GROUP 13A

MULTIPORT FUEL INJECTION (MPI)

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GENERAL INFORMATION

M1131000102462

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 <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.

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

THROTTLE VALVE OPENING CONTROL

This system electrically controls the opening of the throttle valve. The engine-ECU <M/T> or engine-A/T-ECU <A/T> detects the amount of travel of the accelerator pedal via the accelerator pedal position sensor, and controls the actuation of the throttle actuator control 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.

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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.-II/III. In addition, the actuators can be force-driven under certain circumstances.

OTHER CONTROL FUNCTIONS

1. Fuel Pump Control
   Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.
2. A/C Relay Control
   Turns the compressor clutch of the A/C ON and OFF.
3. 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 Momtrol
   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.17-52, GROUP 17 – Engine And Emission Control –Evaporative Emission Control System).
7. EGR Control Solenoid Valve Control
   [Refer to P.17-55, GROUP 17 – Engine And Emission Control – Exhaust Gas Recirculation (EGR) System].

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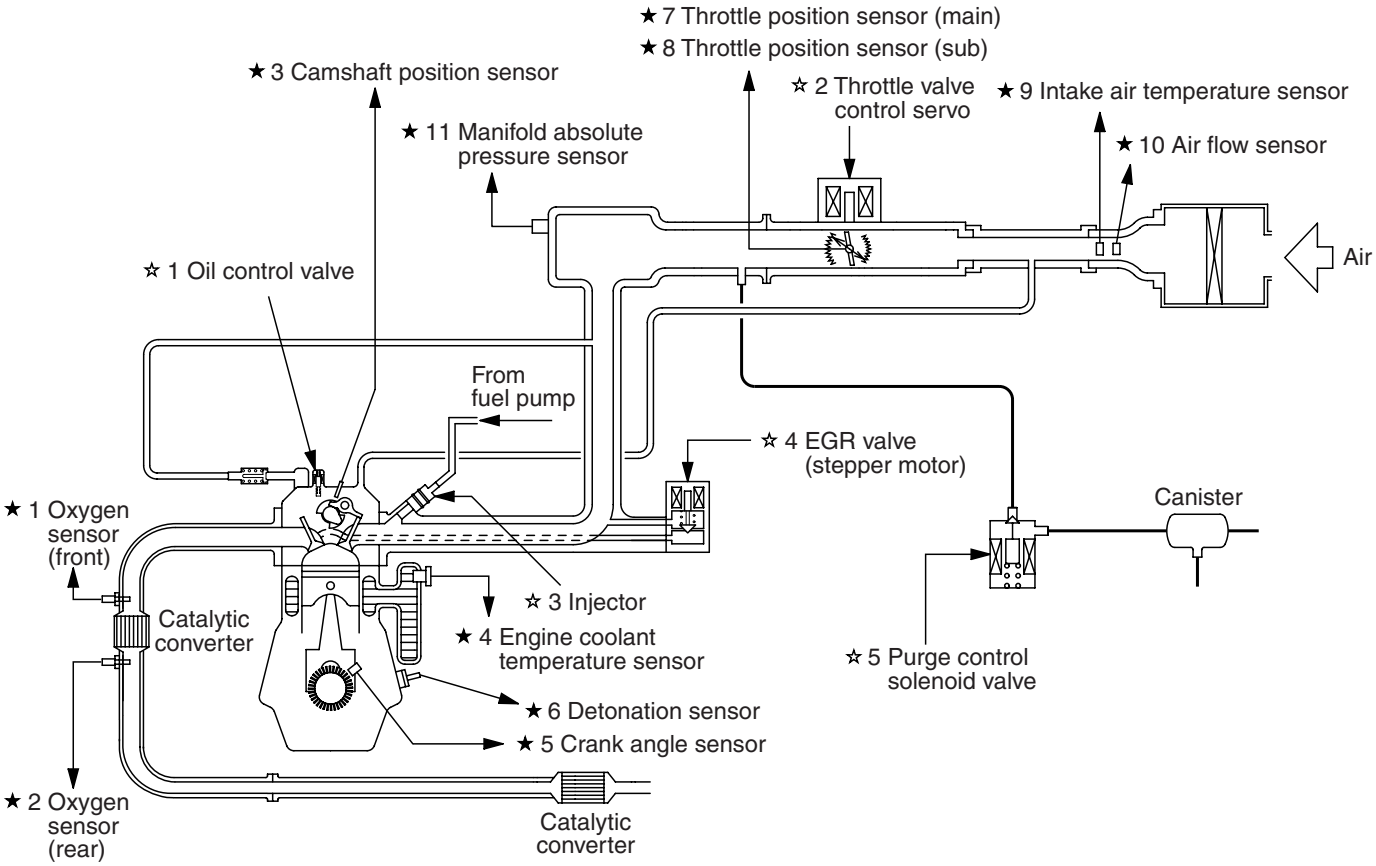
GENERAL SPECIFICATIONS

Items		Specifications
Throttle body	Throttle bore mm	60
	Throttle position sensor	Hall element type
	Throttle valve control servo	DC motor type, having broshes
Engine-ECU <M/T>	Identification No.	E6T46971
Engine-A/T-ECU <A/T>	Identification No.	E6T37982
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	Variable resistor type
	Accelerator pedal position switch	Contact switch 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
	Manifold absolute pressure sensor	Semiconductor type
	Power steering fluid pressure switch	Contact switch type
Actuators	Engine control relay type	Contact switch type
	Fuel pump relay type	Contact switch type
	Injector type and number	Electromagnetic type, 4
	Injector identification mark	HDA305E
	Throttle actuator control motor relay	Contact switch type
	Oil control valve	Duty cycle type solenoid valve
	EGR valve	Stepper motor
	Purge control solenoid valve	Duty cycle type solenoid valve
Fuel pressure regulator	Regulator pressure kPa	324

MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM

★ 1 Oxygen sensor (front) ★ 2 Oxygen sensor (rear) ★ 3 Camshaft position sensor ★ 4 Engine coolant temperature sensor ★ 5 Crank angle sensor ★ 6 Detonation sensor ★ 7 Throttle position sensor (main) ★ 8 Throttle position sensor (sub) ★ 9 Intake air temperature sensor ★ 10 Air flow sensor ★ 11 Manifold absolute pressure sensor	● Power supply ● Ignition switch-IG ● Ignition switch-ST ● A/C switch ● A/C load signal ● Power steering fluid pressure switch ● Alternator FR terminal ● Accelerator pedal position switch ● Accelerator pedal position sensor (main) ● Accelerator pedal position sensor (sub) ● Vehicle speed sensor <M/T> ● Inhibitor switch <A/T>	⇨	Engine-ECU <M/T> or Engine-A/T-ECU <A/T> ●Barometric pressure sensor	⇨	☆ 1 Oil control valve ☆ 2 Throttle valve control servo ☆ 3 Injector ☆ 4 EGR valve (Stepper motor) ☆ 5 Purge control solenoid valve	● Engine control relay ● Fuel pump relay ● A/C compressor relay ● Throttle valve control servo relay ● Ignition coil ● Fan controller ● Engine warning lamp ● Diagnosis output ● Alternator G terminal ● Tachometer ● Oxygen sensor heater (front) ● Oxygen sensor heater (rear)



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SERVICE SPECIFICATIONS

M1131000301474

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
Accelerator pedal position sensor resistance kΩ		3.5 – 6.5
Oxygen sensor output voltage (at racing) V		0.6 – 1.0
Oxygen sensor heater resistance (at 20° C) Ω	front	4.5 – 8.0
	rear	11 – 18
Fuel pressure kPa		Approximately. 324 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 resistance (at 20° C) Ω		6.9 – 7.9

SEALANT

M1131000501003

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

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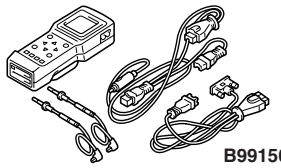
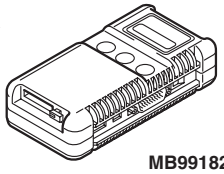
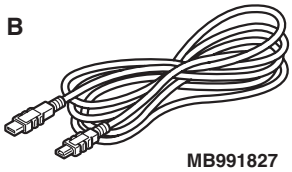
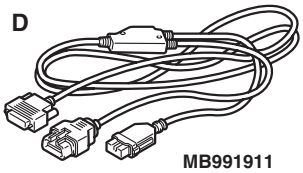
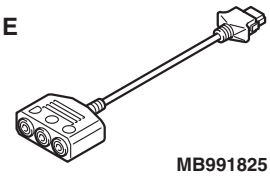
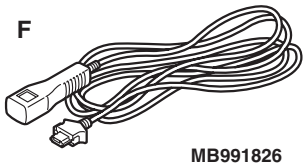
SPECIAL TOOLS

M1131000601594

Tool	Number	Name	Use
 B991502	MB991502	M.U.T.-II sub assembly	• Reading diagnosis code • MPI system inspection • Measurement of fuel pressure
A  MB991824 B  MB991827 C MB991910 D  MB991911 E  MB991825 F  MB991826 MB991955	MB991955 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991825 F: MB991826	M.U.T.-III sub assembly A: Vehicle communication interface (V.C.I.) B: M.U.T.-III USB cable C: M.U.T.-III main harness A (Vehicles with CAN communication system) D: M.U.T.-III main harness B (Vehicles without CAN communication system) E: M.U.T.-III measurement adapter F: M.U.T.-III trigger harness	• Reading diagnosis code • MPI system inspection • Measurement of fuel pressure
MB991348	MB991348	Test harness set	• Measurement of voltage during troubleshooting

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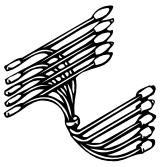
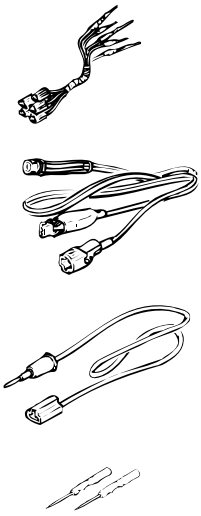
Tool	Number	Name	Use
	MB991709	Test harness	• Measurement of voltage during troubleshooting • Inspection using an oscilloscope
	MD998464	Test harness (4-pin, square)	• Measurement of voltage during Troubleshooting • Inspection of oxygen sensor (front)
 MB991658	MB991658	Test harness	• Measurement of voltage during Troubleshooting • Inspection using an oscilloscope • Inspection of oxygen sensor (rear)
 MB991223	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	• Check at the engine-ECU <M/T> or engine-A/T-ECU <A/T> terminals A: Connector pin contact inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection

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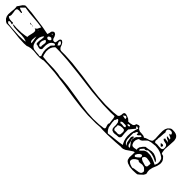
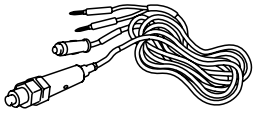
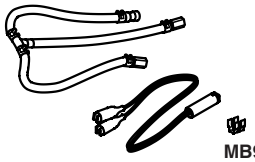
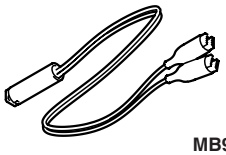
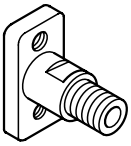
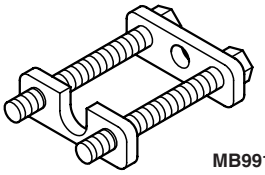
Tool	Number	Name	Use
	MD998709	Adaptor hose	Measurement of fuel pressure
	MD998742	Hose adaptor	
 MB991981	MB991981	Fuel pressure gauge set	
 MB992076	MB992076	Injector test set	Checking the spray condition of injectors
 MB991607	MB991607	Injector test harness	
 MD998741	MD998741	Injector test adaptor	
 MB991976	MB991976	Injector test holder assembly	

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TROUBLESHOOTING

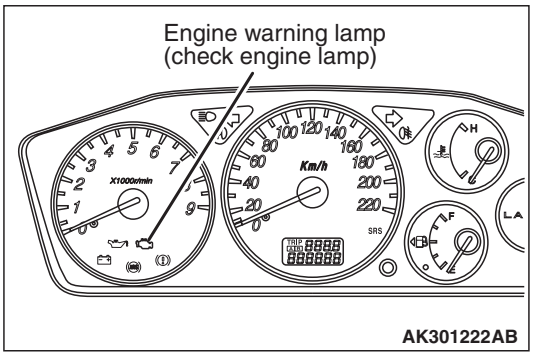
DIAGNOSIS TROUBLESHOOTING FLOW

Refer to P.00-13, GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions.

