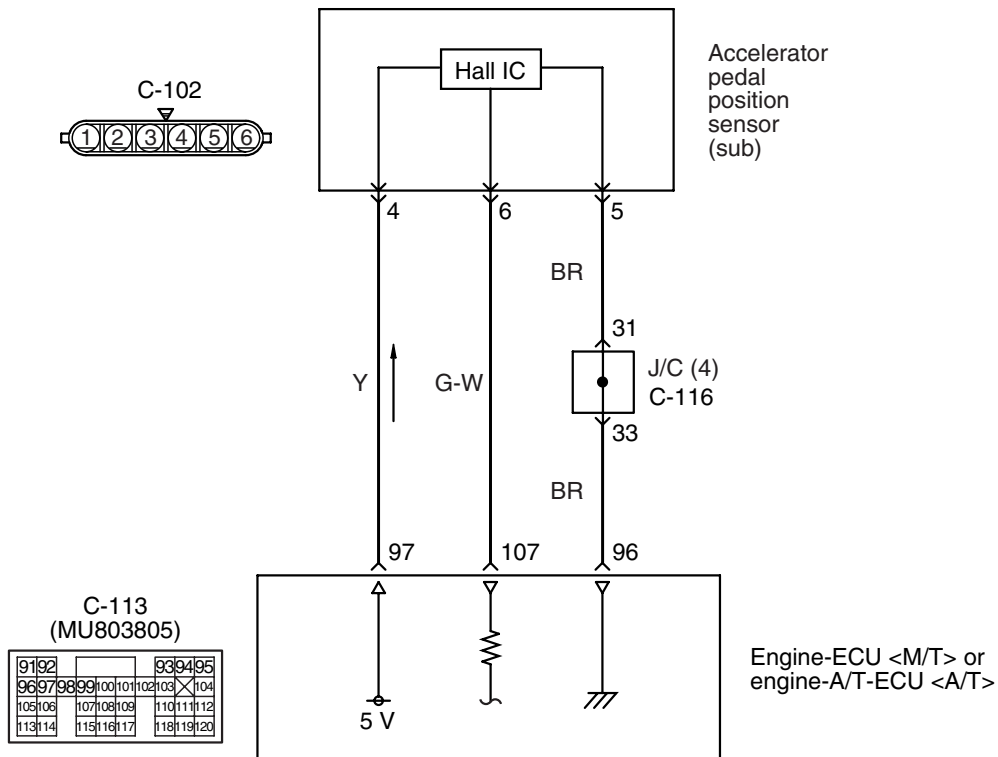
Q: Is the diagnosis code set?

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. P1225: Accelerator Pedal Position Sensor (Sub) System

Accelerator pedal position sensor (sub) circuit



AK305572AC

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 outputs voltage signals corresponding to angles of the accelerator pedal 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> controls the opening of the throttle valve and the fuel injection rate as well, based on the accelerator pedal position sensor signals.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criteria

- Accelerator pedal position sensor (sub) output voltage is 0.2 V or less.

or

- Accelerator pedal position sensor (sub) output voltage is 4.8 V or more.

Check Conditions

- Ignition switch is in the "ON" position.
- Accelerator pedal position sensor (main) output voltage is between 0.5 V and 4.5 V.
- Accelerator pedal position sensor (sub) output voltage is between 0.5 V and 4.5 V.

Judgment Criteria

- When the variation in the accelerator pedal-opened degree is small, the voltage obtained through the following equation is 1 V or more.

[Accelerator pedal position sensor (sub) output voltage +0.3 V – Accelerator pedal position sensor (main) output voltage]

or

- When the variation in the accelerator pedal-opened degree is small, the voltage obtained through the following equation is 1 V or more.

[Accelerator pedal position sensor (main) output voltage +0.3 V – Accelerator pedal position sensor (sub) output voltage]

PROBABLE CAUSE

- Failed accelerator pedal position sensor
- Open/short circuit in circuit in accelerator pedal position sensor (sub) circuit or loose connector contact
- Harness damage in accelerator pedal position sensor (main) circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

YES : Go to Step 2

NO : Go to Step 3 .

STEP 2. M.U.T.-III data list

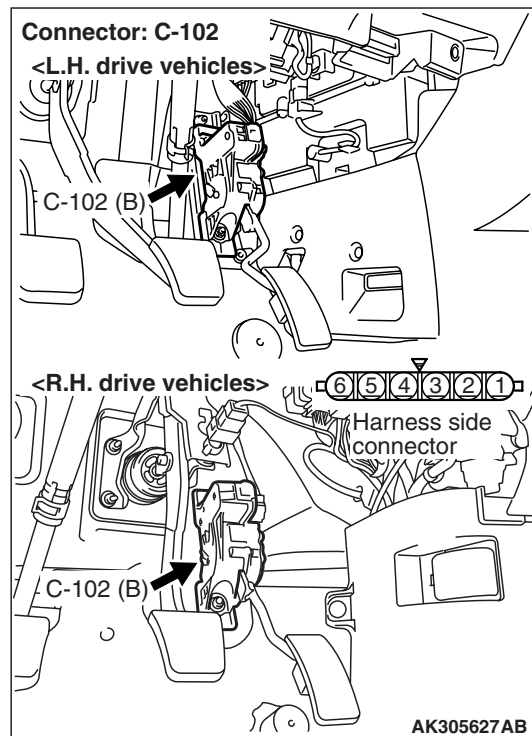
- Refer to Data List Reference Table [P.13A-284](#).
 - Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

NO : Check accelerator pedal position sensor (main) system (Refer to Code No. P0220 [P.13A-83](#)).

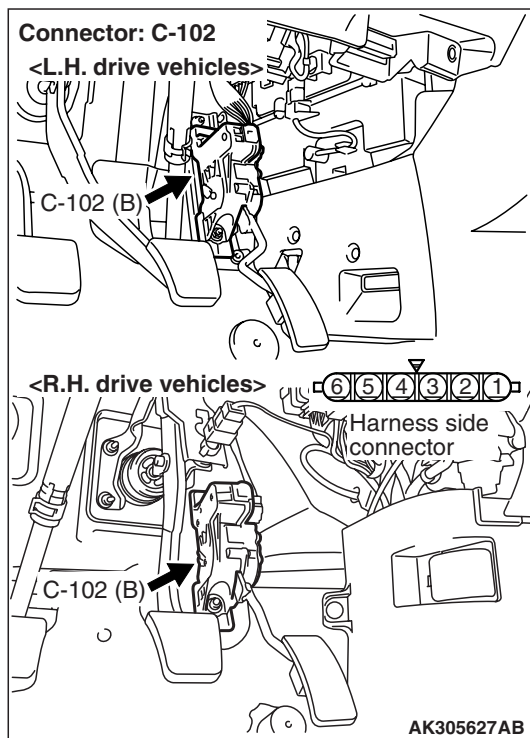
STEP 3. Connector check: C-102 accelerator pedal position sensor connector



Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Perform voltage measurement at C-102 accelerator pedal position sensor connector.

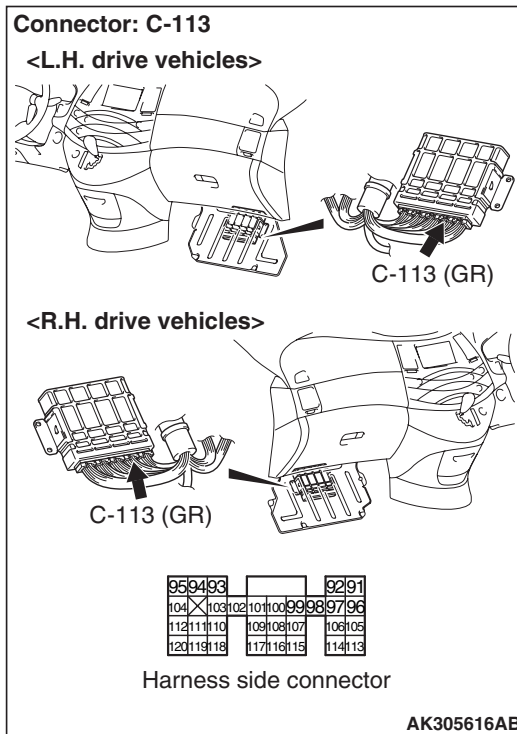
- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 4 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 8 .

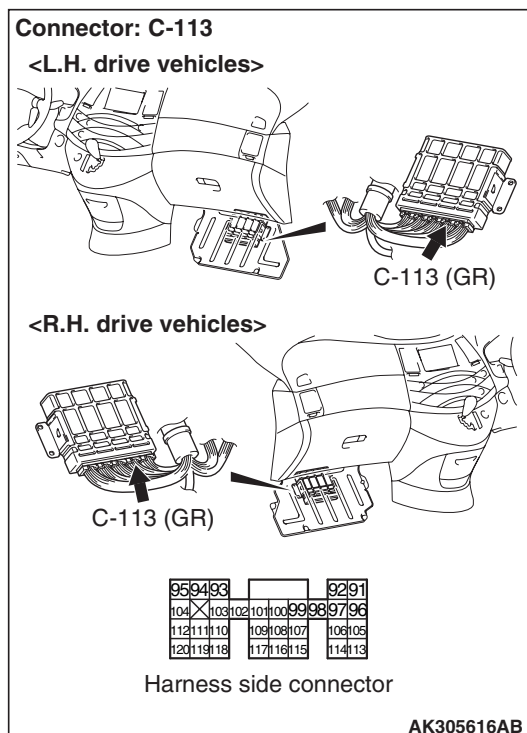
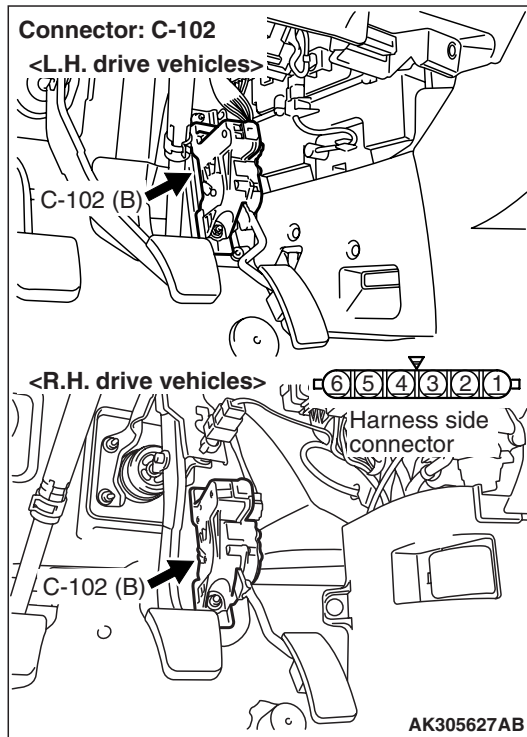
NO : Go to Step 5 .

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 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.



- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 7 .
NO : Repair.

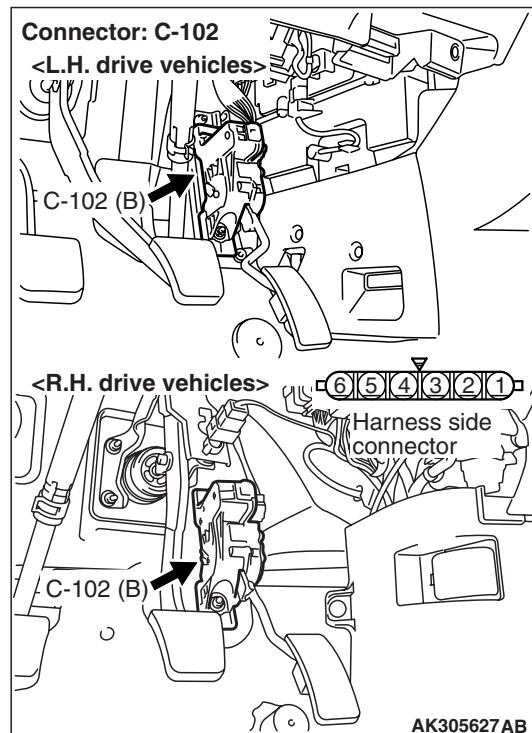
STEP 7. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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 8. Perform resistance measurement at C-102 accelerator pedal position sensor connector.



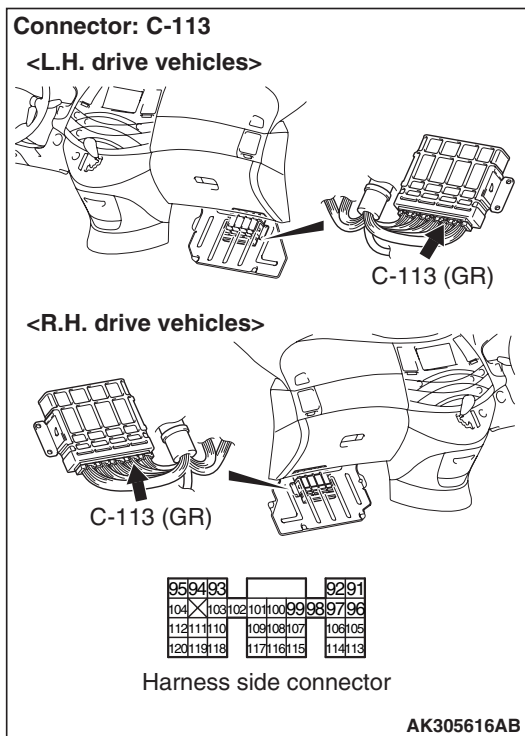
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 5 and earth.

OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 12 .
NO : Go to Step 9 .

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

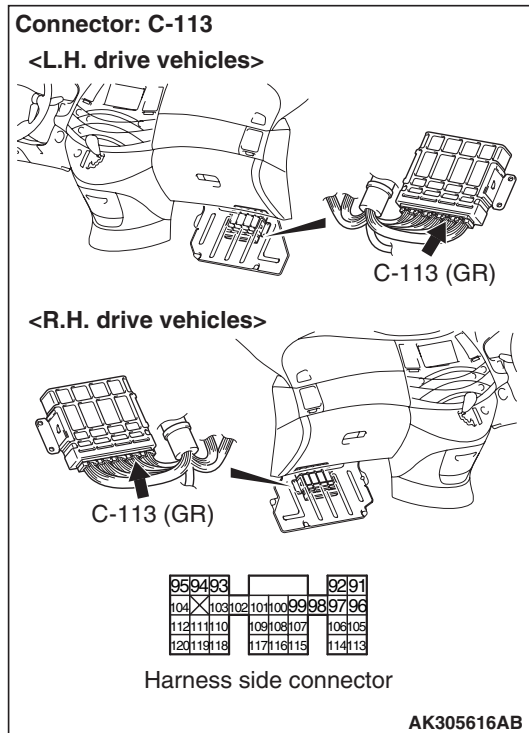
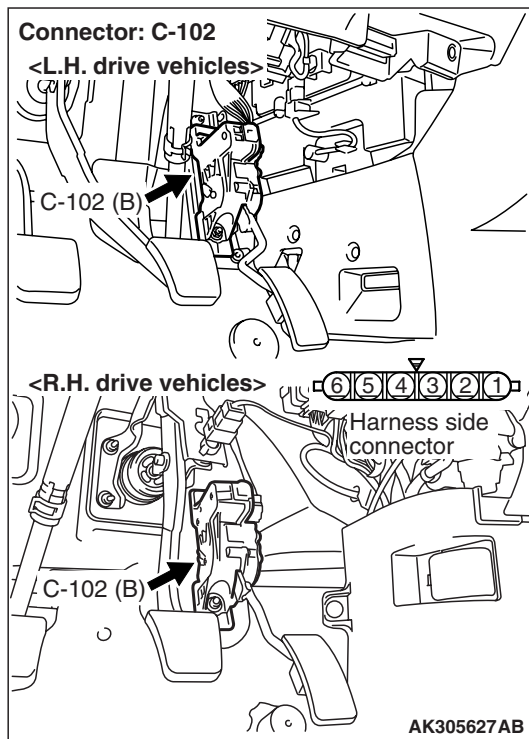


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. Check harness between C-102 (terminal No. 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 open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. M.U.T.-III data list

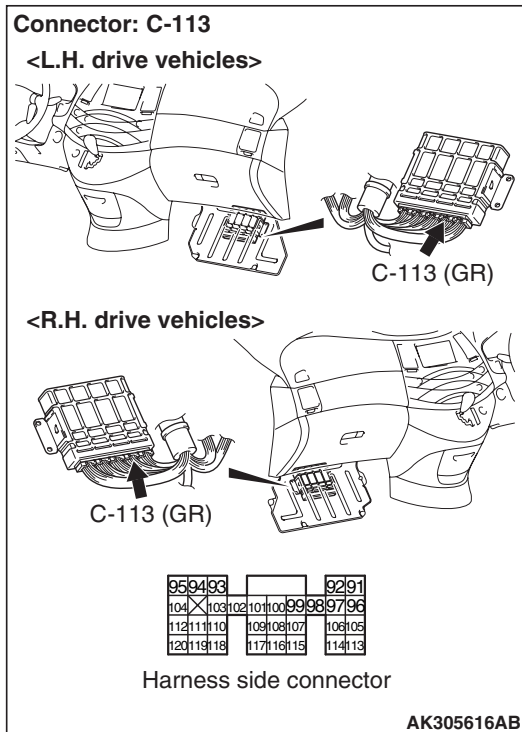
- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 77: Accelerator pedal position sensor (sub)

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

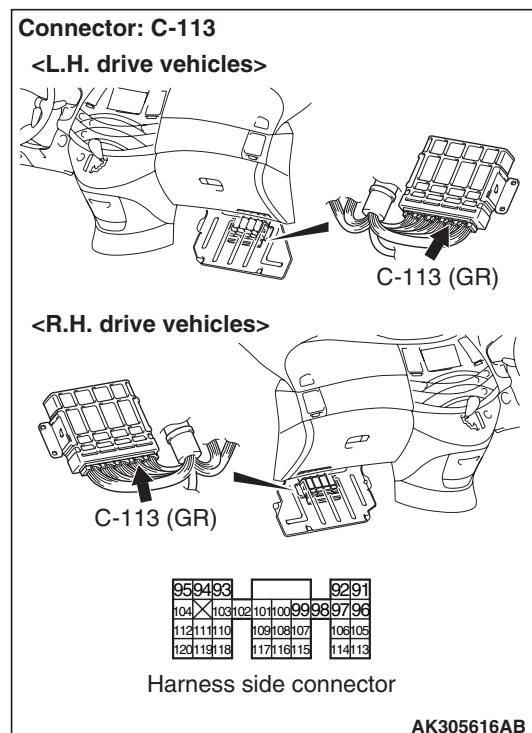
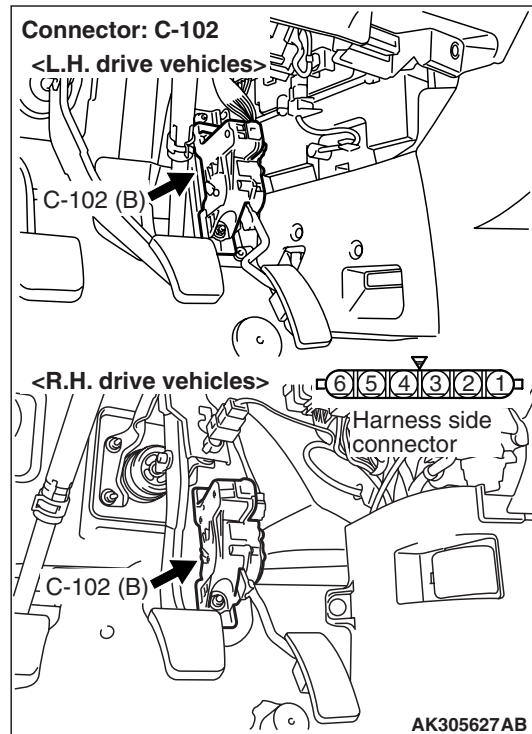


Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair or replace.

STEP 13. 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.



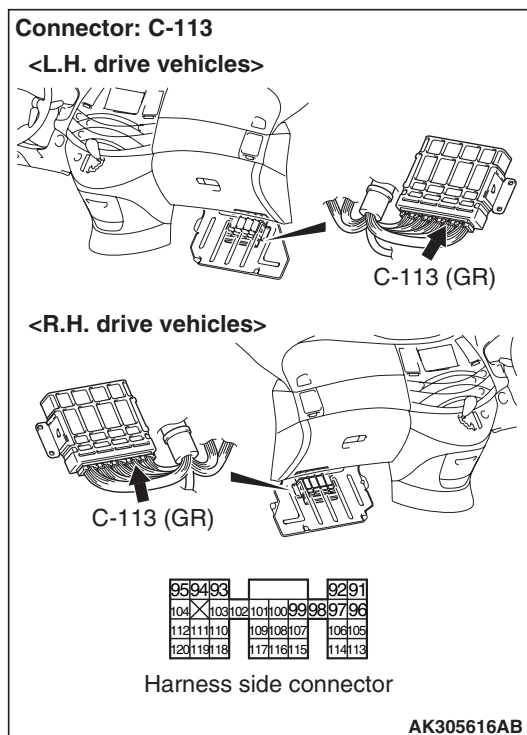
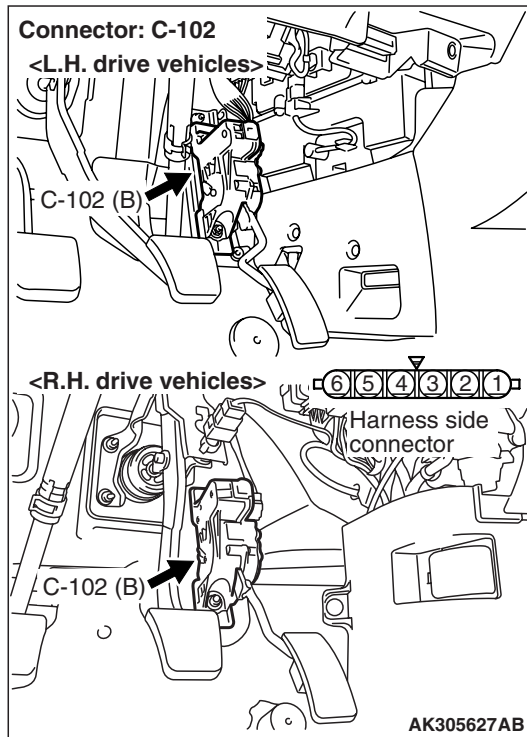
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14. 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.



Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

STEP 15. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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 accelerator pedal assembly. Then go to Step 16 .

STEP 16. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

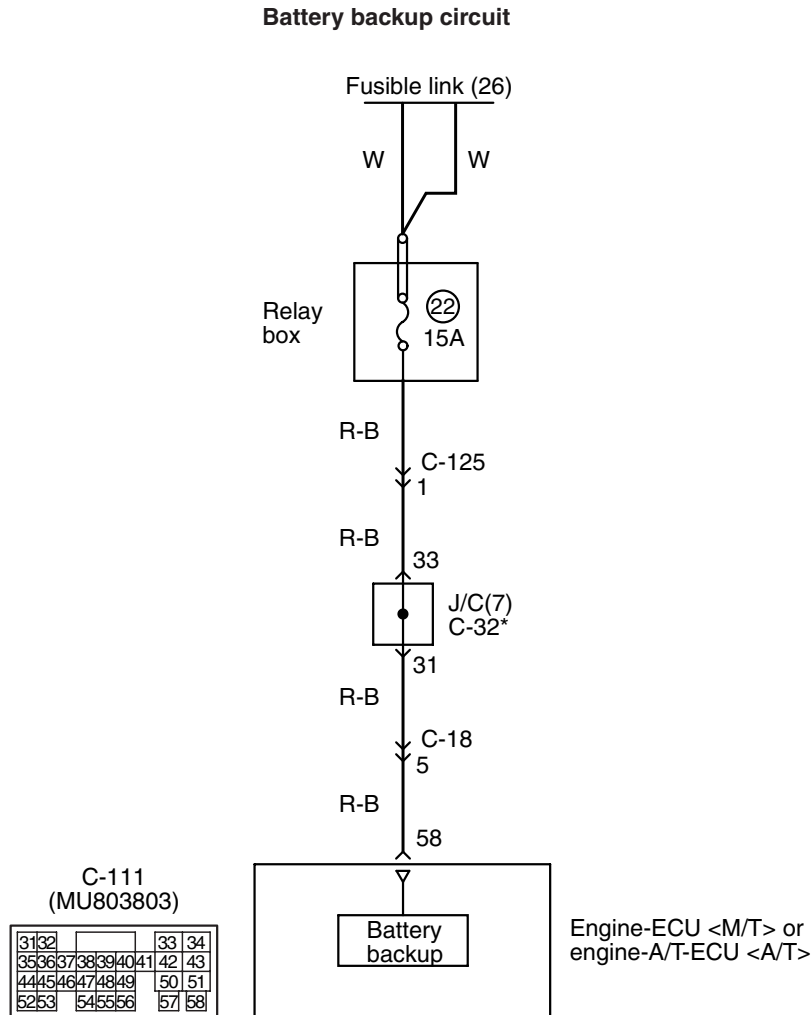
Q: Is the diagnosis code set?

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

NO : Check end.

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

Code No. P1603: Battery Backup Circuit Malfunction



NOTE

*: 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

AK501337AB

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 Condition

- Ignition switch is in ON position.

Judgment Criterion

- The information of the backup RAM, which was set when the previous ignition switch was in OFF position, is not stored.

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. Check the battery condition.**

Q: Was the battery terminal removed just before reading the diagnosis code?

YES : Go to Step 2 .

NO : Go to Step 3 .

STEP 2. M.U.T.-III diagnosis code

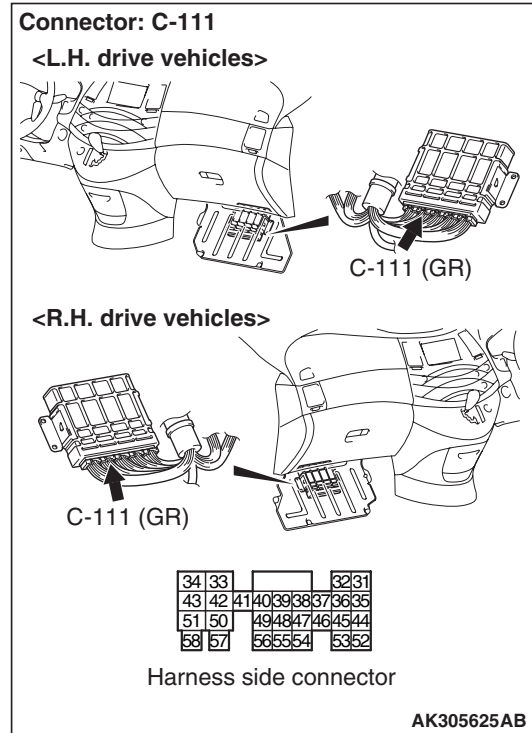
- Temporarily place the ignition switch in LOCK (OFF) position, and 10 seconds after that, place it in ON position again.

Q: Is the diagnosis code P1603 set?

YES : Go to Step 3 .

NO : Check end.

STEP 3. 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

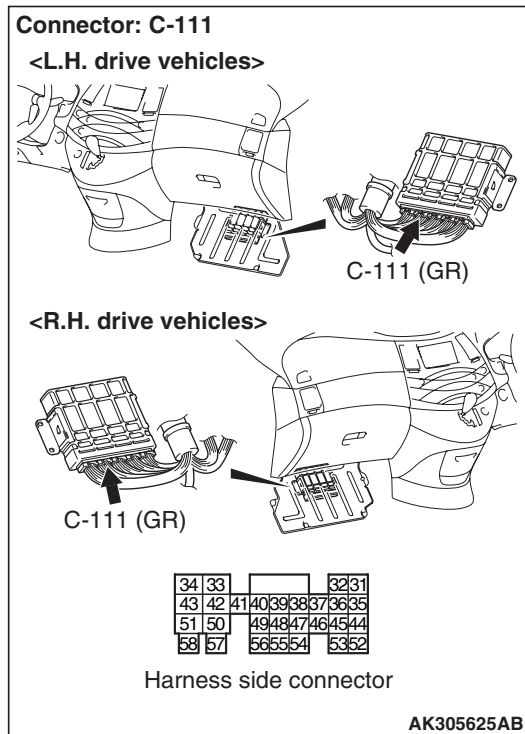
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check intermediate connector C-18, C-32 (R. H. drive vehicles) and C-125, and repair if necessary. If intermediate connector is normal, check and repair harness between battery and C-111 (terminal No. 58) engine-A/T-ECU connector.

- Check power supply line for open/short circuit.

STEP 4. 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 5 .

NO : Repair or replace.

STEP 5. M.U.T.-III diagnosis code

- Reconfirmation of diagnosis code.

Q: Is the diagnosis code set?

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. 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 harness and connector in CAN busline
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS

STEP 1. M.U.T.-III CAN bus diagnostics

- Using M.U.T.-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Correct CAN busline (Refer to 54F – Diagnosis – Can Bus Diagnosis Table [P.54F-13](#)), and then go to Step 3 .

STEP 2. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code output?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>, go to Step 3 .

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

STEP 3. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code 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 <A/T> 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, M.U.T.-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 54F – Explanation About The M.U.T.-III CAN Bus Diagnostics [P.54F-7](#)).

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. M.U.T.-III CAN bus diagnostics

- Using M.U.T.-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Correct CAN busline (Refer to GROUP54F – Diagnosis – Can Bus Diagnosis Table P.54F-13), and then go to Step 6 .

STEP 2. M.U.T.-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 – Check Chart For Diagnosis Codes P.35B-7).

NO : Go to Step 3 .

STEP 3. M.U.T.-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. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code output?

YES : Replace ABS-ECU, 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. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code output?

YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>, 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. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code output?

YES : Go to Step 1 .

NO : Check end.

Code No. U1108: Combination Meter Time-out**⚠ 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, M.U.T.-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 54F – Explanation About The M.U.T.-III CAN Bus Diagnostics [P.54F-7](#)).

PROBABLE CAUSE

- Failed harness and connector in CAN busline
- Failed combination meter
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS**STEP 1. M.U.T.-III CAN bus diagnostics**

- Using M.U.T.-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Correct CAN busline (Refer to Group 54F – Diagnosis – Can Bus Diagnosis Table [P.54F-13](#)), and then go to Step 6 .

STEP 2. M.U.T.-III other system diagnosis codes.

- Confirm whether the diagnosis code is output from combination meter.

Q: Is the diagnosis code output?

YES : Perform the troubleshooting of combination meter (Refer to GROUP 54A – combination meter – Check Chart For Diagnosis Codes [P.54A-55](#)).

NO : Go to Step 3 .

STEP 3. M.U.T.-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 to Step 4 .

NO : Go to Step 5 .

STEP 4. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code output?

YES : Replace combination meter, go to Step 6 .

NO : Intermittent 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. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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>, go to Step 6 .

NO : Intermittent 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. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code output?

YES : Go to Step 1 .

NO : Check end.

Code No. U1110: A/C-ECU Time-out

⚠ 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 or 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, M.U.T.-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 54F – Explanation About The M.U.T.-III CAN Bus Diagnostics [P.54F-7](#)).

PROBABLE CAUSE

- Failed harness and connector
- Failed A/C-ECU
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS**STEP 1. M.U.T.-III CAN bus diagnostics**

- Using M.U.T.-III, perform CAN busline diagnosis.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Correct CAN busline (Refer to Group 54F – Diagnosis – Can Bus Diagnostic Table [P.54F-13](#)), and then go to Step 6 .

STEP 2. M.U.T.-III other system diagnosis codes

- Confirm whether the diagnosis code is output from A/C-ECU.

Q: Is the diagnosis code output?

YES : Perform the troubleshooting of A/C-ECU (Refer to GROUP 55 Troubleshooting – Diagnosis Code Chart [P.55-8](#)).

NO : Go to Step 3 .

STEP 3. M.U.T.-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. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code output?

YES : Replace A/C-ECU, 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. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code output?

YES : Replace engine-ECU<M/T> or engine-A/T-ECU <A/T>, 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. M.U.T.-III diagnosis code

- Reconfirm whether the diagnosis code is 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 code is output.

Q: Is the diagnosis code output?

YES : Go to Step 1 .

NO : Check end.

INSPECTION CHART FOR TROUBLE SYMPTOMS

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Items	Trouble symptom		Inspection procedure No.
Communication with M.U.T.-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
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

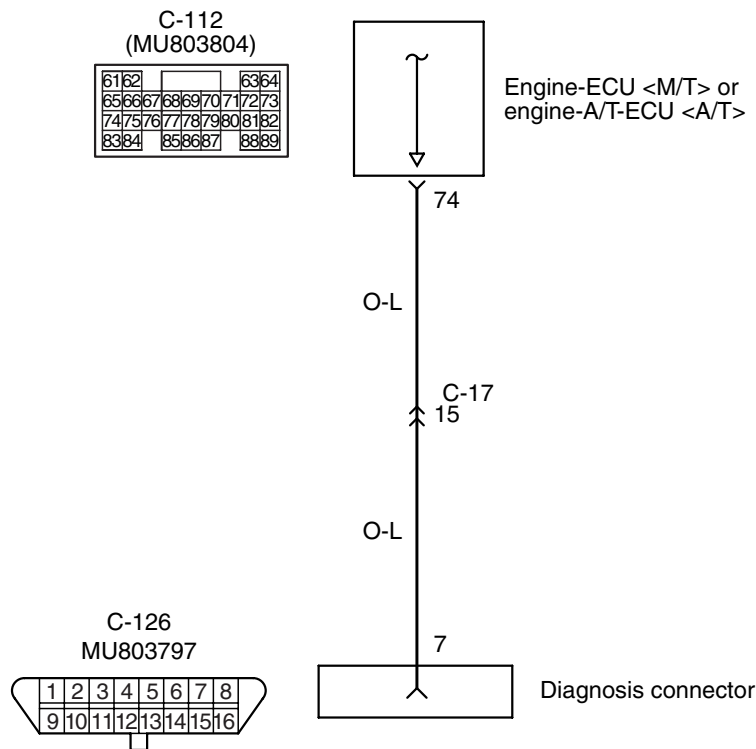
Inspection procedure No.	Trouble symptom	Reference page
1	Communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> only is not possible	P.13A-189
2	The engine warning lamp does not illuminate right after the ignition switch is turned the "ON" position	P.13A-191
3	The engine warning lamp remains illuminating and never goes out	P.13A-191
4	Starting impossible (No initial combustion) <M/T>	P.13A-192
5	Starting impossible (No initial combustion) <A/T>	P.13A-199
6	Starting impossible (Starter operative but no initial combustion)	P.13A-206
7	Starting impossible (Initial combustion but no complete combustion)	P.13A-209
	Starting impossible (Long time to start)	
8	Unstable idling (Rough idling, hunting)	P.13A-210
	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-214
10	The engine stalls when decelerating	P.13A-215
11	Engine does not revolve up	P.13A-216
12	Hesitation, sag	P.13A-217
	Poor acceleration	
	Stumble	
	Surge	
13	The feeling of impact or vibration when accelerating	P.13A-218
14	The feeling of impact or vibration when decelerating	P.13A-219
15	Knocking	P.13A-220
16	Ignition timing offset	P.13A-220
17	Run on (Dieseling)	P.13A-222
18	Odor, white smoke, black smoke, high-concentration CO/HC during idling	P.13A-222
19	Battery rundown	P.13A-224

Inspection procedure No.	Trouble symptom	Reference page
20	Overheating	P.13A-228
21	Abnormal rotation of fan motor	P.13A-229
22	Engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply, engine control relay, ignition switch-IG1 system	P.13A-232
23	Fuel pump system	P.13A-240
24	Fan control relay system	P.13A-252
25	A/C compressor relay system	P.13A-259
26	Ignition circuit system	P.13A-267
27	Purge control solenoid valve system	P.13A-275
28	Stop lamp switch system	P.13A-280

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

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OPERATION

- There is data communication between diagnosis connector output terminal (terminal No. 7) and engine-ECU <M/T> or engine-A/T-ECU (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/short in the diagnosis connector 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>

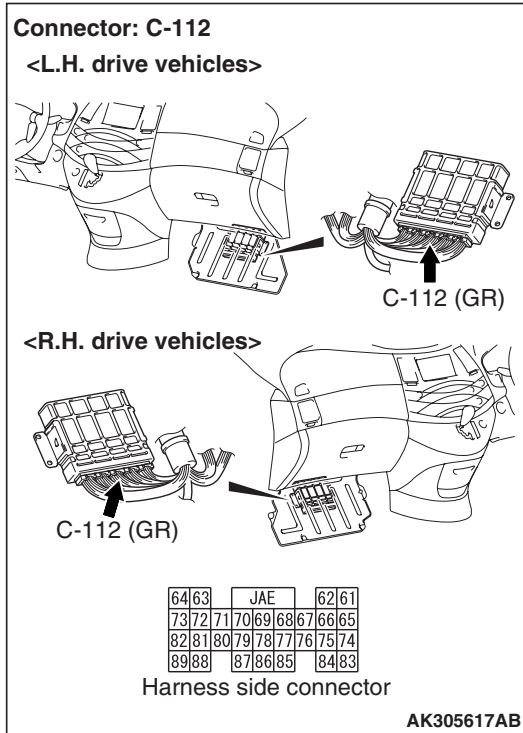
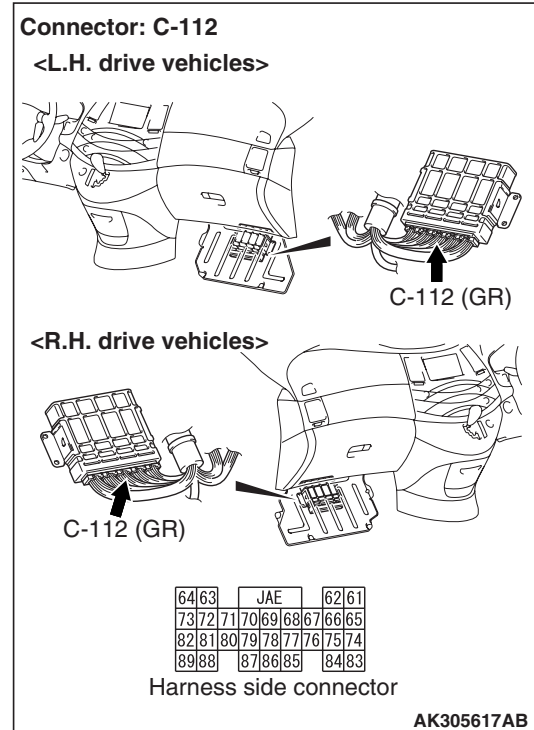
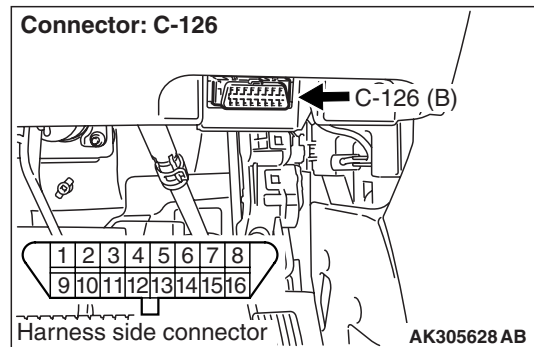
DIAGNOSIS PROCEDURE

STEP 1. Check engine starting.

Q: Is engine starting possible?

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-232](#)).

STEP 2. 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 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?****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/short in the combination meter circuits and so on.

PROBABLE CAUSE

- Failed engine warning lamp
- Open/short circuit in combination meter circuits

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

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

- Failure possibly occurs when engine-ECU <M/T> or engine-A/T-ECU <A/T> detects malfunction, or is possibly caused by short circuit in combination meter circuit and so on.

PROBABLE CAUSE

- Short circuit in combination meter circuit

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#).)

NO : Go to Step 2 .

STEP 2. Check the trouble symptoms.

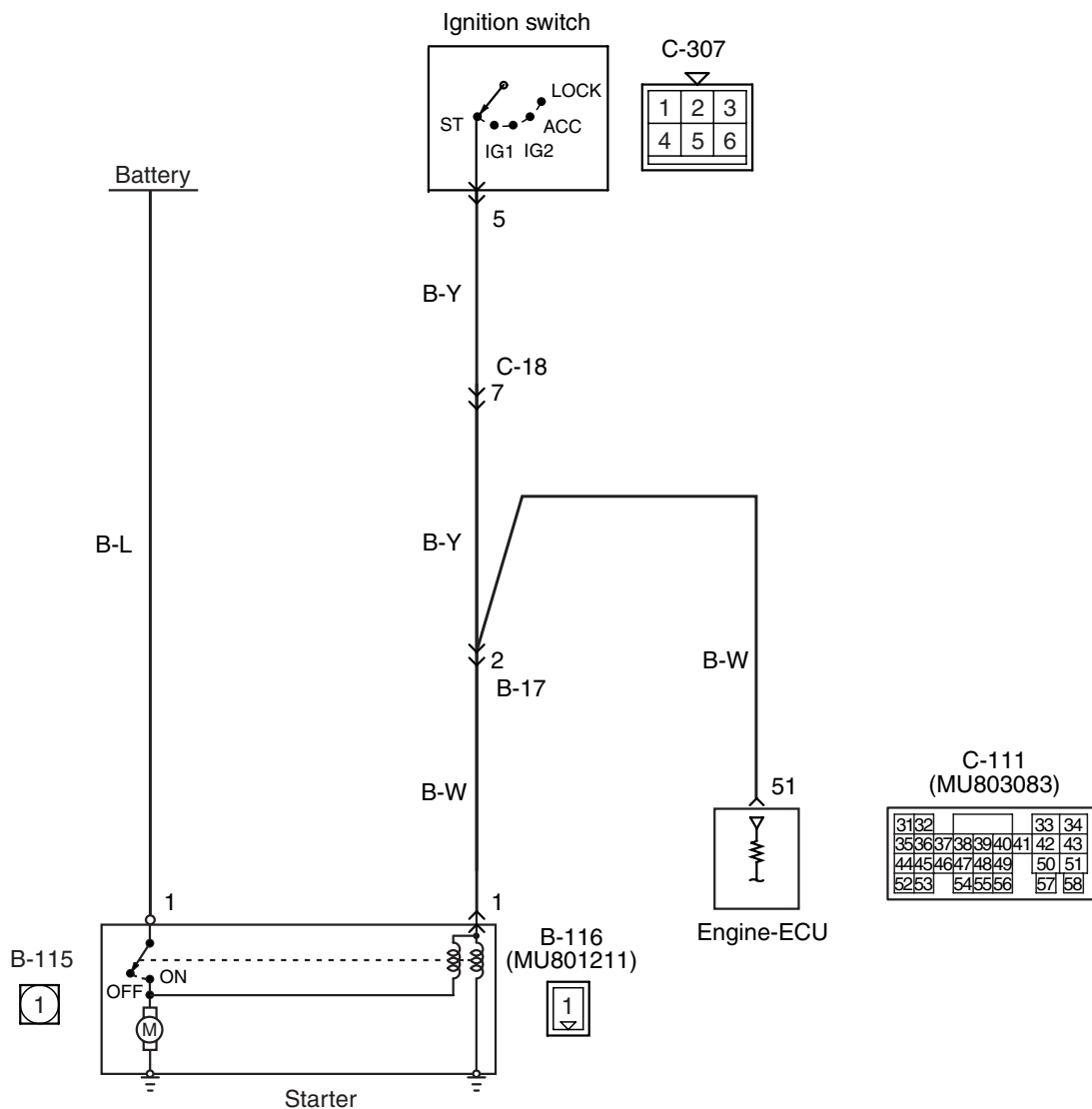
Q: Does trouble symptom persist?

YES : Replace combination meter assembly.

NO : Intermittent malfunction (Refer to GROUP00 – How to Use Troubleshooting/Inspection Service Points [P.00-5](#)).

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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OPERATION

- If the ignition switch is turned to "START" position, battery voltage is applied to starter (terminal No. 1).
- If the ignition switch is turned to "START" position, battery voltage is applied to engine-ECU (terminal No. 51) from ignition switch. Because of this, engine-ECU detects that the engine is cranked.

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 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. M.U.T.-III data list

- Item 18: Cranking signal

OK:

ON (Ignition switch: ST)

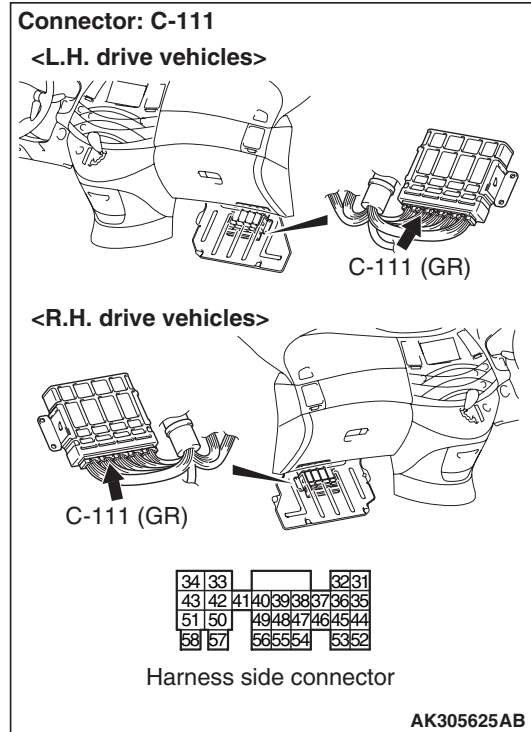
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 3 .

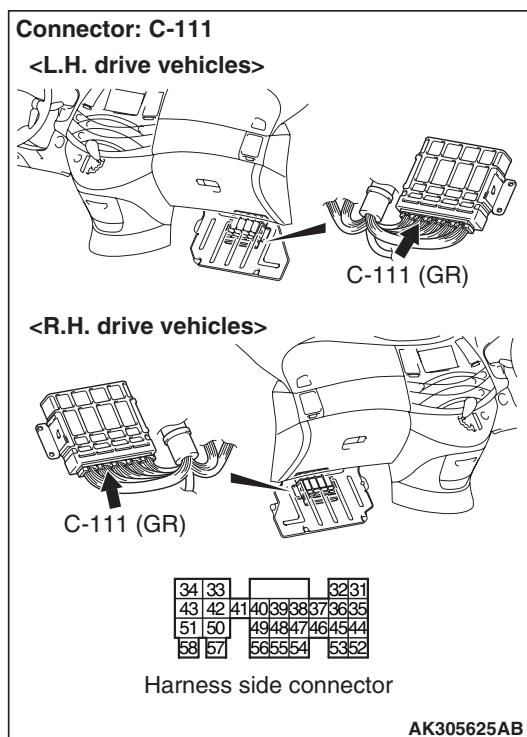
STEP 3. Connector check: C-111 engine-ECU connector



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.

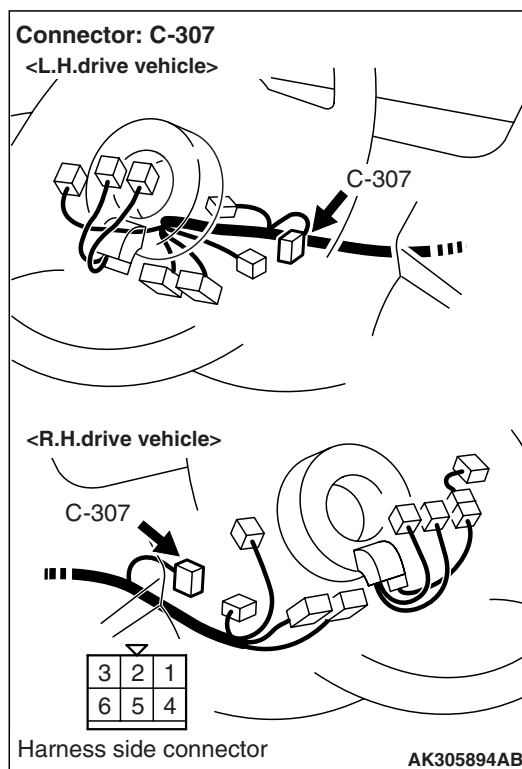
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 51 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 5 .

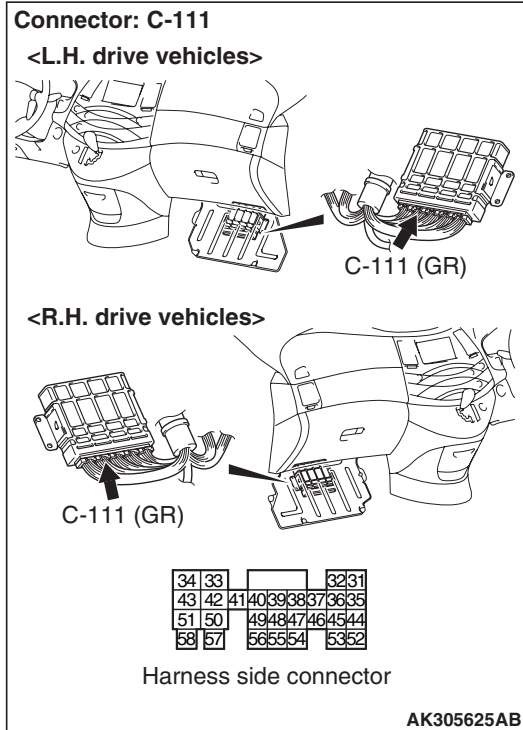
STEP 5. Connector check: C-307 ignition switch connector

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check ignition switch.

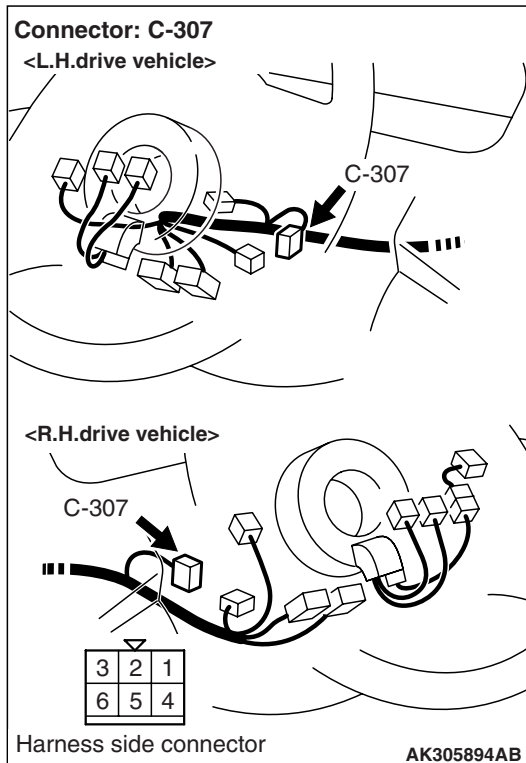


Q: Is the check result normal?

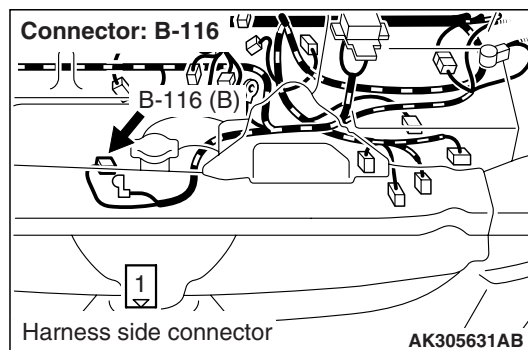
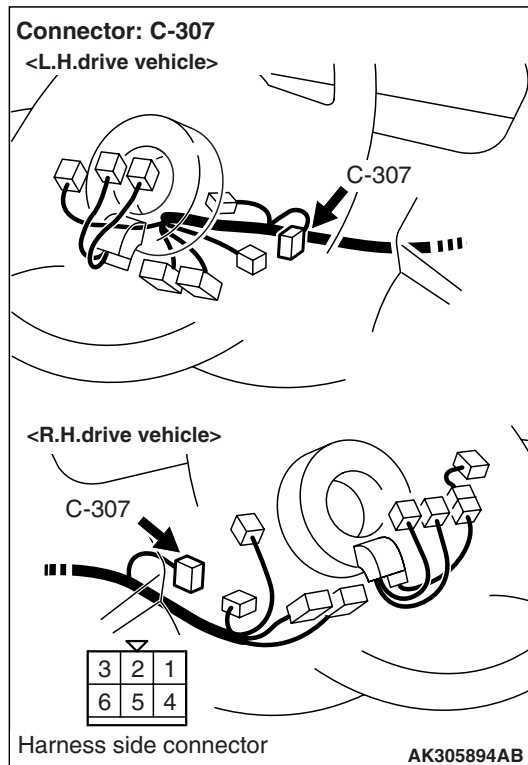
YES : Check intermediate connectors C-18 and B-17, and repair if necessary. If intermediate connector are normal, check and repair harness between C-111 (terminal No. 51) engine-ECU connector and C-307 (terminal No. 5) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Replace ignition switch.



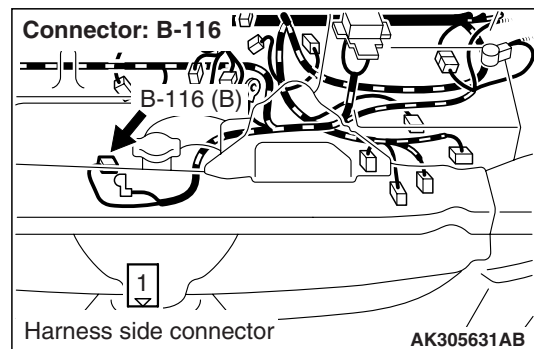
- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Ignition Switch – Inspection P.54A-49).

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.

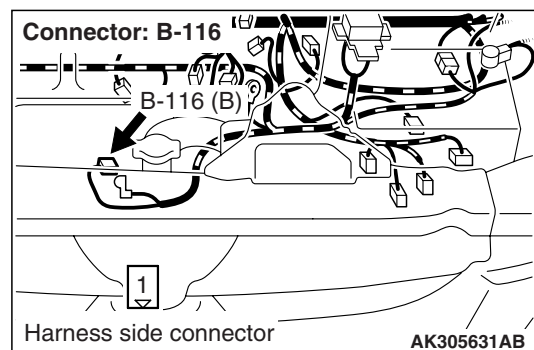
- Check output line for short circuit.

NO : Repair or replace.

STEP 8. Check connector: 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.

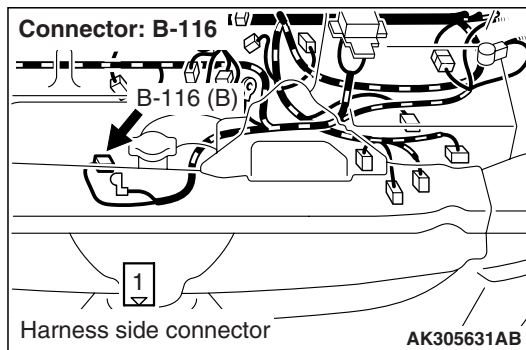
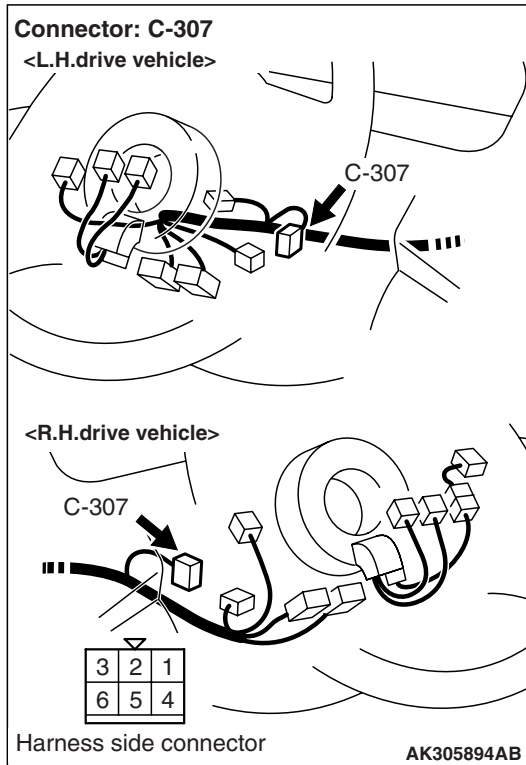
OK: System voltage

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



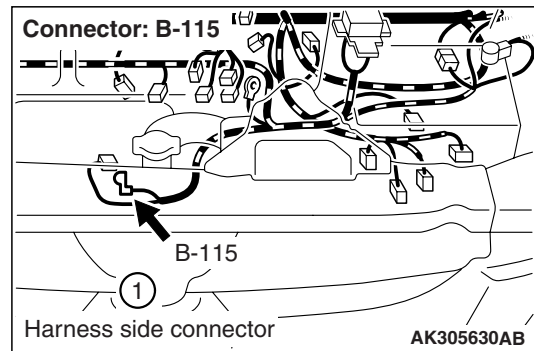
Q: Is the check result normal?

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

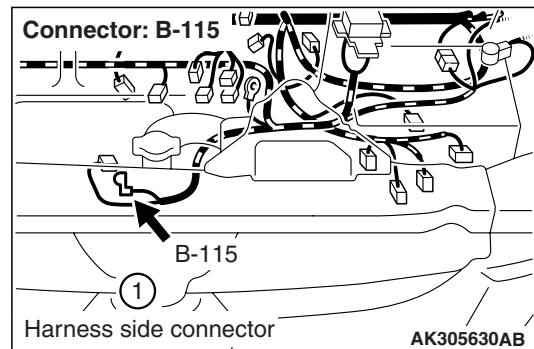


Q: Is the check result normal?

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

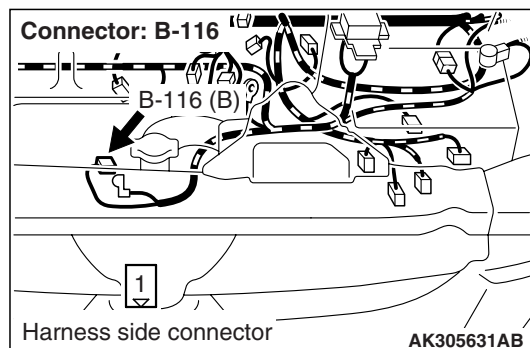
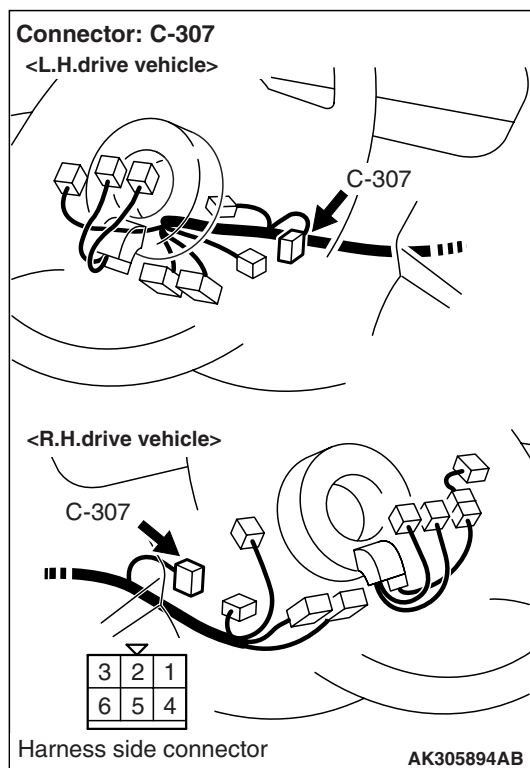
Q: Is the check result normal?

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.

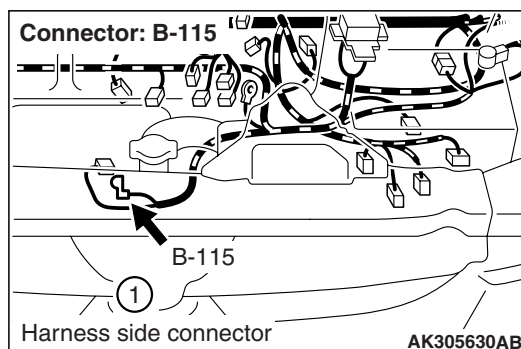
- Check output line for damage.

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.

- If the ignition switch is turned to "START" position, battery voltage is applied to the engine-A/T-ECU (terminal No. 51) from ignition switch. Because of this, the engine-A/T-ECU detects that the engine is cranked.

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by malfunction of starter or starter-related circuits.

PROBABLE CAUSE

- Failed battery
- Failed inhibitor switch
- Failed ignition 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 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. M.U.T.-III data list

- Item 18: Cranking signal

OK:

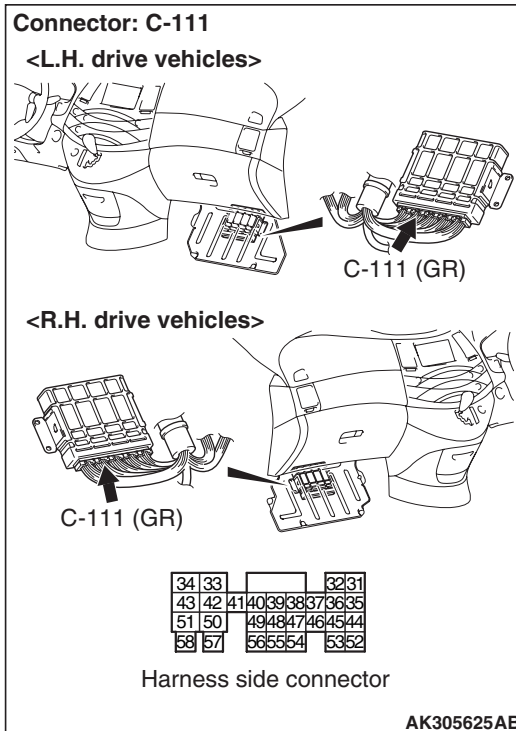
ON (Ignition switch: ST)

OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 3 .

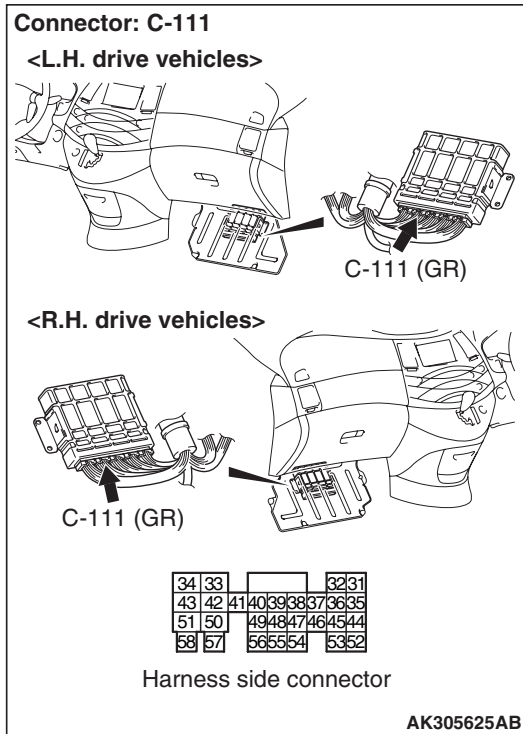
STEP 3. Connector check: C-111 engine-A/T-ECU connector

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.

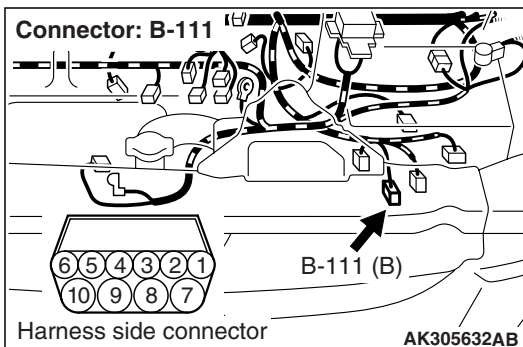
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 5 .

STEP 5. Connector check: B-111 inhibitor switch connector

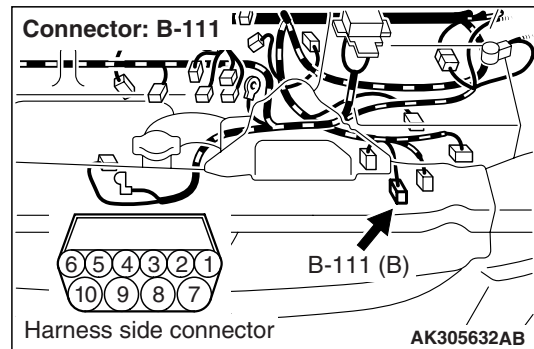


Q: Is the check result normal?

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.

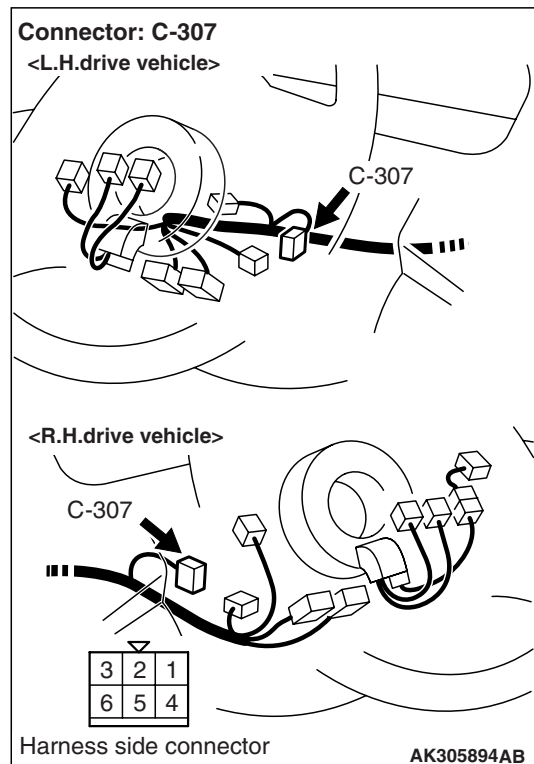
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 7 .

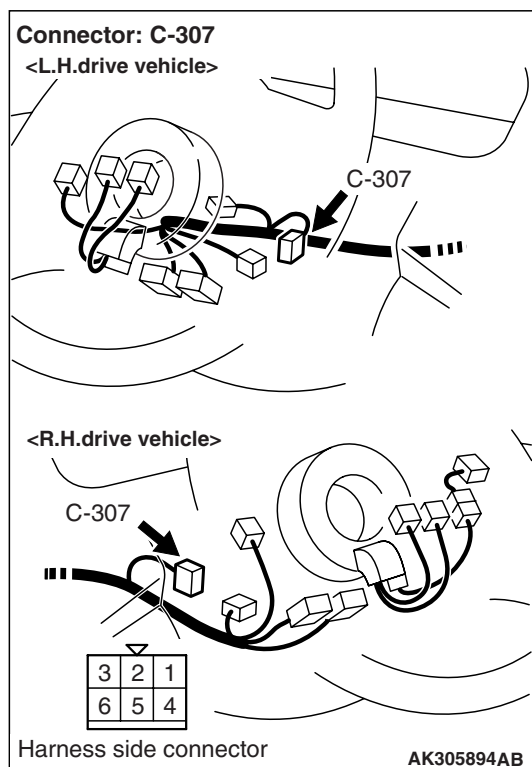
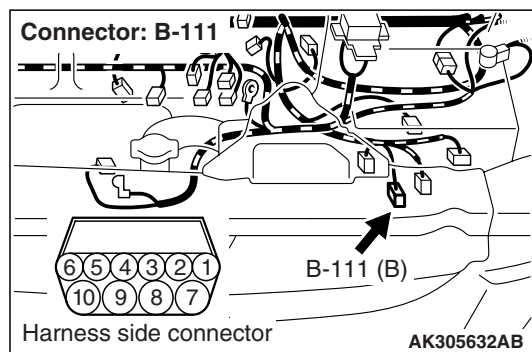
STEP 7. Connector check: C-307 ignition switch connector



Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Check ignition switch

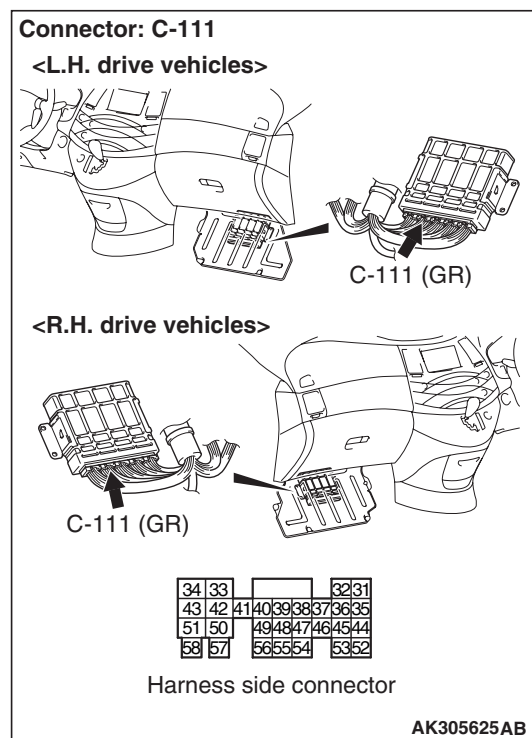
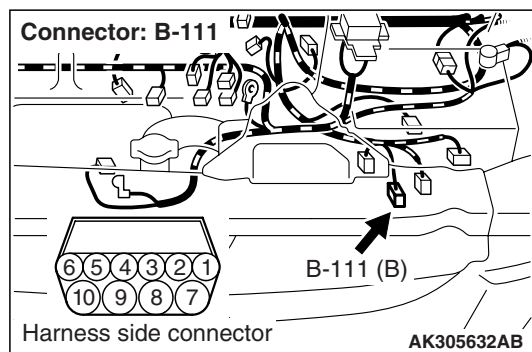
- Check ignition switch (Refer to GROUP 54A – Ignition switch – Ignition Switch – Inspection P.54A-49).

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 itself.

- Check ignition switch itself (Refer to GROUP 23A – On – vehicle Service – A/T Control Component Check – Inhibitor Switch Check P.23A-147).

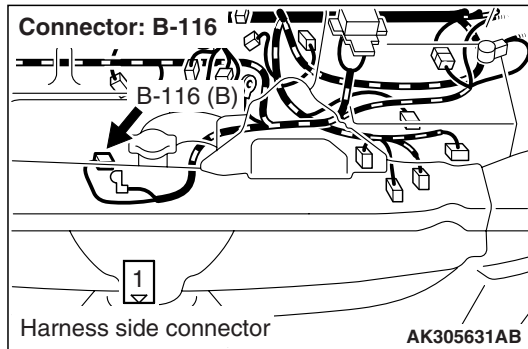
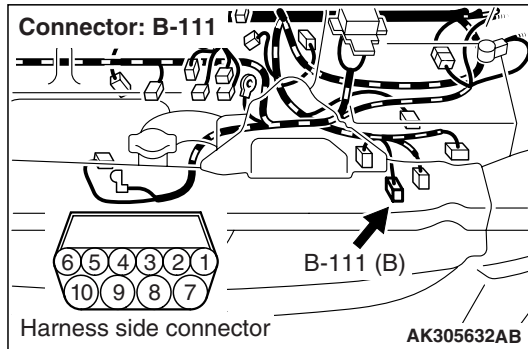
Q: Is the check result normal?

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 inhibitor switch.

STEP 10. Connector check: B-111 inhibitor switch connector and B-116 starter connector



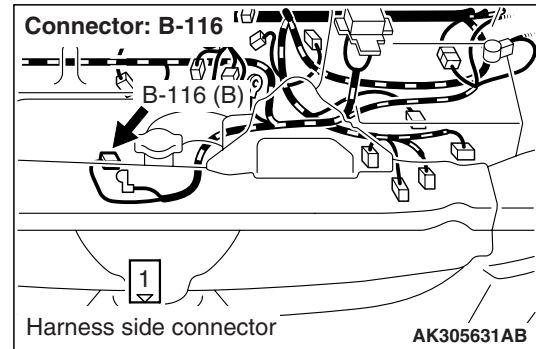
Q: Is the check result normal?

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. Check connector: B-116 starter connector

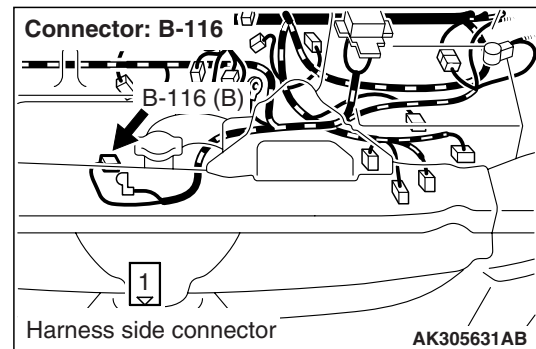


Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace.

STEP 12. Perform voltage measurement at B-116 starter connector.



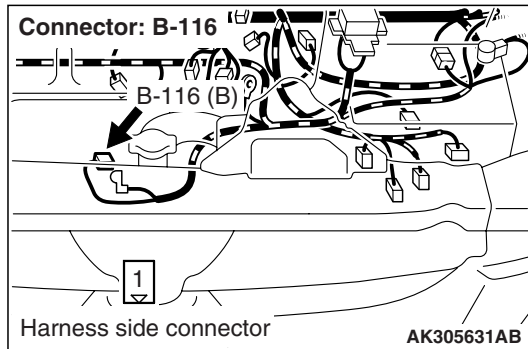
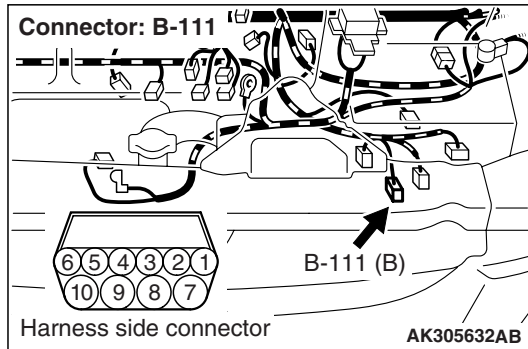
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 14 .

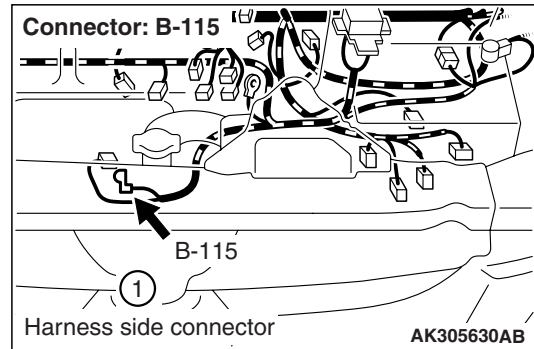
NO : Go to Step 13 .

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.

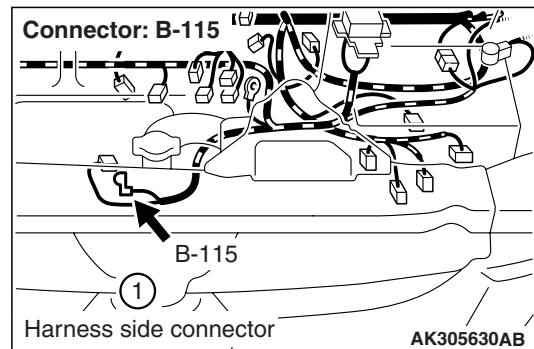
- Check output line for open circuit and damage.

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

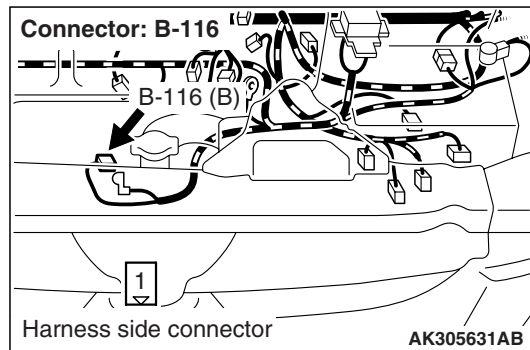
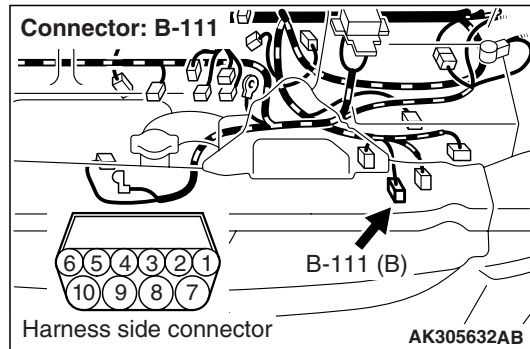
Q: Is the check result normal?

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.

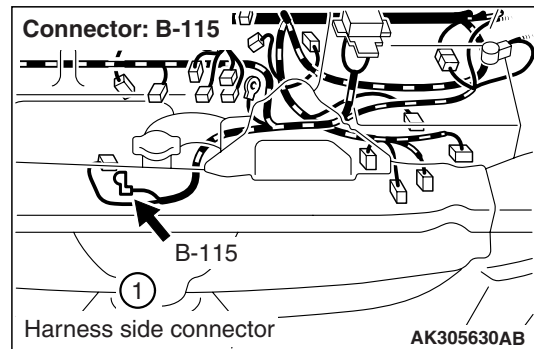
- Check output line for damage.

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
- Contamination of throttle body (throttle valve portion)
- 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 M.U.T.-III of communication.

- Confirm the communication available M.U.T.-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-232](#)).

STEP 3. M.U.T.-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis codes (Refer to [P.13A-14](#))

NO : Go to Step 4 .

STEP 4. M.U.T.-III actuator test

- Item 18: Cranking signal

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-240](#))

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 portion) contamination.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-307](#)).

STEP 7. M.U.T.-III data list

- Item 18: Cranking signal

OK:

ON (Ignition switch: ST)

OFF (Ignition switch: ON)

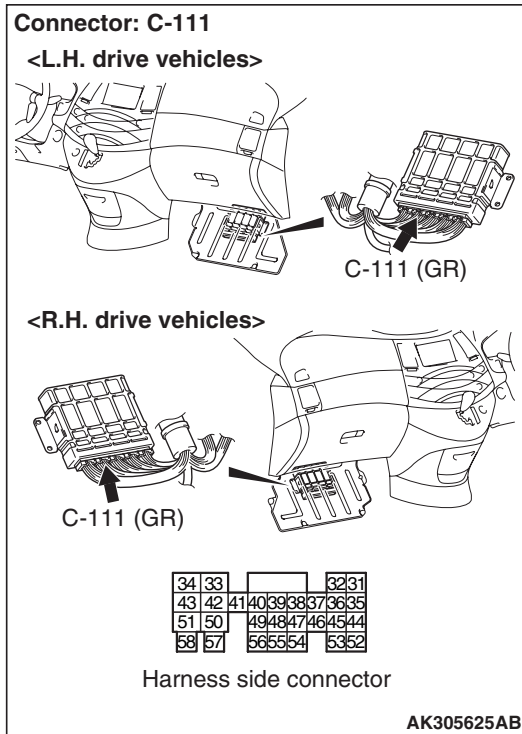
Q: Is the check result normal?

YES : Go to Step 10 .

NO <M/T> : Go to Step 8 <M/T>.

NO <A/T> : Go to Step 9 <A/T>.

STEP 8. Connector check: C-111 engine-ECU connector

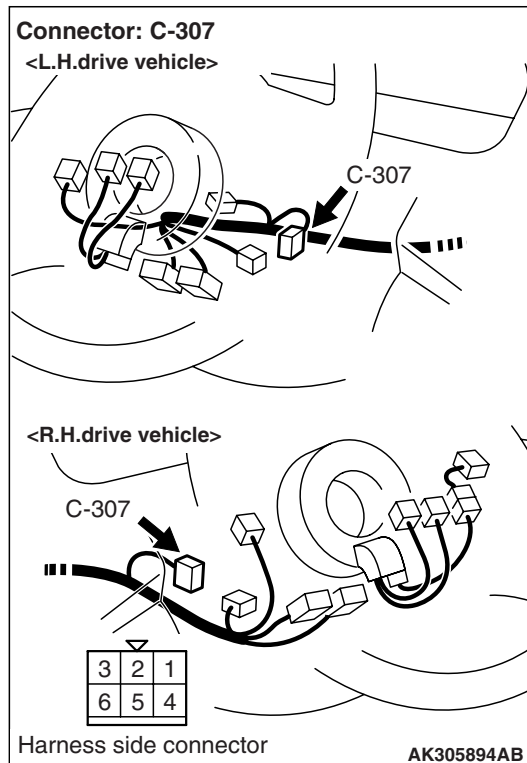


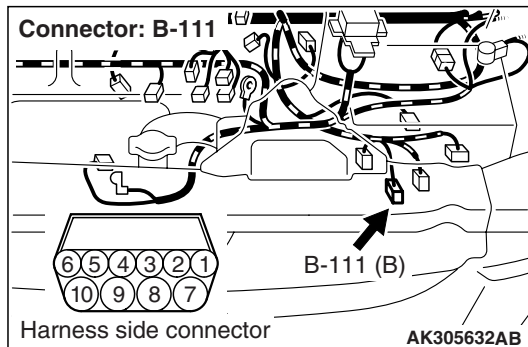
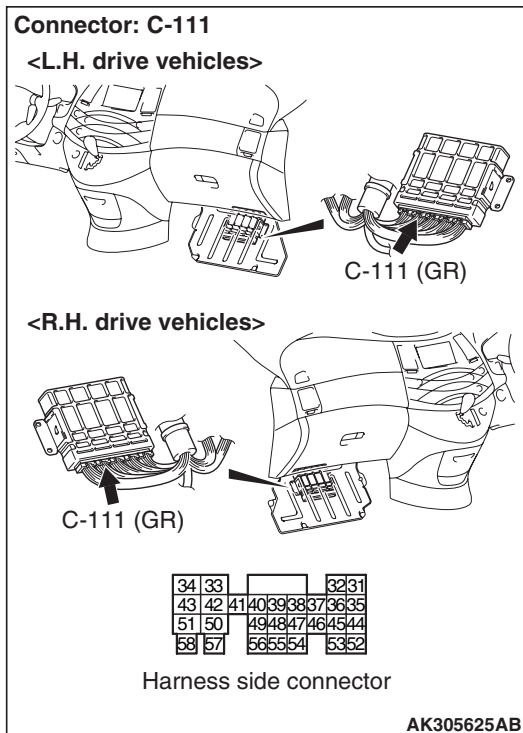
Q: Is the check result normal?

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 C-111 (terminal No. 51) engine-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?**

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 10. M.U.T.-III data list

- Refer to Data list reference table [P.13A-284](#).
 - 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-107](#)).

STEP 11. Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13A-317](#)).

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, Code No. P0202: No. 2 injector system, Code No. P0203: No. 3 injector system, Code No. P0204: No. 4 injector system [P.13A-78](#)).

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)

STEP 13: Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-307](#)).

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 and so on.

PROBABLE CAUSE

- Failed battery
- Failed ignition system
- Failed fuel system
- Failed air-fuel ratio control system
- Failed intake system
- Failed exhaust gas cleaning system
- Contamination of throttle body (throttle valve portion)
- Timing belt in out of place.
- Improper compression pressure.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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 more

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. M.U.T.-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis codes (Refer to [P.13A-14](#))

NO : Go to Step 4 .

STEP 4. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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-14](#)).

STEP 5. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 25: Barometric pressure sensor

Q: Are the check results 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 portion) contamination.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-307](#)).

STEP 7. M.U.T.-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-240](#)).

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-317](#)).

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, Code No. P0202: No. 2 injector System, Code No. P0203: No. 3 injector System, Code No. P0204: No. 4 injector System [P.13A-78](#)).

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-267](#)).

STEP 12. Check spray condition of injector.

- Check each injector for spray condition (Refer to [P.13A-317](#)).

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-14](#)).

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.17-44](#)].

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, throttle valve control system, fuel system, etc. A sudden engine stall is possibly caused by poor connector contact.

PROBABLE CAUSE

- Failed ignition system
- Failed fuel system
- Failed throttle valve control system
- Failed air-fuel control system
- Failed intake/exhaust system
- Failed emission gas cleaning system

- Contamination of throttle body (throttle valve portion)
- Timing belt in out of place
- Improper compression pressure
- 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. M.U.T.-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

NO : Go to Step 3 .

STEP 3. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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 : 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-14](#)).

STEP 4. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 5 .

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

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 portion) contamination.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13A-307](#)).

STEP 8. M.U.T.-III data list

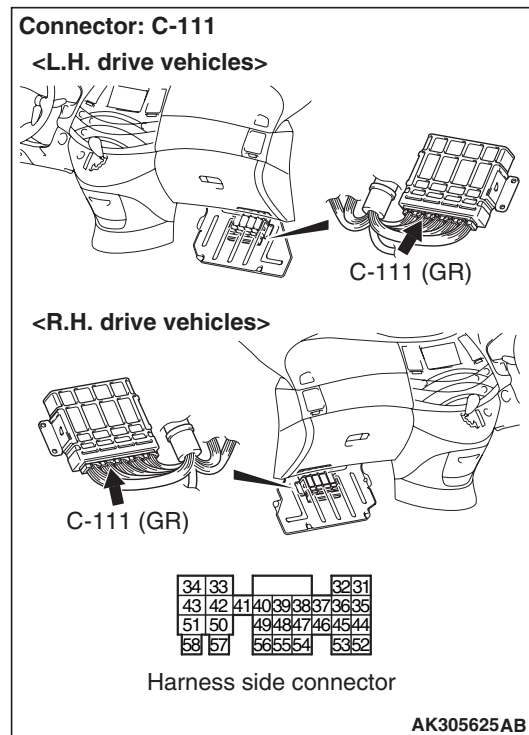
- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor
 - b. Item 39: Cylinder 2, 3 oxygen sensor

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-14](#)).