DIAGNOSIS FUNCTION

M1131155501550

ENGINE WARNING LAMP (CHECK ENGINE LAMP)



M1131150001602

If an abnormality occurs in any of the following items related to the Multipoint Fuel Injection (MPI) system, the engine warning lamp will illuminate.
If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.

ENGINE WARNING LAMP INSPECTION ITEMS

Code No.	Diagnosis item
–	Engine-ECU <M/T> or engine-A/T-ECU <A/T>
P0100	Air flow sensor system
P0105	Manifold absolute pressure sensor system
P0110	Intake air temperature sensor system
P0115	Engine coolant temperature sensor system
P0122*	Throttle position sensor (main) circuit low input
P0123*	Throttle position sensor (main) circuit high input
P0125*	Feedback system monitor
P0130	Oxygen sensor (front) system
P0135	Oxygen sensor (front) heater system
P0136	Oxygen sensor (rear) system
P0141	Oxygen sensor (rear) heater system
P0170	Abnormal fuel system
P0201	No. 1 injector system
P0202	No. 2 injector system
P0203	No. 3 injector system
P0204	No. 4 injector system
P0222*	Throttle position sensor (sub) circuit low input
P0223*	Throttle position sensor (sub) circuit high input
P0300*	Random/multiple cylinder misfire detected
P0301*	No. 1 cylinder misfire detected
P0302*	No. 2 cylinder misfire detected

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Code No.	Diagnosis item
P0303*	No. 3 cylinder misfire detected
P0304*	No. 4 cylinder misfire detected
P0335	Crank angle sensor system
P0340	Camshaft position sensor system
P0403	Exhaust gas recirculation control system
P0421	Warm up catalyst malfunction
P0443	Purge control solenoid valve system
P0500	Vehicle speed sensor system <M/T>
P0513	Immobilizer malfunction
P0551*	Power steering fluid pressure switch system
P0603	EEP ROM malfunction
P0606*	Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction
P0638*	Throttle valve control servo circuit range/performance problem
P0642*	Throttle position sensor power supply
P0657*	Throttle valve control servo relay circuit malfunction
P0705	Inhibitor switch system
P0710	A/T fluid temperature sensor system
P0715*	Input shaft speed sensor system
P0720*	Output shaft speed sensor system
P0740*	Torque converter clutch solenoid valve system
P0750*	Low-reverse solenoid valve system
P0755*	Underdrive solenoid valve system
P0760*	Second solenoid valve system
P0765*	Overdrive solenoid valve system
P1021	Oil control valve system
P1602*	Communication malfunction (between engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor and system LSI)
P1603*	Battery backup circuit malfunction
P1751*	A/T control relay system
P2100*	Throttle valve control servo circuit (open)
P2102*	Throttle valve control servo circuit (shorted low)
P2121*	Accelerator pedal position sensor (main) circuit range/performance problem
P2122*	Accelerator pedal position sensor (main) circuit low input
P2123*	Accelerator pedal position sensor (main) circuit high input
P2126*	Accelerator pedal position sensor (sub) circuit range/performance problem
P2127*	Accelerator pedal position sensor (sub) circuit low input
P2128*	Accelerator pedal position sensor (sub) circuit high input
P2135*	Throttle position sensor (main and sub) range/performance problem

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Code No.	Diagnosis item
P2138*	Accelerator pedal position sensor (main and sub) range/performance problem
P2173*	Abnormal intake air amount
P2226	Barometric pressure sensor system

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.-II/III and the engine-ECU <M/T> or engine-A/T-ECU <A/T> is impossible. In this case, the diagnosis code cannot be read.*
- *After the engine-ECU <M/T> or engine-A/T-ECU <A/T> has detected a malfunction, the engine warning lamp illuminates when the engine is next turned on and the same malfunction is re-detected.However, for items marked with a "*" in the diagnosis code number column, the engine warning lamp illuminates only on the first detection of the malfunction.*
- *After the engine warning lamp illuminates, it will be switched off under the following conditions.*
  - *When the engine-ECU <M/T> or engine-A/T-ECU <A/T> monitored the power train malfunction three times* met set condition requirements, it detected no malfunction.*

  **: In this case, "one time" indicates from engine start to stop.*
  - *For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.*
- *Sensor 1 indicates, the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.*

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METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to P.00-13, GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions.

DIAGNOSIS USING DIAGNOSIS 2 CODES

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

NOTE: By turning the ignition switch to OFF, the ENGINE-ECU <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.-II/III DATA LIST AND ACTUATOR TESTING

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

FREEZE FRAME DATA

When the engine-ECU <M/T> or engine-A/T-ECU <A/T> detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called "Freeze frame data". By analyzing this "Freeze frame" data with the M.U.T.-II/III, an effective troubleshooting can be performed.
The display items of freeze frame data are shown below.

DISPLAY ITEM LIST

Item No.	Data		Unit
12	Air flow sensor		°C
13	Intake air temperature sensor		r/min
21	Engine coolant temperature sensor		°C
22	Crank angle sensor		r/min
24	Vehicle speed		km/h
44	Ignition advance		km/h
81	Long-term fuel compensation		%
82	Short-term fuel compensation		%
88	Fuel control condition	Open loop	OL
		Closed loop	CL
		Open loop owing to drive condition	OL-DRV.
		Open loop owing to system malfunction	OL-SYS.
		Closed loop based on one oxygen sensor	CL- H02S
87	Calculation load value		%
8A	Throttle position sensor (main)		%
–	Diagnosis code during data recording		–

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

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DRIVE CYCLE

The following five drive cycle patterns are performed on the diagnosis codes monitored during the vehicle driving. The vehicle driving requires the patterns to identify the fault. In other words, doing such a drive allows to regenerate any kind of trouble which involves illuminating the engine warming lamp (check engine lamp) and to verify the repair procedure has eliminated the trouble [the engine warming lamp (check engine lamp) is no longer illuminated].

⚠ CAUTION

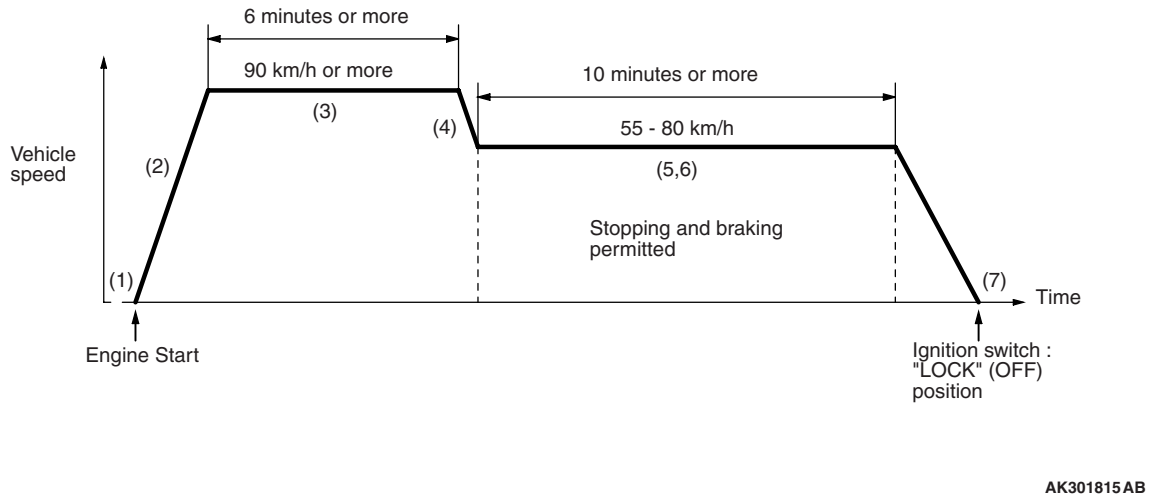
Two technicians should always be in the vehicle when carrying out a test drive.

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

DRIVE CYCLE PATTERN LIST

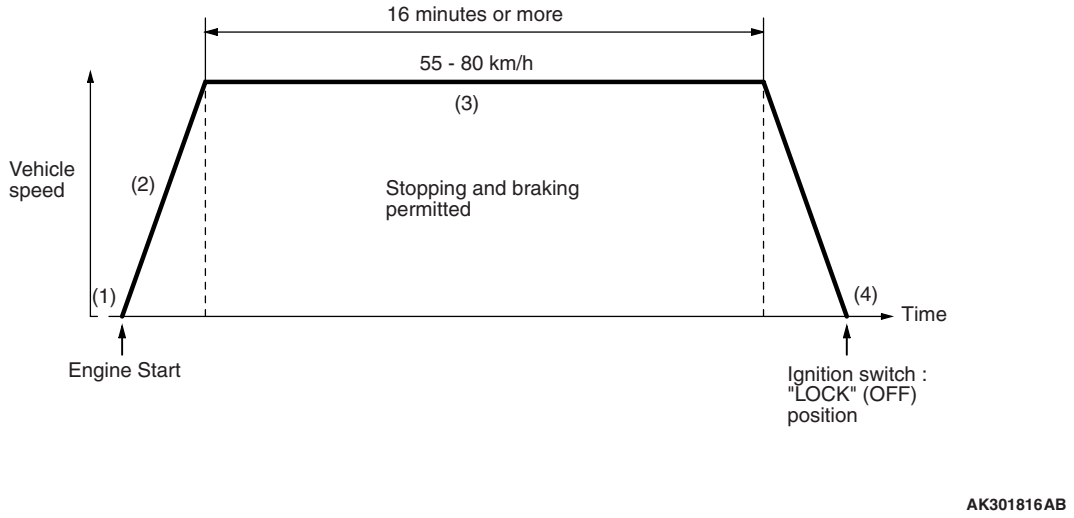
Procedure	Monitor item	Diagnosis code
1	Catalytic converter monitor	P0421
2	Oxygen sensor (front) monitor	P0130
3	Other monitor	P0135, P0136, P0141, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0325, P0551, P0638

Procedure 1

Catalytic converter monitor	
Diagnosis code No.	P0421
Drive cycle pattern	One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 16 minutes or more. 
Inspection condition	• Atmospheric temperature: –10° C or more

Catalytic converter monitor	
Test procedure	1. Engine: start 2. Accelerate until the vehicle speed is 90 km/h or more. 3. Travel for 6 minutes or more while keeping the vehicle speed at 90 km/h or more. 4. Decelerate until the vehicle speed is within 80 km/h or less. 5. While traveling at 55 – 80 km/h for 10 minutes or more, fully close the throttle at least once in 2 minutes and decelerate for 10 seconds or more. • Do not repeat deceleration too often. • Vehicle speed may go below 55 km/h after the deceleration. • Stopping and braking are permitted. (If stopped or drive at 55 km/h or less for more than 5 minutes the monitoring may be stopped. In this case please restart monitoring from the beginning.) 6. After completing the above deceleration, bring the vehicle speed back to 55 – 80 km/h and keep it in the range until starting the deceleration again. • Repeat the above deceleration at least 5 times. 7. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position.