STEP 9. 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: Not operating
- Voltage between terminal No. 45 and earth.

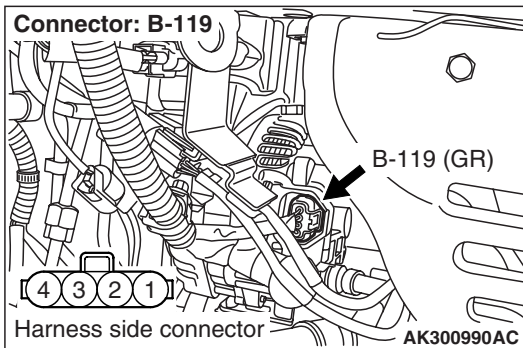
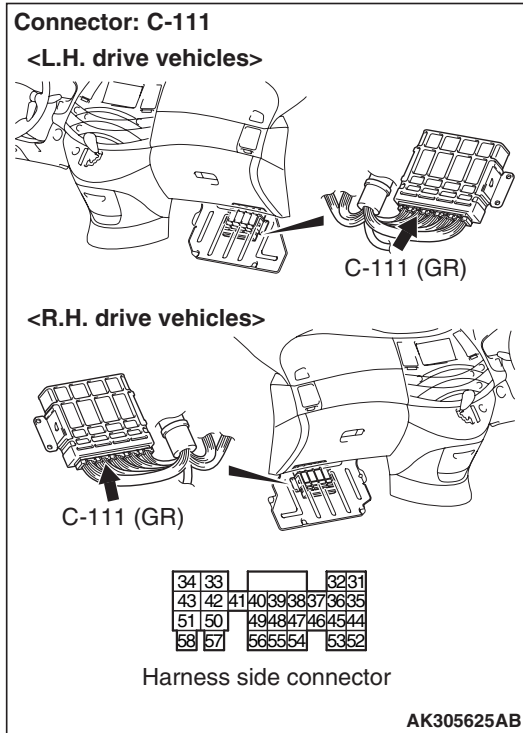
OK: Switching the headlamps to ON from OFF causes the voltage to increase.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 10 .

STEP 10. Connector check: C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-119 alternator connector

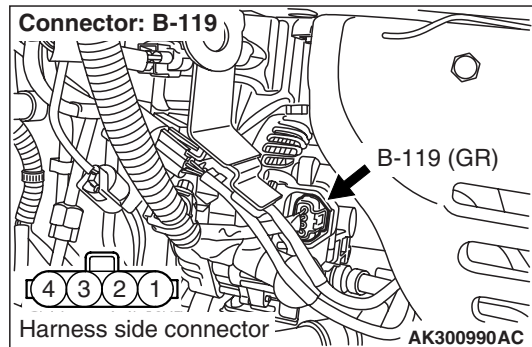
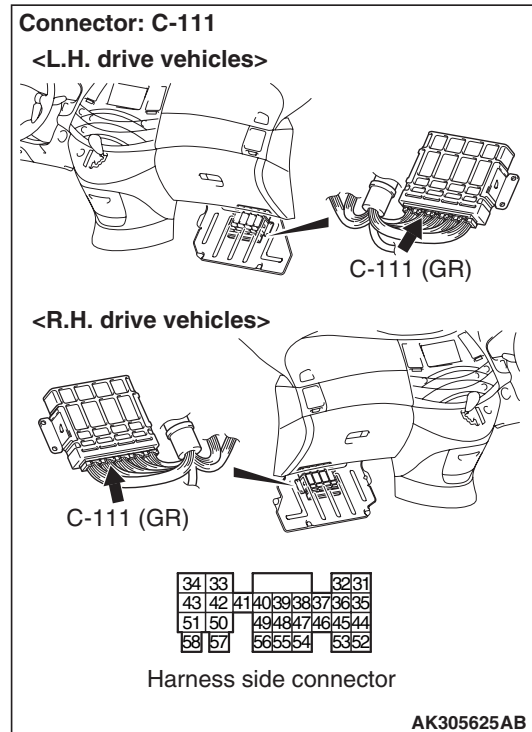


Q: Is the check result normal?

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 : Replace alternator. Then go to Step 12 .

NO : Repair.

STEP 12. Check 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-267](#)).

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.17-42](#))

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.17-44](#)].

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-317](#)).

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-14](#)).

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 mis-fire due to failed spark plug, improper air-fuel ratio at accelerator pedal depression and so on.

PROBABLE CAUSE

- Failed ignition system
- Failed intake system
- Failed emission gas cleaning system
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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-14](#)).

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.17-44](#)].

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 spark plug.**Q: Is the check result normal?**

YES : Go to Step 6 .

NO : Replace spark plug.

STEP 6. 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-267](#)).

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 and so on.

PROBABLE CAUSE

- Failed throttle valve control system
- Failed ignition system
- Failed emission control system
- Contamination of throttle body (throttle valve portion)
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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-14](#)).

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.17-44](#)].

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-307](#)).

STEP 5. Check spark plug.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace spark plug.

STEP 6. 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-267](#)).

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 and so on.

PROBABLE CAUSE

- Failed ignition system
- Failed fuel system
- Failed throttle valve control system
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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-14](#)).

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-267](#)).

STEP 4. Check timing marks of timing belt.**Q: Is the check result normal?**

YES : Go to Step 5 .

NO : Align timing marks.

STEP 5. Check spark plug.**Q: Is the check result normal?**

YES : Go to Step 6 .

NO : Replace spark plug.

STEP 6. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-307](#)).

Q: Is the check result normal?

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

NO : Repair.

Inspection Procedure 12: Hesitation, Sag, Poor Acceleration, Stumble, Surge

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition system, improper air-fuel ratio, throttle valve control system, improper compression pressure and so on.

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 control system
- Improper compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13A-317](#)).

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, Code No. P0202: No. 2 injector System, Code No. P0203: No. 3 injector System, Code No. P0204: No. 4 injector System [P.13A-78](#)).

STEP 3. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 13: Intake air temperature sensor
 - b. Item 14: Throttle position sensor (sub)
 - c. Item 21: Engine coolant temperature sensor
 - d. Item 77: Accelerator pedal position sensor (sub)
 - e. Item 78: Accelerator pedal position sensor (main)
 - f. 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-14](#)).

STEP 4: M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 25: Barometric pressure sensor

Q: Are the check results 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.17-42](#)).

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.17-44](#)].

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Replace EGR valve (stepper motor).

STEP 7. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - Item 11: Cylinder 1, 4 oxygen sensor
 - Item 39: Cylinder 2, 3 oxygen sensor

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-14](#)).**STEP 8. Check spark plug.****Q: Is the check result normal?****YES** : Go to Step 9 .**NO** : Replace spark plug.**STEP 9. Check ignition coil spark.****Q: Is the check result normal?****YES** : Go to Step 10 .**NO** : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-267](#)).**STEP 10. Check throttle body (throttle valve portion) for contamination.****Q: Is the check result normal?****YES** : Go to Step 11 .**NO** : Clean throttle body (throttle valve portion) (Refer to [P.13A-307](#)).**STEP 11. Fuel pressure measurement.**

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13A-307](#)).

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

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service – Compression Pressure Check [P.11A-14](#)).

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 control system.

PROBABLE CAUSE

- Failed ignition system
- Failed throttle valve control system
- Contamination of throttle body (throttle valve portion)
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-III diagnosis code****Q: Diagnosis code set?****YES** : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).**NO** : Go to Step 2 .**STEP 2. M.U.T.-III data list**

- Refer to Data List Reference Table [P.13A-284](#).
 - 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-14](#)).**STEP 3. Check throttle body (throttle valve portion) for contamination.****Q: Is the check result normal?****YES** : Go to Step 4 .**NO** : Clean throttle body (throttle valve portion) (Refer to [P.13A-307](#)).

STEP 4. Check spark plug.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Replace spark plug.

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-267](#)).

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 throttle valve control system.

PROBABLE CAUSE

- Failed throttle valve control system
- Contamination of throttle body (throttle valve portion)
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. M.U.T.-III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

NO : Go to Step 2 .

STEP 2. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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: Is the check result normal?

YES : Go to Step 3 .

NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code [P.13A-14](#)).

STEP 3. Check throttle body (throttle valve portion) 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-307](#)).

Inspection Procedure 15: Knocking

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed detonation control, improper thermal value of spark plug and so on.

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. M.U.T.-III diagnosis code**Q: Diagnosis code set?**

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

NO : Go to Step 2 .

STEP 2. Check spark plug.**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Replace spark plug.

STEP 3. Check ignition coil spark.**Q: Is the check result normal?**

YES : Check detonation sensor system (Refer to Code No. P0325 [P.13A-104](#)).

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-267](#)).

Inspection Procedure 16: Ignition Timing Offset

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed crank angle sensor, camshaft position sensor, or timing belt in out of place and so on.

PROBABLE CAUSE

- Failed crank angle sensor
- Failed camshaft position sensor
- Timing belt in out of place
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

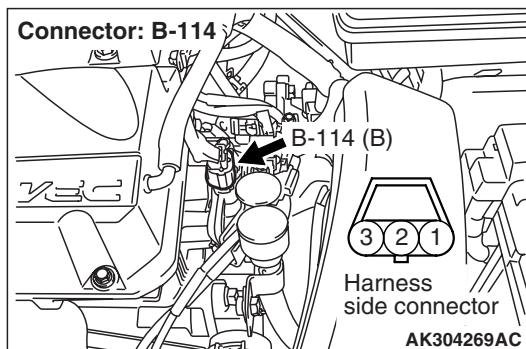
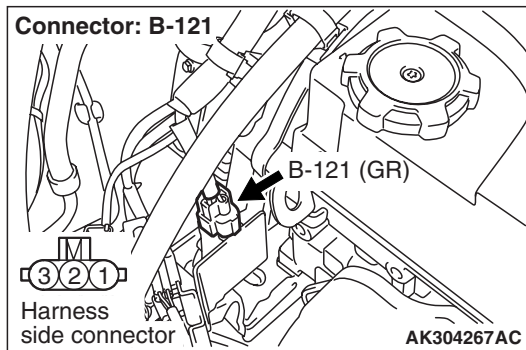
DIAGNOSIS PROCEDURE

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

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

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-300) 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-317](#)).

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, improper compression pressure and so on.

PROBABLE CAUSE

- Failed air-fuel control system
- Failed ignition system
- Failed fuel system
- Failed intake and exhaust system
- Failed emission control system
- Improper compression pressure
- Failed catalytic converter
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13A-317](#)).

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, Code No. P0202: No. 2 injector system, Code No. P0203: No. 3 injector system, Code No. P0204: No. 4 injector system [P.13A-78](#)).

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-220](#)).

STEP 4. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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 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-14](#)).

STEP 5: M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - 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-307](#)).

STEP 9. M.U.T.-III data list

- Refer to Data list reference table [P.13A-284](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor
 - b. Item 39: Cylinder 2, 3 oxygen sensor

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-14](#)).

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.17-42](#)).

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.17-44](#)].

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-307](#)).

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.17-40](#)).

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

YES : Go to Step 16 .

NO : Check ignition circuit system (Refer to Inspection Procedure 26 [P.13A-267](#)).

STEP 16. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A – On-vehicle Service – Compression Pressure Check [P.11A-14](#)).

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-317](#)).

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**

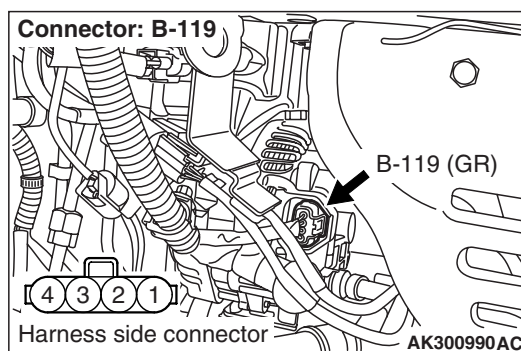
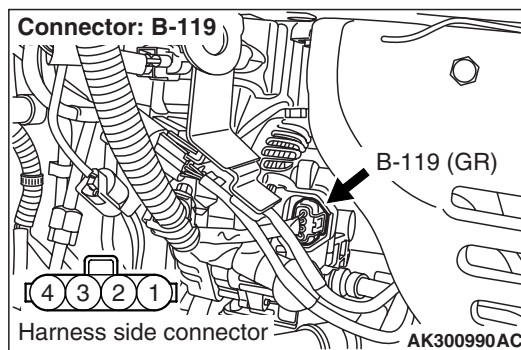
- Failure is possibly caused by failed alternator, generation control circuit and so on.

PROBABLE CAUSE

- Failed battery
- Short-circuited in alternator G terminal
- Failed alternator
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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

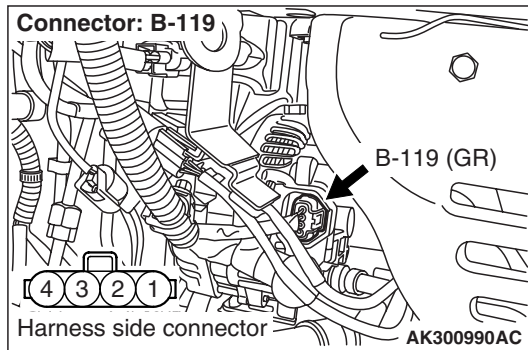
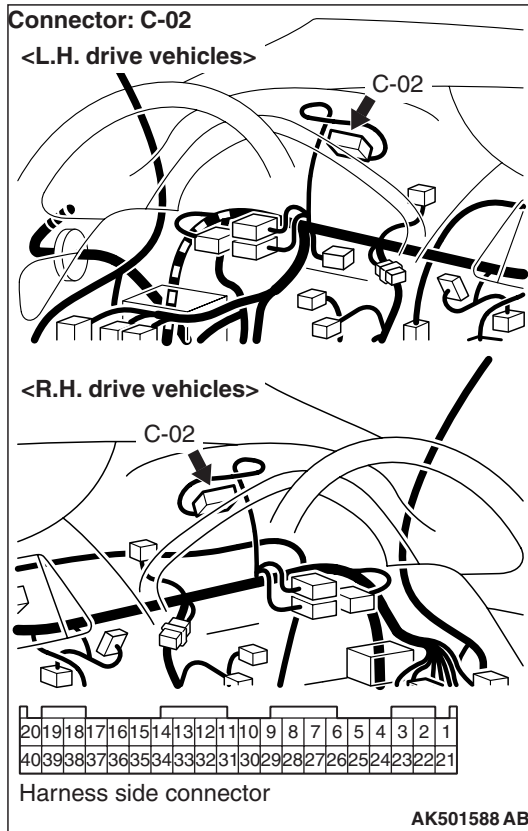
- Measure battery voltage at cranking.

OK: 8 V or 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-02 combination meter connector



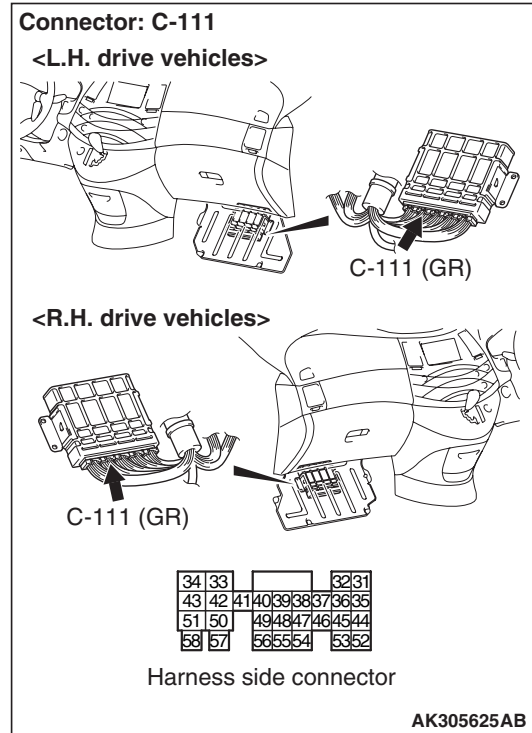
Q: Is the check result normal?

YES : Check intermediate connectors A-19 and C-125, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-119 (terminal No. 3) alternator connector and C-02 (terminal No. 35) combination meter 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

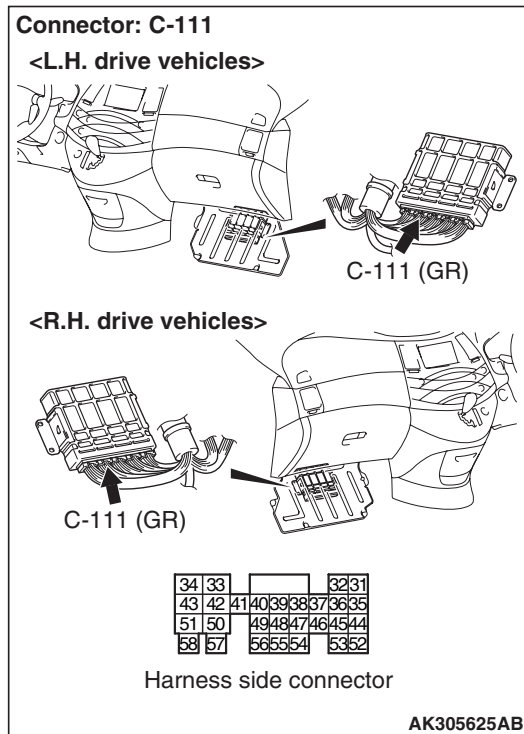


Q: Is the check result normal?

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.

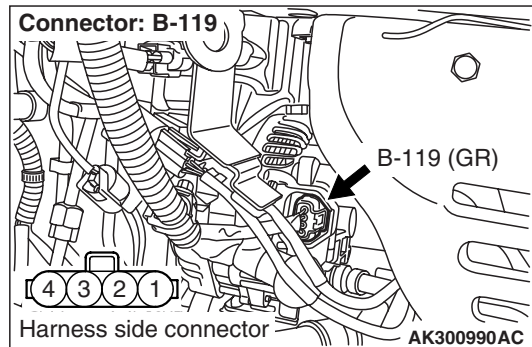
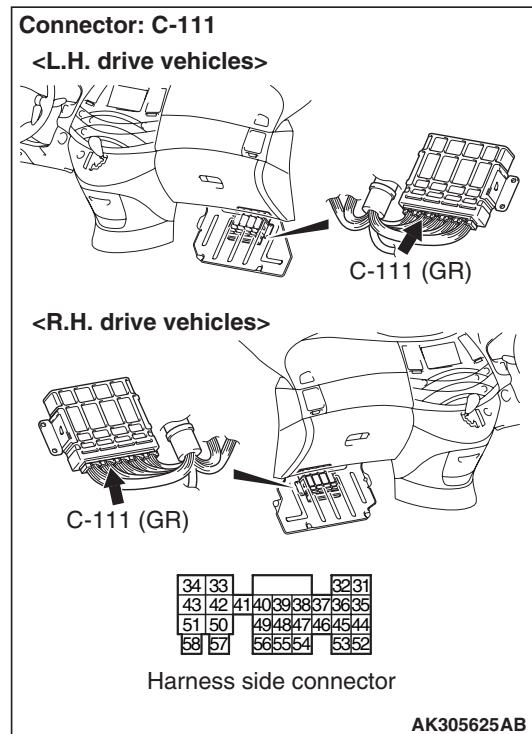
OK: System voltage

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.



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

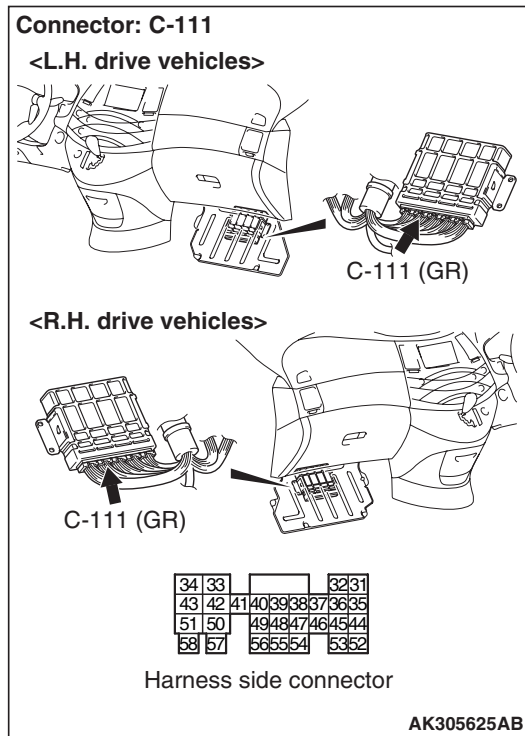
- Check output line for open/short circuit.

Q: Is the check result normal?

YES : 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, fan controller, failed engine coolant temperature sensor and so on.

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. M.U.T.-III diagnosis code**Q: Diagnosis code set?**

YES : Inspection chart for diagnosis code (Refer to [P.13A-14](#)).

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.14-18](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace or add engine coolant.

STEP 3. M.U.T.-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-252](#)).

STEP 4. M.U.T.-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-35](#)).

STEP 5. Check thermostat.

- Check thermostat (Refer to GROUP 14 – Thermostat – Thermostat Inspection [P.14-22](#)).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace thermostat.

STEP 6. Check water pump.

- Check water pump.

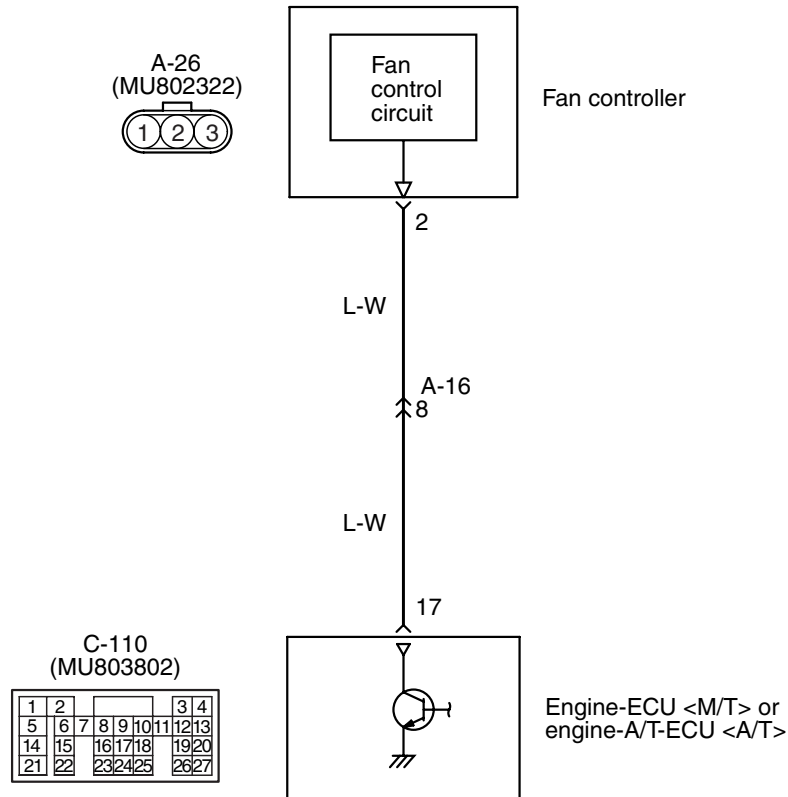
Q: Is the check result normal?

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).

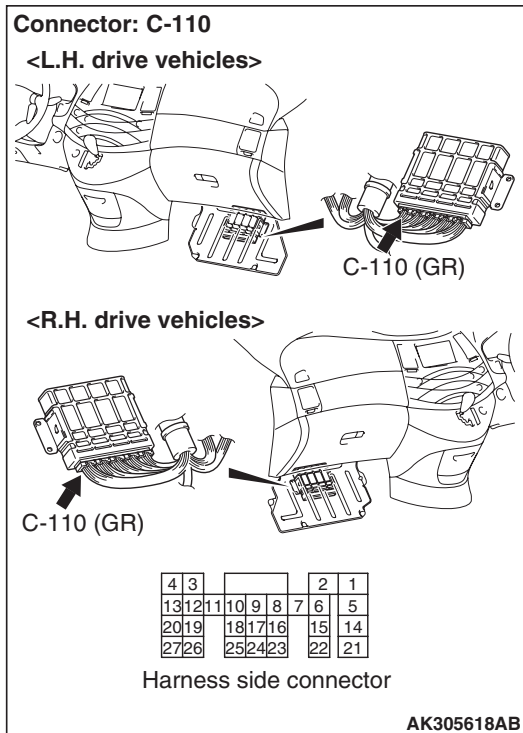
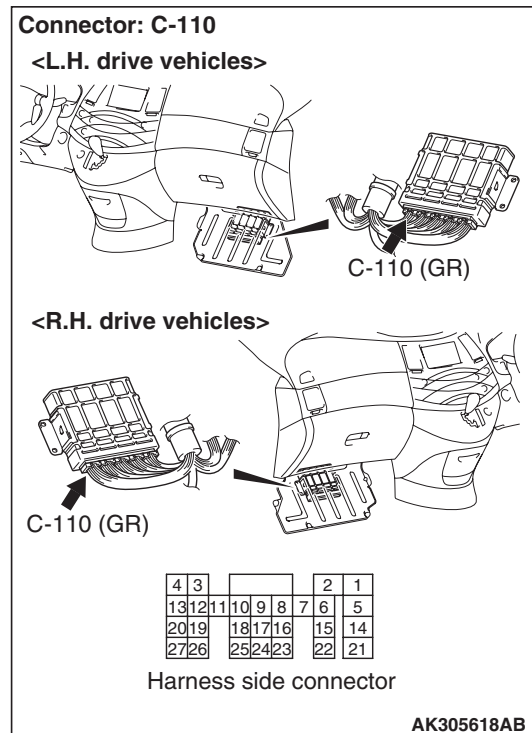
FUNCTION

- 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>

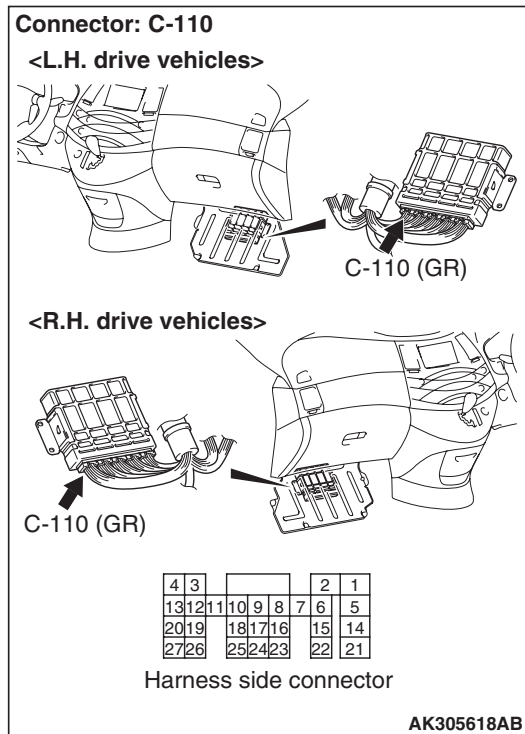
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-110 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**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 or engine-AT-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 17 and earth.

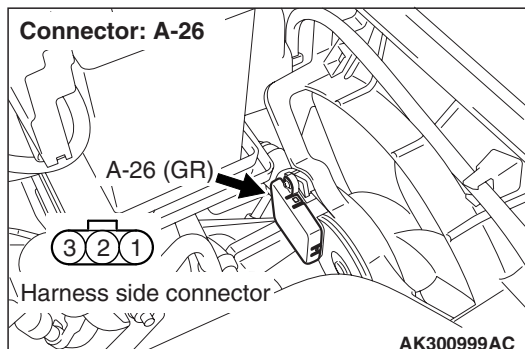
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Replace fan controller.

NO : Go to Step 5 .

STEP 5. Connector check: A-26 fan controller connector

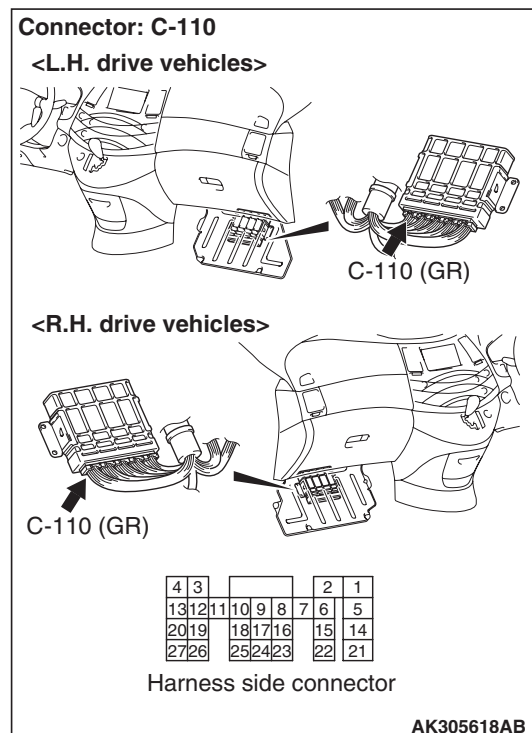
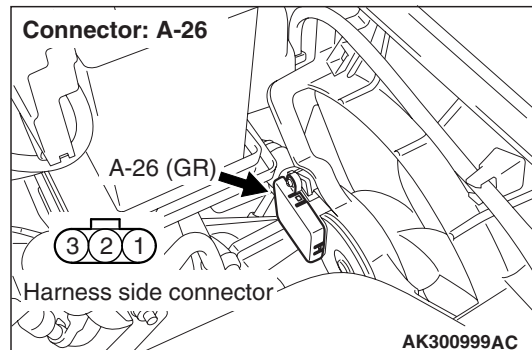


Q: Is the check result normal?

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



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

- Check output line for open circuit.

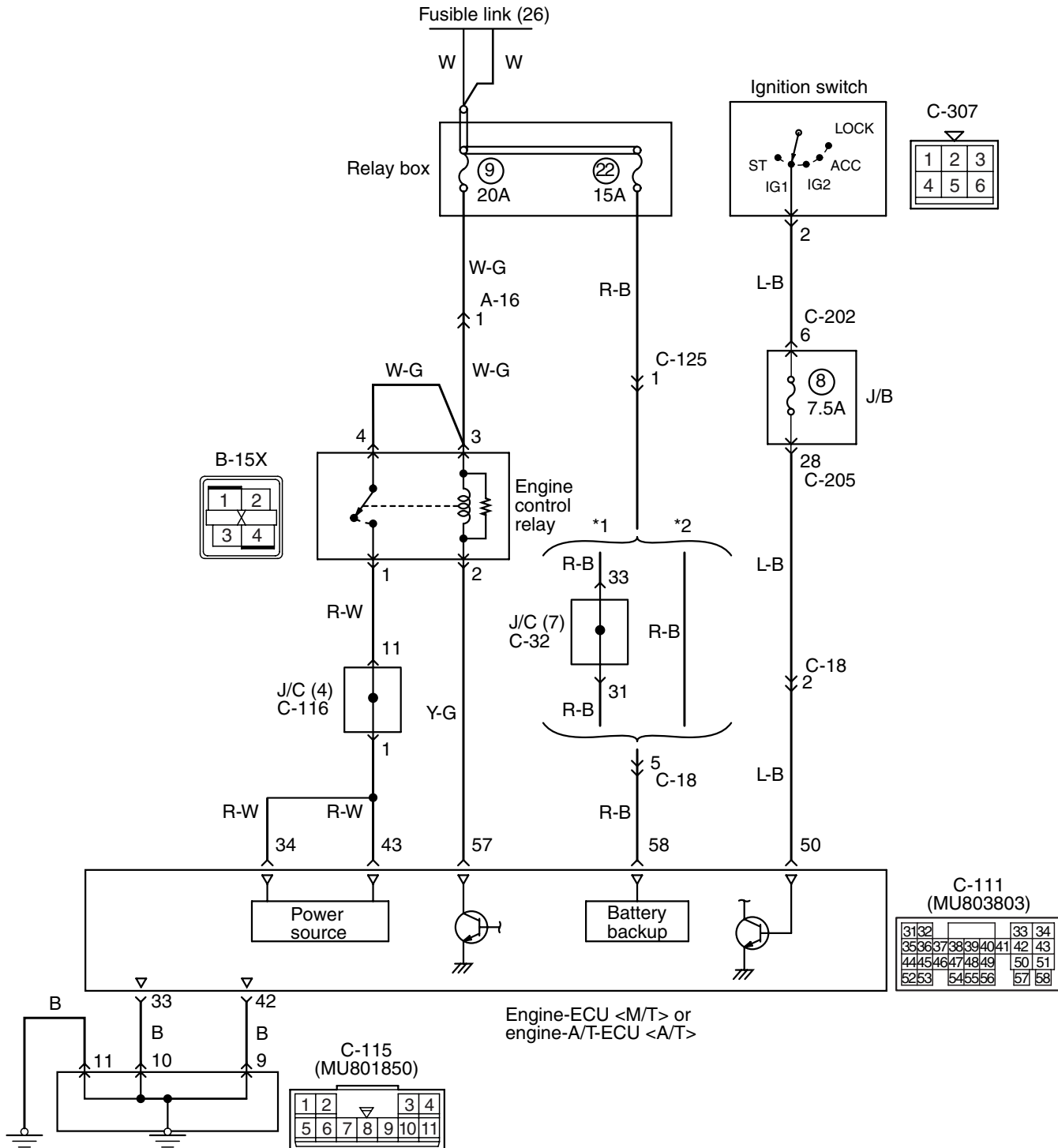
Q: Is the check result normal?

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



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 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
- Failed battery
- Failed ignition switch
- Open/short circuit in engine control relay circuit or loose connector contact
- Open/short circuit in ignition switch-IG1 circuit or loose connector contact
- Open circuit in engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 at cranking.

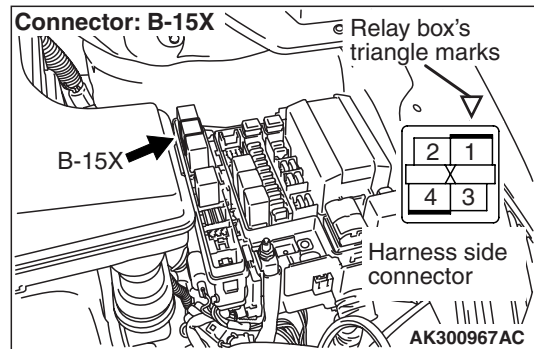
OK: 8 V or more

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 itself.

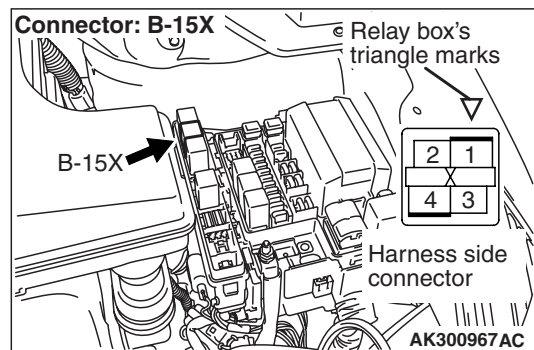
- Check engine control relay itself (Refer to P.13A-313).

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

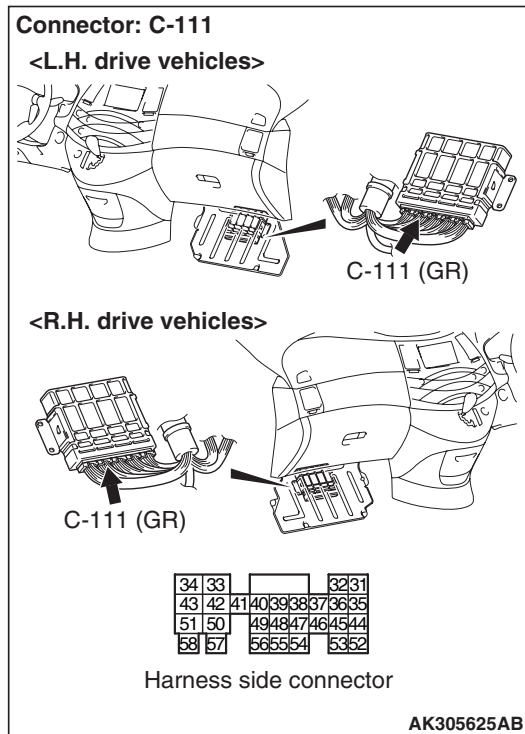
Q: Is the check result normal?

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. Connector check: C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

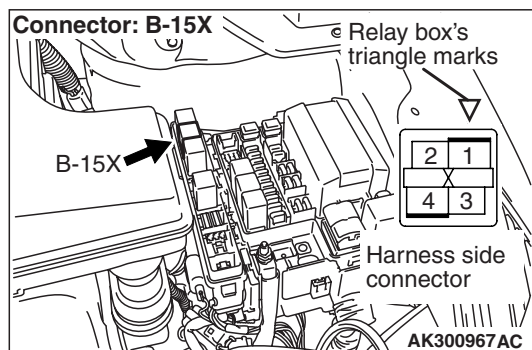
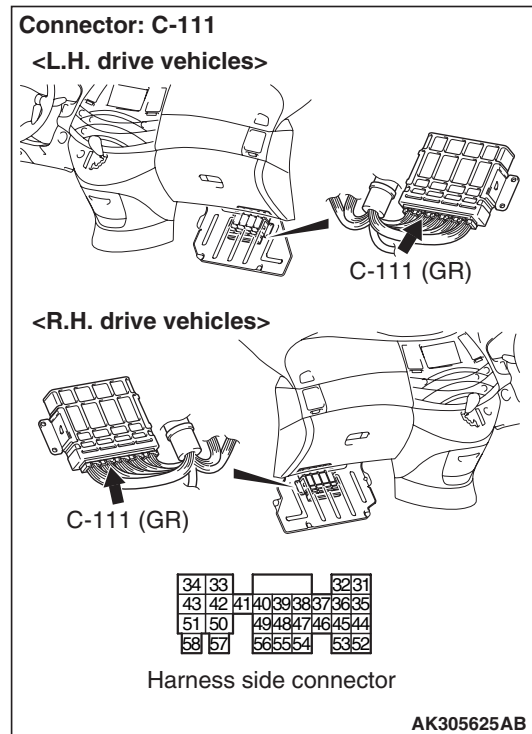


Q: Is the check result normal?

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.



- 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

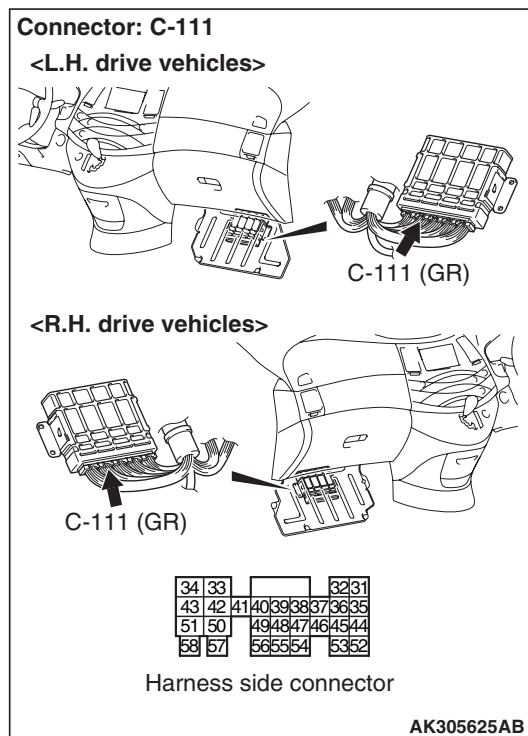
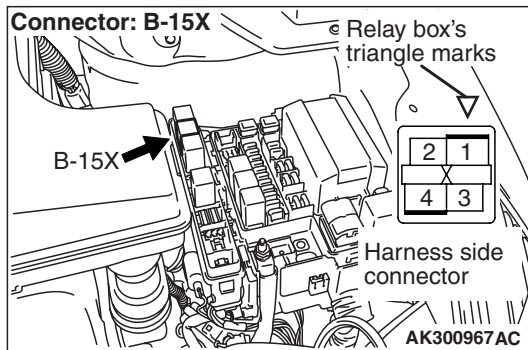
Q: Is the check result normal?

YES : Check and repair 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.

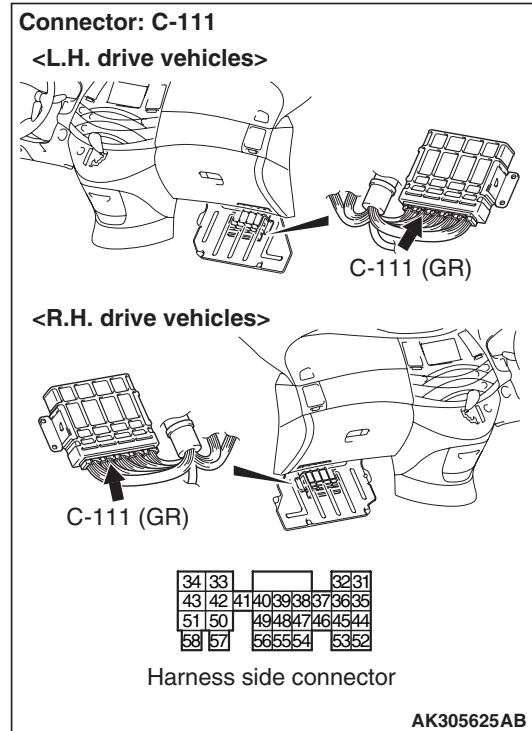
- Check earthing line for short circuit.

NO : Go to Step 7 .

STEP 7. Check harness between B-15X (terminal No. 1) engine control relay connector and C-111 (terminal No. 34 and No.43) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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.
- Ignition switch: ON
- Voltage between terminal No. 50 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 9 .

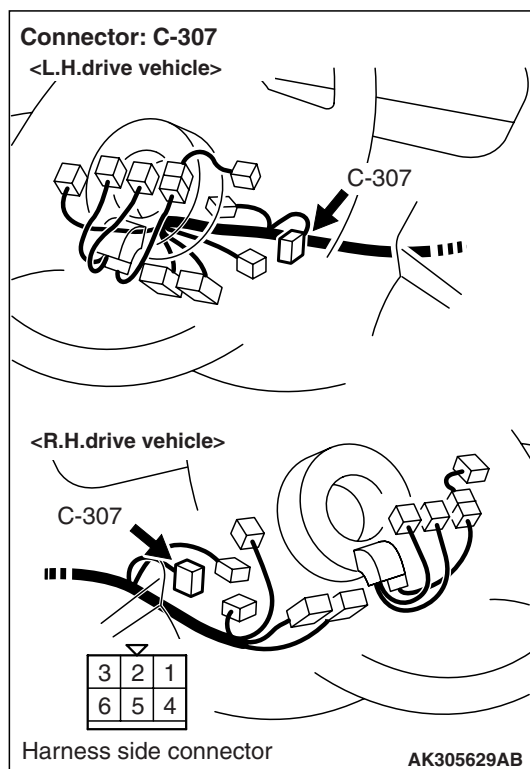
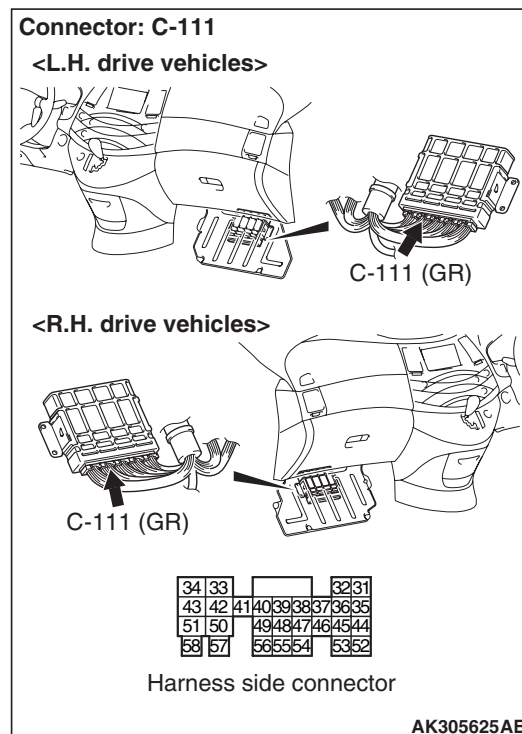
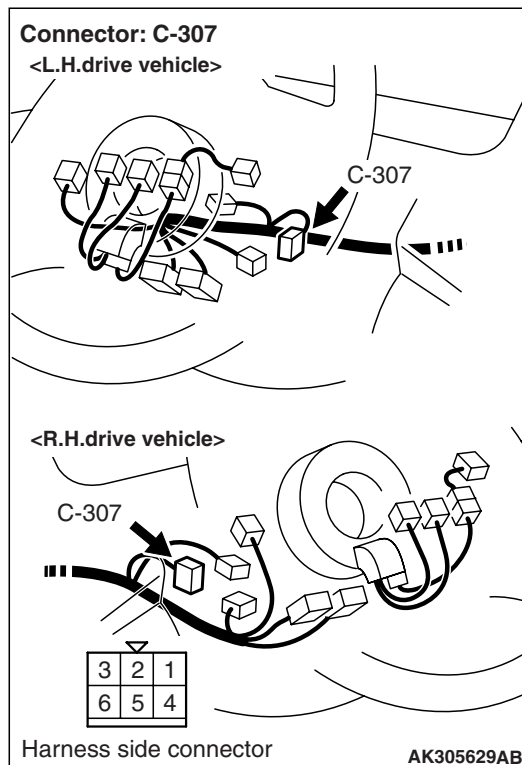
NOTE: Before checking harness, check intermediate connector C-116, and repair if necessary.

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

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 9. Connector check: C-307 ignition switch connector**Q: Is the check result normal?****YES :** Go to Step 10 .**NO :** Repair or replace.**STEP 10. Check ignition switch itself.**

- Check ignition switch itself (Refer to GROUP 54A – Ignition Switch – Ignition Switch – Inspection P.54A-49).

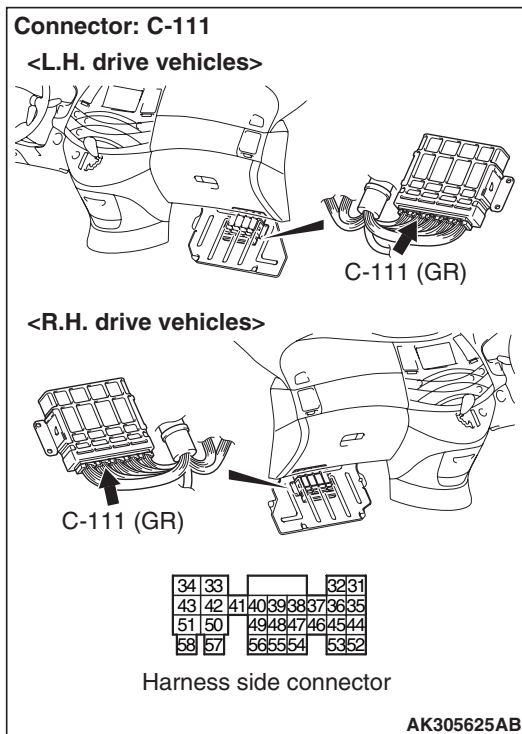
Q: Is the check result normal?

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.

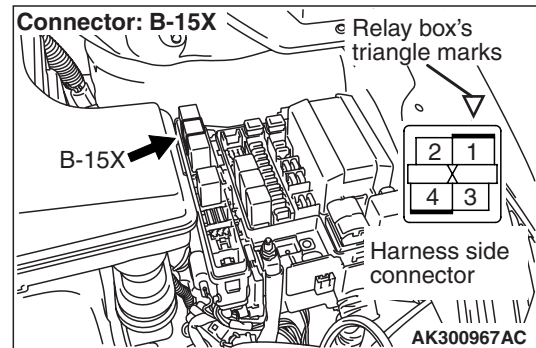
- Check output line for open/short circuit and damage.

NO : Replace ignition switch.

STEP 11. Check 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.



STEP 12. Check harness between B-15X (terminal No. 3 and No. 4) engine control relay connector and battery.



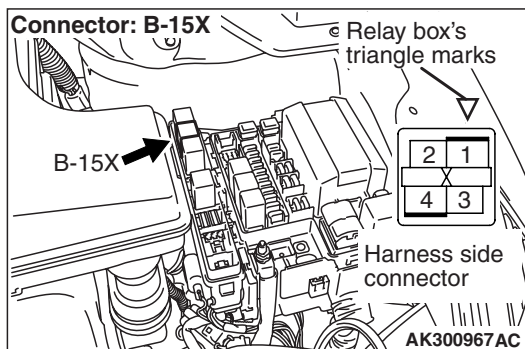
NOTE: Before checking harness, check intermediate connector A-16, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 12 .

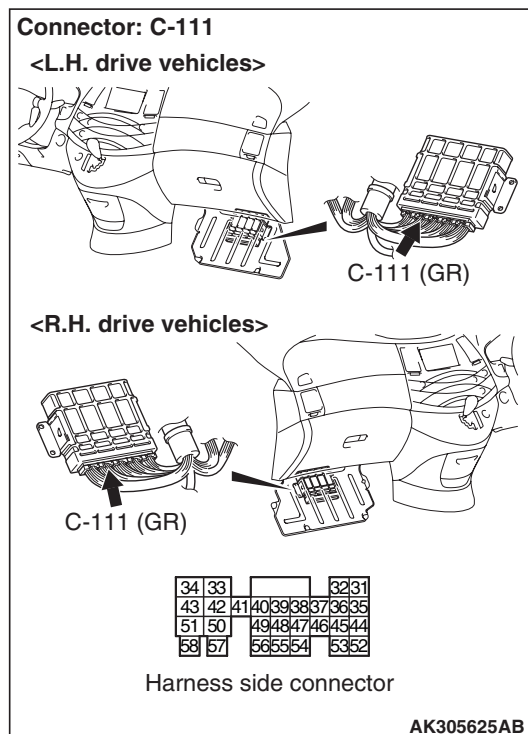
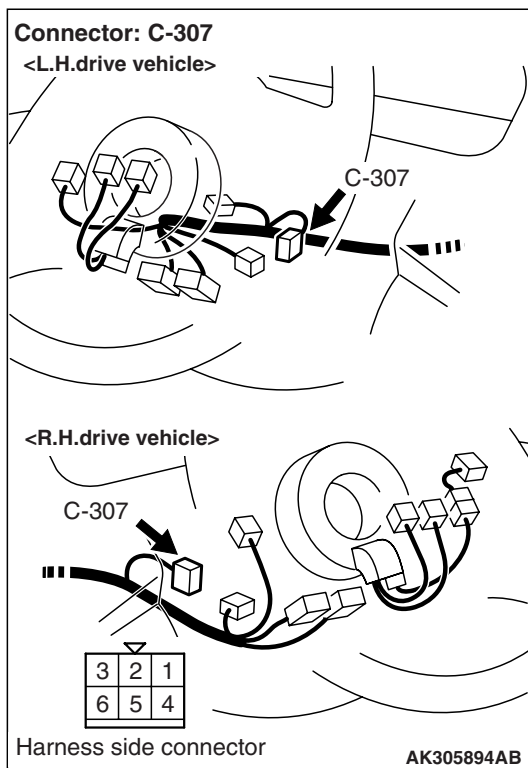
NO : Repair.

STEP 13. 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 14 .

NO : Repair.



NOTE: Before checking harness, check intermediate connectors C-18, C-205 and C-202 and repair if necessary.

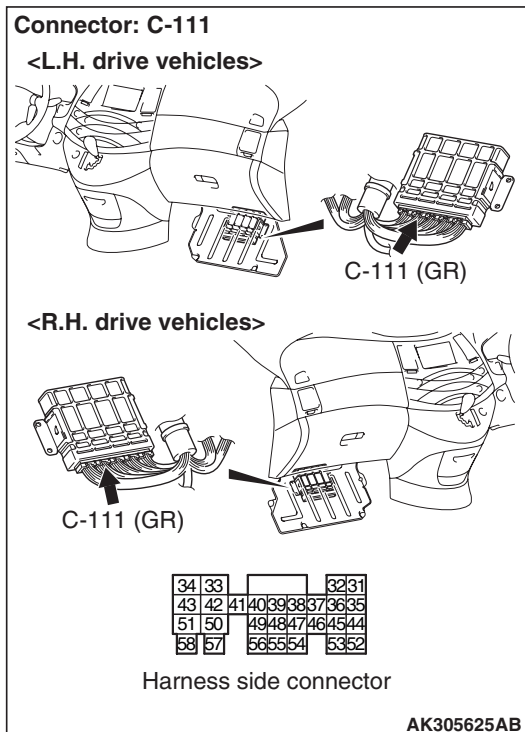
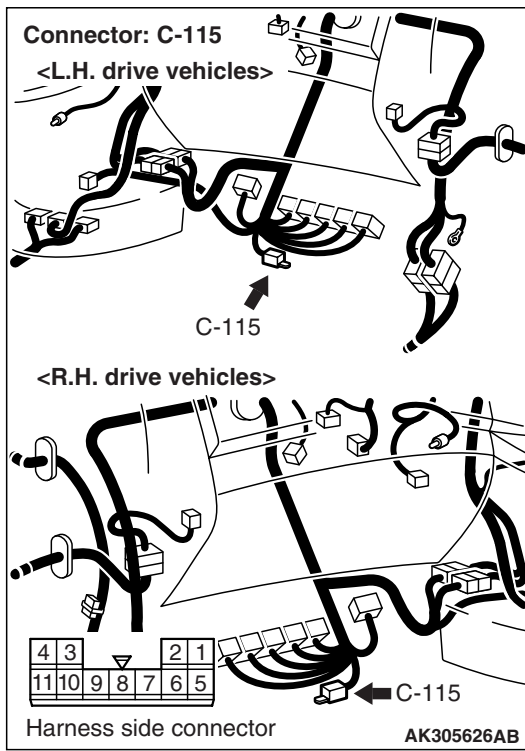
- Check output line for damage.

STEP 14. Check harness between C-111 (terminal No. 33 and No. 42) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and body earth.

Q: Is the check result normal?

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

NO : Repair.

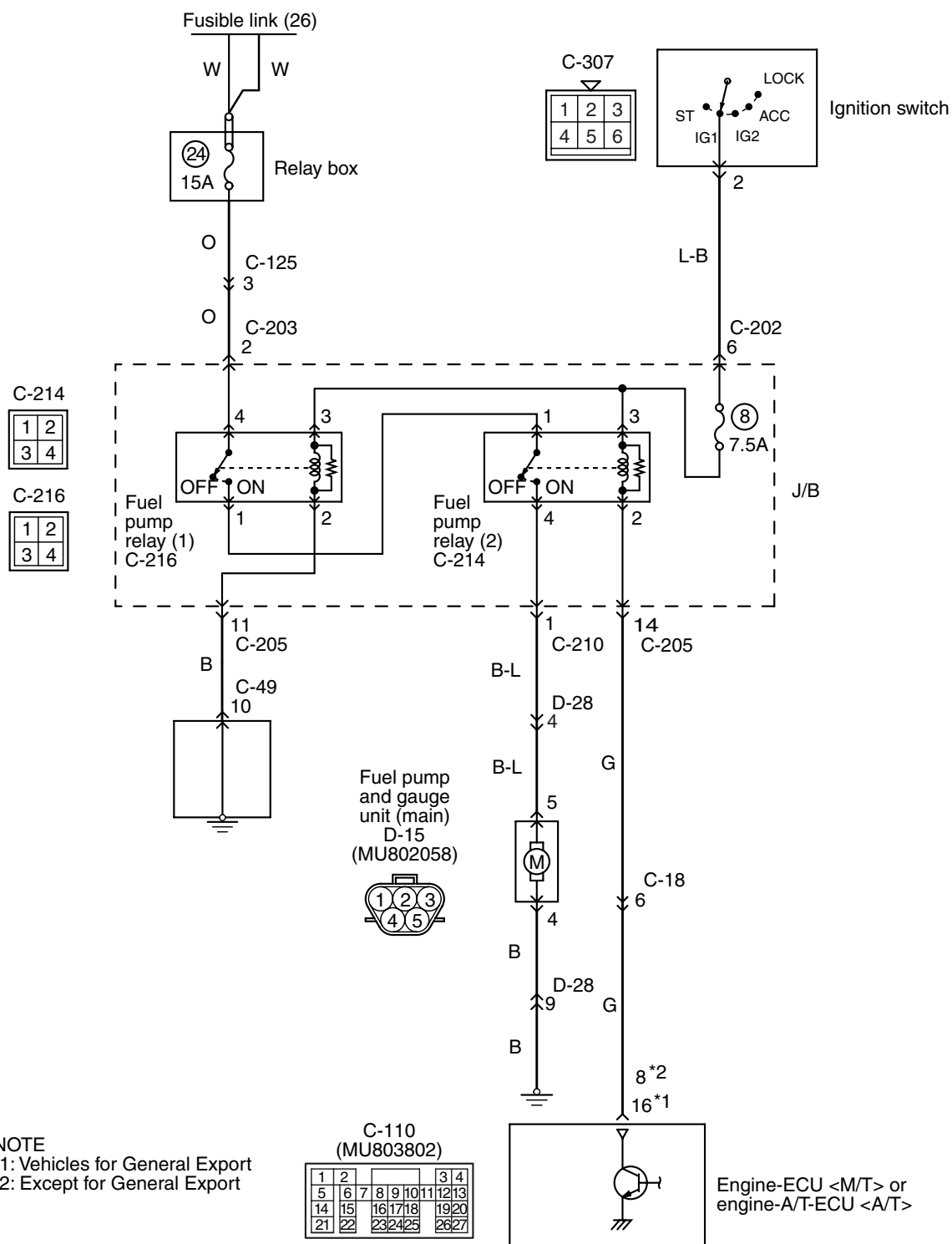


NOTE: Before checking harness, check intermediate connector C-115, and repair if necessary.

- Check earthing line for damage.

Inspection Procedure 23: Fuel Pump System

Fuel pump and gauge unit (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

OPERATION

NOTE:

*1: Except for General Export

*2: Vehicles for General Export

- 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. 8^{*1} or No. 16^{*2}) 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>

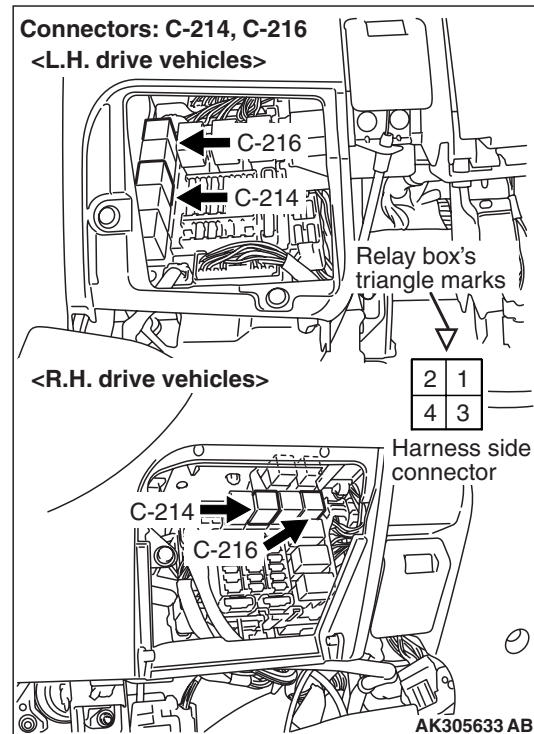
DIAGNOSIS PROCEDURE

NOTE:

*1: Except for General Export

*2: Vehicles for General Export

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.

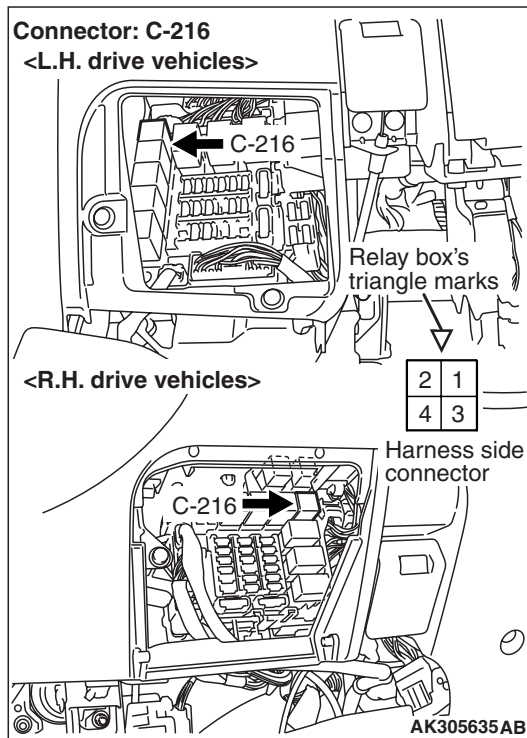
STEP 2. Check fuel pump relay.

- Fuel pump relay, continuity check (Refer to [P.13A-314](#)).

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.

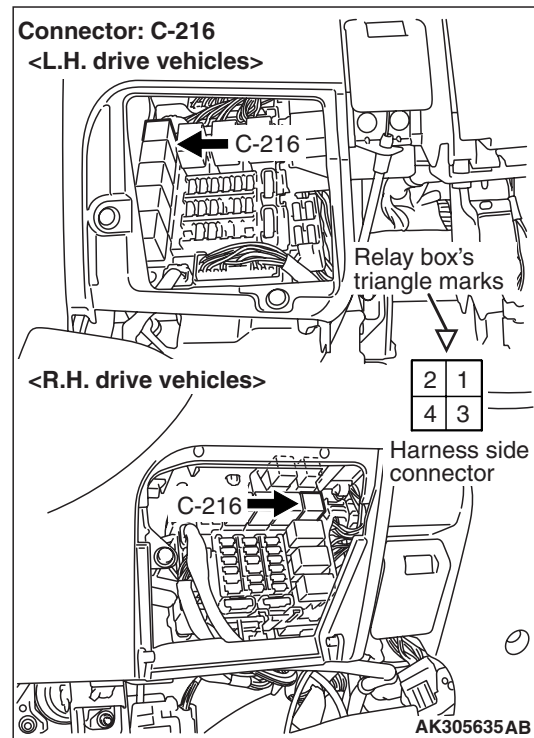
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check intermediate connectors C-49 and C-205, and repair if necessary. If intermediate connector are normal, check and repair harness between C-216 (terminal No. 2) fuel pump relay (1) connector and C-49 (terminal No. 10) earth connector.

- 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.

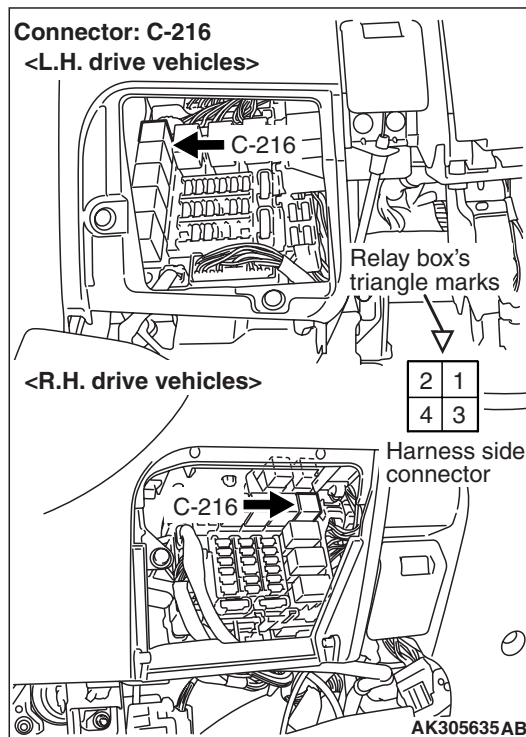
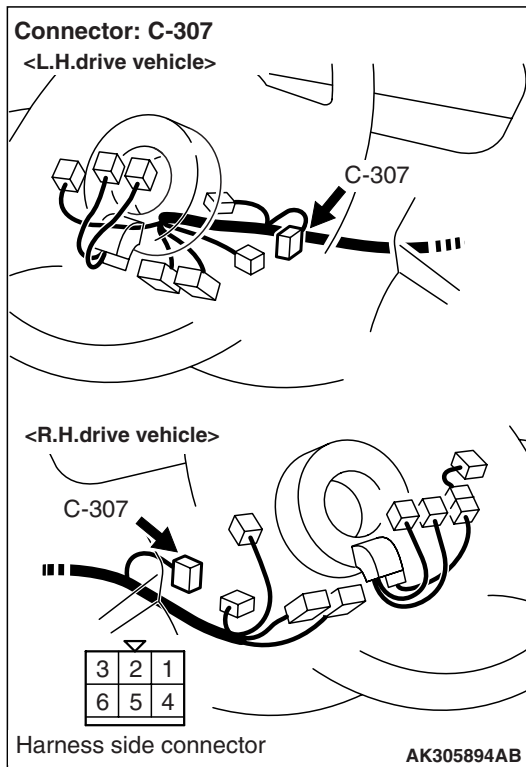
OK: System voltage

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



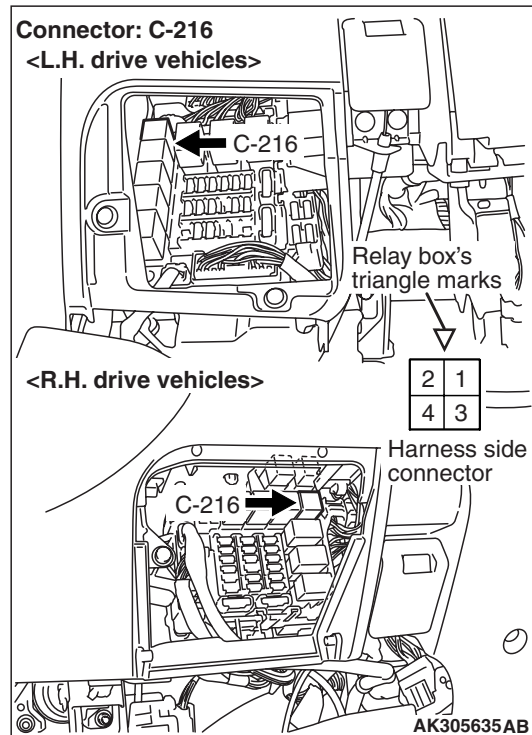
Q: Is the check result normal?

YES : Check intermediate connector C-202, and repair if necessary. If intermediate connector is normal, check and repair harness between C-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.

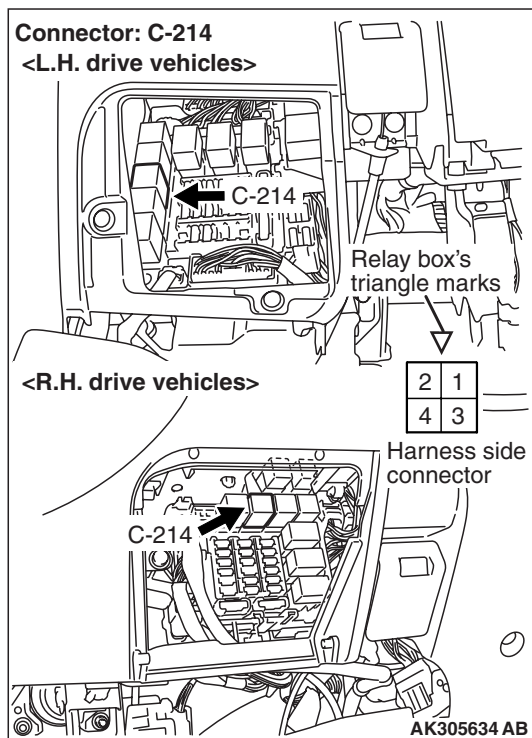
OK: System voltage

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.

STEP 7. Perform voltage measurement at C-214 fuel pump relay (2) connector.

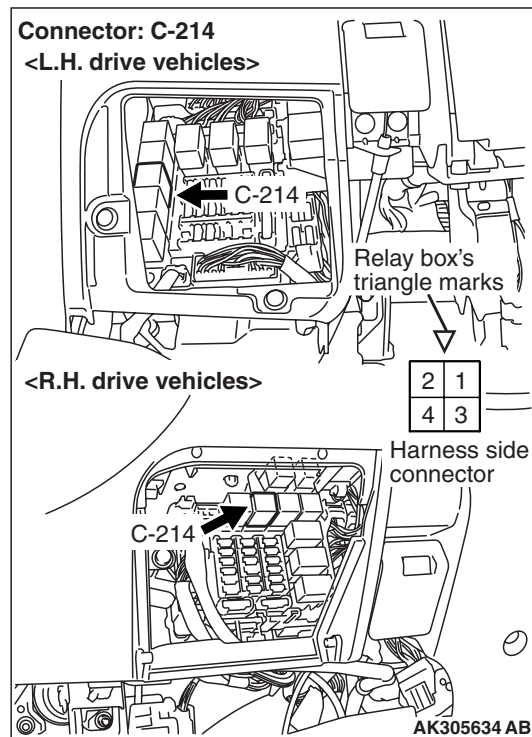
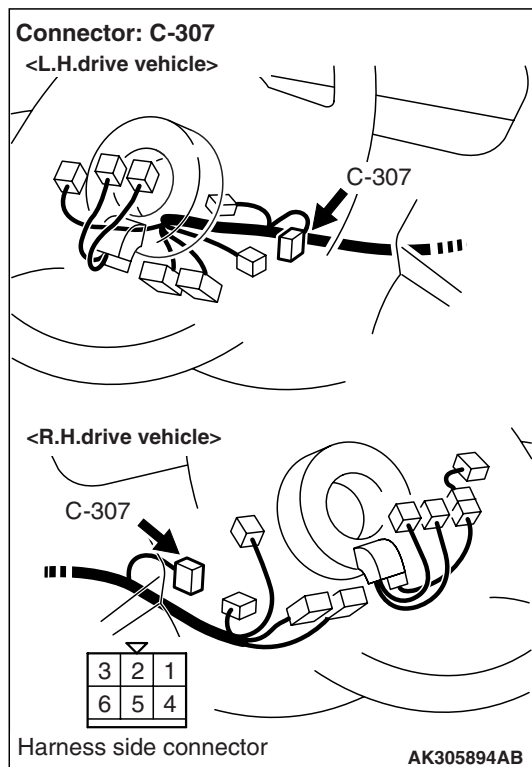
- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

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

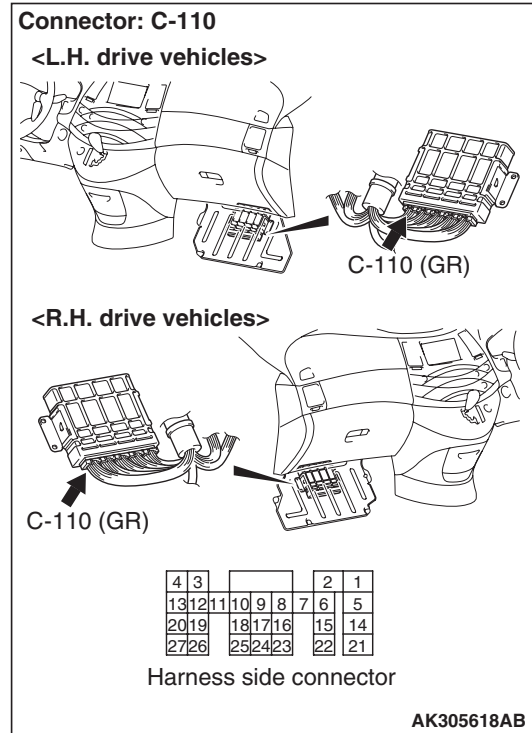
Q: Is the check result normal?

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**

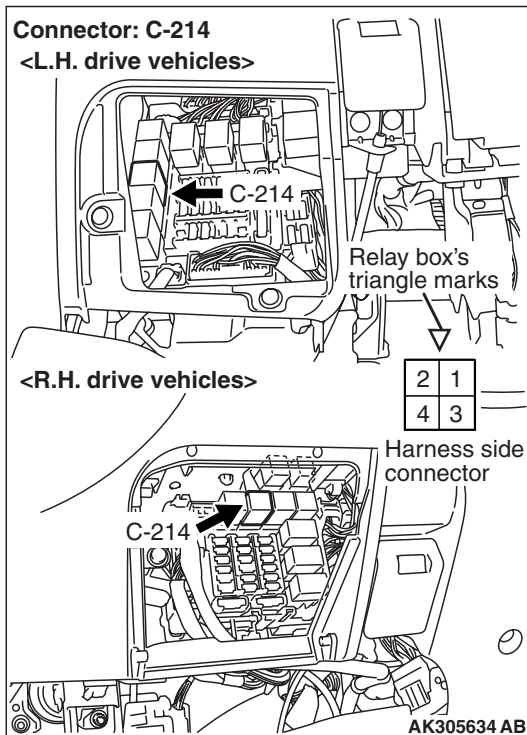
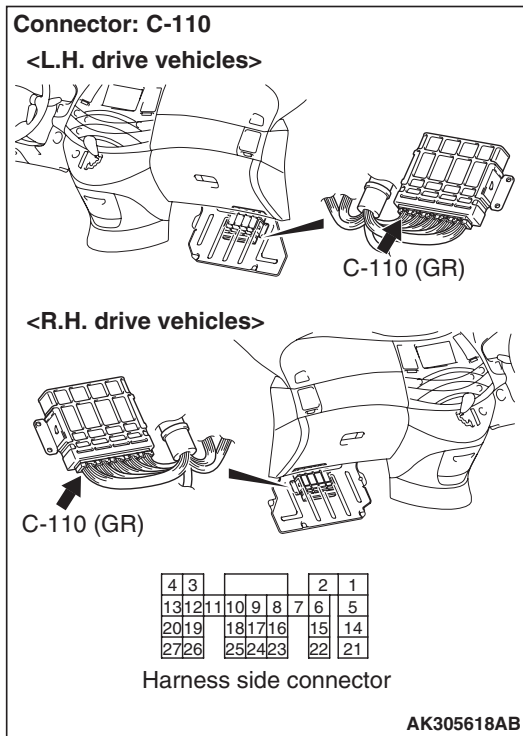


Q: Is the check result normal?

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. 8^{*1} or No. 16^{*2} and earth.

OK: System voltage

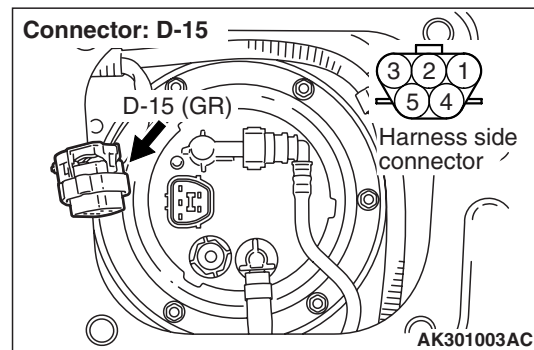
Q: Is the check result normal?

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. 8^{*1} or No. 16^{*2}) 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

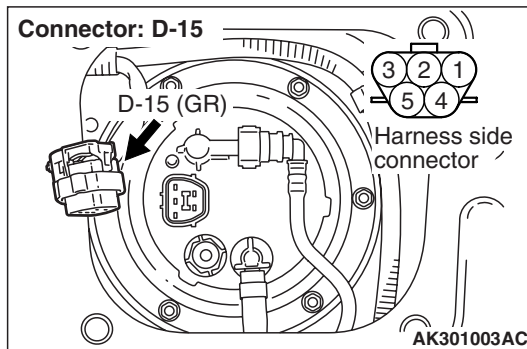


Q: Is the check result normal?

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. 8*¹ or No. 16*²) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and earth.
- Voltage between terminal No. 5 and earth.

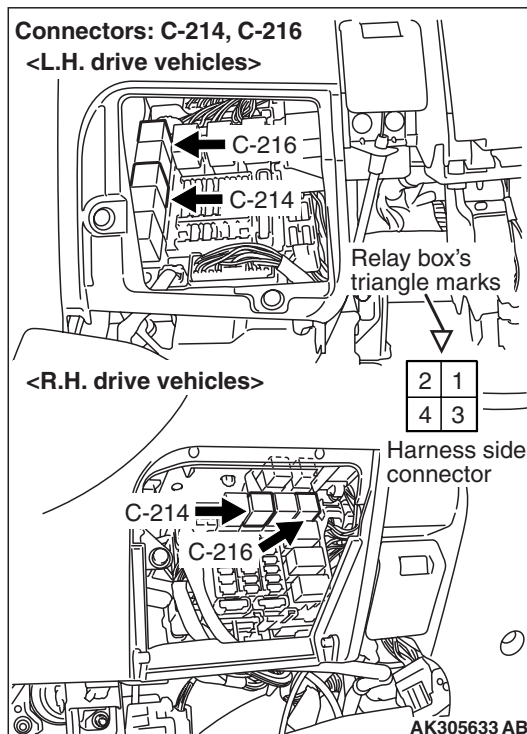
OK: System voltage

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.



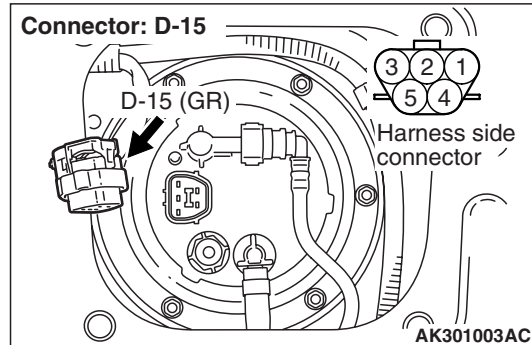
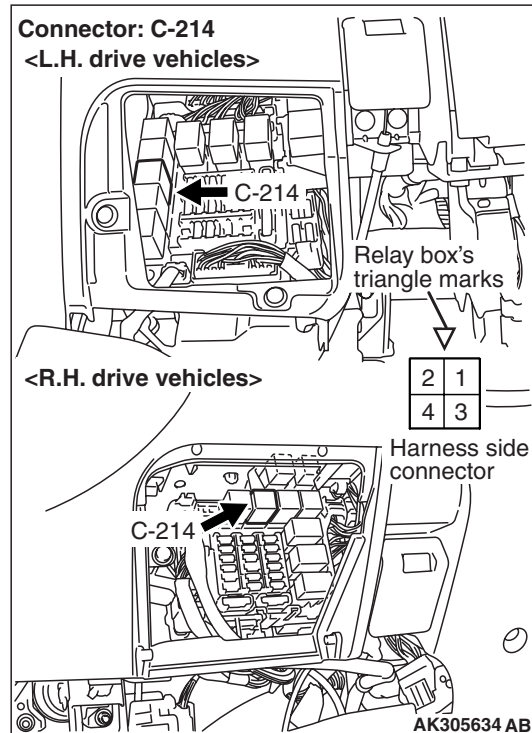
- Check power supply line for open/short circuit.

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.



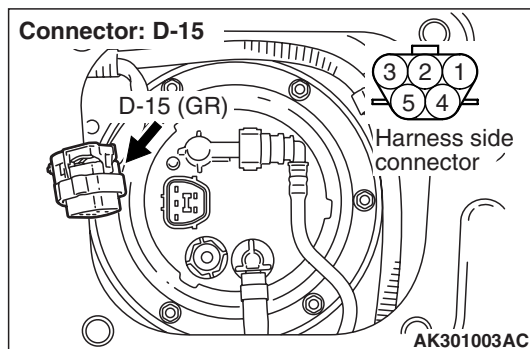
NOTE: Before checking harness, check intermediate connectors D-210 and D-28, and repair if necessary.

- Check power supply 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.

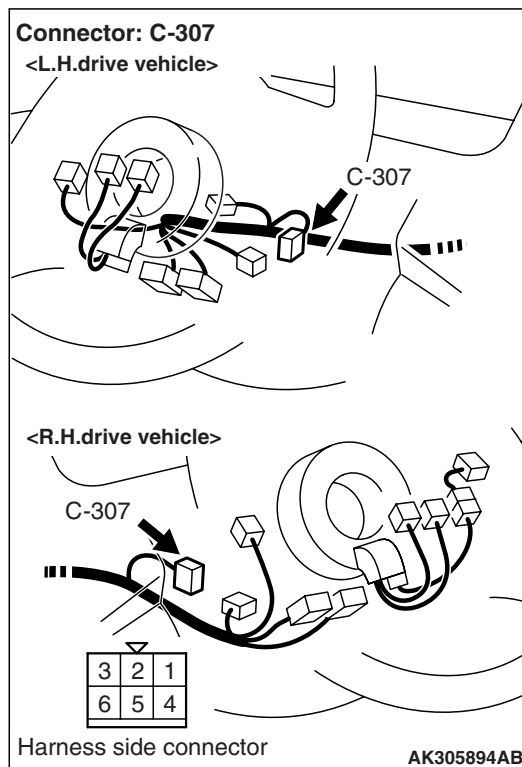
OK: 2 Ω or less

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.

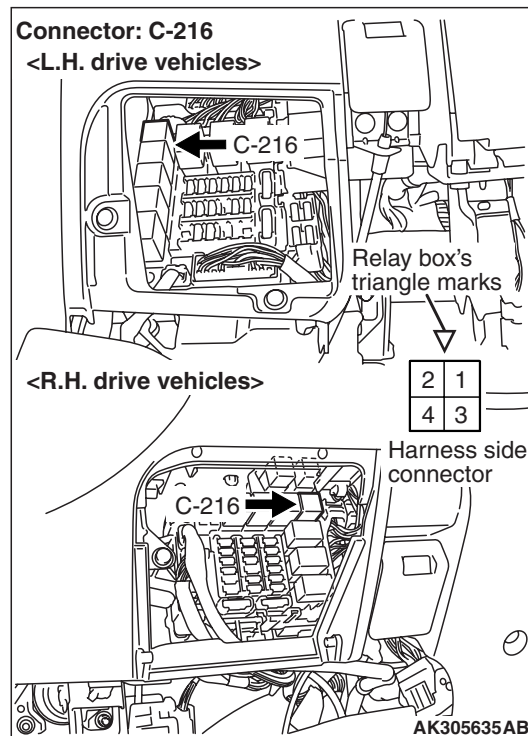
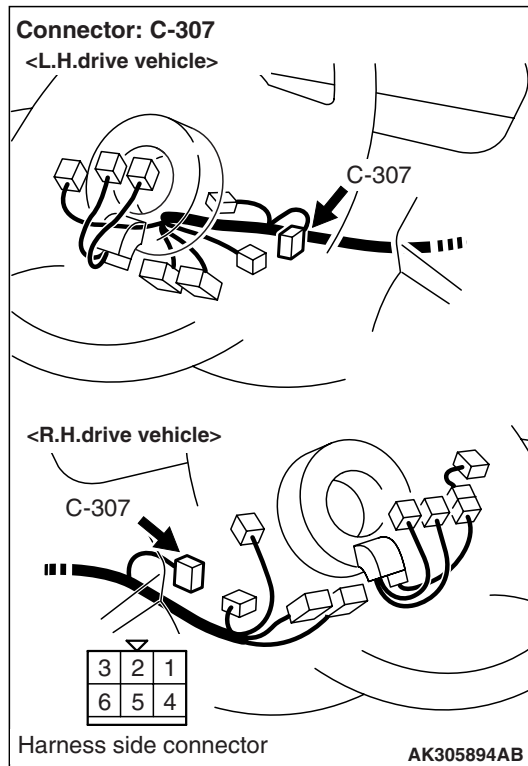
STEP 16. Connector check: C-307 ignition switch connector

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.

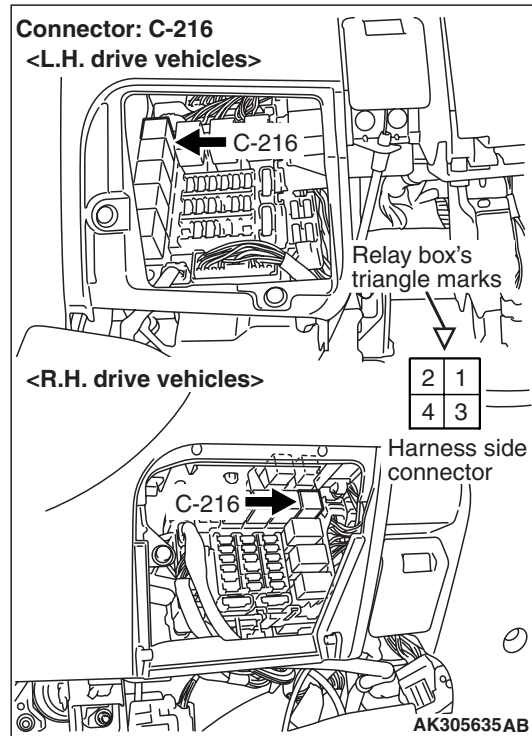
- Check power supply line for damage.

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.