Procedure 2

Oxygen sensor (front) monitor	
Diagnosis code No.	P0130
Drive cycle pattern	One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 16 minutes or more. 
Inspection conditions	• Engine coolant temperature: After engine warm up • Atmospheric temperature: –10° C or more
Test procedure	1. Engine: start 2. Accelerate until the vehicle speed is 55 – 80 km/h. 3. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 55 – 80km/h and travel for 16 minutes or more. • Stopping and braking during this operation are permitted. 4. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position.

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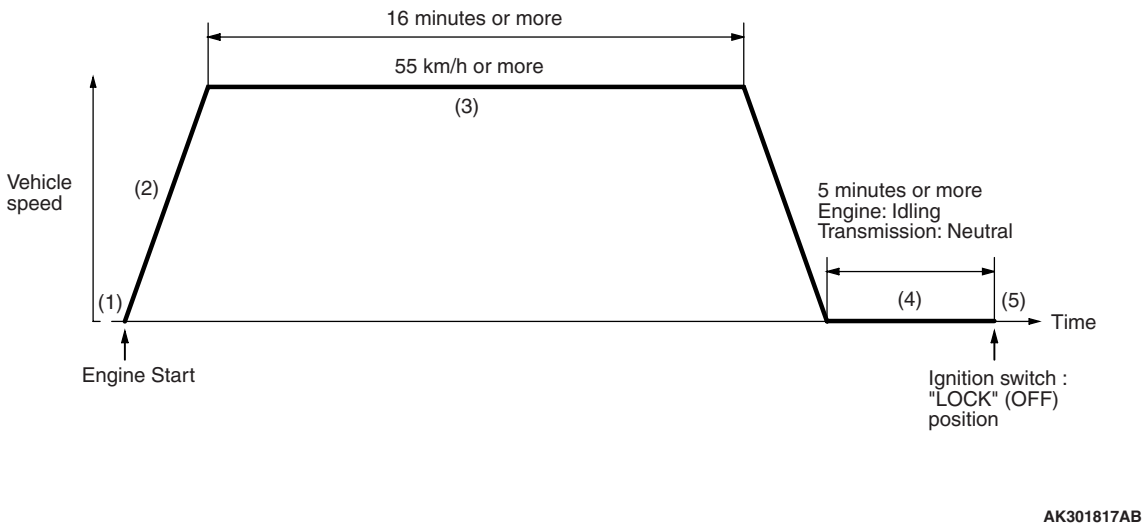
Procedure 3

Other monitor	
Diagnosis code No.	P0135, P0136, P0141, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0325, P0551, P0638
Drive cycle pattern	One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 21 minutes or more. 
Inspection conditions	• Engine coolant temperature: After engine warm up • Atmospheric temperature: –10° C or more
Test procedure	1. Engine: start 2. Accelerate until the vehicle speed is 55 km/h. 3. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 55 km/h and travel for 16 minutes or more. 4. Return the vehicle to the shop. 5. After stopping the vehicle, continue idling for 5 minutes, and then turn the ignition switch to "LOCK" (OFF) position.

READINESS TEST STATUS

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

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

- Catalyst: P0421
- Oxygen sensor: P0130, P0136
- Oxygen sensor heater: P0135, P0141

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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)	• 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)	• 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)	• 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)	• Detects the amount of the accelerator pedal travel through the use of the accelerator pedal position sensor (main) signal, but rendering it only as being approximately one-half the normal opening angle. • Cuts off fuel when the engine speed exceeds 3,000 r/min. • Suppresses the engine output by stopping the electronic-controlled throttle valve system if the accelerator pedal position sensor (main) is also malfunctioning.
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80° C. (This control will be continued until the ignition switch is turned to the "LOCK" (OFF) position even though the sensor signal returns to normal.)
Camshaft position sensor	Injects fuel into the cylinders in the order 1 - 3 - 4 - 2 with irregular timing. (After the ignition switch is turned to the "ON" position, the No. 1 cylinder top dead center is not detected at all.)
Oxygen sensor (front)	Air/fuel ratio closed loop control is not performed.
Oxygen sensor (rear)	Performs the closed loop control of the air/fuel ratio by using only the signal of the oxygen sensor (front) installed on the front side of the catalytic converter.

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Malfunctioning item	Control contents during malfunction
Detonation sensor	Switches the ignition timing from ignition timing for high octane to ignition timing for standard octane fuel.
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	• 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	• 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	• 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	• 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	• Suppresses the engine output by stopping the electronic-controlled throttle valve system. • Prohibits the operation of engine speed feedback.
Oil control valve	• Do not switch to high-speed cam. • Cut off fuel when the engine speed exceeds 5,000 r/min.

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INSPECTION CHART FOR DIAGNOSIS CODE

M1131151001995

Code No.	Diagnosis item	Reference page
P0100	Air flow sensor system	P.13A-22
P0105	Manifold absolute pressure sensor system	P.13A-27
P0110	Intake air temperature sensor system	P.13A-34
P0115	Engine coolant temperature sensor system	P.13A-40
P0122*	Throttle position sensor (main) circuit low input	P.13A-46
P0123*	Throttle position sensor (main) circuit high input	P.13A-50
P0125*	Feedback system monitor	P.13A-53
P0130	Oxygen sensor (front) system	P.13A-57
P0135	Oxygen sensor (front) heater system	P.13A-62
P0136	Oxygen sensor (rear) system	P.13A-67
P0141	Oxygen sensor (rear) heater system	P.13A-73
P0170	Abnormal fuel system	P.13A-79
P0201	No. 1 injector system	P.13A-82
P0202	No. 2 injector system	P.13A-86
P0203	No. 3 injector system	P.13A-90
P0204	No. 4 injector system	P.13A-94
P0222*	Throttle position sensor (sub) circuit low input	P.13A-98
P0223*	Throttle position sensor (sub) circuit high input	P.13A-102
P0300*	Random/multiple cylinder misfire detected	P.13A-104
P0301*	No. 1 cylinder misfire detected	P.13A-106
P0302*	No. 2 cylinder misfire detected	P.13A-108
P0303*	No. 3 cylinder misfire detected	P.13A-111
P0304*	No. 4 cylinder misfire detected	P.13A-113
P0325	Detonation sensor system	P.13A-115
P0335	Crank angle sensor system	P.13A-118
P0340	Camshaft position sensor system	P.13A-126
P0403	Exhaust gas recirculation control system	P.13A-133
P0421	Warm Up Catalyst Malfunction	P.13A-137
P0443	Purge control solenoid valve system	P.13A-139
P0500	Vehicle speed sensor system <M/T>	P.13A-143
P0513	Immobilizer malfunction	P.13A-145
P0551*	Power steering fluid pressure switch system	P.13A-147
P0603	EEP ROM malfunction	P.13A-151
P0606*	Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction	P.13A-151
P0622	Alternator FR terminal system	P.13A-152

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Code No.	Diagnosis item		Reference page
P0638*	Throttle valve control servo circuit range/performance problem		P.13A-156
P0642*	Throttle position sensor power supply		P.13A-159
P0657*	Throttle valve control servo relay circuit malfunction		P.13A-160
P0705	Inhibitor switch system	• A/T DTC No. 27 (Inhibitor switch system: open circuit) • A/T DTC No. 28 (Inhibitor switch system: short circuit)	P.23A-41, P.23A-45
P0710	A/T fluid temperature sensor system	• A/T DTC No. 15 (A/T fluid temperature sensor system: open circuit) • A/T DTC No. 16 A/T (fluid temperature sensor system: short circuit)	P.23A-16, P.23A-20
P0715*	Input shaft speed sensor system	• A/T DTC No. 22 (Input shaft speed sensor system)	P.23A-23
P0720*	Output shaft speed sensor system	• A/T DTC No. 23 (Output shaft speed sensor system)	P.23A-30
P0740*	Torque converter clutch solenoid valve system	• A/T DTC No. 36 (Torque converter clutch solenoid valve system)	P.23A-61
P0750*	Low-reverse solenoid valve system	• A/T DTC No. 31 (Low-reverse solenoid valve system)	P.23A-48
P0755*	Underdrive solenoid valve system	• A/T DTC No. 32 (Underdrive solenoid valve system)	P.23A-52
P0760*	Second solenoid valve system	• A/T DTC No. 33 (Second solenoid valve system)	P.23A-55
P0765*	Overdrive solenoid valve system	• A/T DTC No. 34 (Overdrive solenoid valve system)	P.23A-58
P1021	Oil control valve circuit		P.13A-165
P1602*	Communication malfunction (between engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor and system LSI)		P.13A-169
P1603*	Battery backup circuit malfunction		P.13A-170
P1751*	A/T control relay system	• A/T DTC No. 54 (A/T control relay system)	P.23A-67
P2100*	Throttle valve control servo circuit (open)		P.13A-172
P2102*	Throttle valve control servo circuit (shorted low)		P.13A-175
P2121*	Accelerator pedal position sensor (main) circuit range/performance problem		P.13A-177
P2122*	Accelerator pedal position sensor (main) circuit low input		P.13A-180
P2123*	Accelerator pedal position sensor (main) circuit high input		P.13A-184
P2126*	Accelerator pedal position sensor (sub) circuit range/performance problem		P.13A-186
P2127*	Accelerator pedal position sensor (sub) circuit low input		P.13A-189
P2128*	Accelerator pedal position sensor (sub) circuit high input		P.13A-193
P2135*	Throttle position sensor (main and sub) range/performance problem		P.13A-195

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Code No.	Diagnosis item	Reference page
P2138*	Accelerator pedal position sensor (main and sub) range/performance problem	P.13A-197
P2173*	Abnormal intake air amount	P.13A-203
P2226	Barometric pressure sensor system	P.13A-203

NOTE:

- *Do not replace the engine-ECU <M/T> or engine-A/T-ECU <A/T> until a through terminal check reveals there are no short/open circuit.*
- *Check that the engine-ECU <M/T> or engine-A/T-ECU <A/T> earth circuit is normal before checking for the cause of the problem.*
- *After the engine-ECU <M/T> or engine-A/T-ECU <A/T> has detected a malfunction, a diagnosis code is recorded the next time the engine is started and the same malfunction is re-detected. However, for items marked with "*", the diagnosis code is recorded on the first detection of the malfunction.*