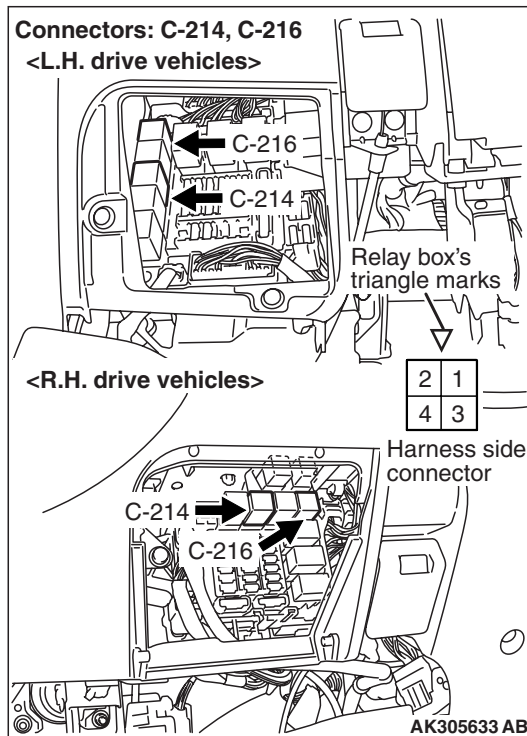
- Check power supply line for damage.

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.



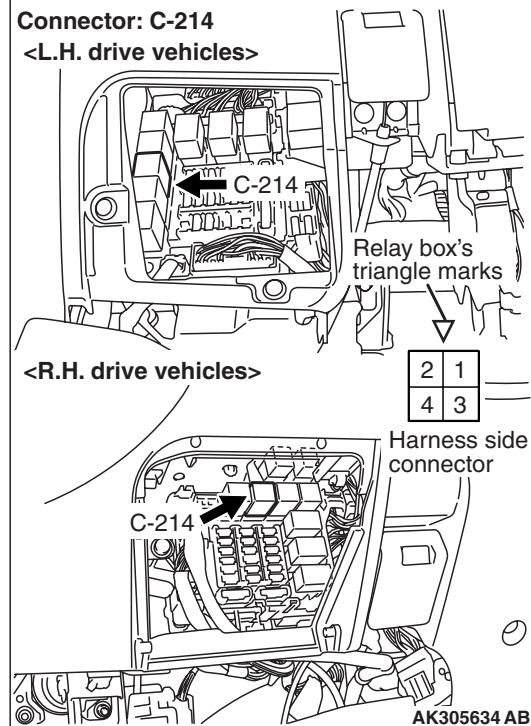
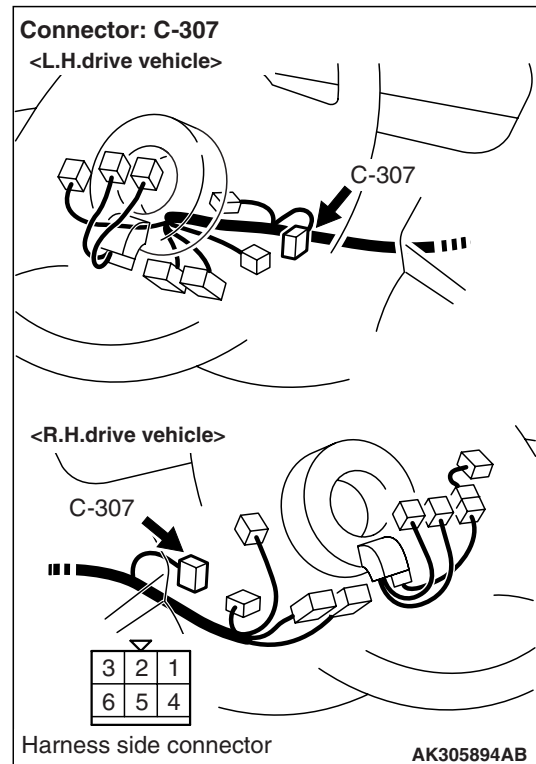
- Check power supply line for damage.

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.



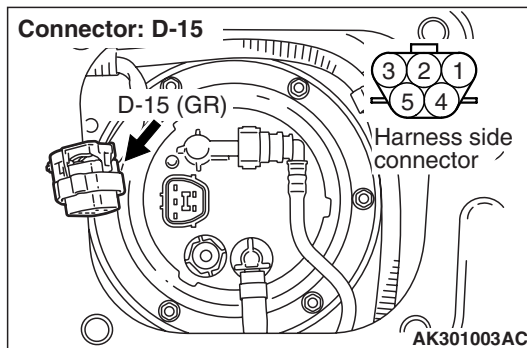
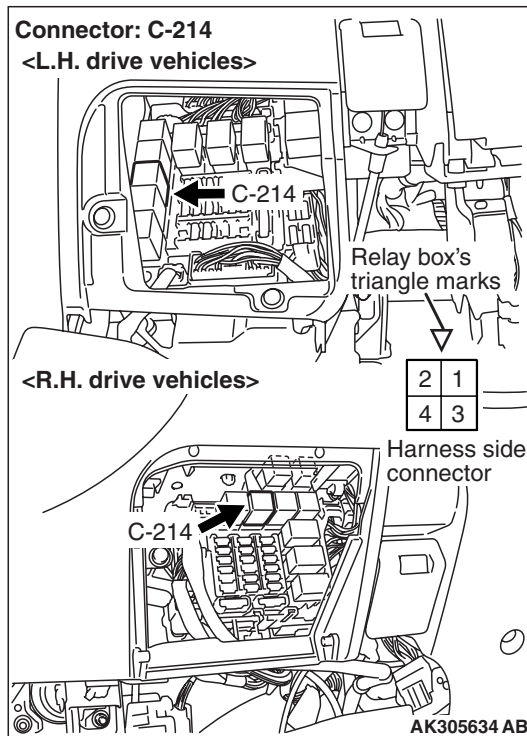
- Check power supply line for damage.

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.

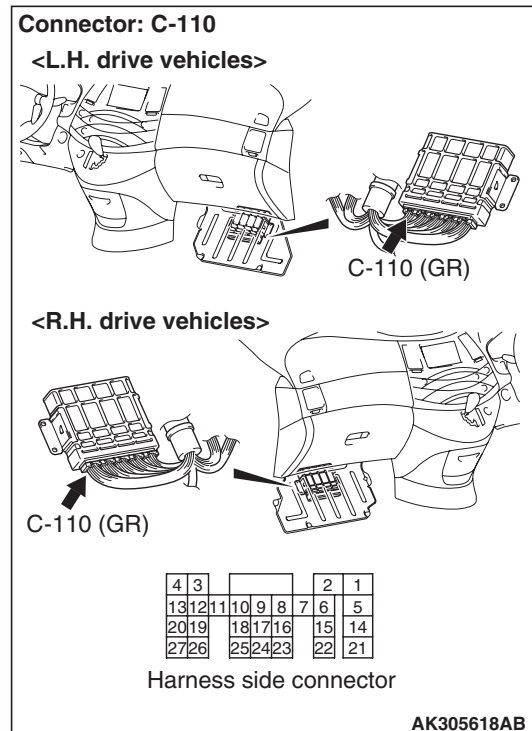
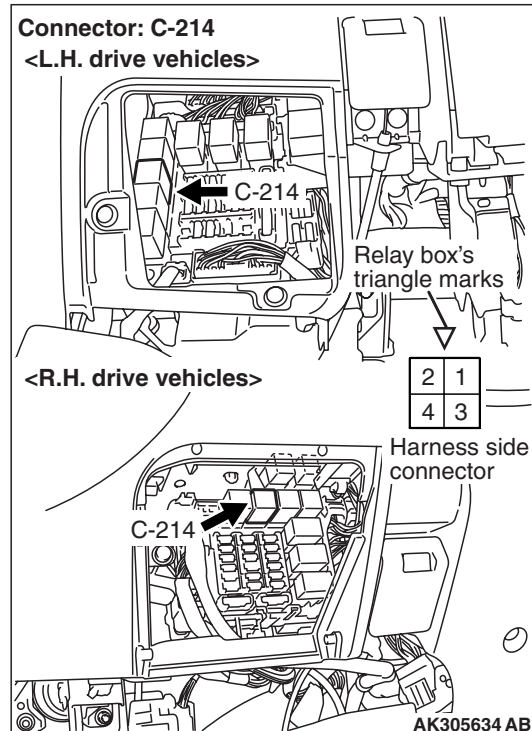
- Check power supply line for damage.

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. 8^{*1} or No. 16^{*2}) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connectors C-18 and C-205, and repair if necessary.

- Check earthing line for damage.

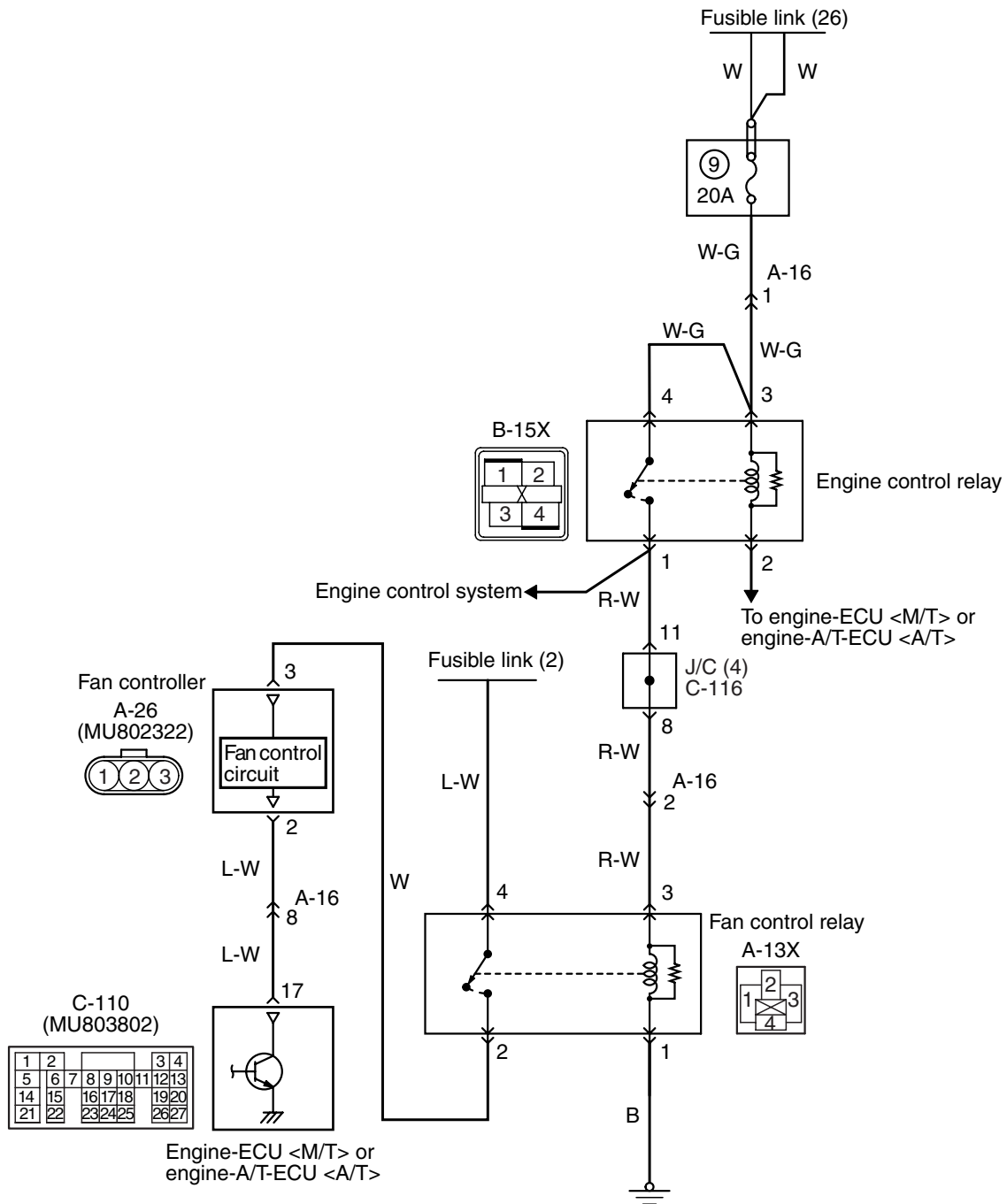
Q: Is the check result normal?

YES : Replace fuel pump.

NO : Repair.

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

OPERATION

- The battery voltage is applied to the fan control relay (terminal No. 3) from the engine control relay (terminal No. 1) and is earthed to the vehicle body from the fan control relay (terminal No. 1).
- The battery voltage is applied to the fan control relay (terminal No. 4).
- When the fan control relay is in "ON" position, the battery voltage is supplied to the fan controller (terminal No. 3) from the fan control relay (terminal No. 2).

FUNCTION

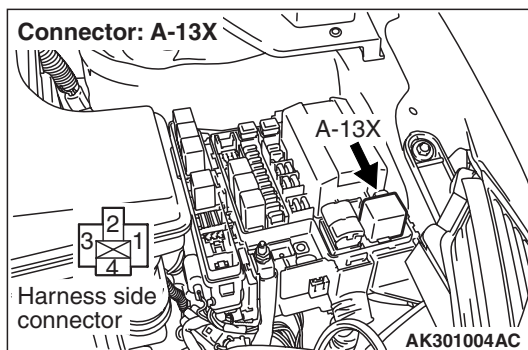
- When the engine control relay is in "ON" position, the fan control relay is also simultaneously placed in "ON" position. Accordingly, the battery voltage is supplied to the fan controller.

PROBABLE CAUSE

- Failed fan control relay
- Failed fan controller
- Failed radiator fan motor
- Failed condenser fan motor
- Open/short circuit in fan control relay circuit or loose connector contact
- Failed engine-ECU <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.

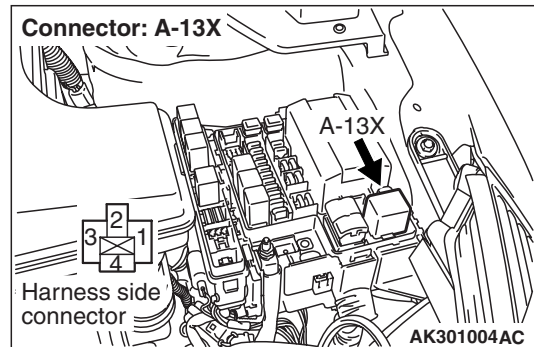
- Check fan control relay (Refer to GROUP 14 – On-vehicle Service – Fan Control Relay Continuity Check [P.14-20](#)).

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

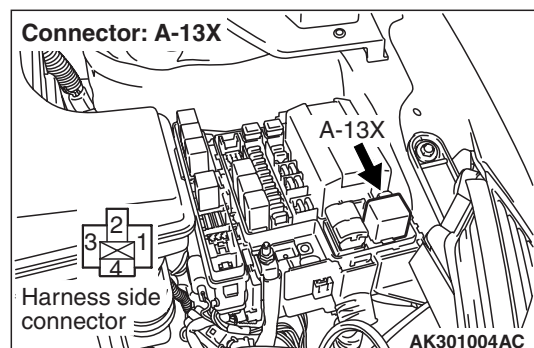
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check and repair harness between A-13X (terminal No. 1) fan control relay connector and body earth.

- Check earthing line for open circuit and damage.

STEP 4. Perform voltage measurement at A-13X fan control relay connector.



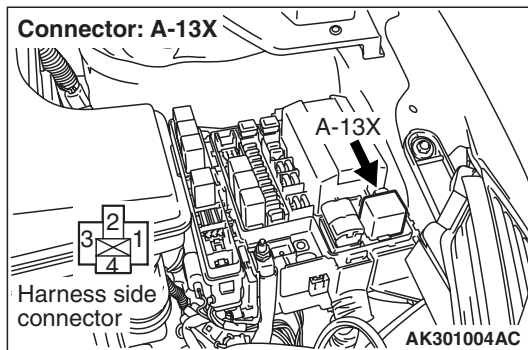
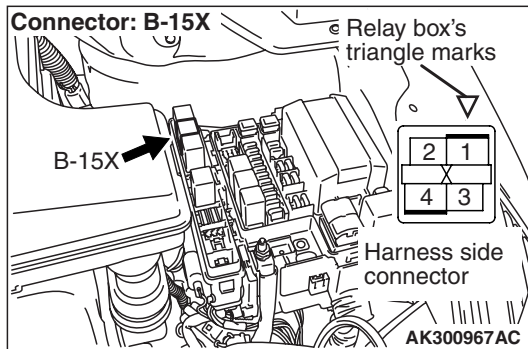
- Remove relay and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

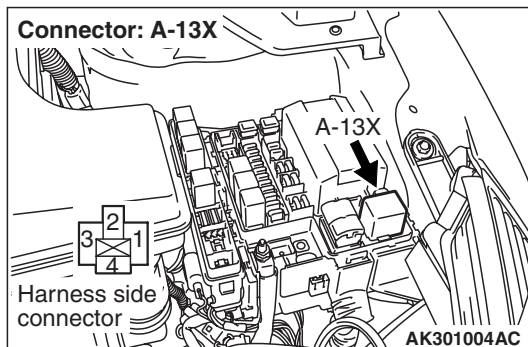
NO : Go to Step 5 .

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

YES : Check intermediate 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 6. 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.

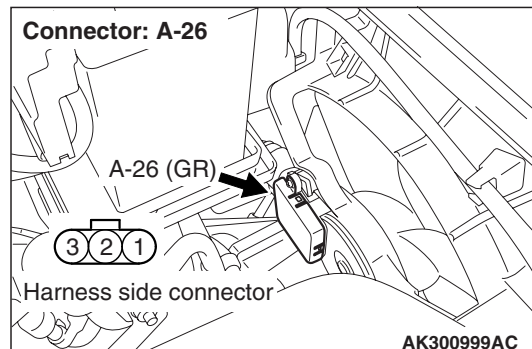
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

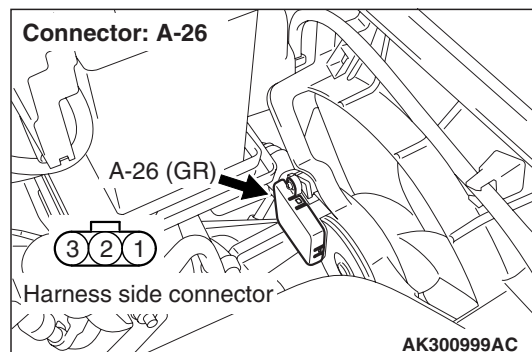
NO : Check and repair harness between battery and A-13X (terminal No. 4) fan control relay connector.

- Check power supply line for open/short circuit.

STEP 7. Connector check: A-26 fan controller connector**Q: Is the check result normal?**

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. 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.

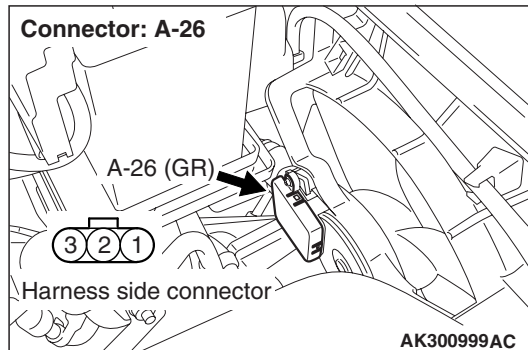
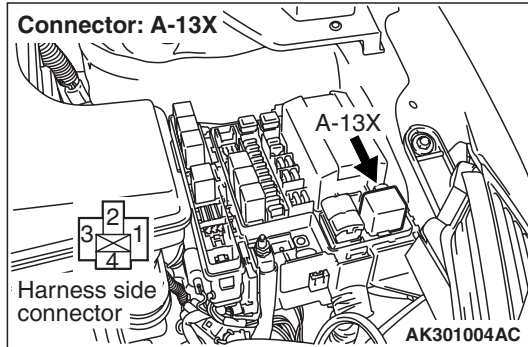
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 9 .

STEP 9. Check harness between A-13X (terminal No. 2) fan control relay connector and A-26 (terminal No. 3) fan controller connector.

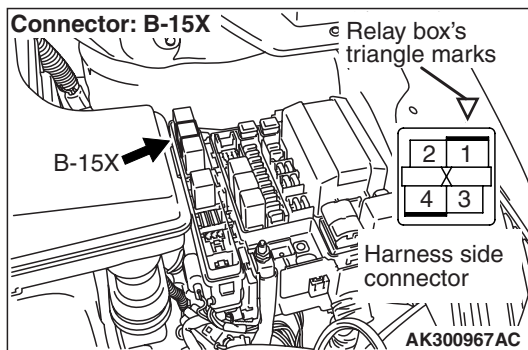


- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Repair.

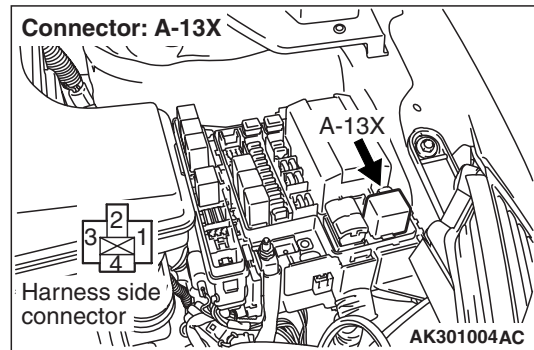
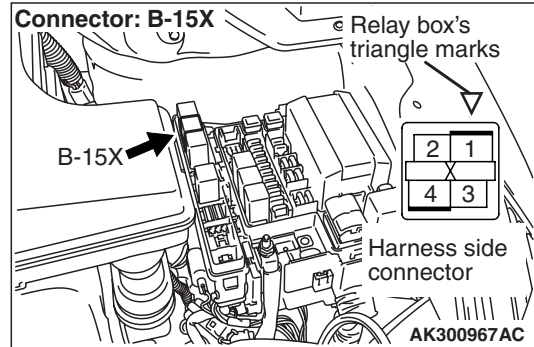
STEP 10. Connector check: B-15X engine control relay connector



Q: Is the check result normal?

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

STEP 11. Check harness between B-15X (terminal No. 1) engine control relay connector and A-13X (terminal No. 3) fan control relay connector.



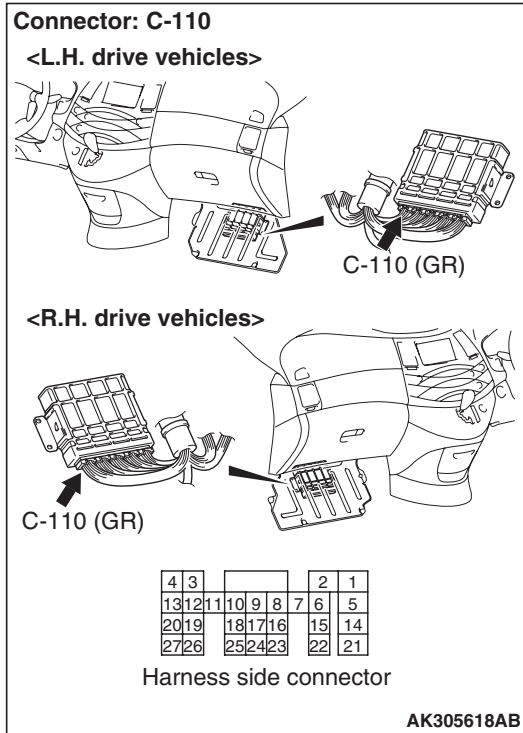
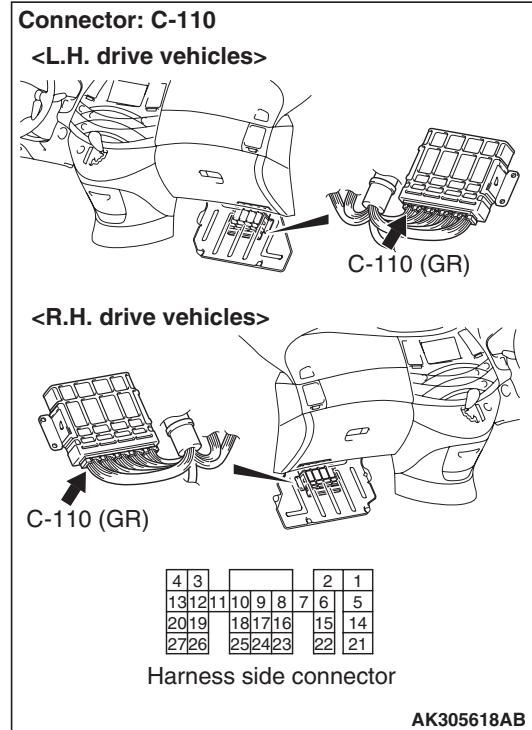
NOTE: Before checking harness, check intermediate connectors A-16 and C-116, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

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

NO : Repair.

STEP 12. 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 13 .**NO :** Repair or replace.**STEP 13. 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 14 .**NO :** Go to Step 15 .**STEP 14. M.U.T.-III actuator test**

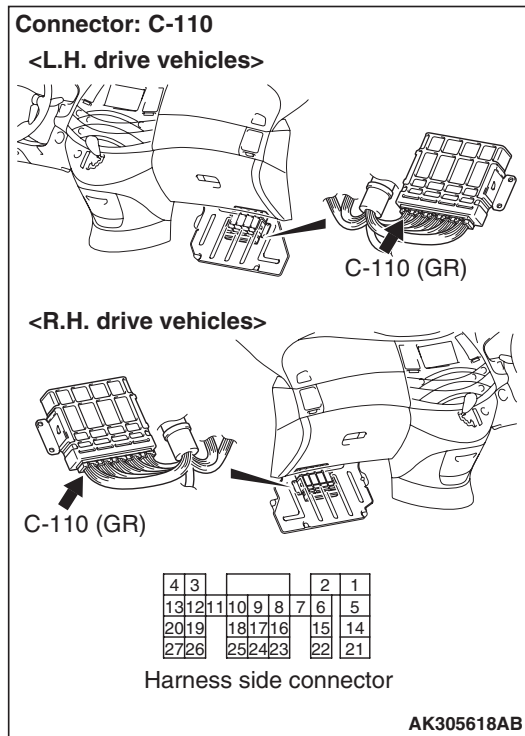
- Item 21: Fan controller

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 15. 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.

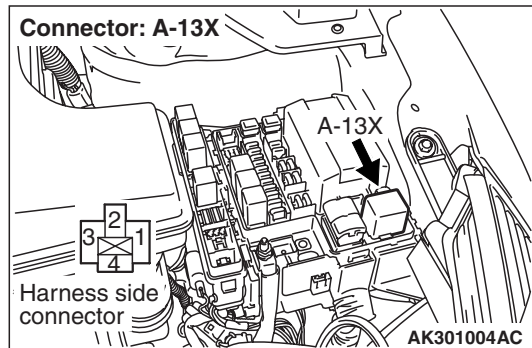
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Go to Step 18 .

STEP 16. Check harness between A-13X (terminal No. 4) fan control relay connector and battery.



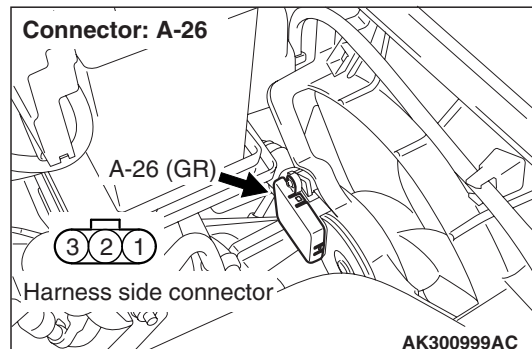
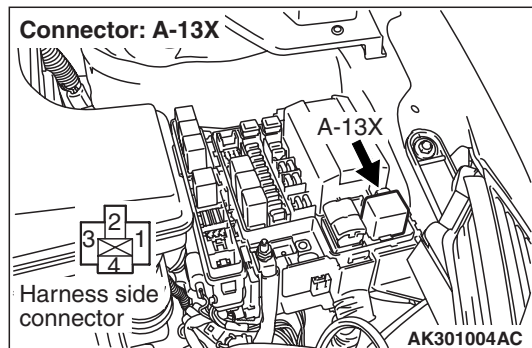
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Check harness between A-13X (terminal No. 2) fan control relay connector and A-26 (terminal No. 3) fan controller connector.



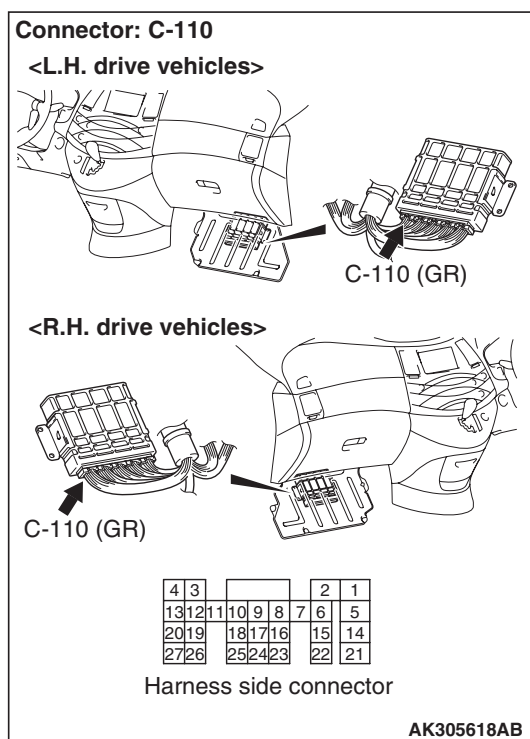
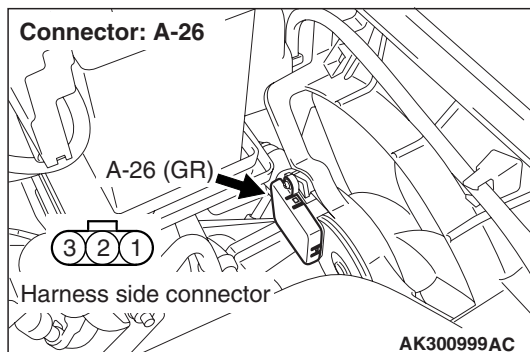
- Check power supply line for damage.

Q: Is the check result normal?

YES : Replace fan motor and fan controller.

NO : Repair.

STEP 18. 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.



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

- Check earthing line for short circuit.

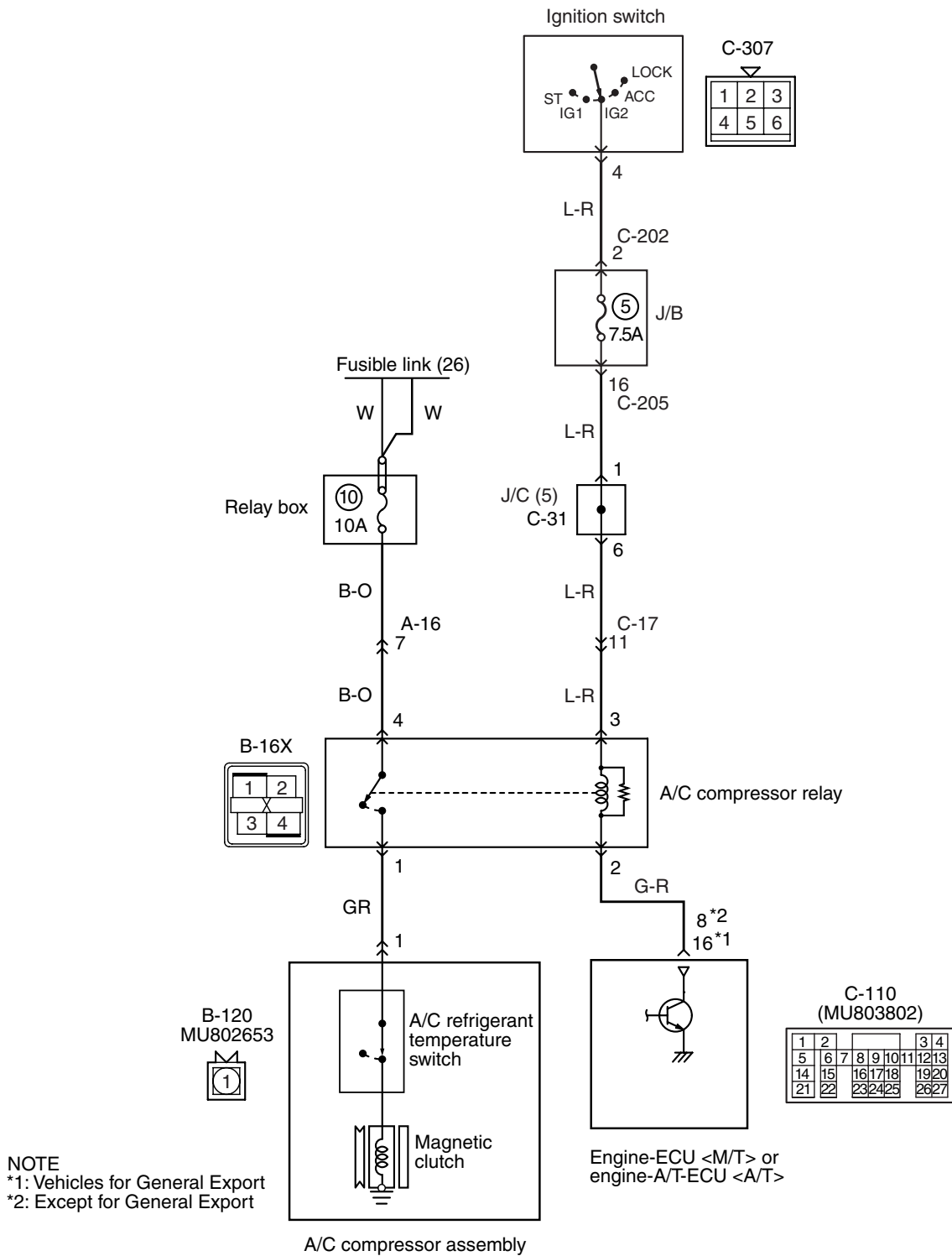
Q: Is the check result normal?

YES : Replace fan motor and fan controller.

NO : Repair.

Inspection Procedure 25: A/C Compressor Relay System

A/C compressor relay circuit



OPERATION**NOTE:**

*1: Except for General Export

*2: Vehicles for General Export

- 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*¹ or No. 16*²) 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 relay 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.

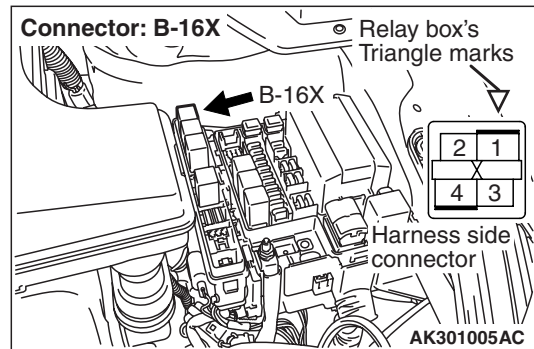
PROBABLE CAUSE

- 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>

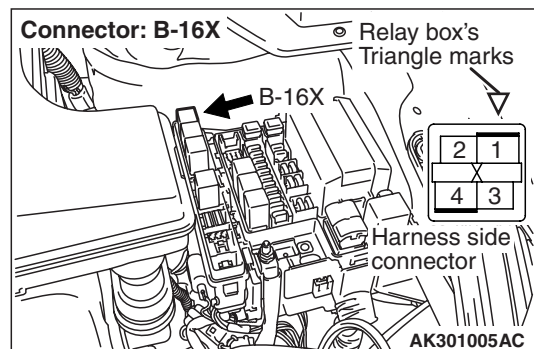
DIAGNOSIS PROCEDURE**NOTE:**

*1: Except for General Export

*2: Vehicles for General Export

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.**

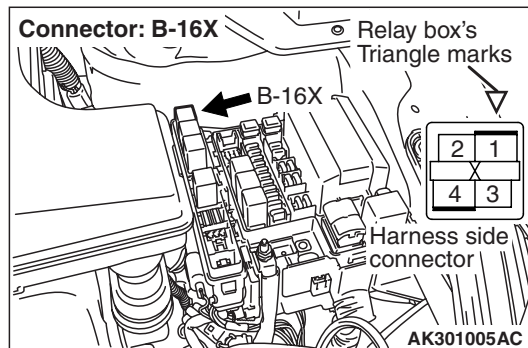
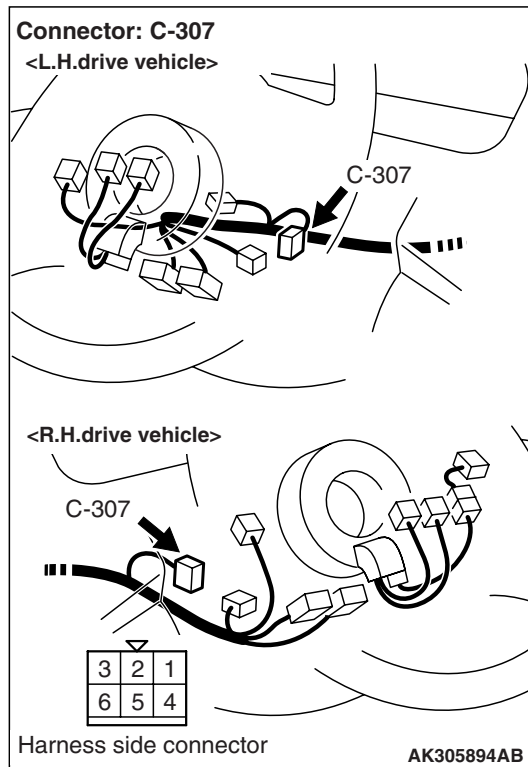
- Check A/C compressor relay (Refer to GROUP 55 – On-vehicle Service [P.55-208](#)).

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



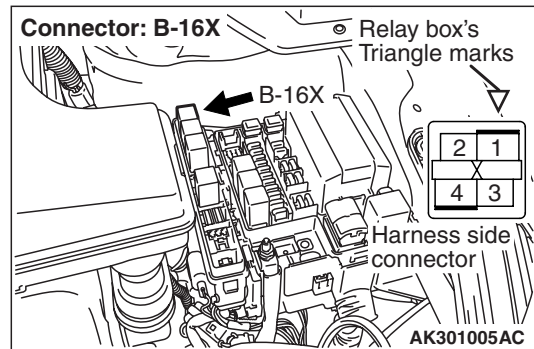
Q: Is the check result normal?

YES : Check intermediate connectors C-17, C-31, 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

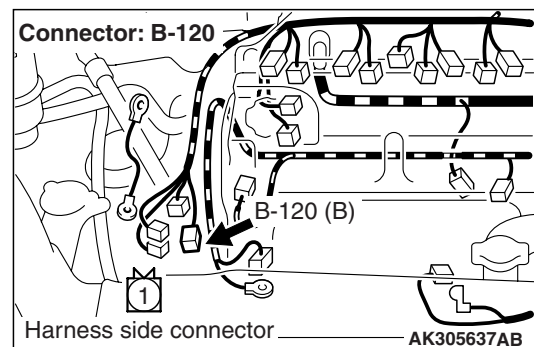
Q: Is the check result normal?

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.

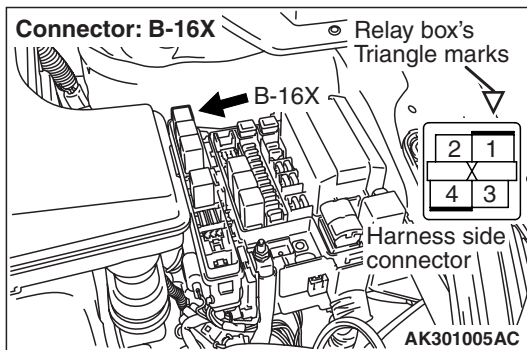
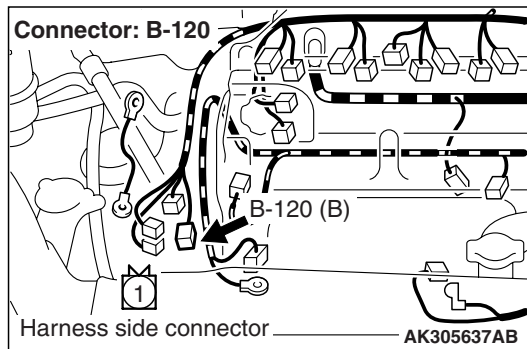
STEP 6. Connector check: B-120 A/C compressor assembly connector



Q: Is the check result normal?

YES : Go to Step 7 .

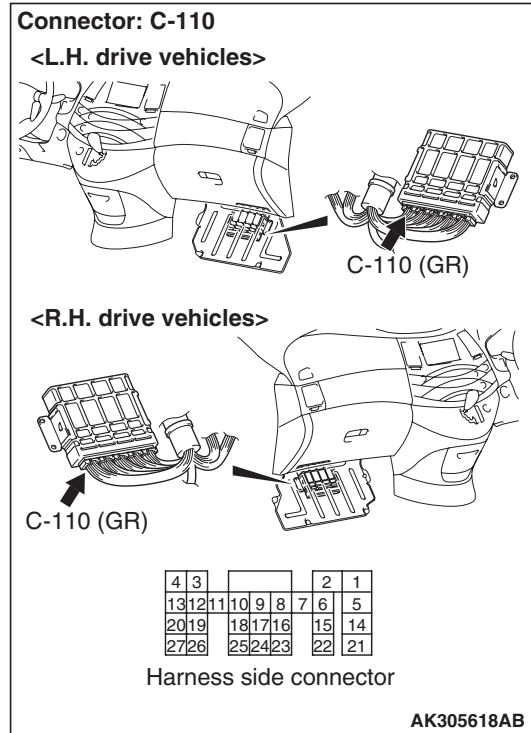
NO : Repair or replace.

STEP 7. Perform voltage measurement at B-120 A/C compressor assembly connector.

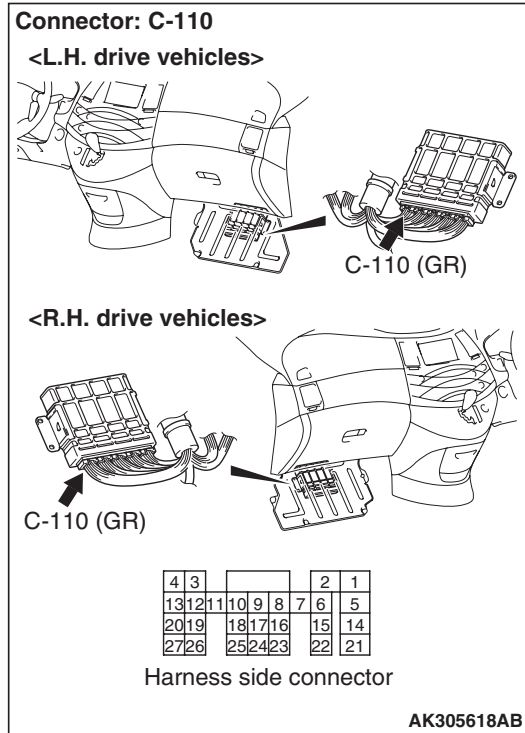
- Disconnect connector, and measure at harness side.
- Remove B-16X (terminal No. 1 and No. 4) A/C compressor relay and short-circuit of harness side connector.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

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 power supply line for open/short circuit.

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. 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*¹ or No. 16*² and earth.

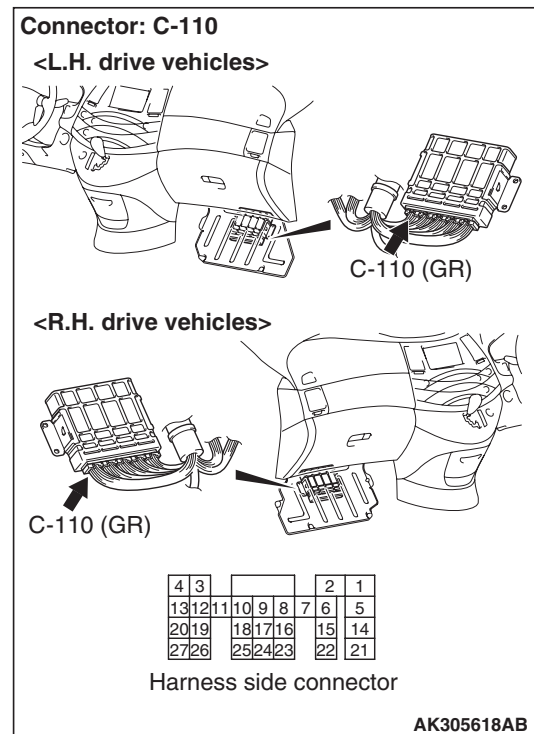
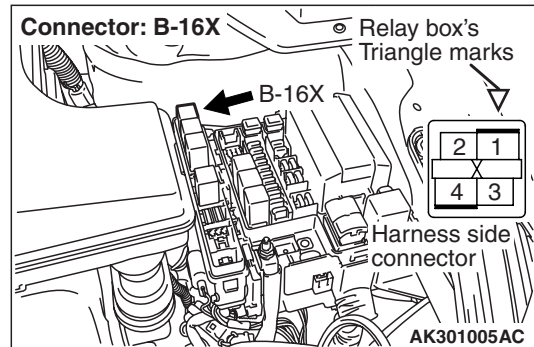
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 10 .

STEP 10. Check harness between B-16X (terminal No. 2) A/C compressor relay connector and C-110 (terminal No. 8*¹ or No. 16*²) 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. M.U.T.-III data list

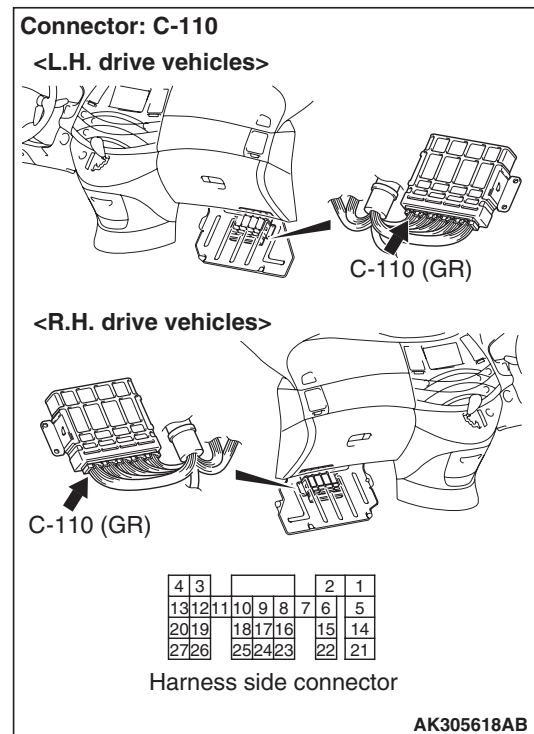
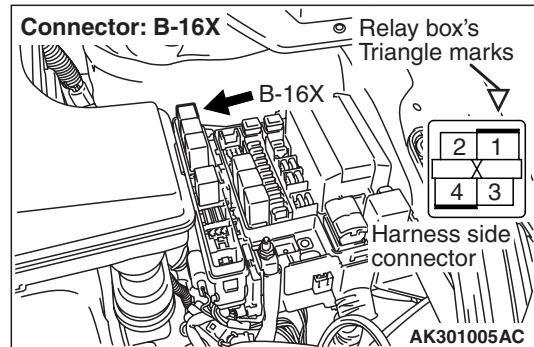
- Item 49: A/C relay
 - a. Engine: Idling
 - b. A/C set temperature:
 - Maximum Cool when temperature in cabin is 25°C or more
 - Maximum Hot when temperature in cabin is 25°C or less

OK:**ON (when A/C is ON)****OFF (when A/C is OFF)****Q: Is the check result normal?**

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

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

STEP 12. Check harness between B-16X (terminal No. 2) A/C compressor relay connector and C-110 (terminal No. 8^{*1} or No. 16^{*2}) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



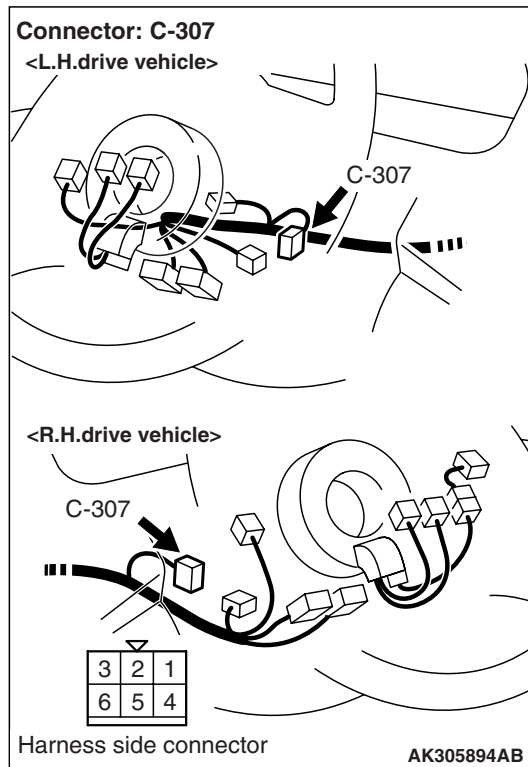
- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

STEP 13. Connector check: C-307 ignition switch connector

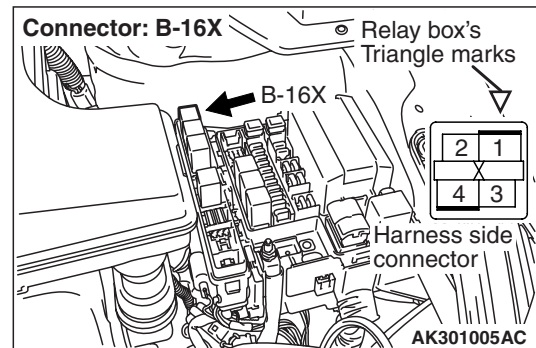
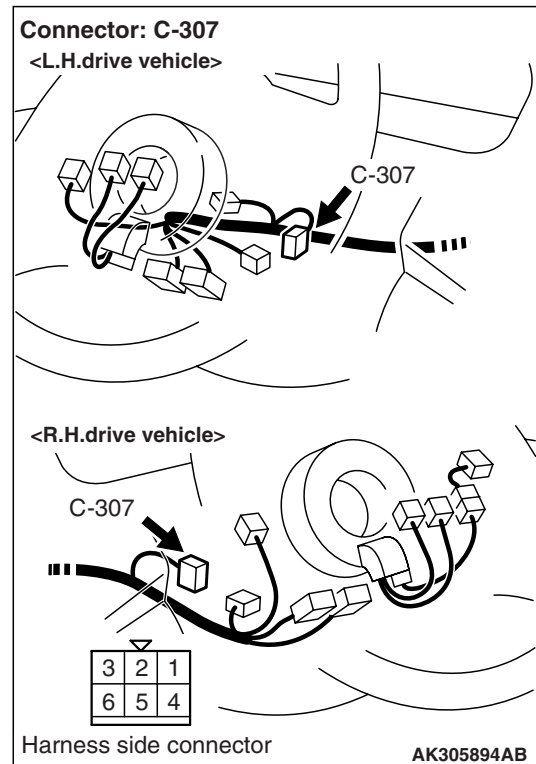


Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair or replace.

STEP 14. 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, C-205 and C-202, and repair if necessary.

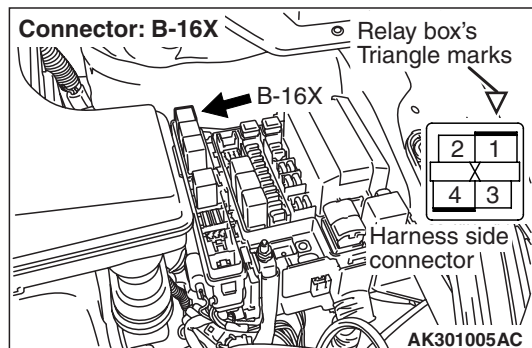
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

STEP 15. 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.

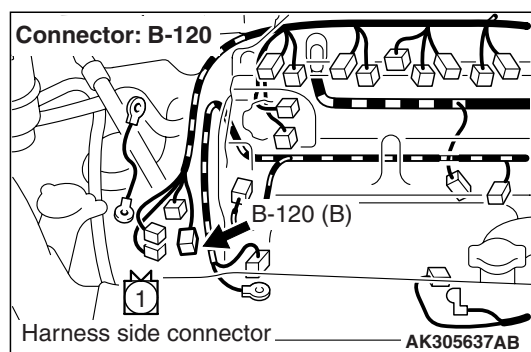
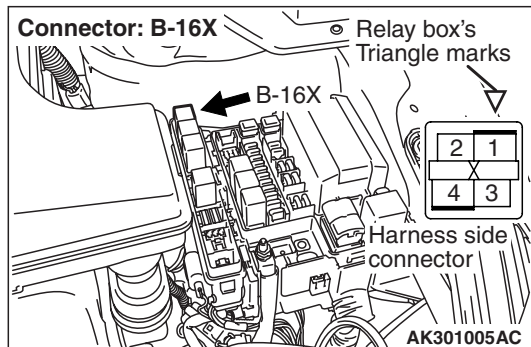
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair.

STEP 16. 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.

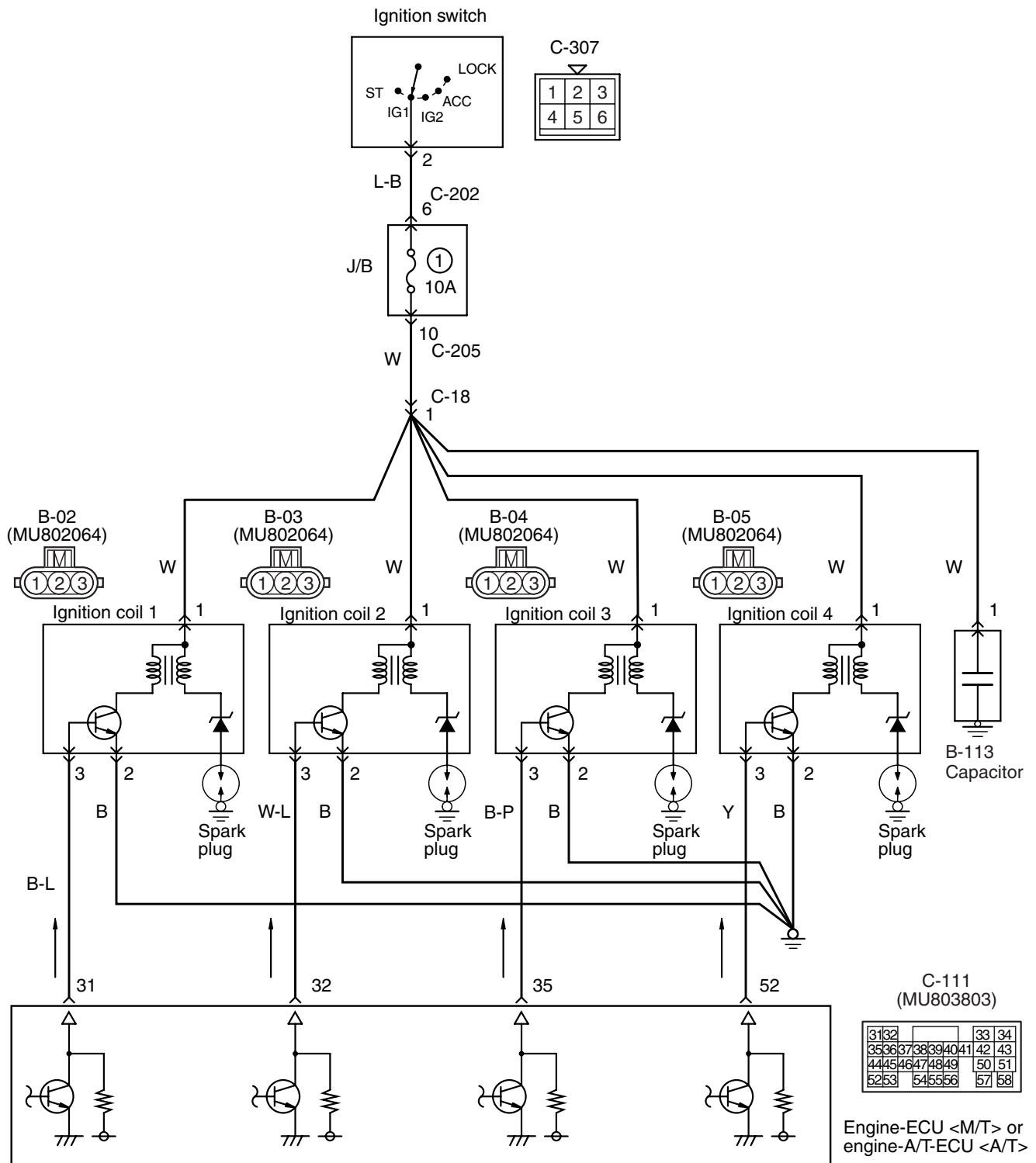
Q: Is the check result normal?

YES : Replace A/C compressor magnet clutch.

NO : Repair.

Inspection Procedure 26: Ignition Circuit System

Ignition circuit



OPERATION

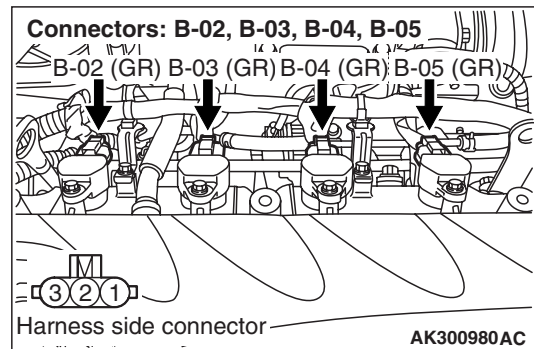
- The battery voltage is applied to the ignition coil (terminal No. 1) from the ignition switch and is earthed to the vehicle body from the ignition coil (terminal No. 2).
- A power voltage of 12 V is applied to the ignition coil output terminal (terminal No. 3) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 31, No. 32, No. 35 and No. 52).

FUNCTION

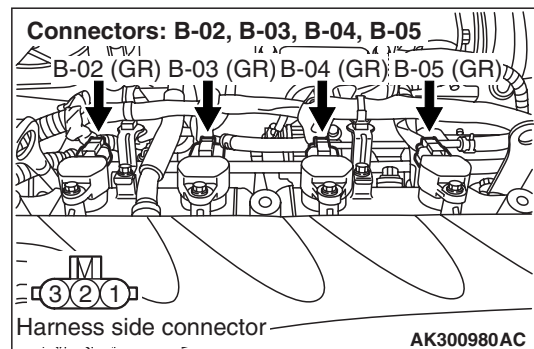
- When the engine-ECU <M/T> or engine-A/T-ECU <A/T> makes the power transistor in the unit be in "OFF" position, the battery voltage in the unit is applied to the power transistor unit, and that makes the power transistor unit be in "ON" position. The engine-ECU <M/T> or engine-A/T-ECU <A/T> makes the 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
- 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.**

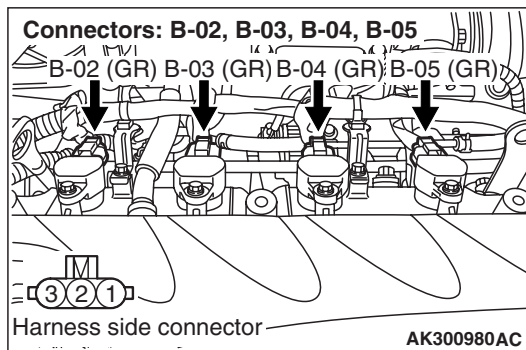
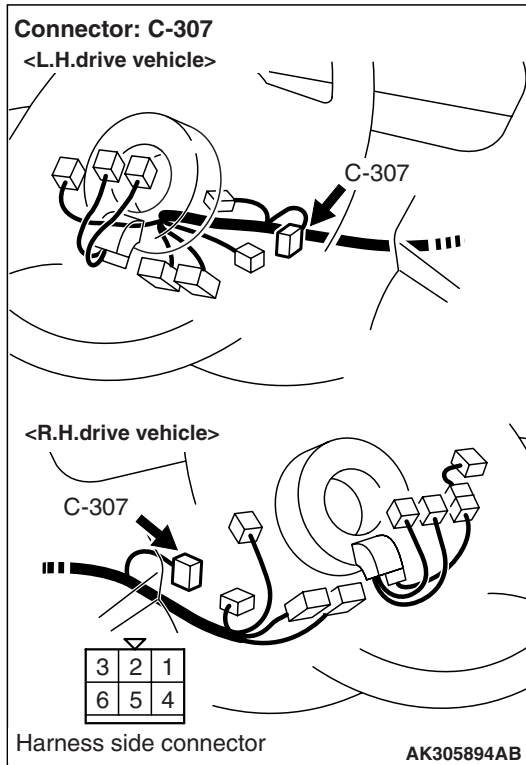
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service – Ignition coil check [P.16-29](#)).

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



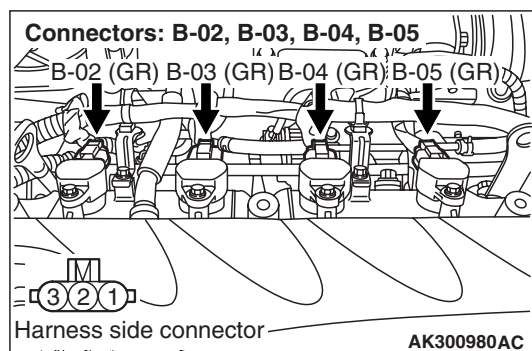
Q: Is the check result normal?

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.

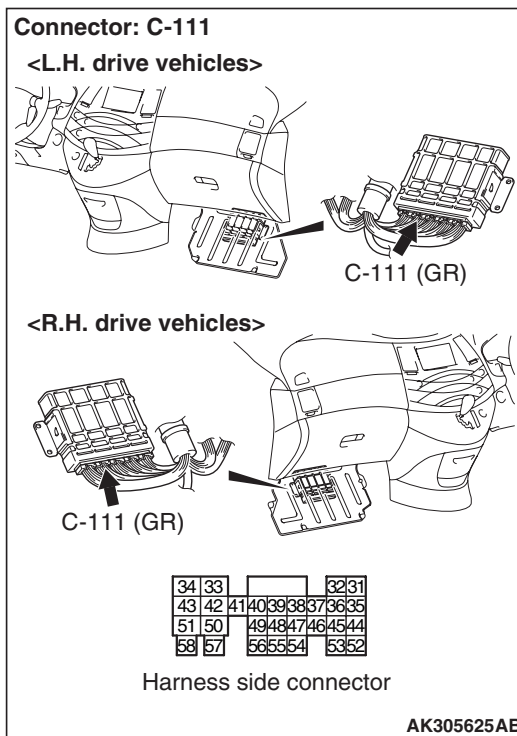
OK: 0.5 – 4.0 V

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 7 .

STEP 7. Connector check: C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

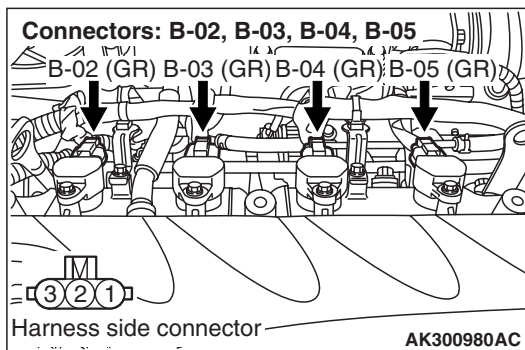
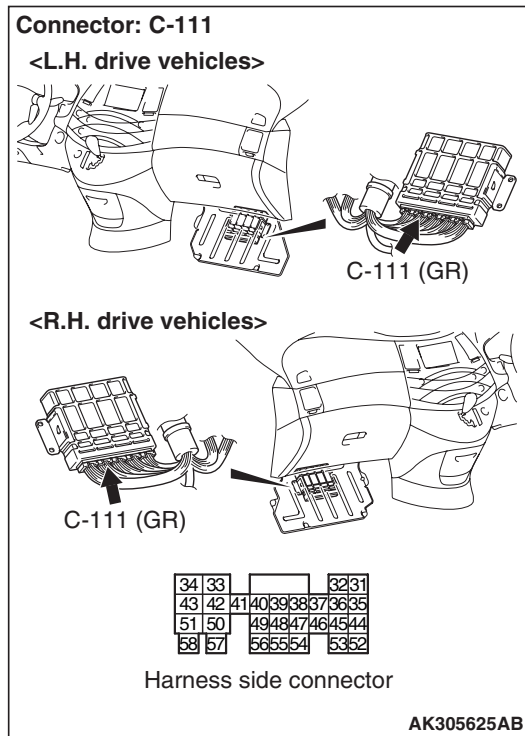


Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Perform voltage measurement at C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T>.



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

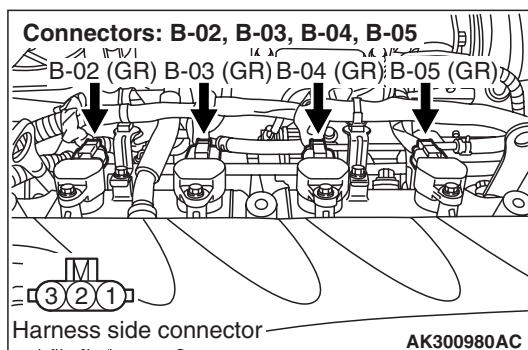
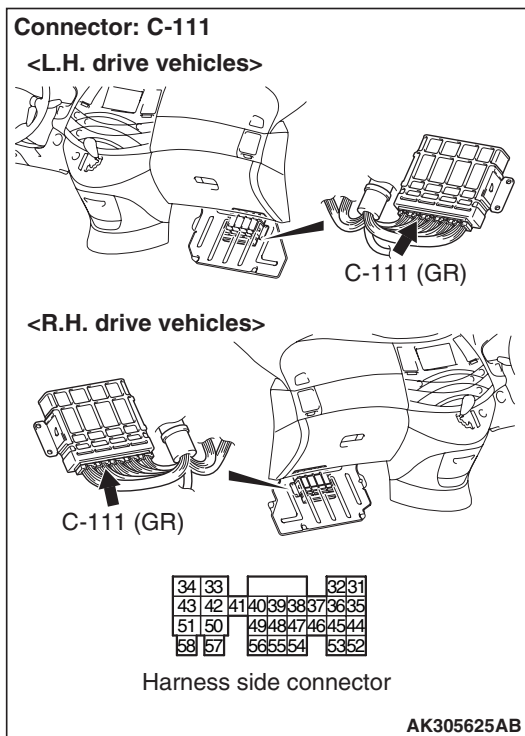
- Check and repair harness between B-02 (terminal No. 3) No. 1 ignition coil connector and C-111 (terminal No. 31) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-03 (terminal No. 3) No. 2 ignition coil connector and C-111 (terminal No. 32) engine-ECU <M/T> or 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 open circuit.

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
 - Voltage between terminal No. 31 and earth (No. 1 Ignition coil).
 - Voltage between terminal No. 32 and earth (No. 2 Ignition coil).
 - Voltage between terminal No. 35 and earth (No. 3 Ignition coil).
 - Voltage between terminal No. 52 and earth (No. 4 Ignition coil).

OK: 0.5 – 4.0 V

STEP 9. 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: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

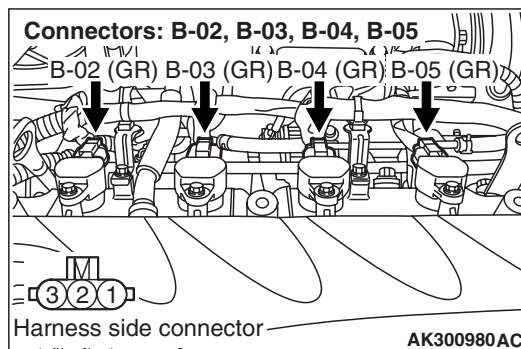
STEP 10. Check the trouble symptoms.

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).

STEP 11. 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 12 .

NO : Check and repair harness between ignition coil connector and body earth

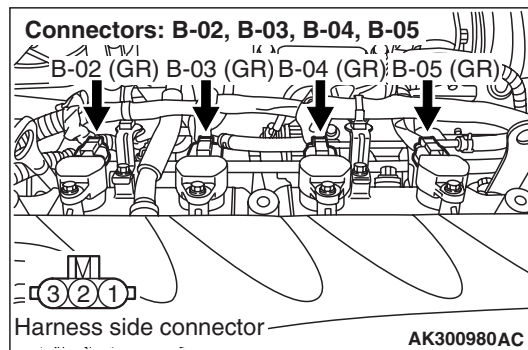
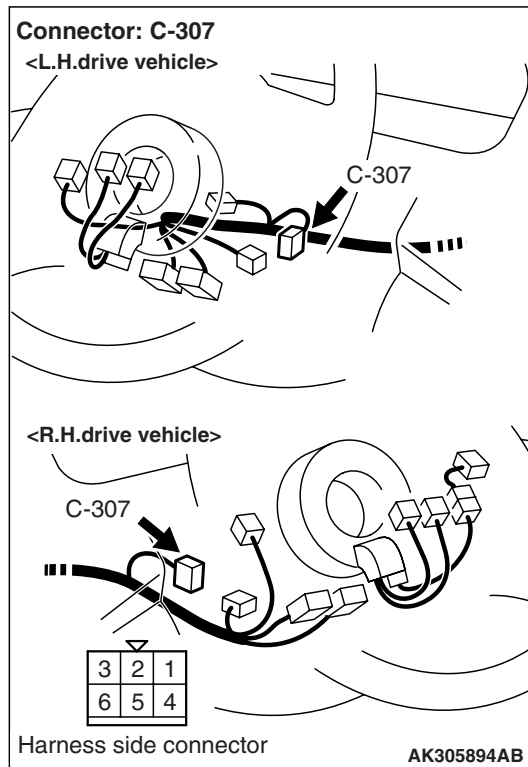
- Check and repair harness between B-02 (terminal No. 2) No. 1 ignition coil connector and body earth
- Check and repair harness between B-03 (terminal No. 2) No. 2 ignition coil connector and body earth
- Check and repair harness between B-04 (terminal No. 2) No. 3 ignition coil connector and body earth
- 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 12. Check harness between ignition switch connector and ignition coil connector.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.



NOTE: Before checking harness, check intermediate connectors C-18, C-202 and C-205, and repair if necessary.

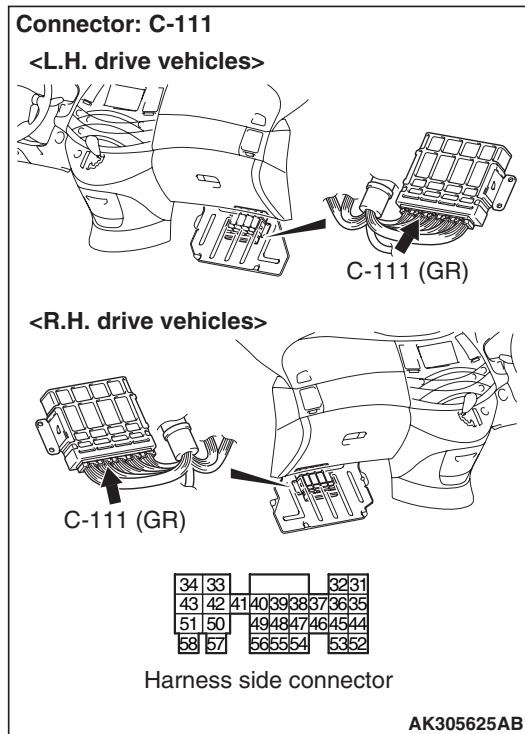
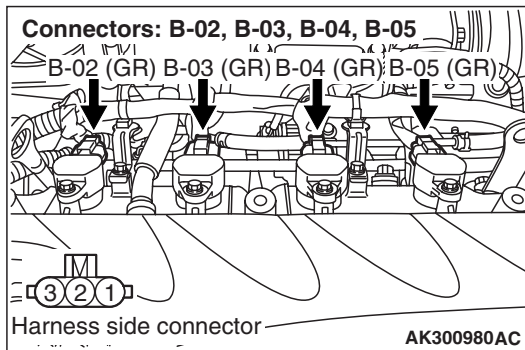
- Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-02 (terminal No. 1) No. 1 ignition coil connector
 - Check and repair harness between C-307 (terminal No. 2) ignition switch connector and B-03 (terminal No. 1) No. 2 ignition coil connector
 - Check and repair 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 damage.

STEP 13. Check harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Q: Is the check result normal?

YES : Go to Step 10 .

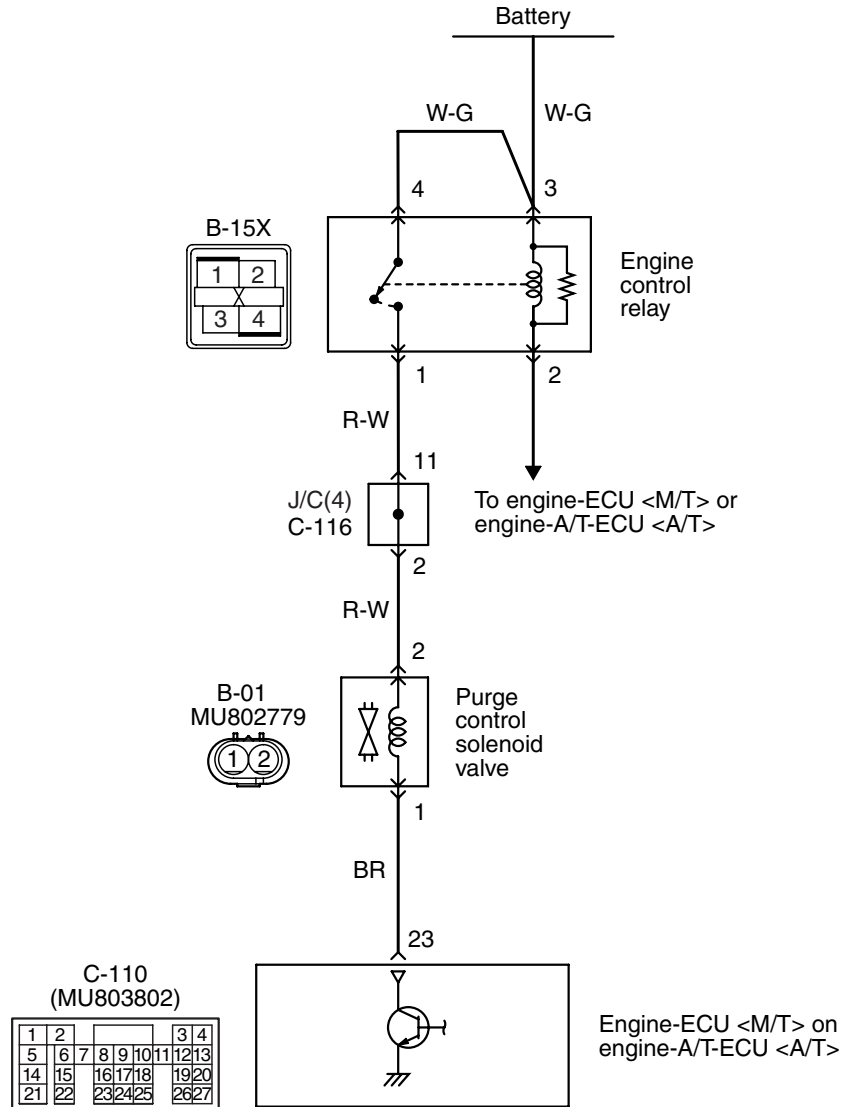
NO : Repair.



- 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.

Inspection procedure 27: 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.

PROBABLE CAUSE

- Failed purge control solenoid valve
- Open/short circuit in purge control solenoid value circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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

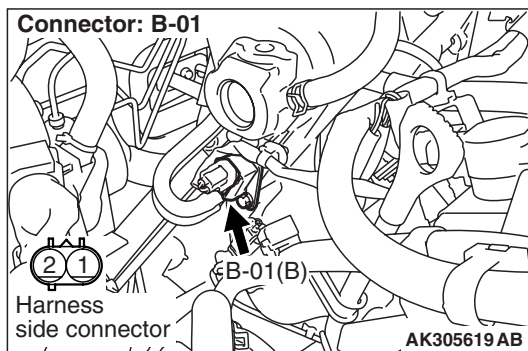
- Item 08: Purge control solenoid valve

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).

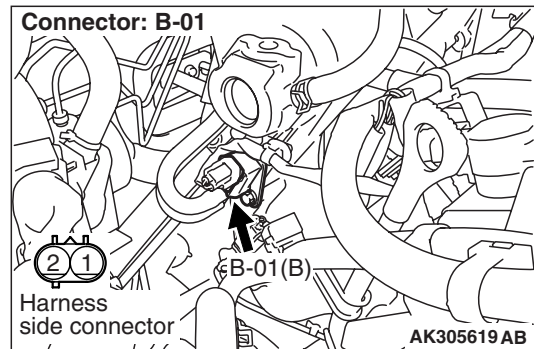
NO : Go to Step 2 .

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.

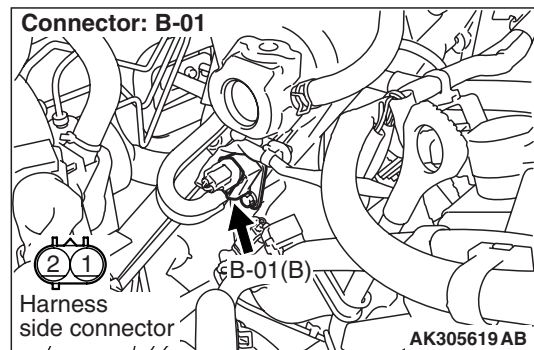
- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.

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.

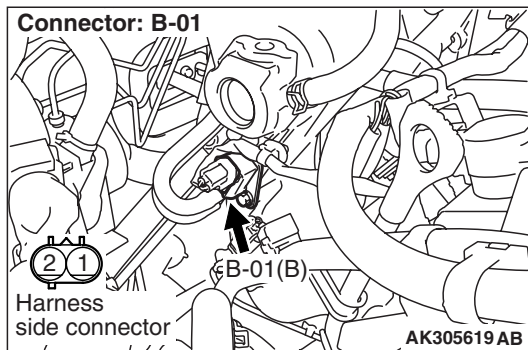
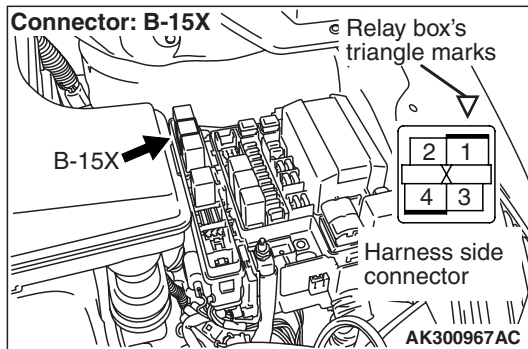
OK: System voltage

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



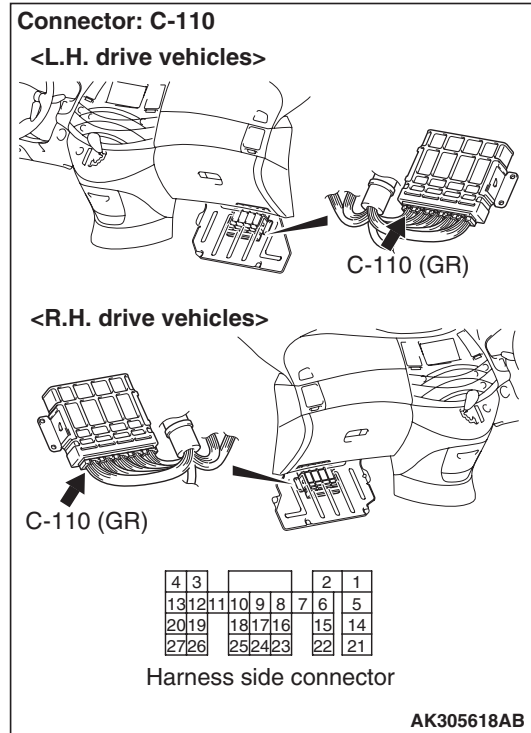
Q: Is the check result normal?

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

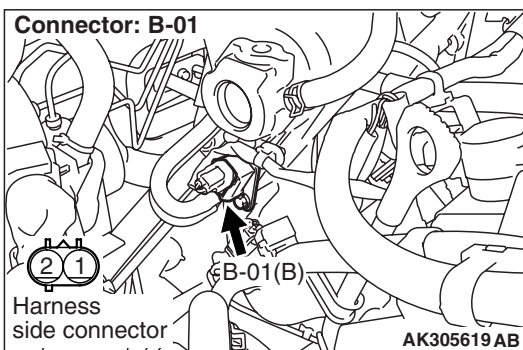
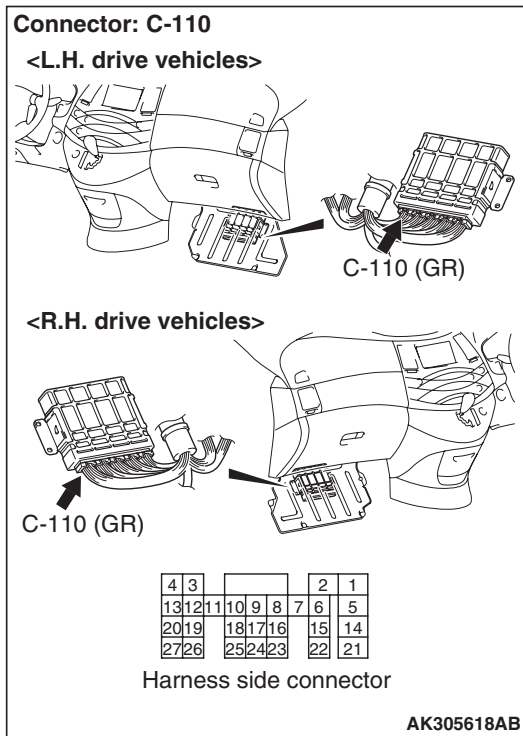


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. 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

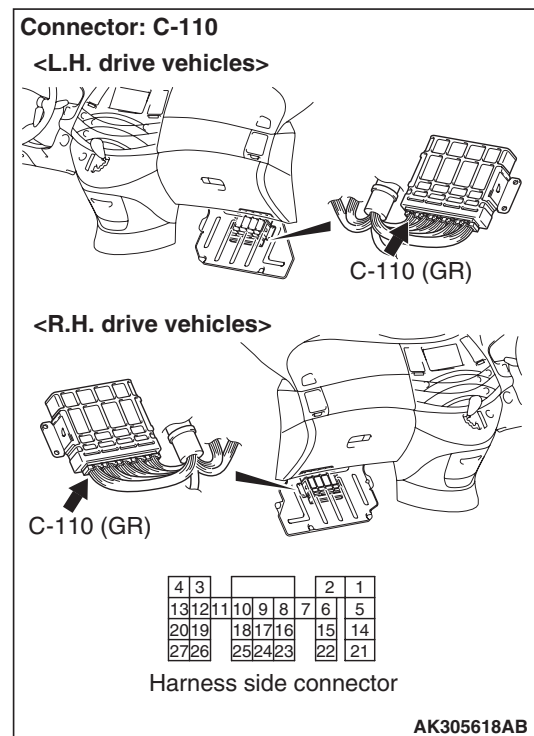
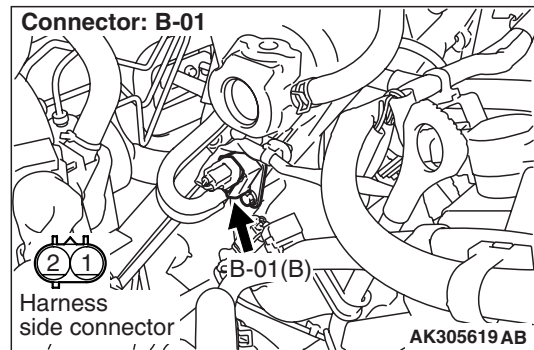
Q: Is the check result normal?

YES : Go to Step 8 .

NO : 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.

STEP 8. 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.



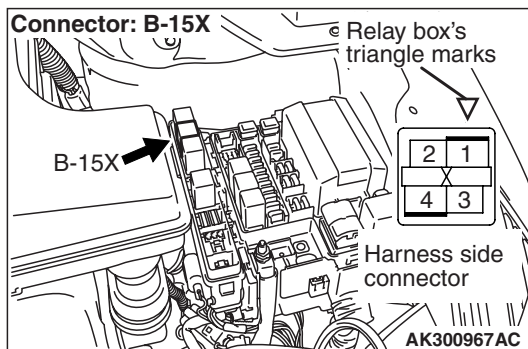
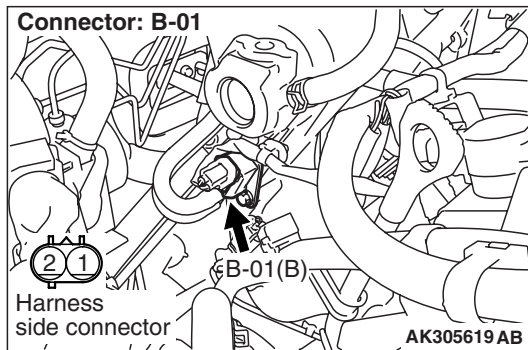
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. 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 10 .

NO : Repair.