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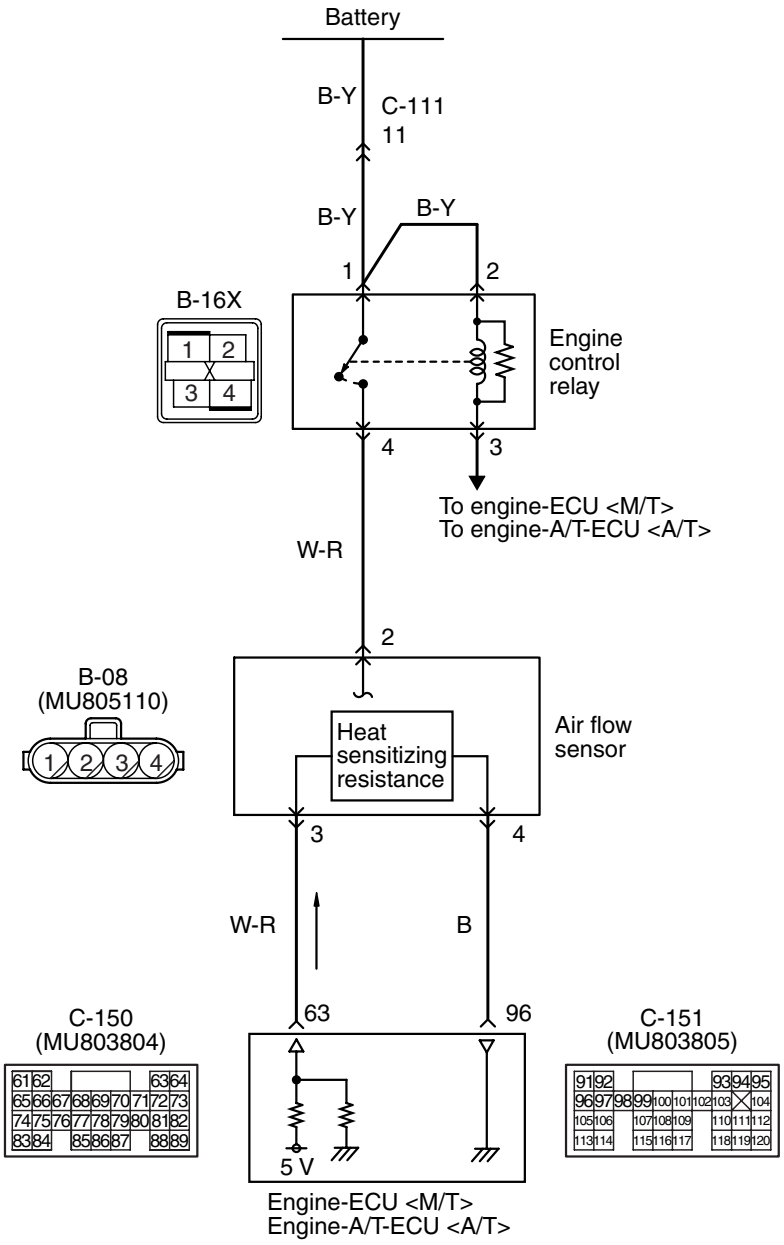
INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. P0100: Air Flow Sensor System

Air flow sensor circuit



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

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OPERATION

- Power is supplied by the engine control relay (terminal No. 4) 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.-II/III data list

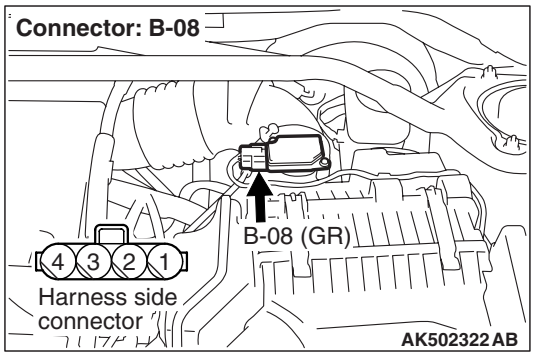
- Refer to Data List Reference Table P.13A-297.
  a. Item 12: Air flow sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

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

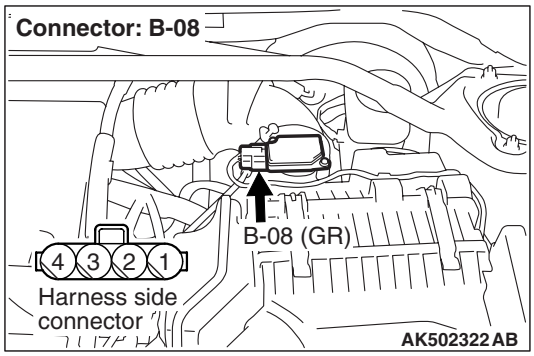


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

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



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

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

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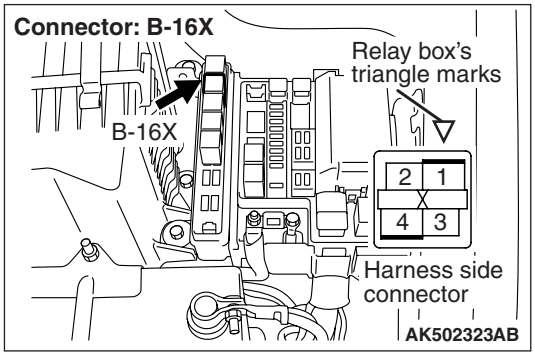
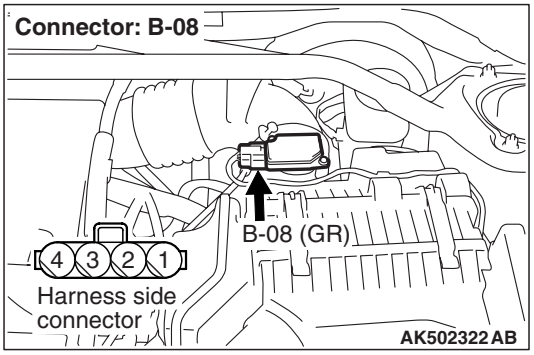
STEP 4. Connector check: B-16X engine control relay connector





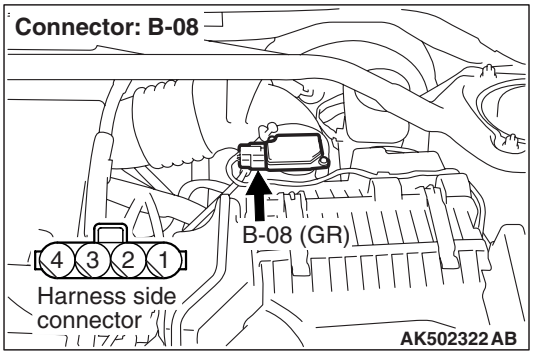
Q: Is the check result normal?

YES : Check and repair harness between B-08 (terminal No. 2) air flow sensor connector and B-16X (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Perform resistance measurement at B-08 air flow sensor connector.



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

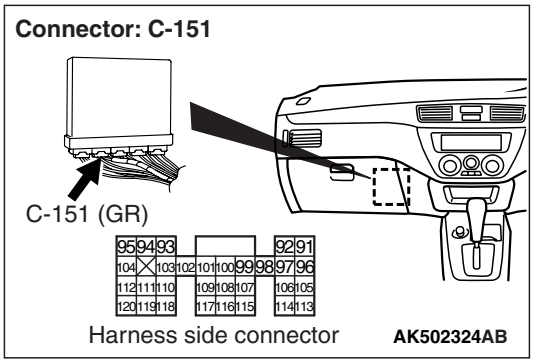
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 6 .

STEP 6. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

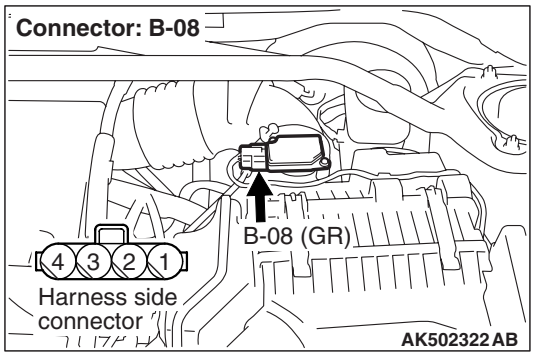


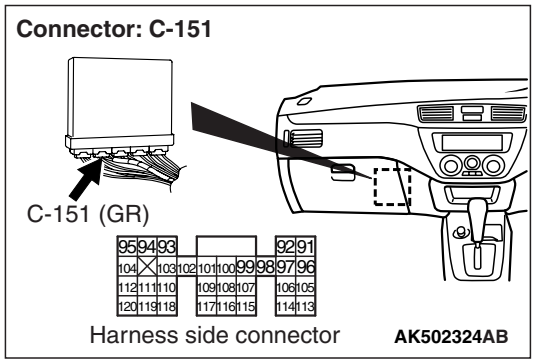
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between B-08 (terminal No. 4) air flow sensor connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for open circuit.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

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

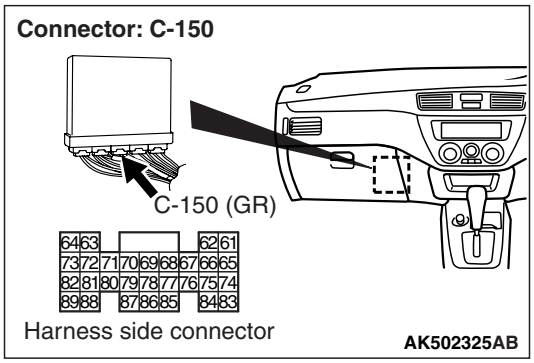
- Refer to Data List Reference Table P.13A-297.
  a. Item 12: Air flow sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

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

STEP 9. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

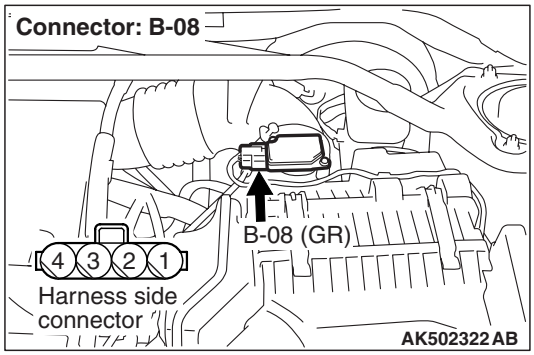


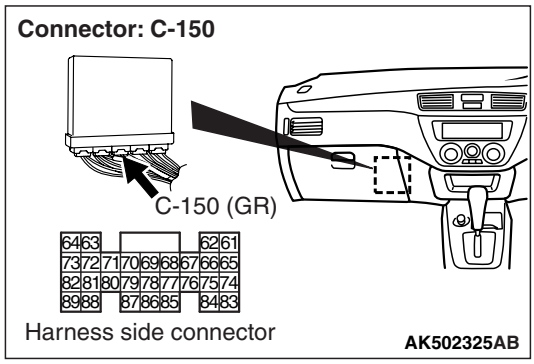
Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace the connector.

STEP 10. Check harness between B-08 (terminal No. 3) air flow sensor connector and C-150 (terminal No. 63) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





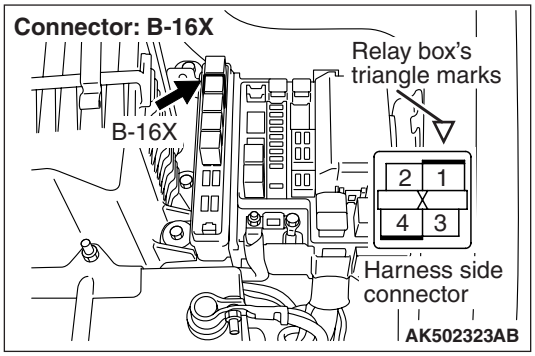
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair the damaged harness wire.