STEP 10. M.U.T.-III actuator test

- Item 08: purge control solenoid valve

OK: Operating sound can be heard and the valve vibrates

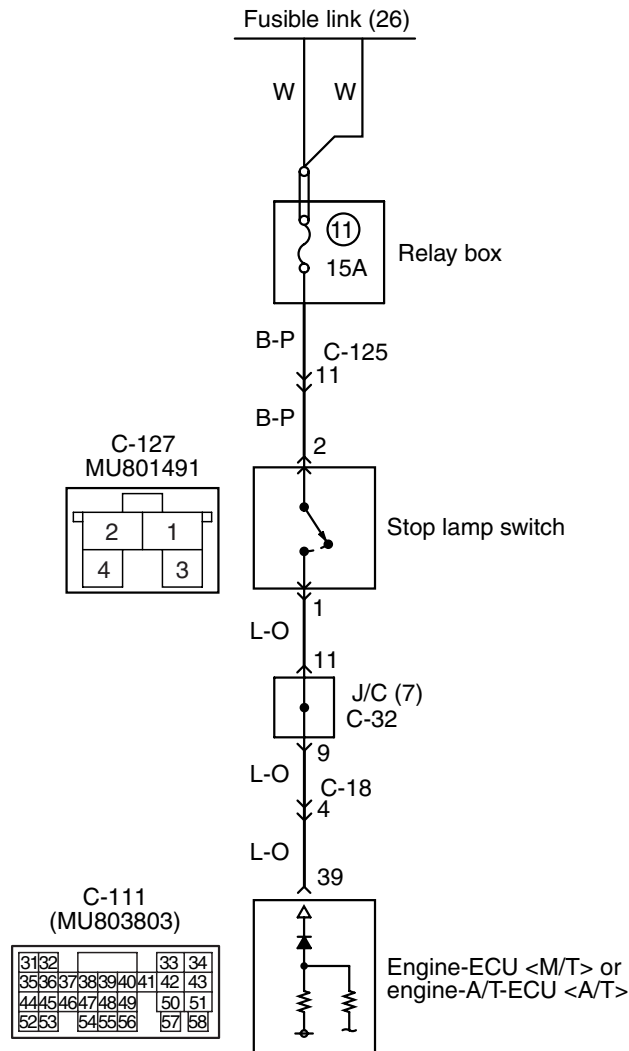
Q: Is the check result normal?

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>.

Inspection Procedure 28: Stop Lamp Switch System

Stop Lamp Switch Circuit



Wire colour code

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

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OPERATION

- The battery voltage is applied to the stop lamp switch (terminal No.2).
- The stop lamp switch output terminal (terminal No.1) inputs the switch signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 39).

FUNCTION

- The system checks whether the vehicle has the illuminating stop lamp or not, and inputs the signal 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> knows the vehicle state through the stop lamp switch signal and carries out control of the each system.

POSSIBLE CAUSES

- Failed stop lamp switch
- Open/short circuit in stop lamp switch or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Check for height of brake pedal.

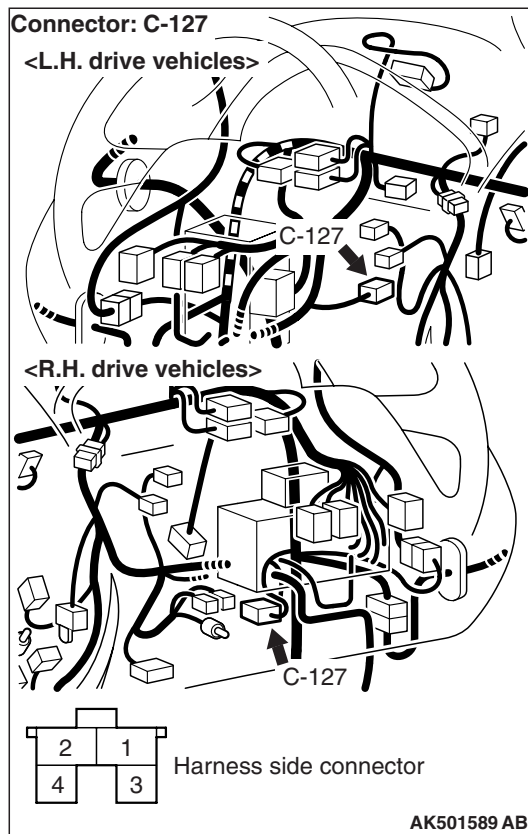
- Check for height of brake pedal (Refer to Group 35A – On-vehicle Service – Brake Pedal Check And Adjustment P.35A-4).

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Adjust.

STEP 2. Connector check: C-127 stop lamp switch connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Check the stop lamp switch.

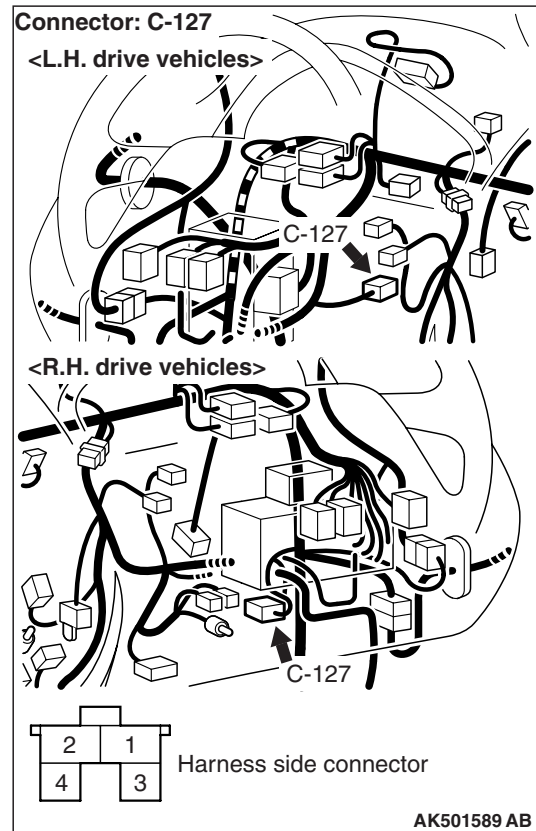
- Check the stop lamp switch (Refer to Group 35A – Brake Pedal Inspection P.35A-14).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace stop lamp switch.

STEP 4. Perform voltage measurement at C-127 stop lamp switch connector



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

OK: System voltage

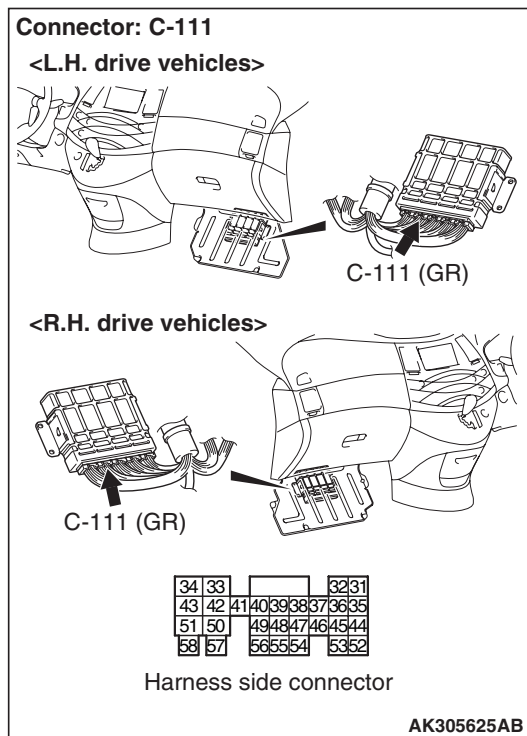
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check for the intermediate connector C-125, and repair if necessary. If intermediate connector is normal, check and repair harness between C-127 (terminal No.2) stop lamp switch connector and battery.

- Check power supply line open/short circuit supply.

STEP 5. Connector check: C-111 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

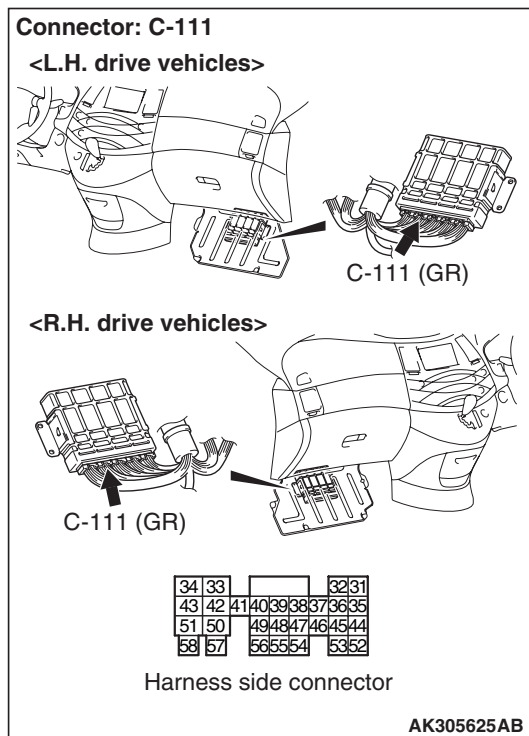


Q: Is the check result normal?

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.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 39 and the earth.

OK:

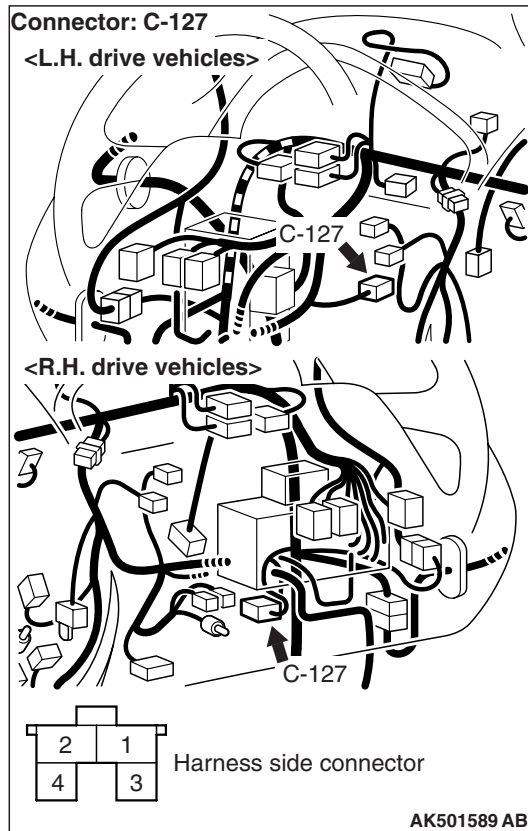
**System voltage (Brake pedal: Depressed)
1V or less (Brake pedal: Released)**

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Check harness between C-127 (terminal No. 1) stop lamp switch connector and C-111 (terminal No. 39) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



Q: Is the check result normal?

YES : For a short circuit, check and repair harness and the connector for the stop lamp switch output signal.

NO : Repair.

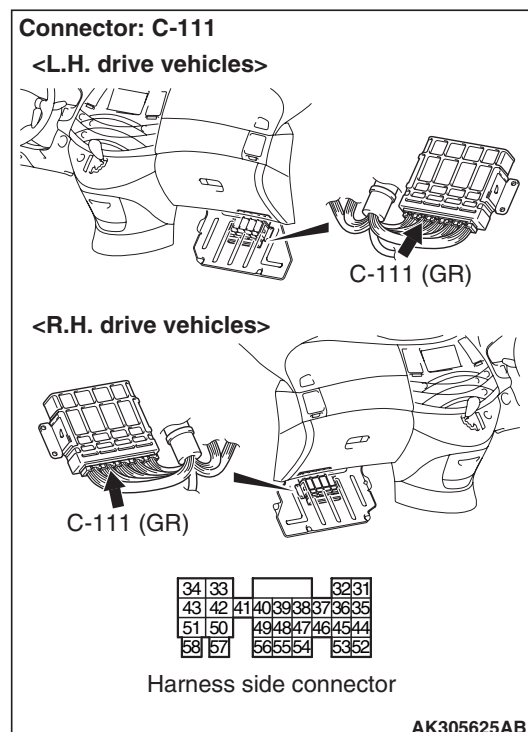
STEP 8. M.U.T.-III data list

- Refer to Data List Reference Table [P.13A-284](#).
 - a. Item 67: Stop lamp switch

Q: Is the check result normal?

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

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



NOTE: Before checking harness, check intermediate connectors C-18 and C-32, and repair if necessary.

- Check output line open/short circuit.

Data List Reference Table

M1131152002098

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
11	Cylinder 1,4 oxygen sensor	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-48
			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 gm/s	–	–
			2,500 r/min	6.5 – 12.0 gm/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-28
			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
14	Throttle position sensor (sub) *3	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the electronic-controlled throttle valve connector, 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. P0225	P.13A-90
			Fully open the throttle valve with your finger	4,000 mV or more		
16	Power supply voltage	Ignition switch: "ON"		System voltage	Procedure No. 22	P.13A-232
18	Cranking signal (ignition switch-ST)	Ignition switch: "ON"	Engine: Stopped	OFF	Procedure No. 22	P.13A-232
			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-35
			Coolant temperature: 0°C	0°C		
			Coolant temperature: 20°C	20°C		
			Coolant temperature: 40°C	40°C		
			Coolant temperature: 80°C	80°C		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
22	Crank angle sensor	<ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected 	Compare engine speed on tachometer with the value displayed on M.U.T.-III	Matched	Code No. P0335	P.13A-107
			Engine: Idle operation	Coolant temperature: -20°C		
		Engine: Idle operation	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-199
			Selector lever: D, 2, L, or R	D, 2, L, R		
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.		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
39	Cylinder 2,3 oxygen sensor	Engine: After warm-up (leaner by deceleration, richer acceleration)	Excessive deceleration from 4,000 r/min	200 mV or less	Code No. P0150	P.13A-61
			At excessive acceleration	600 – 1,000 mV		
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU <M/T> or engine-A/T-ECU <A/T>)	Idle operation	400 mV or less		
			2,500 r/min	⇔ 600 – 1,000 mV (altered)		
41	Injectors*2	<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	–	–
			2,500 r/min	26 – 46°BTDC		
49	A/C relay	Engine: After warm-up, idle operation after warm-up	A/C switch: OFF	OFF	Procedure No. 25	P.13A-259
			A/C switch: ON	A/C compressor is not driven		
				A/C compressor is driven		
67	Stop lamp switch	Ignition switch: ON	Brake pedal: Depressed	ON	Procedure No. 28	P.13A-280
			Brake pedal: Released	OFF		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
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-126
			2,500 r/min	3 – 22 STEP		
77	Accelerator pedal position sensor (sub)	Ignition switch: ON	Release the accelerator pedal	400 – 1,000 mV	Code No. P1225	P.13A-170
			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. P0220	P.13A-83
			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 bodyDisconnect the electronic-controlled throttle valve connector, 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. P0120	P.13A-42	
			Fully open the throttle valve with your finger	4,000 mV or more			
		Engine: Idle operation after warm-up	No load	500 – 700 mV			
			A/C switch: "OFF" → "ON"	Voltage rises			
			Shift lever: "N" → "D" <A/T>				
B4	Power steering fluid pressure sensor	Engine: Idle operation	Steering wheel: Not operated	400 – 1,000 mV	Code No. P0551	P.13A-137	
			Steering wheel: Operated	Voltage rises			
			Full lock	3,000 – 4,000 mV			
12 *4	Air flow sensor	<ul style="list-style-type: none">Engine coolant temperature: 85 – 95°CLamps, electric cooling fan and all accessories: OFFTransmission: 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, flux is increased.			

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
13 *4	Intake air temperature sensor	Ignition switch: "ON" or engine running	Intake air temperature: -20°C	-20°C	Code No. P0110	P.13A-28
			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		
21 *4	Engine coolant temperature sensor	Ignition switch: "ON" or engine running	Coolant temperature: -20°C	-20°C	Code No. P0115	P.13A-35
			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 *4	Crank angle sensor	• Engine: Cranking • Tachometer: Connected	Compare engine speed on tachometer with the value displayed on M.U.T.-III	Matched	-	-
		Engine: Idle operation	Coolant temperature: -20°C	1,300 – 1,500 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 *4	Vehicle speed sensor	Drive 40 km/h		Approximately 40 km/h	-	-
44 *4	Ignition advance	• Engine: After warm-up • Install timing light (for use to measure actual ignition timing)	Idle operation	2 – 18 deg	-	-
			2,500 r/min	26 – 46 deg		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
81 *4	Long-term fuel compensation cylinder 1, 4	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		-13 to 13%	Code No. P0170	P.13A-74
82 *4	Shot-term fuel compensation cylinder 1, 4	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		-10 to 10%	Code No. P0170	P.13A-74
83 *4	Long-term fuel compensation cylinder 2, 3	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		-13 to 13%	Code No. P0173	P.13A-75
84 *4	Shot-term fuel compensation cylinder 2, 3	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		-10 to 10%	Code No. P0173	P.13A-75
87 *4	Calculation load value	Engine: After warm-up	Idle operation	15 – 40%	–	–
			2,500 r/min	15 – 40%		
88 *4	Fuel control condition cylinder 1, 4	Engine: After warm-up	2,500 r/min	Closed loop	–	–
			Acceleration	Open loop-drive condition		
89 *4	Fuel control condition cylinder 2, 3	Engine: After warm-up	2,500 r/min	Closed loop	–	–
			Acceleration	Open loop-drive condition		
8A *4	Throttle position sensor (main) *3	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the electronic-controlled throttle valve connector, 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. P0120	P.13A-42
			Fully open the throttle valve with your finger	75 – 100%		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
A1 *4	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-48
			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)		
A3 *4	Cylinder 2,3 oxygen sensor	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-61
			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)		
A9 *4	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: After the inspection has been completed, disconnect the throttle actuator control motor connector, and then use the M.U.T.-III to delete the diagnosis code that was recorded during the inspection.*

*NOTE: *4: When service data in check mode is selected, the data is not displayed.*

Actuator Test Reference Table

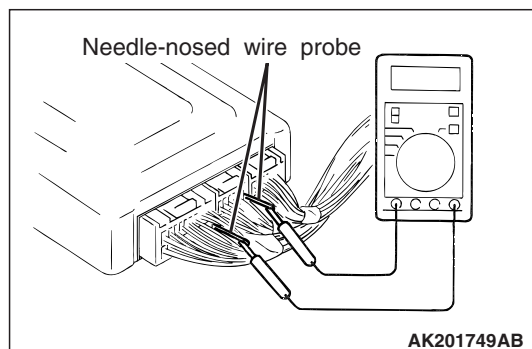
M1131152501261

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, Code No. P0202, Code No. P0203, Code No. P0204	P.13A-78
02		Cut off No. 2 injector					
03		Cut off No. 3 injector					
04		Cut off No. 4 injector					
07	Fuel pump	Drive fuel pump to circulate fuel	Ignition switch: "ON"	Check for pump operating noise near fuel tank	Operating noise audible	Procedure No. 23	P.13A-240
08	Purge control solenoid valve	Switch solenoid valve from OFF to ON	Ignition switch: "OFF"		When the valve is actuated, operating noise is audible	Procedure No. 30	P.13A-275
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. 24	P.13A-252
22	Oil control valve	Oil control valve turns from OFF the ON	Ignition switch: "ON"		Clicks when oil control valve is driven	Code No. P0075	P.13A-16
34	Throttle valve control servo	Stop the throttle valve control servo	Ignition switch: "ON"		Throttle valve is open	Code No. P1221	P.13A-166

CHECK AT THE ECU TERMINALS

M1131153500692

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	62	92	122
2	31	61	91	121
5	4	34	96	125
6	3	33	97	126
14	11	41	106	135
15	10	40	107	136
21	9	39	108	137
	8	38	109	138
	7	37	110	139
		49	111	140
		48	112	141
		56	113	142
		55	114	143
		54	115	144
		84	116	145
		83	117	146
		85	118	
		87	119	
		86	120	
		88	121	
		89	122	
		90	123	
		98	124	
		99	125	
		100	126	
		101	127	
		102	128	
		103	129	
		104	130	
		105	131	
		106	132	
		107	133	
		108	134	
		109	135	
		110	136	
		111	137	
		112	138	
		113	139	
		114	140	
		115	141	
		116	142	
		117	143	
		118	144	
		119	145	
		120	146	

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Terminal No.	Check item	Check condition (Engine condition)	Normal condition
1	No. 1 injector	While engine is idling after having warmed up, suddenly depress the accelerator pedal.	From 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)		

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
8	A/C relay (Except for General Export)	<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
	Fuel pump relay (Vehicles for General Export)	Ignition switch: ON	System voltage
		Engine: Idle speed	1 V or less
10	Cylinder 2,3 oxygen sensor heater	Engine: Idling after warming up	9 – 11 V
		Engine: 5,000 r/min	System voltage
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 (Except for General Export)	Ignition switch: ON	System voltage
		Engine: Idle speed	1 V or less
	A/C relay (Vehicles for General Export)	<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
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
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
25	Cylinder 1,4 oxygen sensor heater	Engine: Idling after warming up	9 – 11 V
		Engine: Racing	System voltage
31	Ignition coil – No. 1	Engine: 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

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
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
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 warming 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"		4.5 – 5.5 V
95	Oil control valve	Ignition switch: "ON"		System voltage
		Engine: warming up, 4,500 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

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
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
106	Power supply voltage applied to throttle position sensor	Ignition switch: "ON"		4.5 – 5.5 V
107	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	0.335 – 0.935 V
			Depress the accelerator pedal fully	4.0 V or more
108	Cylinder 2, 3 oxygen sensor	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)		0 ⇔ 0.8 V (Changes repeatedly)
109	Cylinder 1, 4 oxygen sensor	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)		0 ⇔ 0.8 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	4.6 V or more
114	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	0.335 – 0.935 V
			Depress the accelerator pedal fully	4.0 V or more

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
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
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

- Turn the ignition switch to "LOCK" (OFF) position.
- Disconnect the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- 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:

- When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.
- Checking need not be carried out in the order given in the chart.

CAUTION

If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-ECU <M/T> or engine-A/T-ECU <A/T> and/or ohmmeter. Be careful to prevent this!

- If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and the repair or replace.
- 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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												

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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	11 – 18 Ω (at 20°C)
25 – 34	Cylinder 1,4 oxygen sensor heater	
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)
96 – 98	Engine coolant temperature sensor	14 – 17 kΩ (When coolant temperature is –20°C)
		5.1 – 6.5 kΩ (When coolant temperature is 0°C)
		2.1 – 2.7 kΩ (When coolant temperature is 20°C)
		0.9 – 1.3 kΩ (When coolant temperature is 40°C)
		0.48 – 0.68 kΩ (When coolant temperature is 60°C)
		0.26 – 0.36 kΩ (When coolant temperature is 80°C)

Terminal No.	Inspection item	Normal condition (Check condition)
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 – 0.42 k Ω (When intake air temperature is 80°C)
133 – 141	Throttle valve control servo	0.3 – 100 Ω (at 20°C)

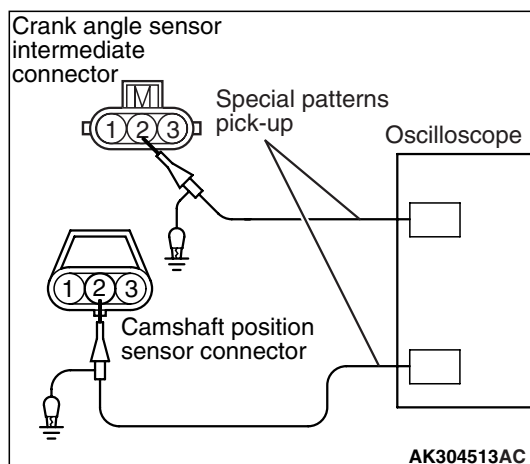
INSPECTION PROCEDURE USING OSCILLOSCOPE

M1131154500929

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)

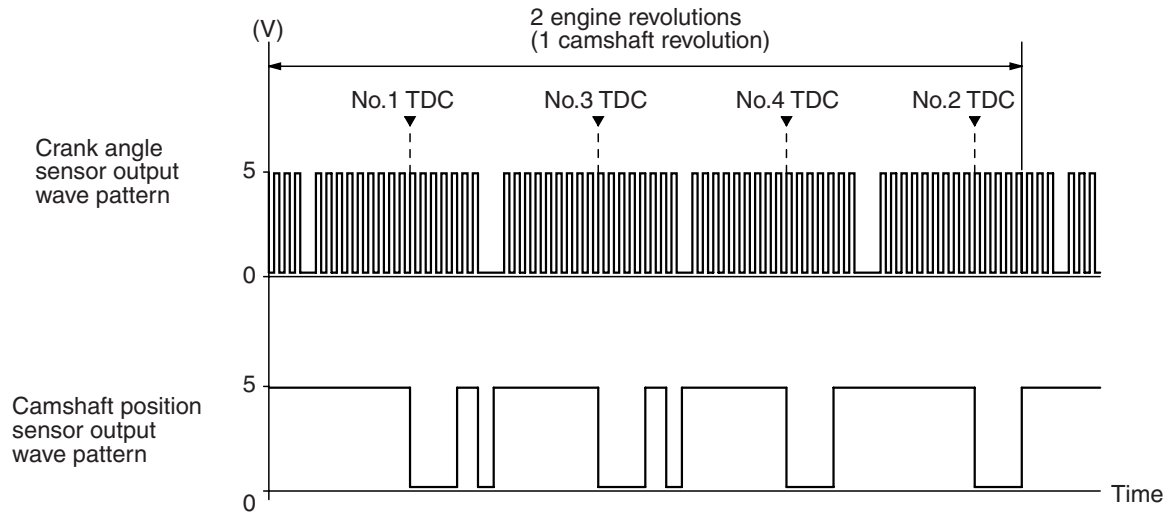
1. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 71 (When checking the camshaft position sensor signal wave pattern).
2. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 70 (When checking 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



TDC: Top dead centre

AK304514AB

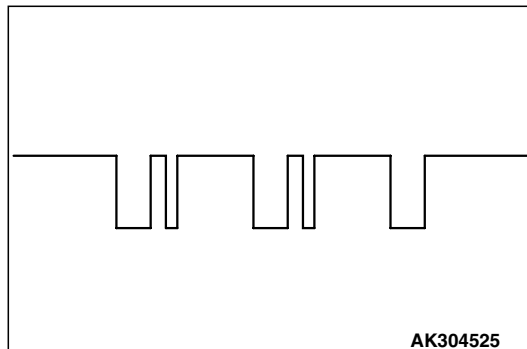
Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.

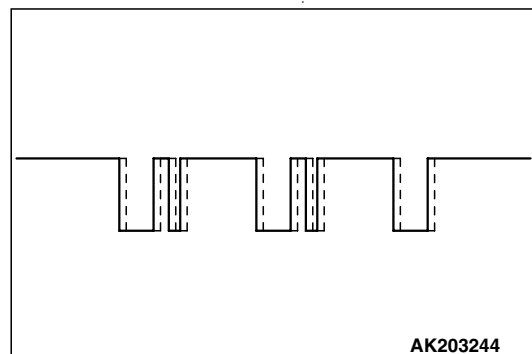
Examples of Abnormal Wave Patterns



Example 1

Cause of problem

Sensor interface malfunction



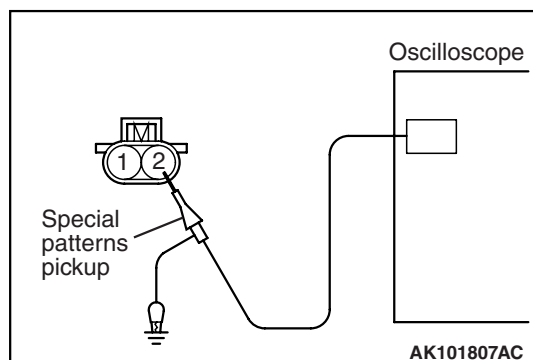
Example 2

Cause of problem

Loose timing belt
Abnormality in sensor disk

Wave pattern characteristics

Wave pattern is displaced to the left or right.

INJECTOR**Measurement Method**

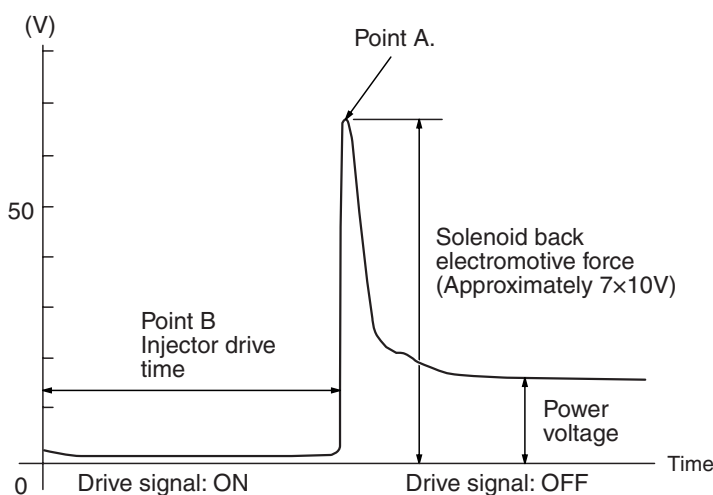
1. Disconnect the injector connector, and then connect the special tool Test harness set (MB991658) in between (All terminals should be connected).
2. Connect the oscilloscope special patterns pickup to terminal No. 2 of the injector connector.

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

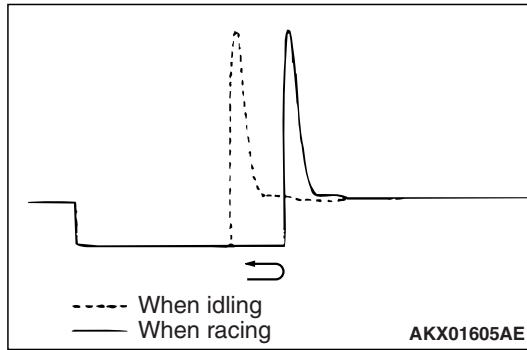
AK305803AB

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

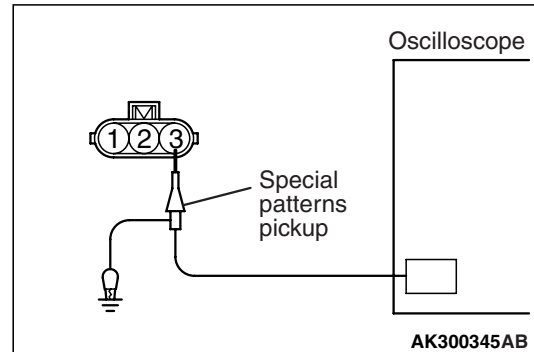


The injector drive time will be synchronized with the M.U.T.-III tester display.

- 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



- Disconnect the ignition coil connector, and connect the special tool Test harness (MB991658) in between (All terminals should be connected).
- Connect the oscilloscope special patterns pickup to terminal No. 3 of each ignition coil connector in turn.

Alternate Method (Test harness not available)

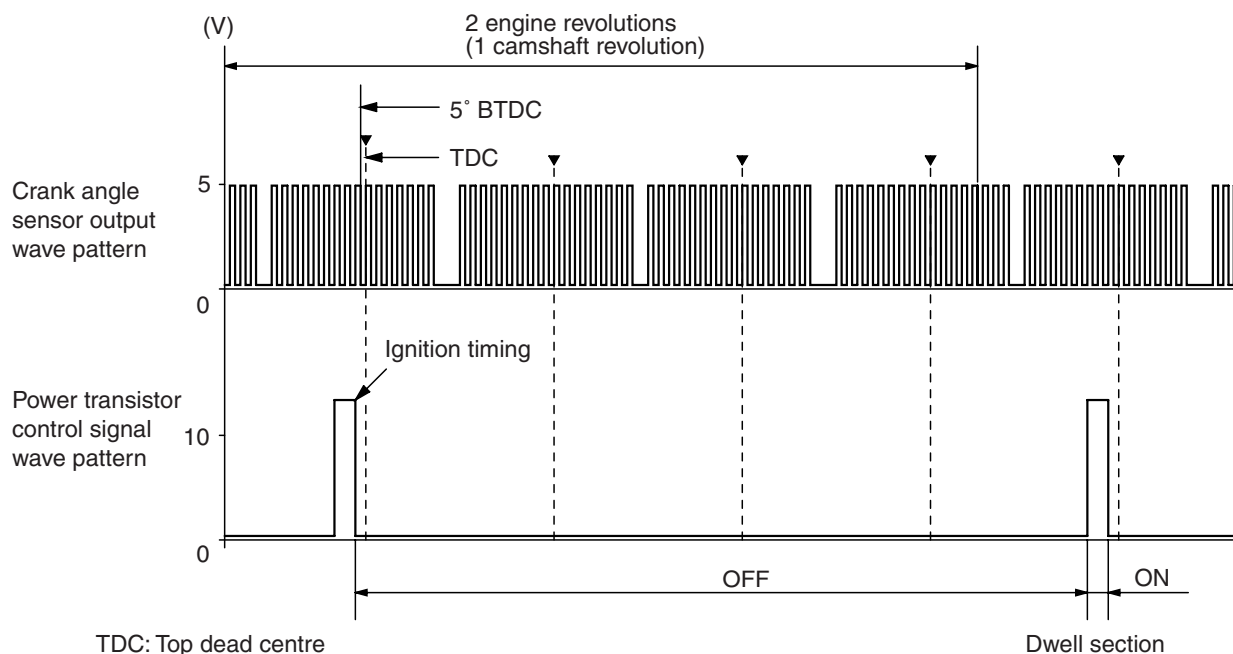
- Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 31. (When checking the number 1 cylinder.)
- Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 32. (When checking the number 2 cylinder.)
- Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 35. (When checking the number 3 cylinder.)
- 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

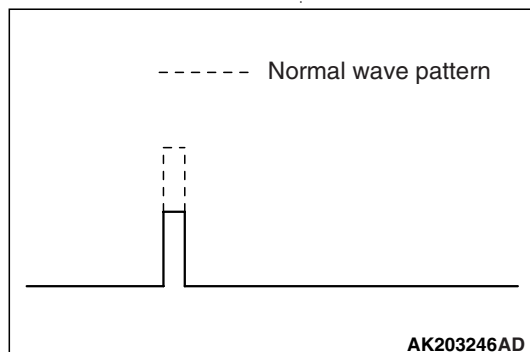


AK305797AB

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



AK203246AD

Example

Wave pattern during engine cranking

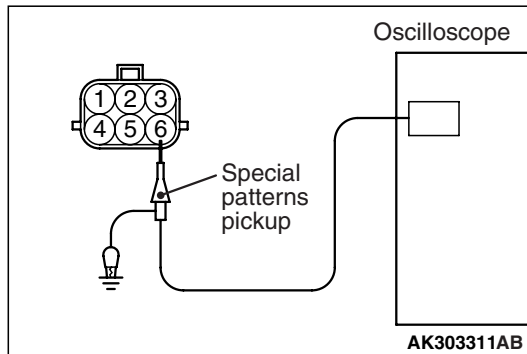
Cause of problem

Open-circuit in ignition primary circuit

Wave pattern characteristics

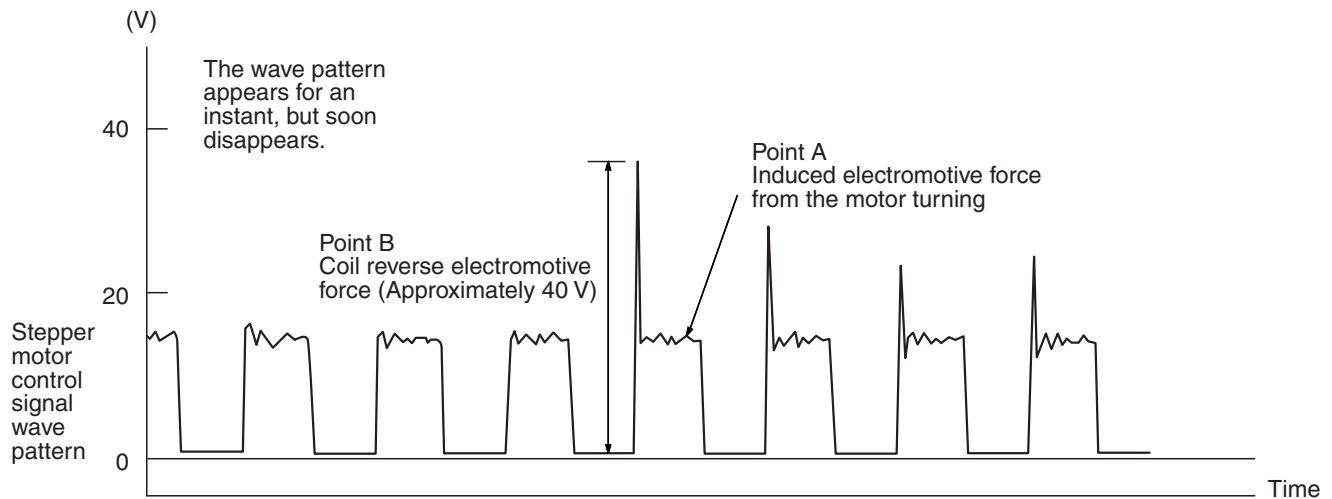
Top-right part of the build-up section cannot be seen, and voltage value is approximately 2 V too low.

EGR VALVE (STEPPER MOTOR) Measurement Method



1. Disconnect the EGR valve connector, and connect the special tool test harness (MB991658) in between.
2. Connect the oscilloscope probe to the EGR valve-side connector terminal 1, terminal 3, terminal 4 and terminal 6 respectively.

Standard wave pattern



AK305868AB

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

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

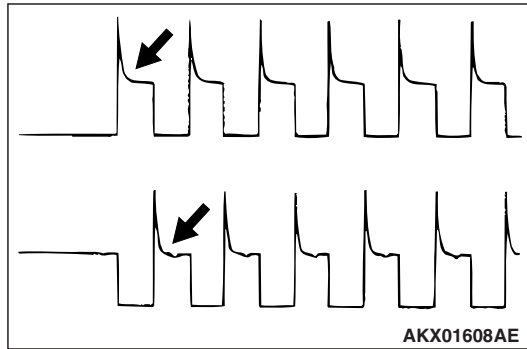
Observation condition

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



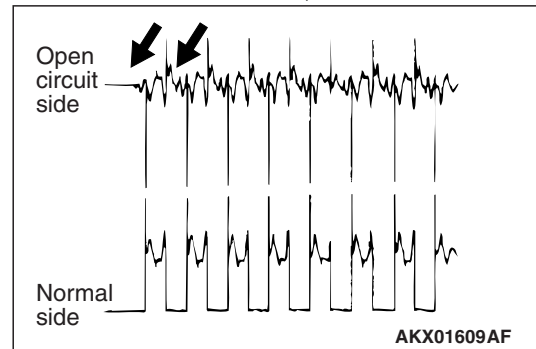
Example 1

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

M1131001000718

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.

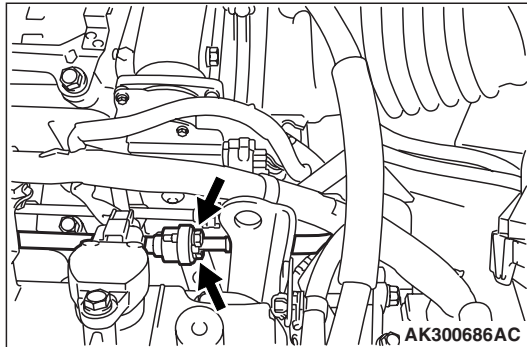
FUEL PRESSURE TEST

M1131001900852

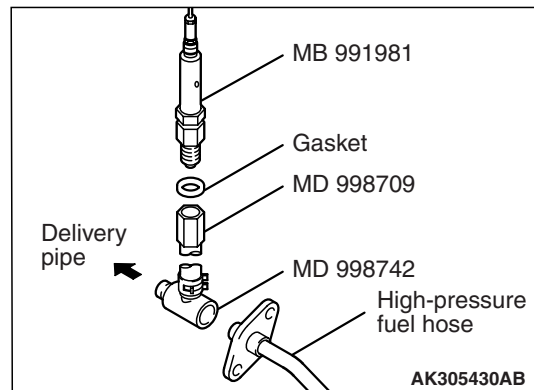
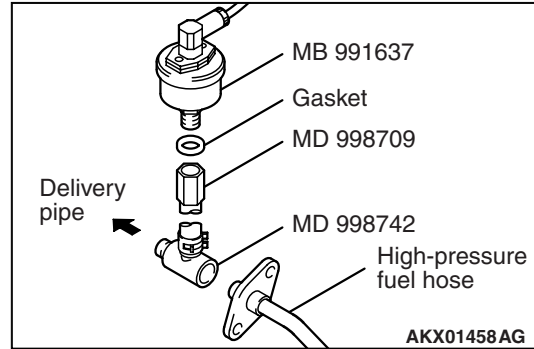
1. Release residual pressure from the fuel pipe line to prevent fuel gush out (Refer to P.13A-310).

CAUTION

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



2. Disconnect the high-pressure fuel hose at the delivery pipe side.



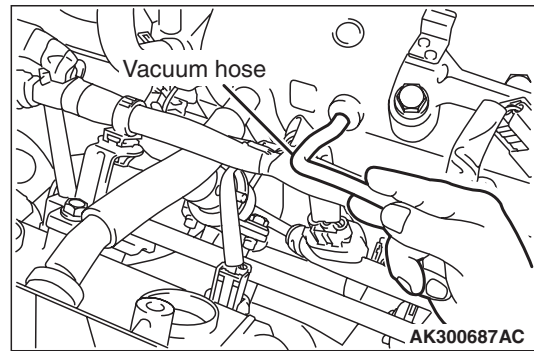
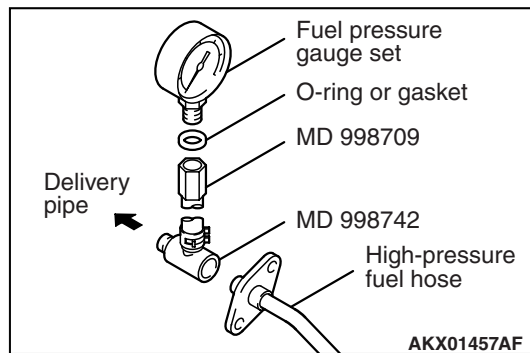
3. Assemble the fuel pressure measurement tools as follows.

<When using the fuel pressure gauge set (special tool)>

- a. Remove the union joint and bolt from the special tool adaptor hose (MD998709) and attach the special tool hose adaptor (MD998742) to the adaptor hose.
- b. Via a gasket, install the special tool fuel pressure gauge set (MB991637 or MB991981) into the special tool that has already assembled as described in (a) above.

<When using the fuel pressure gauge>

- a. Remove the union joint and bolt from special tool adaptor hose (MD998709) and attach the special tool hose adaptor (MD998742) to the adaptor hose.
- b. Via a suitable O-ring or gasket, install the fuel pressure gauge to the special tool that has already assembled as described in (a) above.



4. Install the assembled fuel pressure measurement tools between the fuel rail and high-pressure fuel hose.

CAUTION

To prevent damage to the M.U.T.-III, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting the M.U.T.-III.