STEP 11. Connector check: B-16X engine control relay connector



Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace the connector.

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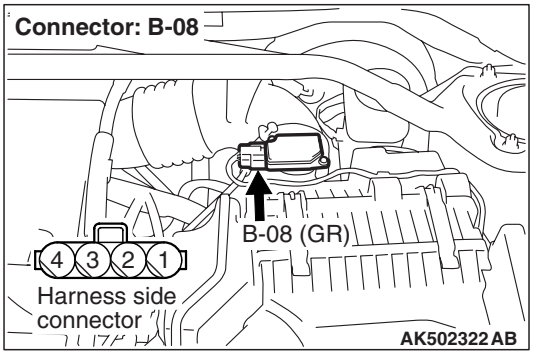
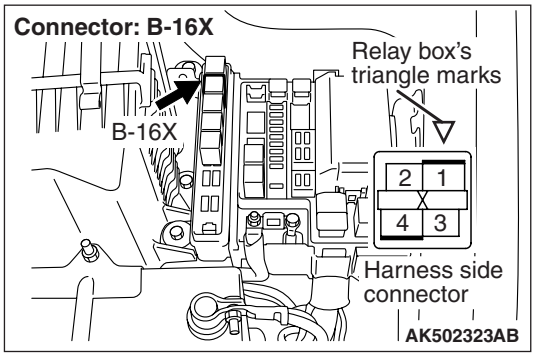
STEP 12. Check harness between B-08 (terminal No. 2) air flow sensor connector and B-16X (terminal No. 4) engine control relay connector.





- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair. the damaged harness wire

STEP 13. M.U.T.-II/III data list

- Refer to Data List Reference Table P.13A-297.
  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 –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 14 .

STEP 14. Replace the air flow sensor.

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

Q: Is the check result normal?

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

NO : The check is end.

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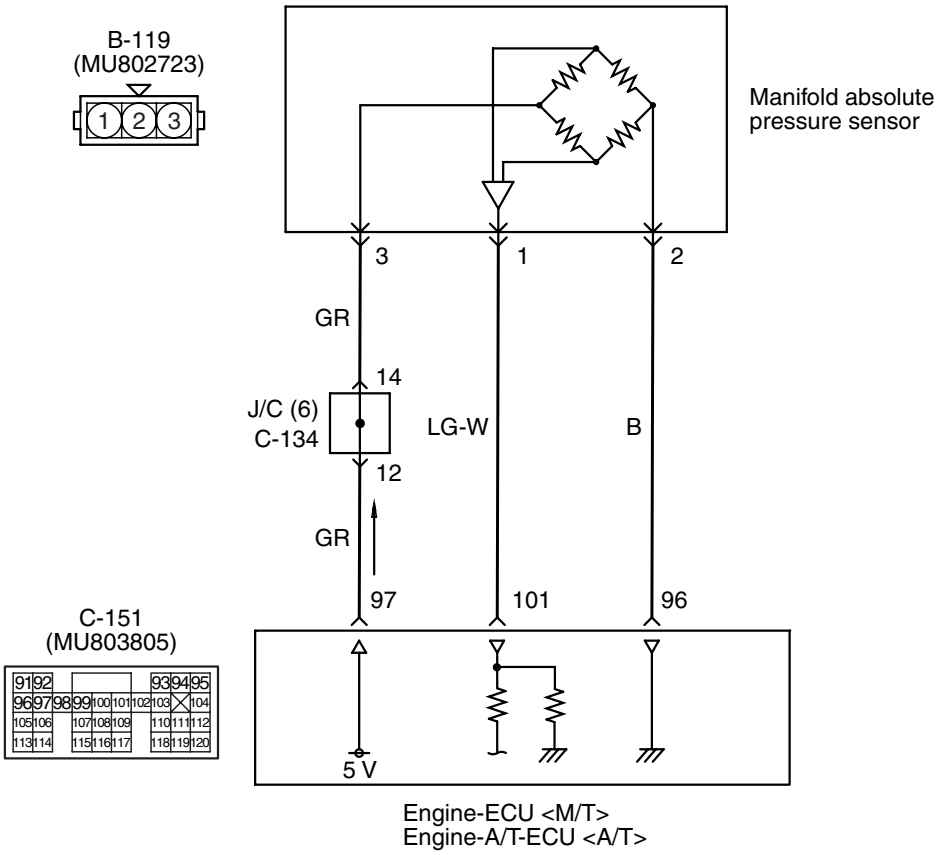
Code No. P0105: Manifold Absolute Pressure Sensor System

Manifold absolute pressure sensor circuit



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

AK502010AB

OPERATION

- A power voltage of 5 V is applied to the manifold absolute pressure sensor power terminal (terminal No. 3) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 97) and earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96) from the manifold absolute pressure sensor (terminal No. 2).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 101) from the manifold absolute pressure sensor output terminal (terminal No. 1).

FUNCTION

- The manifold absolute pressure sensor converts the manifold absolute 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.

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TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

- The sensor output voltage is 4.6 V or more (barometric pressure above 114 kPa or equivalent) for 2 seconds.

or

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

PROBABLE CAUSE

- Failed Manifold absolute pressure sensor
- Open/short circuit in Manifold absolute pressure 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.-II/III data list

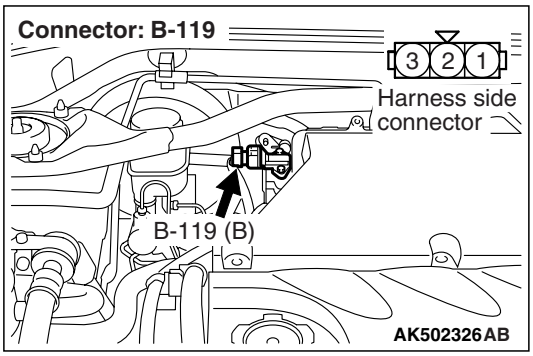
- Refer to Data List Reference Table P.13A-297.
  a. Item 95: Manifold absolute pressure sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-119 Manifold absolute pressure sensor connector

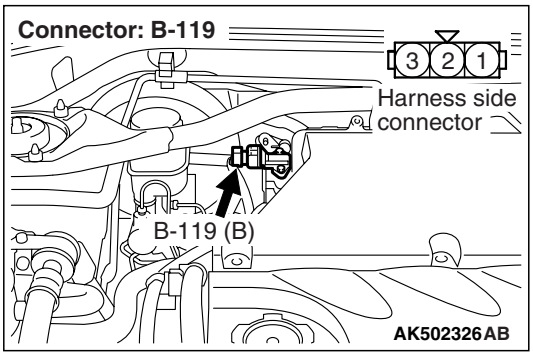


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at B-119 manifold absolute pressure sensor connector.



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

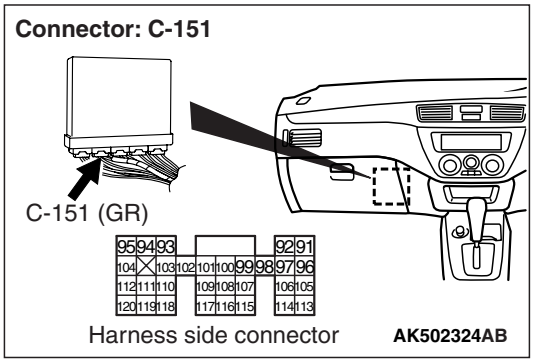
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 4 .

STEP 4. Perform voltage measurement at C-151 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.

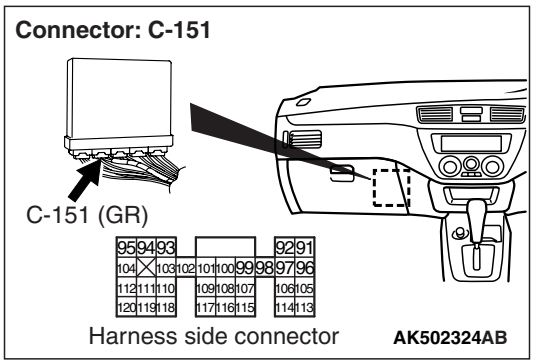
OK: 4.9 – 5.1 V

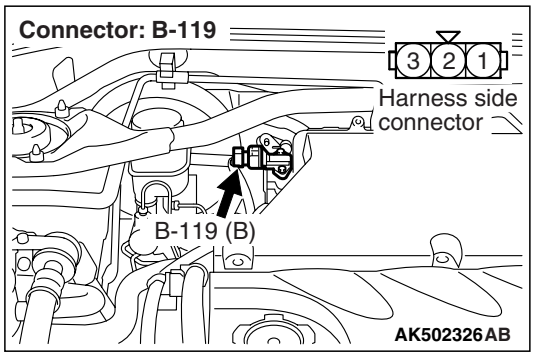
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





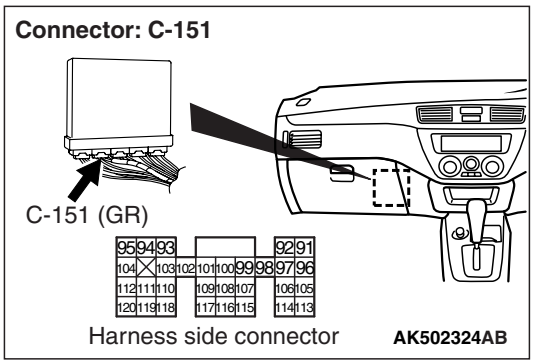
Q: Is the check result normal?

YES : Check intermediate connector C-134, and repair if necessary. If intermediate connector is normal, check and repair harness between B-119 (terminal No. 3) manifold absolute pressure sensor connector and C-151 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check power supply line for open circuit.

NO : Repair or replace the connector.

STEP 6. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

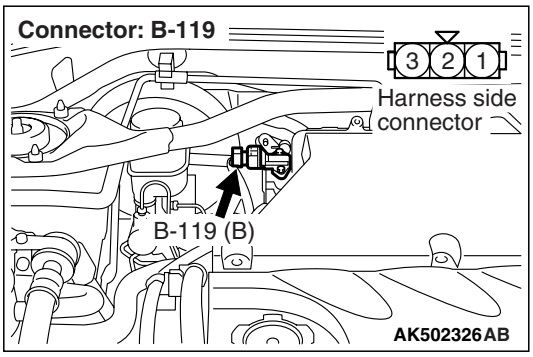


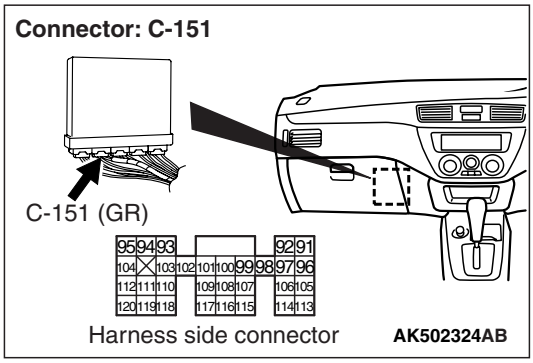
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between B-119 (terminal No. 3) manifold absolute pressure sensor connector and C-151 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





NOTE: Before checking harness, check intermediate connector C-134, and repair if necessary.

- Check power supply line for short circuit.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

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

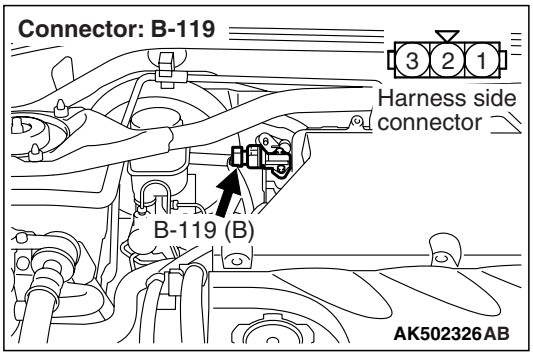
- Refer to Data List Reference Table P.13A-297.
  a. Item 95: Manifold absolute pressure sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

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

STEP 9. Perform resistance measurement at B-119 manifold absolute pressure sensor connector.



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

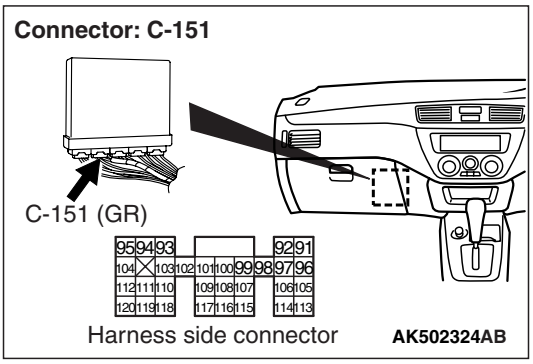
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 10 .

STEP 10. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

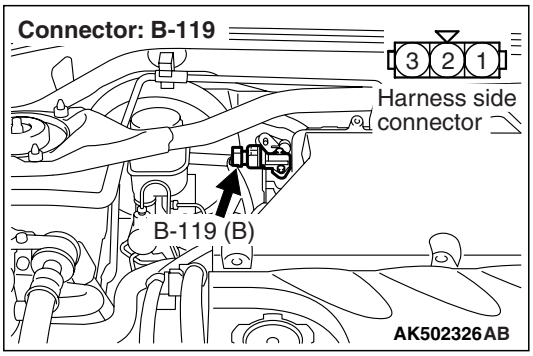


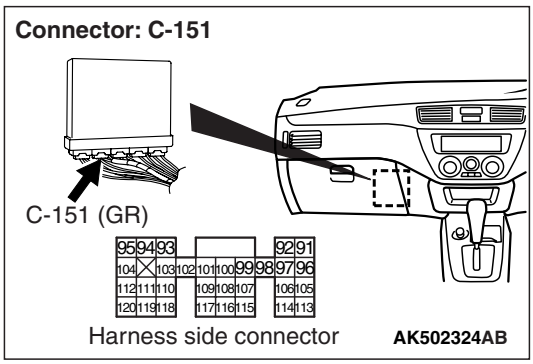
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair or replace the connector.

STEP 11. Check harness between B-119 (terminal No. 2) manifold absolute pressure sensor connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





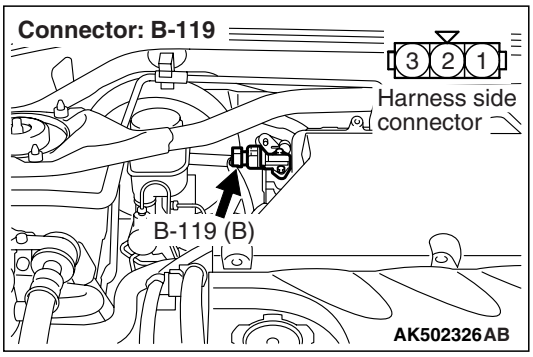
- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

STEP 12. Perform voltage measurement at B-119 manifold absolute pressure sensor connector.



- Use special tool test harness (MB991348) to connect connector and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

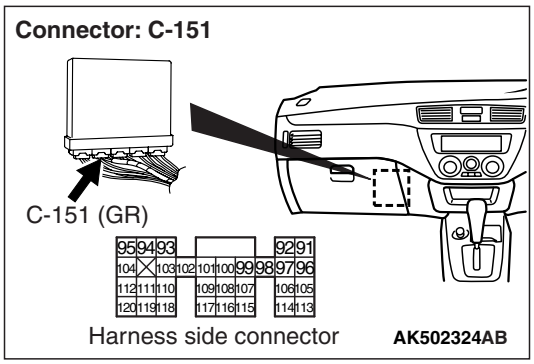
OK: 4.9 – 5.1 V

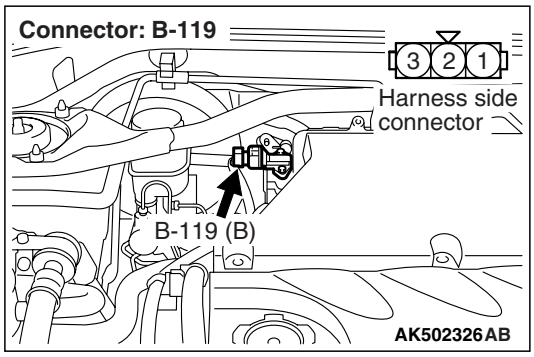
Q: Is the check result normal?

YES : Go to Step 14 .

NO : Go to Step 13 .

STEP 13. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





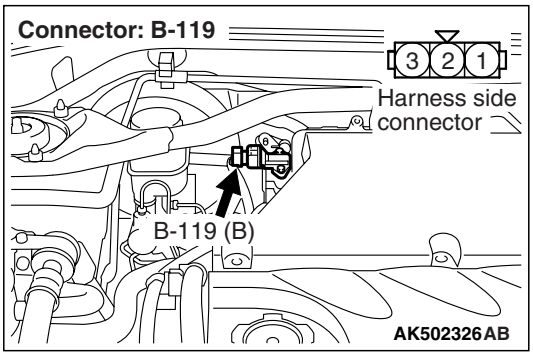
Q: Is the check result normal?

YES : Check intermediate connector C-134, and repair if necessary. If intermediate connector is normal, check and repair harness between B-119 (terminal No. 3) manifold absolute pressure sensor connector and C-151 (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 the connector.

STEP 14. Perform voltage measurement at B-119 manifold absolute pressure sensor connector.



- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

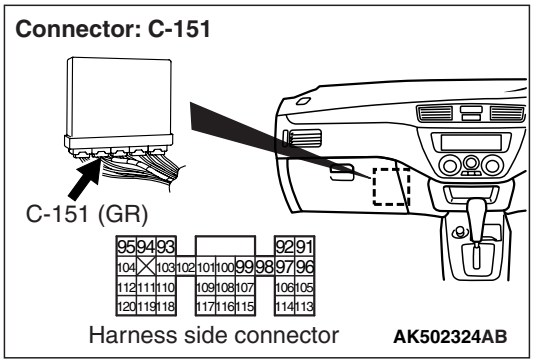
OK:

Altitude 0m: 3.7 – 4.3 V
Altitude 600m: 3.4 – 4.0 V
Altitude 1,200m: 3.2 – 3.8 V
Altitude 1,800m: 2.9 – 3.5 V

Q: Is the check result normal?

YES : Go to Step 17 .
NO : Go to Step 15 .

STEP 15. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

YES : Go to Step 16 .
NO : Repair or replace the connector.

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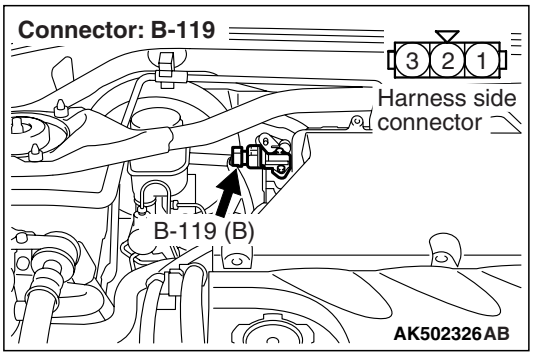
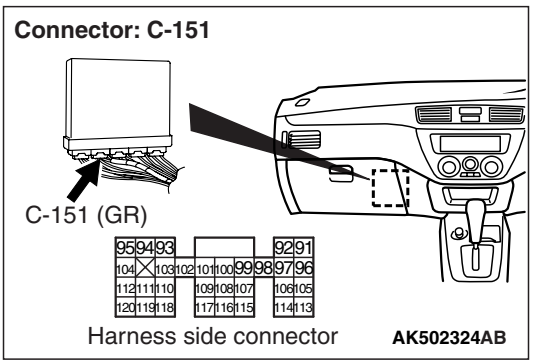
STEP 16. Check harness between B-119 (terminal No. 1) manifold absolute pressure sensor connector and C-151 (terminal No. 101) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

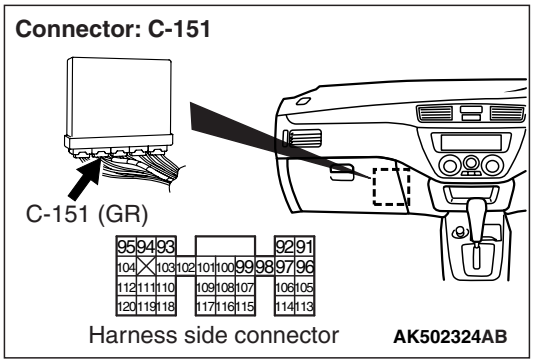




- Check output line for short circuit and damage.

Q: Is the check result normal?
YES : Replace the manifold absolute pressure sensor.
NO : Repair the damaged harness wire.

STEP 17. Perform voltage measurement at C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

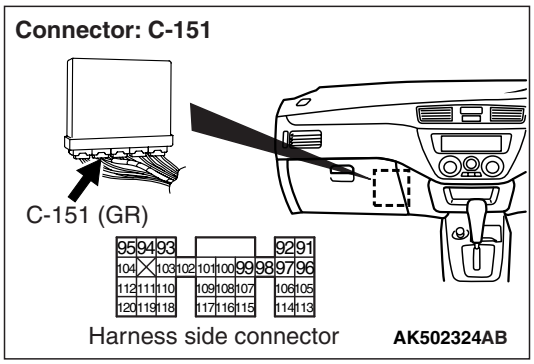


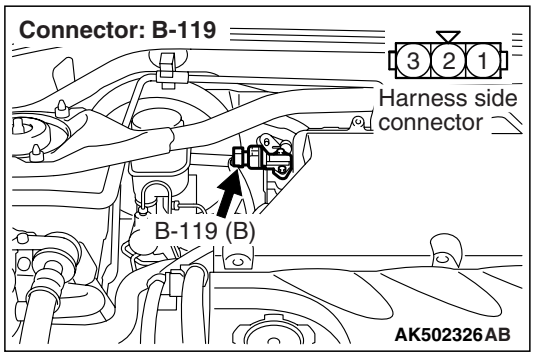
- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 101 and earth.

OK:
Altitude 0m: 3.7 – 4.3 V
Altitude 600m: 3.4 – 4.0 V
Altitude 1,200m: 3.2 – 3.8 V
Altitude 1,800m: 2.9 – 3.5 V

Q: Is the check result normal?
YES : Go to Step 19.
NO : Go to Step 18.