5. Connect the M.U.T.-III to the diagnosis connector.
6. Turn the ignition switch to "ON" position (But do not start the engine).
7. Select "Item No. 07" from the M.U.T.-III actuator test to drive the fuel pump. Check that there are no fuel leaks from any parts.
8. Finish the actuator test or turn the ignition switch to "LOCK" (OFF) position.
9. Start the engine and run at idle.
10. Fuel pressure measurement while the engine is running at idle.

Standard value: Approximately 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-310](#)).

⚠ 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.

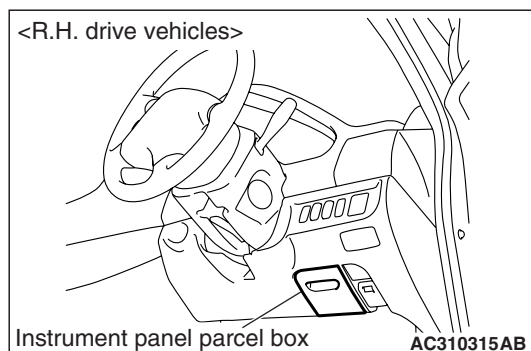
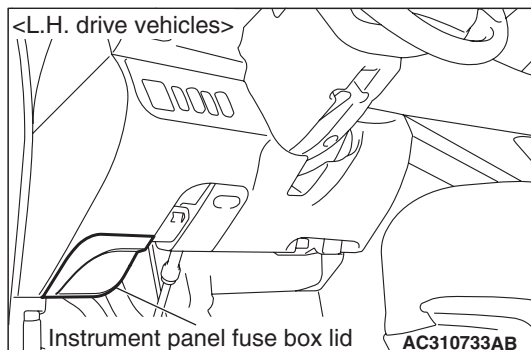
21. Disconnect the M.U.T.-III.

**FUEL PUMP RELAY DISCONNECTION
(HOW TO REDUCE PRESSURIZED FUEL
LINES)**

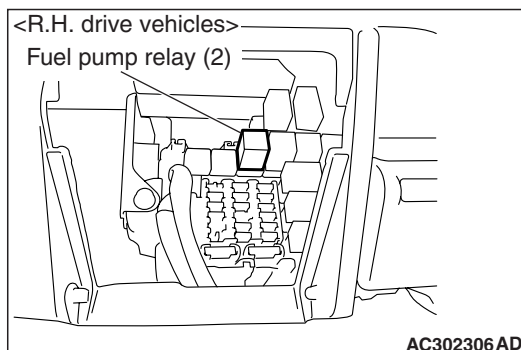
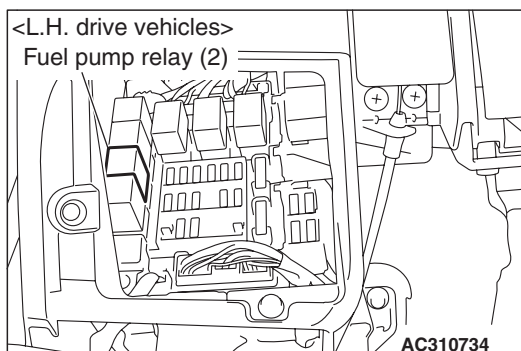
M1131000900730

⚠ 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

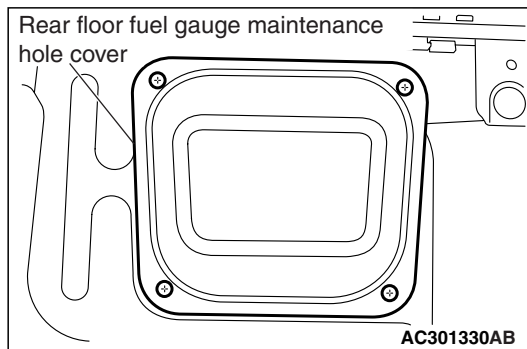
M1131002001220

1. Remove the fuel tank cap.

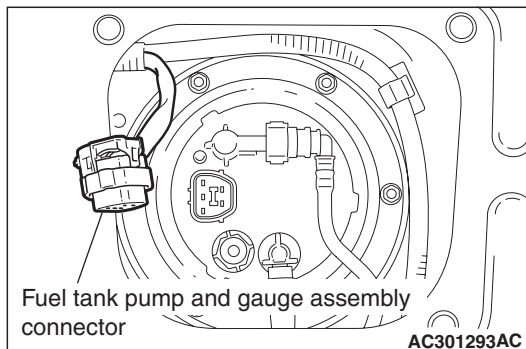
NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear. Then check the sound from the tank inlet.

2. Check the operating of the fuel pump by M.U.T.-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.

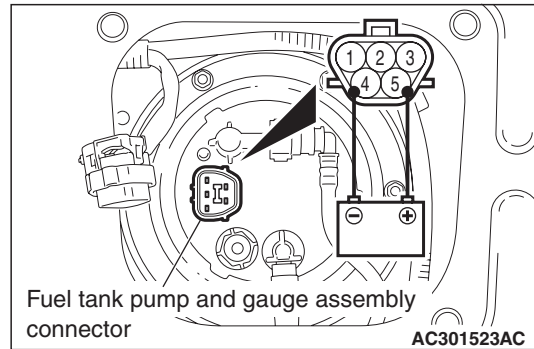
- (1) Turn the ignition switch to the "LOCK" (OFF) position.
- (2) Remove the second seat assembly, the rail cover outer and the rail cover inner. (Refer to GROUP 52A, Second Seat Assembly Removal and Installation P.52A-27).
- (3) Remove the rear scuff plate (Refer to GROUP 52A, Trim Removal and Installation 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 13D, Fuel Pump Module Disassembly and Assembly P.13D-9).

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.

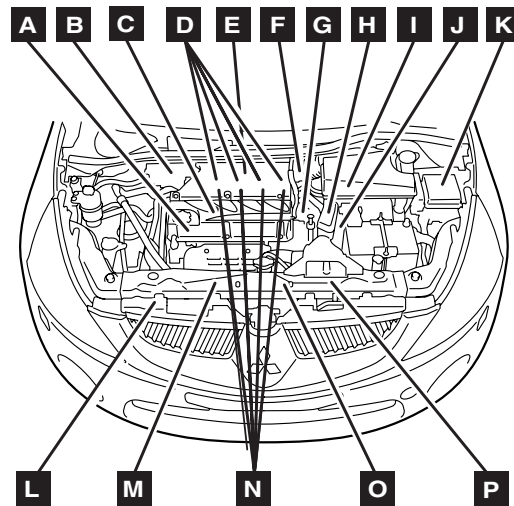
- (7) Connect fuel tank pump and gauge assembly connector.
- (8) Install the rear floor fuel gauge maintenance hole cover (LH).
- (9) Return the floor mat and install the rear scuff plate. (Refer to GROUP 52A, Trim Removal and Installation P.52A-10).
- (10) Install the rail cover outer, the rail cover inner and the second seat assembly. (Refer to GROUP 52A, Second Seat Assembly Removal and Installation P.52A-27).

4. Install the fuel tank cap.

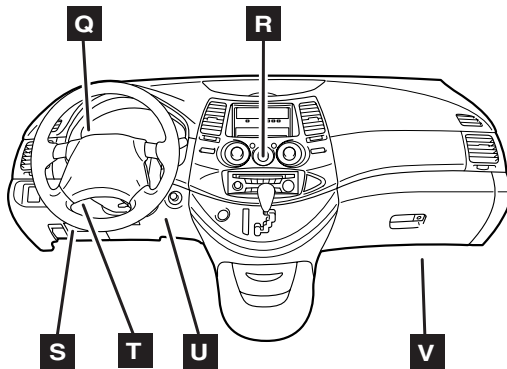
COMPONENT LOCATION

M1131002101090

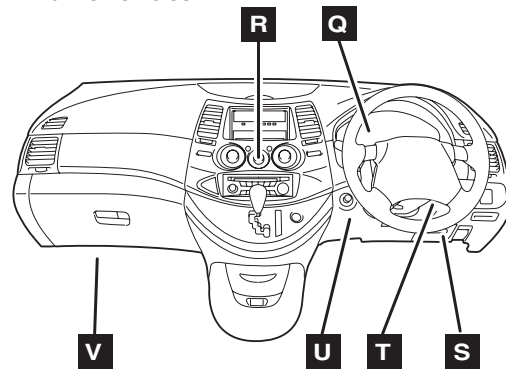
Name	Symbol	Name	Symbol
A/C relay	K	Engine coolant temperature sensor	G
A/C switch	R	Engine-ECU <M/T> or engine-A/T-ECU <A/T> (with barometric pressure sensor)	V
Accelerator pedal position sensor	S	Engine warning lamp (check engine lamp)	Q
Air flow sensor (with intake air temperature sensor)	I	Fuel pump relay (1) and (2)	T
Camshaft position sensor	G	Ignition coil	N
Crank angle sensor	L	Inhibitor switch <A/T>	P
Cylinder 1,4 oxygen sensor	M	Injector	D
Cylinder 2,3 oxygen sensor	O	Oil control valve	G
Detonation sensor	C	Power steering fluid pressure sensor (L. H. drive vehicle)	J
Diagnosis connector	U	Power steering fluid pressure sensor (R. H. drive vehicle)	A
EGR valve	E	Purge control solenoid valve	B
Electronic-controlled throttle valve (Throttle position sensor and throttle valve control servo)	F	Throttle valve control servo relay	K
Engine control relay	K	Vehicle speed sensor <M/T>	H



<L. H. drive vehicles>



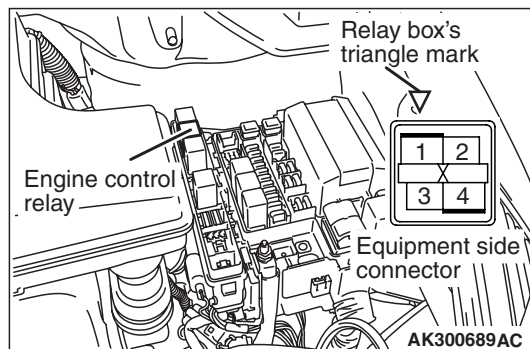
<R. H. drive vehicles>



AK305795 AB

ENGINE CONTROL RELAY CONTINUITY CHECK

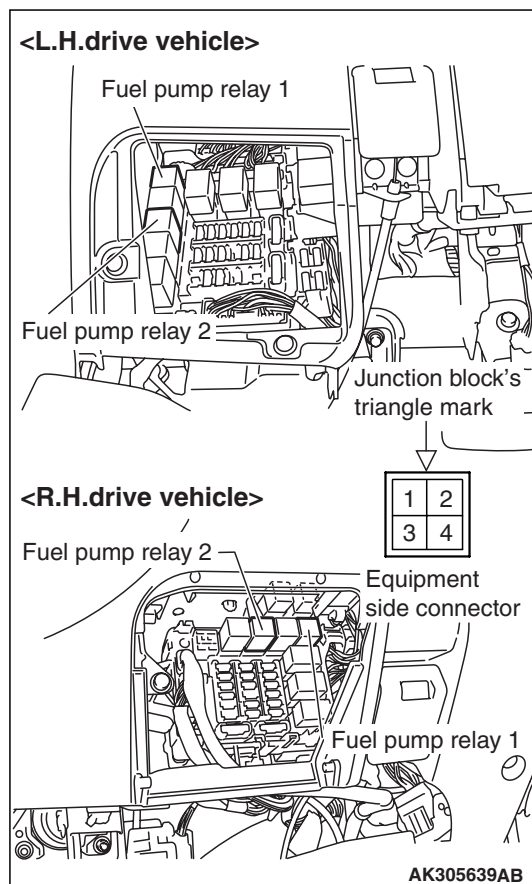
M1131050000516



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

FUEL PUMP RELAY CONTINUITY CHECK

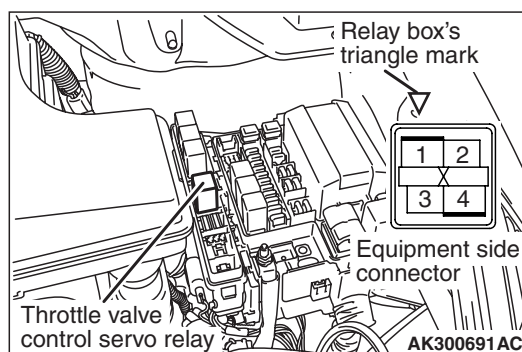
M1131033000513



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

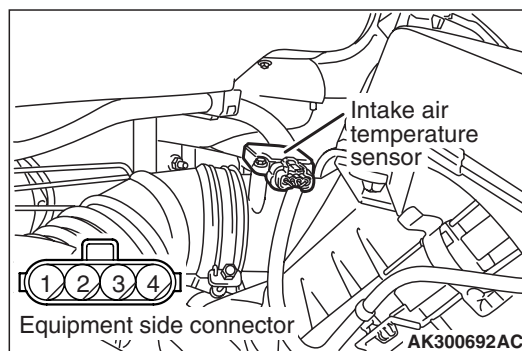
M1131053500060



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

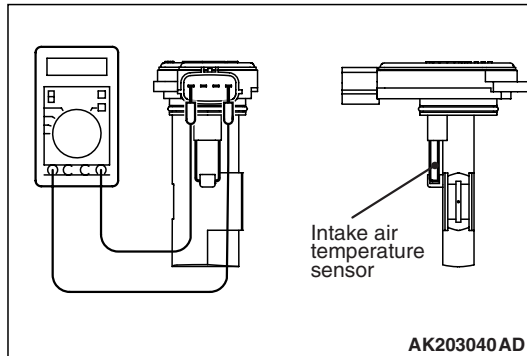
M1131002800762



1. Disconnect the air flow sensor connector.
2. Measure resistance between terminals No. 1 and No. 4.

Standard value:**13 – 17 k Ω (at -20°C)****5.3 – 6.7 k Ω (at 0°C)****2.3 – 3.0 k Ω (at 20°C)****1.0 – 1.5 k Ω (at 40°C)****0.56 – 0.76 k Ω (at 60°C)****0.30 – 0.45 k Ω (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.

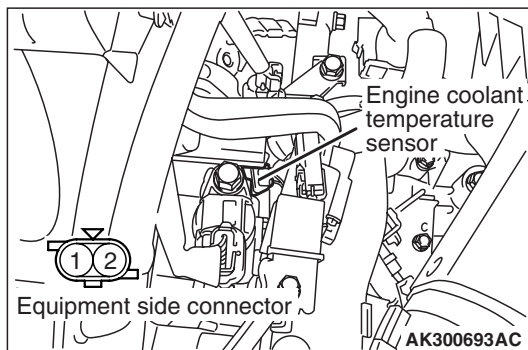
Tightening torque: 1.8 ± 0.6 N·m

ENGINE COOLANT TEMPERATURE SENSOR CHECK

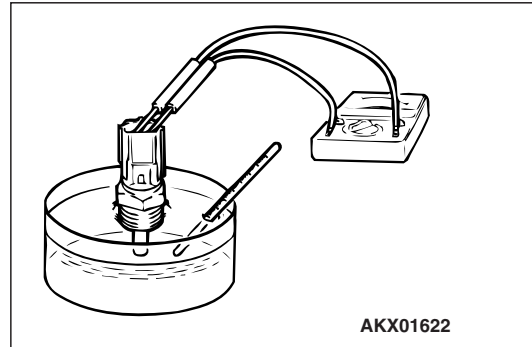
M1131003100722

⚠ 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)

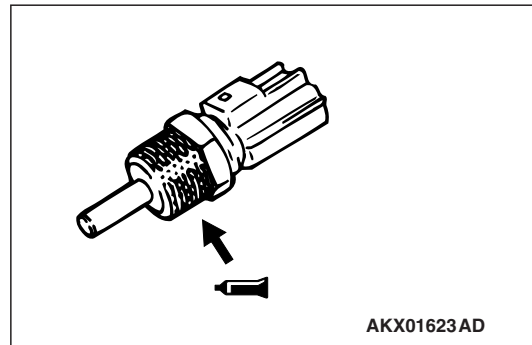
2.1 – 2.7 kΩ (at 20°C)

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

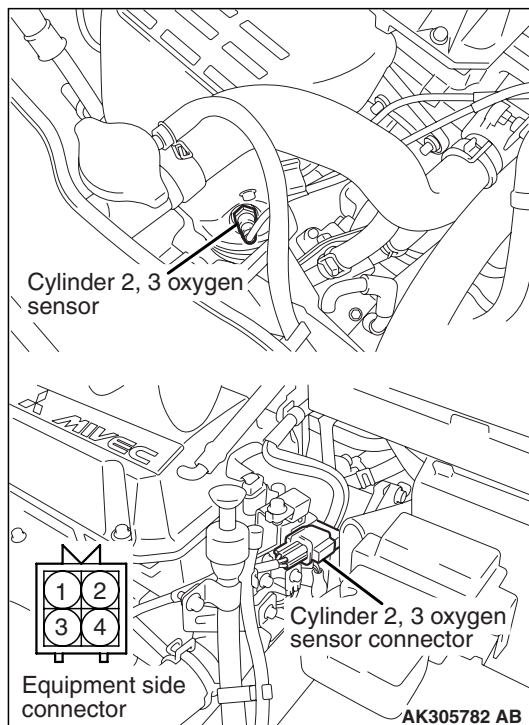
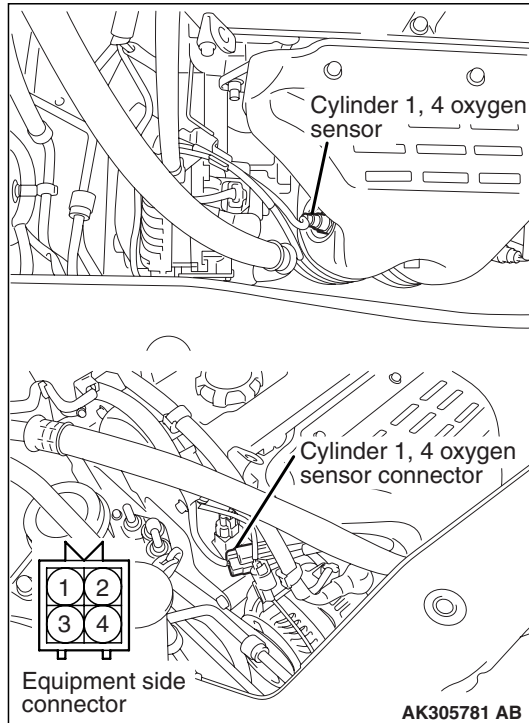
5. Install the engine coolant temperature sensor and tighten it to the specified torque.

Tightening torque: 29 ± 10 N·m

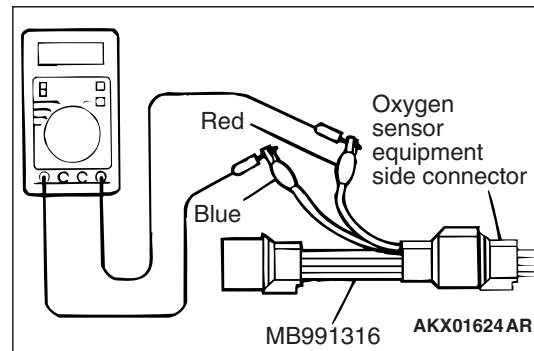
OXYGEN SENSOR CHECK

M1131005000969

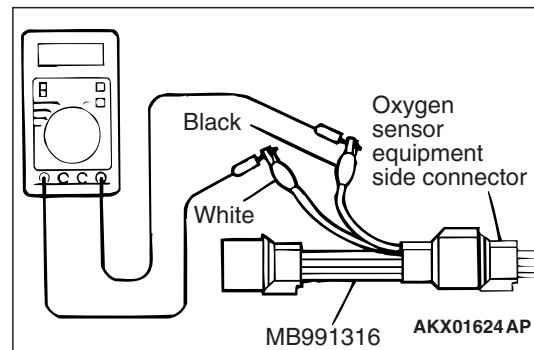
OXYGEN SENSOR



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 ($11 - 18 \Omega$ 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. 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 12 V power supply respectively, then check again.

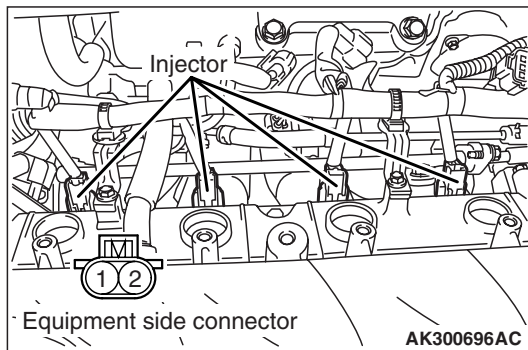
8. If the sensor is defective, replace the oxygen sensor.

NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Manifold. P.15-7.

INJECTOR CHECK

CHECK THE OPERATION SOUND

M1131005200811



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.

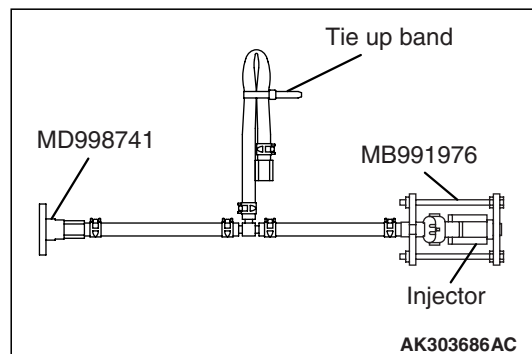
CHECK THE INJECTION CONDITION

1. Carry out the procedure to prevent flow of the fuel (Refer to P.13A-310).

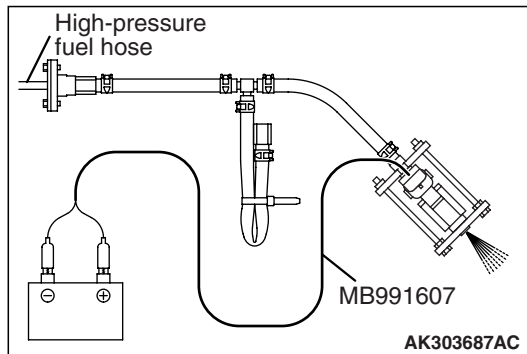
CAUTION

Do not make fuel splash by covering fuel with waste and so on because the residual pressure is in the fuel pipeline.

2. Remove the fuel high-pressure hose at the delivery pipe side.



3. Remove the injector.
4. Assemble Injector Test Set (MD998706) of the special tool as shown in Fig.
 - a. Install the injector to the installation hose for the injector and then fix it using Injector Holder (MB991976) of the special tool.
 - b. Install Injector Test Adaptor (MD998741) of the special tool to another hose connected with the installation hose for the injector.
 - c. Fold, band and tie up the rest of hose completely in order to prevent from fuel leakage because it is not used.
5. Install Injector Test Set (MD998706) of the special tool to the fuel high-pressure hose.
6. Connect the M.U.T.-III to the diagnosis connector.
7. Turn the ignition switch to "ON" position (but do not start the engine).
8. Select "Item No. 07" from M.U.T.-III actuator test and drive the fuel pump.



9. Connect Injector Test Harness (MB991607) of the special tool between the injector and battery, and then actuate the injector.
10. Check the fuel spray condition. The condition can be considered satisfactory unless it is extremely poor.
11. Stop actuating the injector. Check leakage from the injector nozzle. Turn the ignition switch to "LOCK OFF" position and then disconnect M.U.T.-III.
12. Actuate the injector until the fuel cannot flow. Draw the fuel out from the special tool.
13. Remove the special tool.
14. If the fuel spray condition is extremely poor or if there is the fuel leakage from the injector nozzle, replace the injector.
15. Install the injector and fuel high-pressure hose.

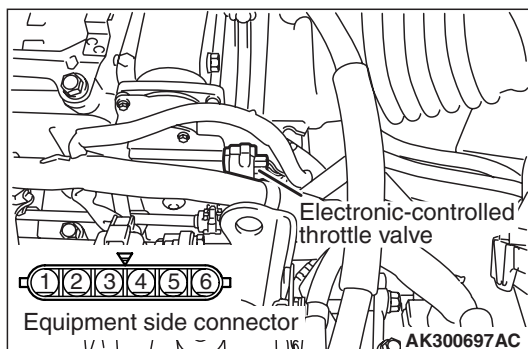
THROTTLE VALVE CONTROL SERVO CHECK

M1131051000155

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.

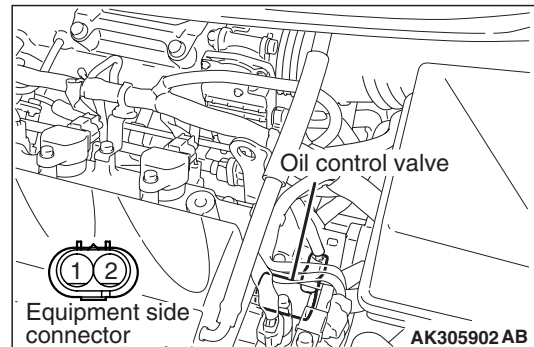
Standard value: 0.3 – 100 Ω (at 20°C)

3. If resistance is outside the standard value, replace the throttle body assembly.

OIL CONTROL VALVE CHECK

M1131053200133

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

M1131007101404

CAUTION

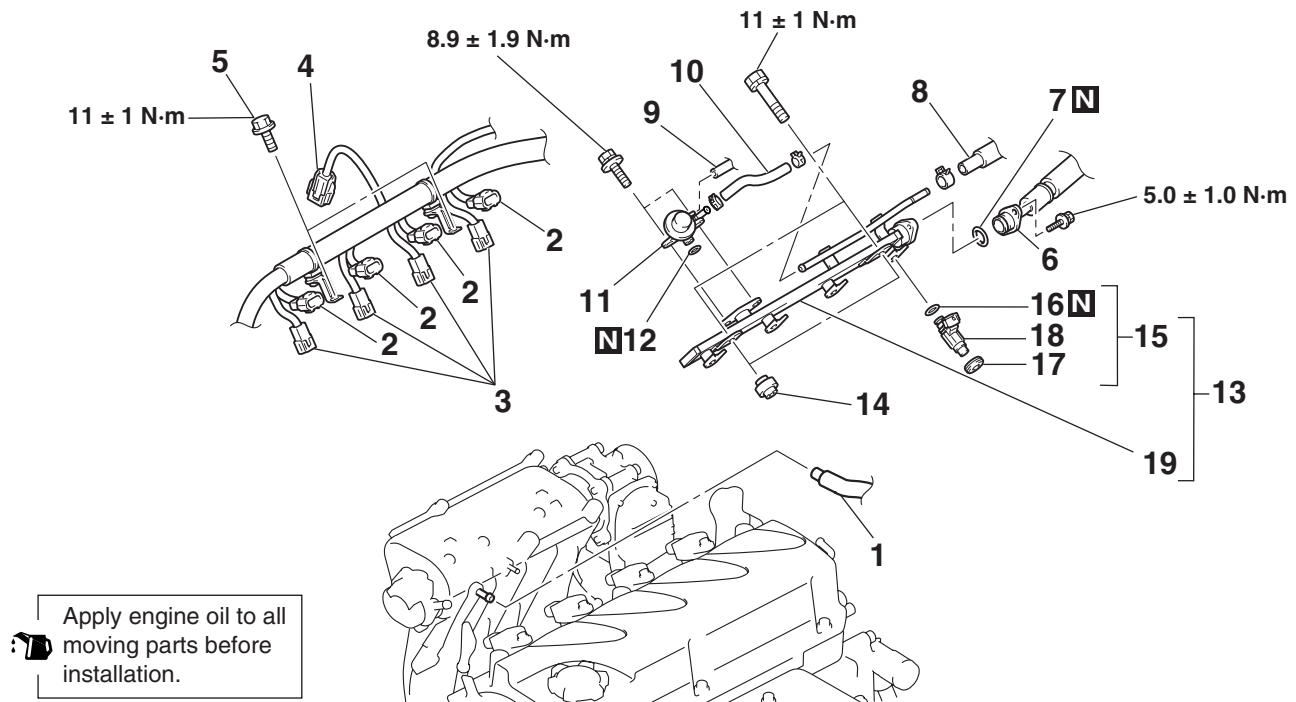
When the fuel injector replacement is performed, use the M.U.T.-III to initialize the learning value (Refer to GROUP 00, Precautions Before Service – Initialization Procedure for Learning Value in MPI Engine P.00-24).

Pre-removal Operation

- Fuel Discharge Prevention (Refer to P.13A-310).
- Engine Cover Removal (Refer to GROUP 11A, Camshaft and Valve Stem Seal P.11A-17).

Post-installation Operation

- Engine Cover Installation (Refer to GROUP 11A, Camshaft and Valve Stem Seal P.11A-17).
- Fuel Leakage Inspection.



AC501650AB

Removal steps

- PCV hose connection
- Ignition coil connector
- Fuel injector connector
- EGR valve connector
- Rocker cover bracket installation bolts
- >>B<< Fuel high-pressure hose connection
- O-ring
- Fuel return hose connection
- Emission control equip hose connection
- Fuel injector hose

Removal steps (Continued)

- >>B<< 11. MPI delivery pipe pressure regulator
12. O-ring
- <<A>> 13. Fuel delivery pipe and fuel injector assembly
14. Fuel injector insulator
- >>B<< 15. Fuel injector assembly
16. O-ring
17. Fuel injector insulator
- >>A<< 18. Fuel injectors
19. Fuel delivery pipe

REMOVAL SERVICE POINT

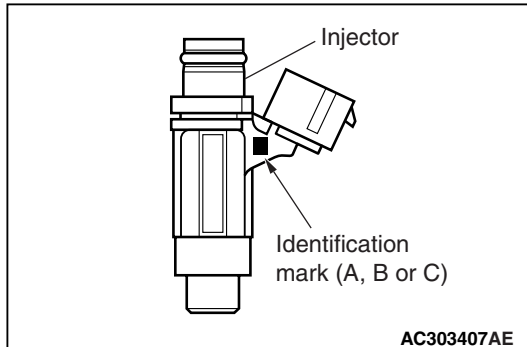
<<A>> FUEL DELIVERY PIPE AND FUEL
INJECTOR ASSEMBLY REMOVAL**⚠ CAUTION**

Do not drop the injector.

Remove the fuel delivery pipe with the fuel injector assembly attached to it.

INSTALLATION SERVICE POINTS

>>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/MPI
DELIVERY PIPE PRESSURE
REGULATOR/FUEL HIGH-PRESSURE
HOSE INSTALLATION**⚠ CAUTION**

Do not let the engine oil get into the delivery pipe will be damaged.

1. Apply a drop of new engine oil to the O-ring.
2. Turn the fuel injector assembly to the right and left to install to the fuel delivery pipe. Repeat for 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 MPI delivery pipe pressure regulator and fuel high-pressure hose to the specified torque.

Tightening torque:

8.9 ± 1.9 N·m <MPI delivery pipe pressure regulator>

5.0 ± 1.0 N·m <Fuel high-pressure hose>

THROTTLE BODY ASSEMBLY

REMOVAL AND INSTALLATION

M1131007701291

CAUTION

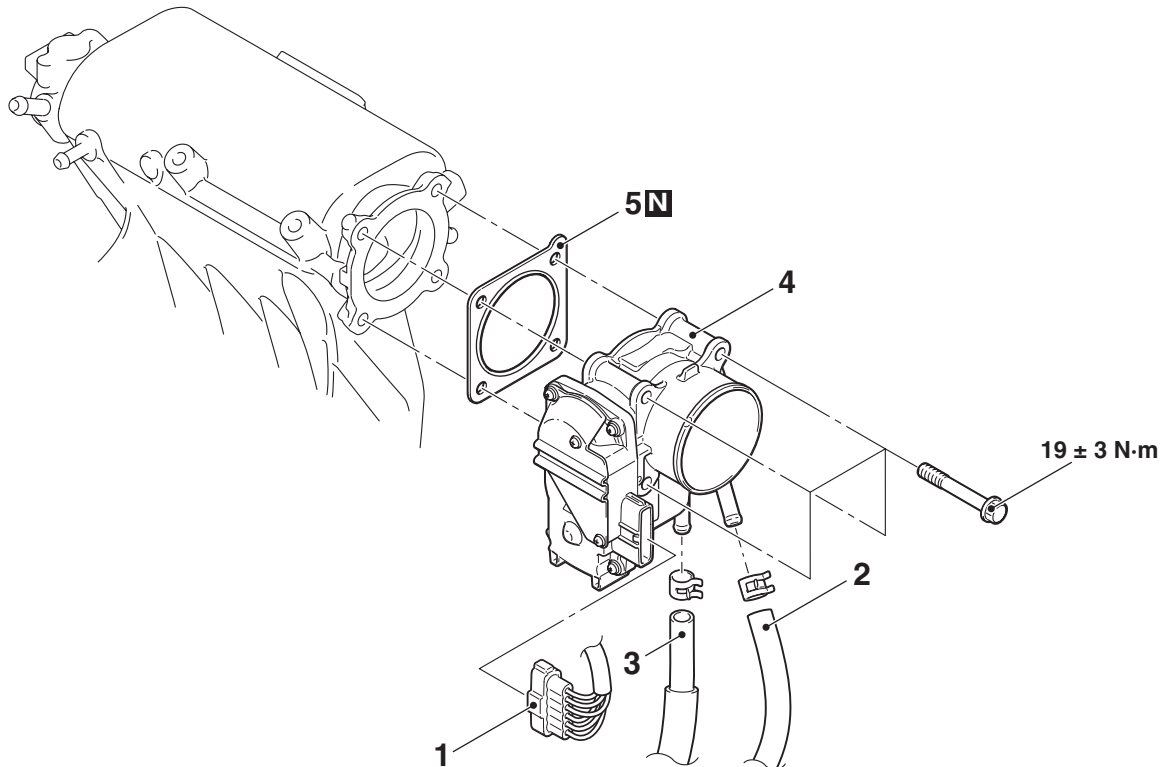
- When the throttle body assembly replacement is performed, use the M.U.T.-III to initialize the learning value (Refer to GROUP 00, Precautions Before Service – Initialization Procedure for Learning Value in MPI Engine P.00-24).
- Do not loosen the fixing screws for the resin cover of throttle body assembly. 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-17).
- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-18).
- 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.14-18).
- Engine Cover Installation (Refer to GROUP 11A, Camshaft and Valve Stem Seal P.11A-17).



AC304161AE

Removal steps

- >>B<<
- Initialization (Installation only)
1. Throttle position sensor connector
 2. Water return hose connection

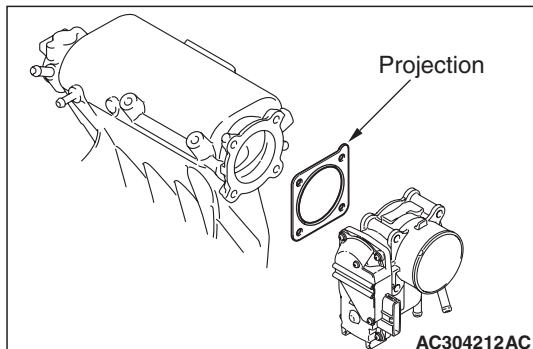
Removal steps (Continued)

- >>A<<
3. Water feed hose connection
 4. Throttle body assembly
 5. Throttle body gasket

INSTALLATION SERVICE POINTS

>>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

M1131022500149

<L.H. drive vehicles>

CAUTION

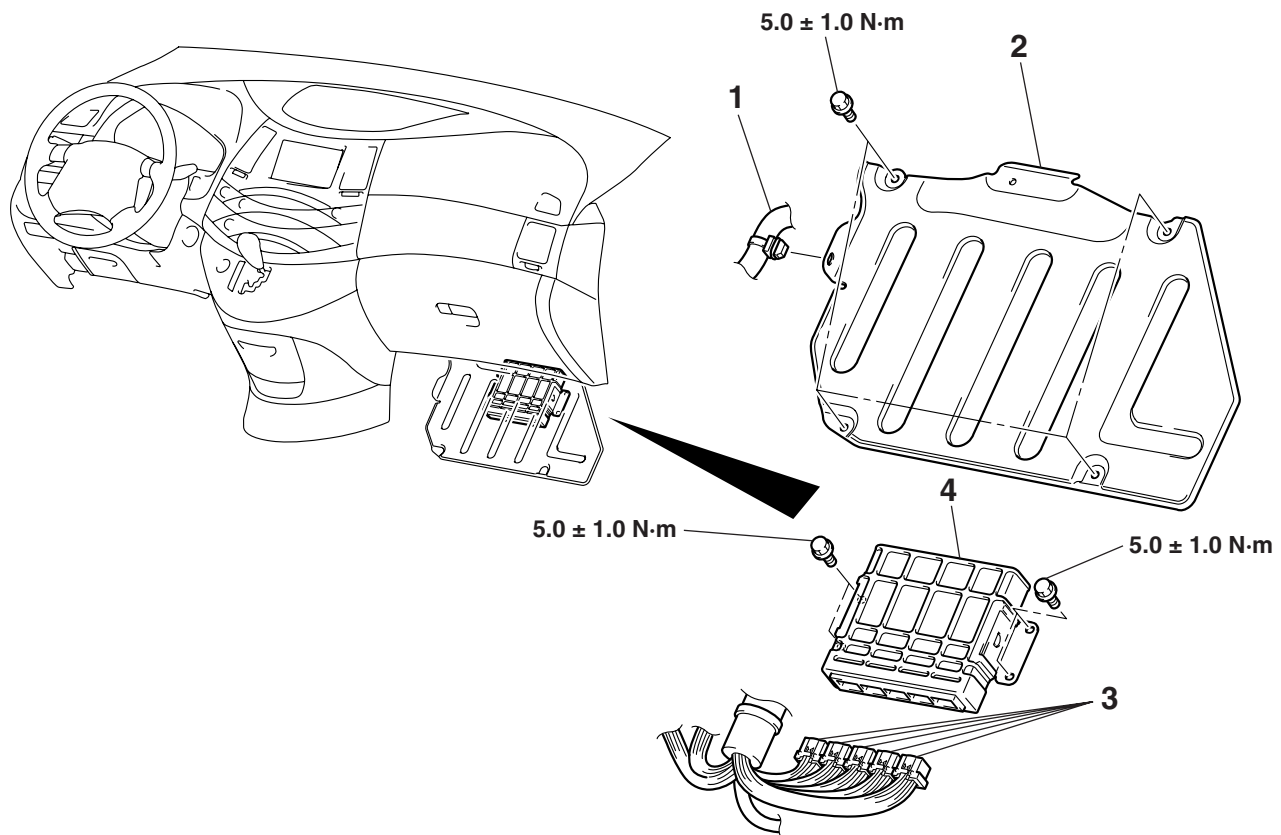
Always register the ignition key(s) when the engine-ECU <M/T> or the engine-A/T-ECU <A/T> is replaced (Refer to GROUP 54A, On-vehicle Service - Immobilizer ID Code Registration [P.54A-44](#)) <Vehicles for GCC>.

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](#)).



AC310595AB

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.

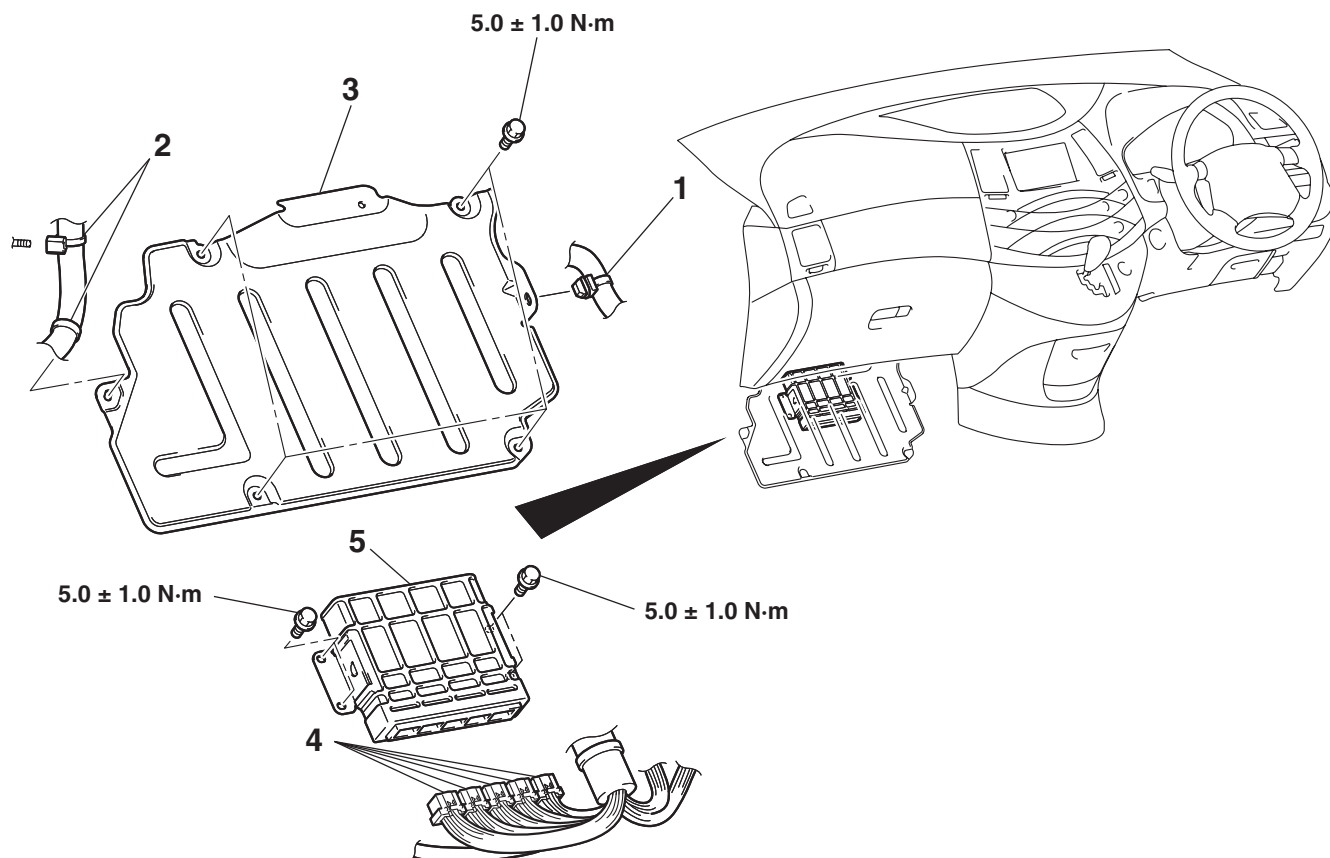
<R.H. drive vehicles>

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-A/T-ECU connector
 5. Engine-A/T-ECU

INSTALLATION SERVICE POINT**>>A<< INITIALIZATION**

When the Engine-A/T-ECU 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.