STEP 18. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





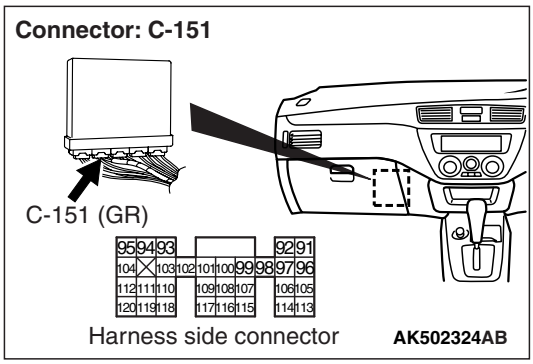
Q: Is the check result normal?

YES : Check and repair check harness between B-119 (terminal No. 1) manifold absolute pressure sensor connector and C-151 (terminal No. 101) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit and damage.

NO : Repair or replace the connector.

STEP 19. Connector check: C-151 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 the connector.

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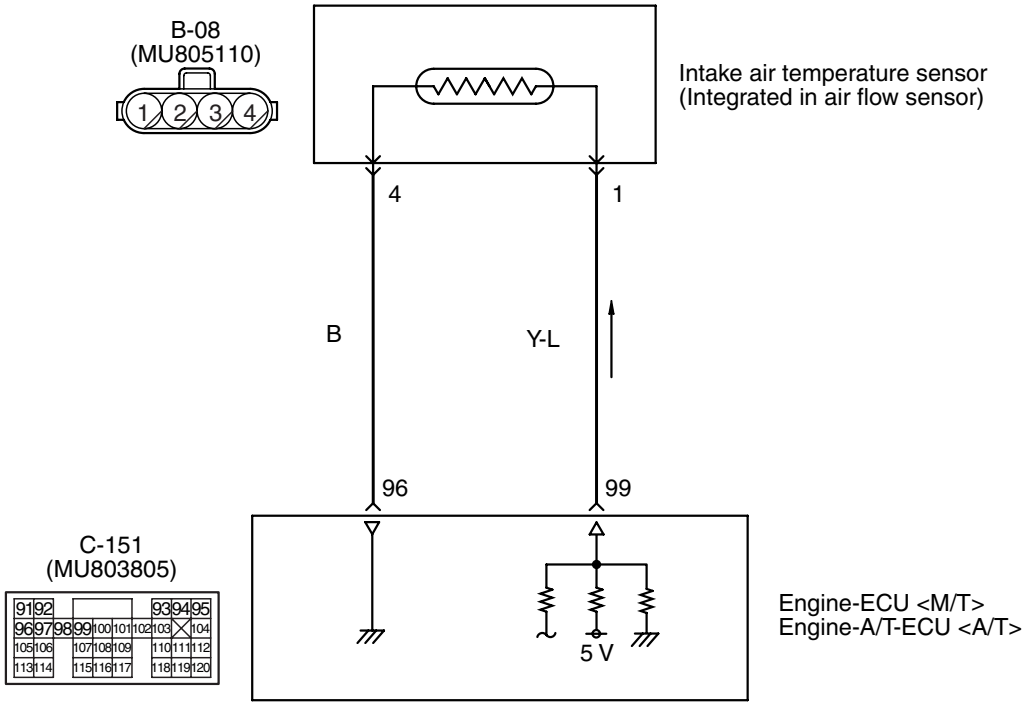
Code No. P0110: Intake Air Temperature Sensor System

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: Viole PU: Purple

AK502011AB

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

- The sensor output voltage is 4.6 V or more (intake air temperature of below – 45° C or equivalent) for 2 seconds.

or

- The sensor output voltage is 0.2 V or less (intake air temperature of above 125° C or equivalent) for 2 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

- Item 13: Intake air temperature sensor

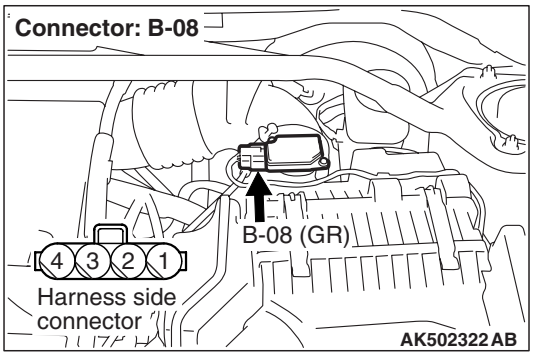
  OK: At ambient temperature (atmospheric temperature) or equivalent.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check intake air temperature sensor itself.

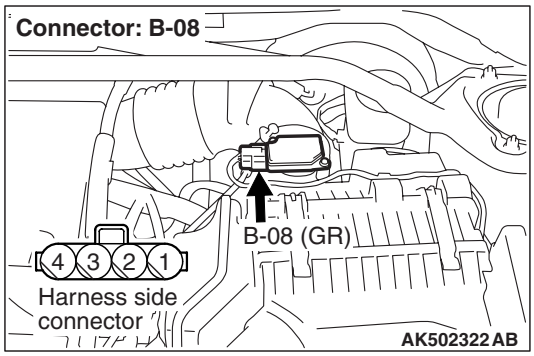
- Check intake air temperature sensor itself (Refer to P.13A-326).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the air flow sensor.

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



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

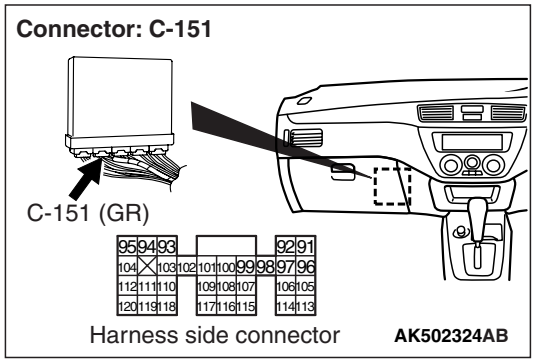
  OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 5 .

STEP 5. Connector check: C-151 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 the connector.

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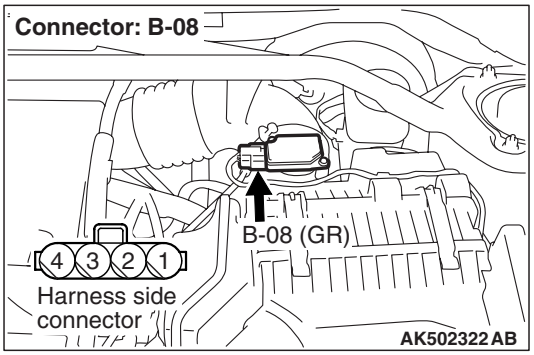
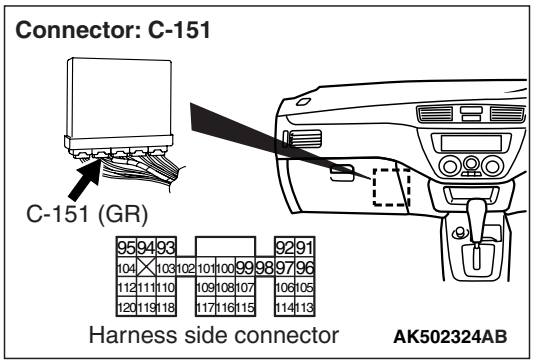
STEP 6. Check harness between B-08 (terminal No. 4) air flow sensor connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair the damaged harness wire.

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

- Item 13: Intake air temperature sensor

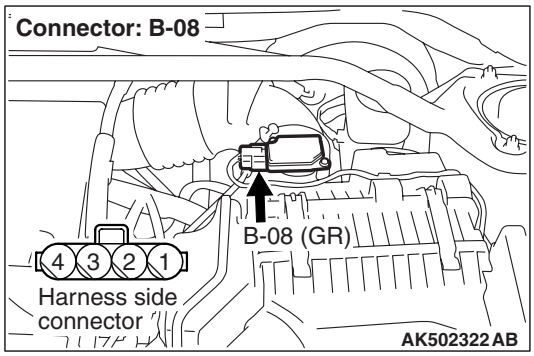
  OK: At ambient temperature (atmospheric temperature) or equivalent.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

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

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



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

  OK: 4.5 – 4.9 V

Q: Is the check result normal?

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

NO : Go to Step 9 .

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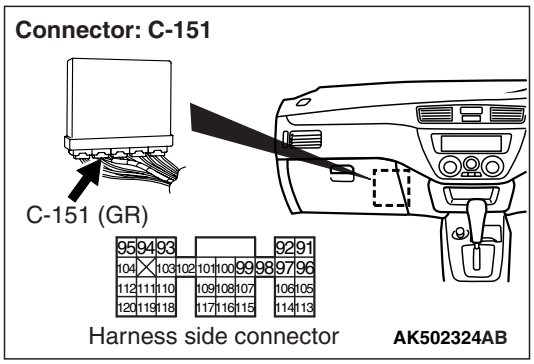
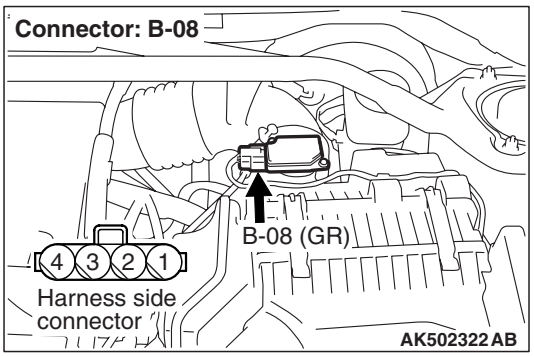
STEP 9. Perform voltage measurement at C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Disconnect B-08 air flow sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 99 and earth.

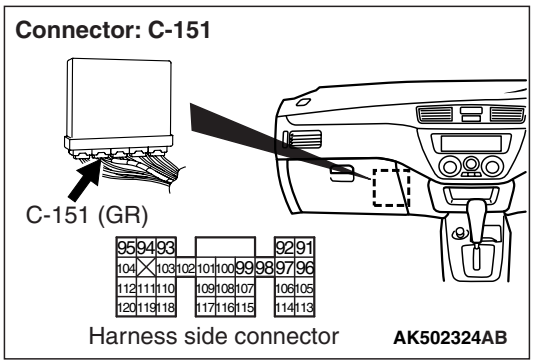
OK: 4.5 – 4.9 V

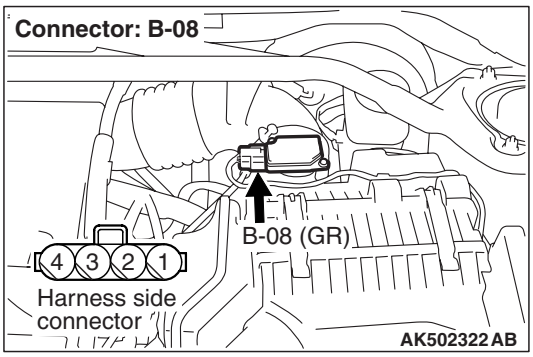
Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 11 .

STEP 10. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





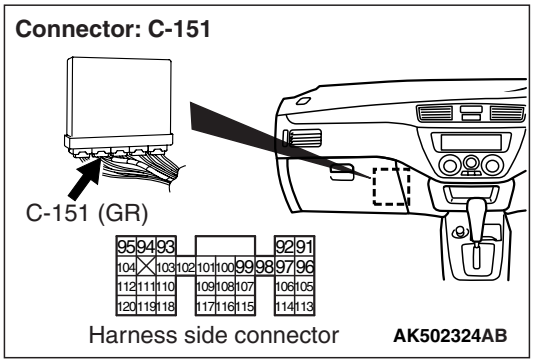
Q: Is the check result normal?

YES : Check and repair harness between B-08 (terminal No. 1) air flow sensor connector and C-151 (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 the connector.

STEP 11. Connector check: C-151 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 the connector.

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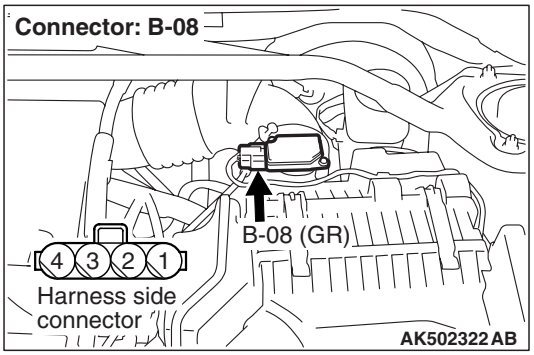
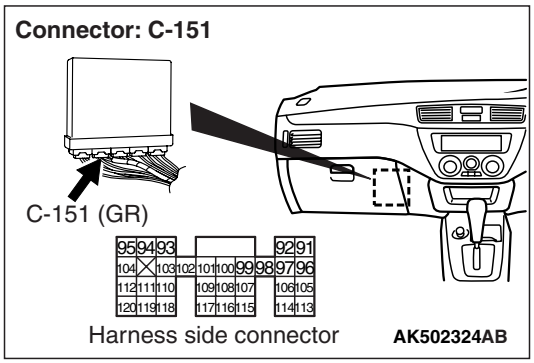
STEP 12. Check harness between B-08 (terminal No. 1) air flow sensor connector and C-151 (terminal No. 99) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

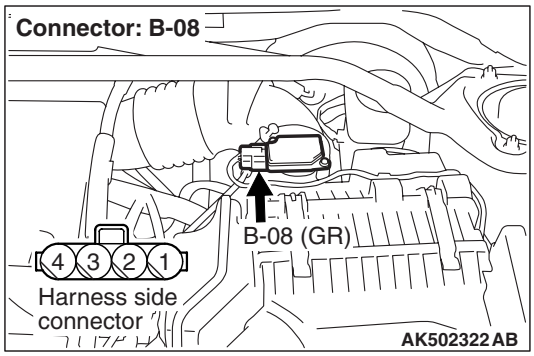




- Check output line for short circuit.

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

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

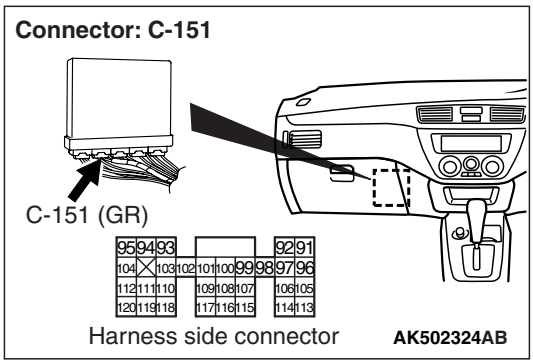


- Use special tool test harness (MB991709) to connect only terminal No. 1 and No. 4, and then measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

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-151 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 the connector.

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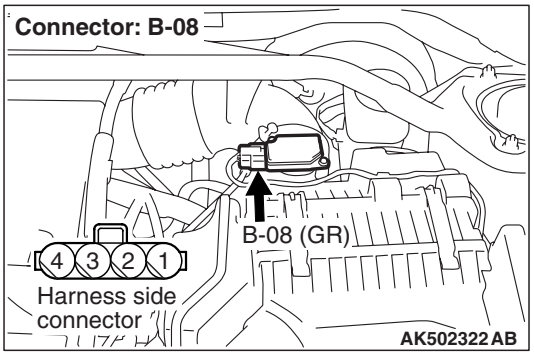
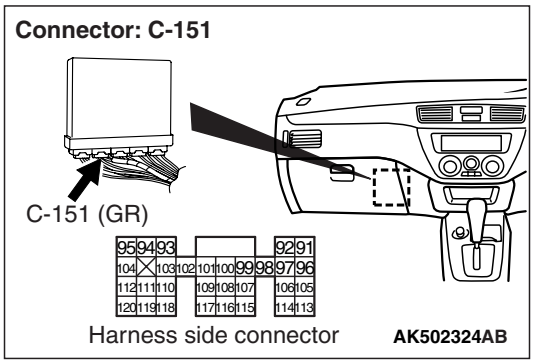
STEP 15. Check harness between B-08 (terminal No. 1) air flow sensor connector and C-151 (terminal No. 99) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for damage.

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

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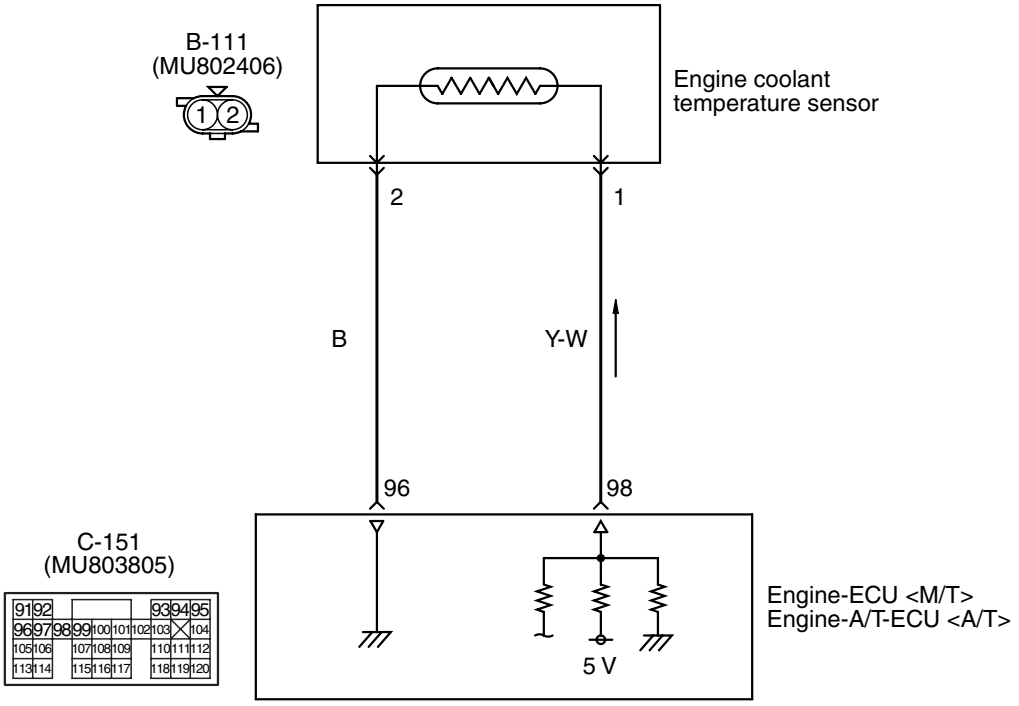
Code No. P0115: Engine Coolant Temperature Sensor System

Engine coolant temperature sensor circuit



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

AK304121AC

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 infection 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

- The sensor output voltage rises 1.6V or more (engine coolant temperature below 40° C or equivalent) from 1.6V or less (engine coolant temperature above 40° C or equivalent).
- Thereafter, the sensor output voltage is 1.6 V or more for 5 minutes.

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.-II/III data list

- Item 21: Engine coolant temperature sensor

OK:

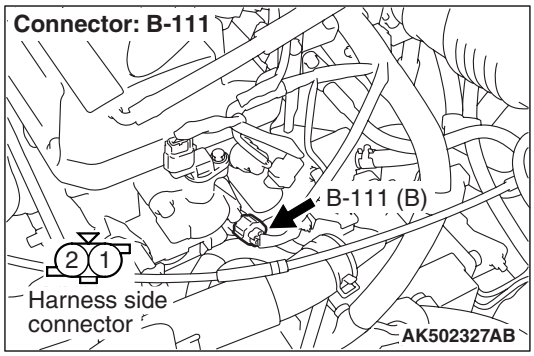
Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.
Engine hot state: At 80 – 120° C

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-111 engine coolant temperature sensor connector

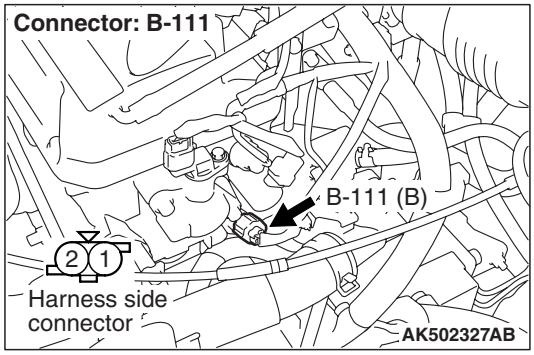


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at B-111 engine coolant temperature sensor connector.



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

OK:

Engine coolant temperature at – 20° C: 14 – 17 kΩ
Engine coolant temperature at 0° C: 5.1 – 6.5 kΩ
Engine coolant temperature at 20° C: 2.1 – 2.7 kΩ
Engine coolant temperature at 40° C: 0.9 – 1.3 kΩ
Engine coolant temperature at 60° C: 0.48 – 0.68 kΩ
Engine coolant temperature at 80° C: 0.26 – 0.36 kΩ

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the engine coolant temperature sensor.

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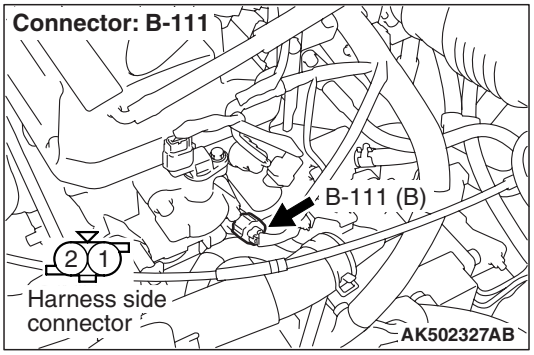
STEP 4. Perform resistance measurement at B-111 engine coolant temperature sensor connector.

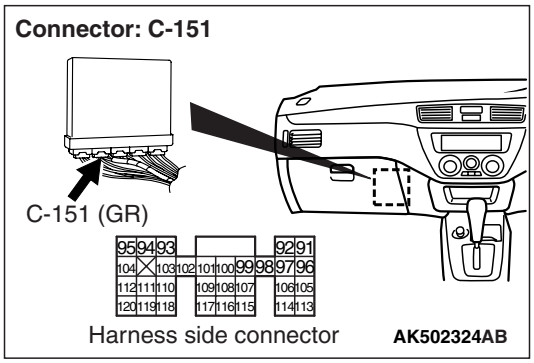


- Disconnect connector and measure at harness side.
- Resistance between terminal No. 2 and earth.

  OK: 2 Ω or less

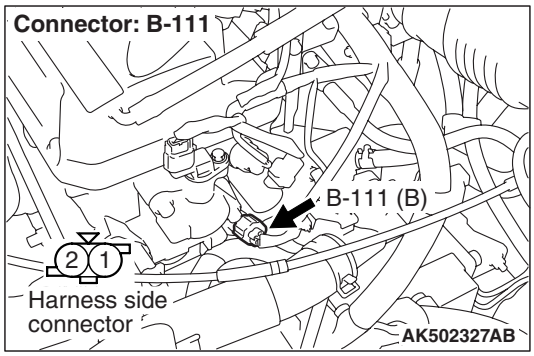
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 5 .

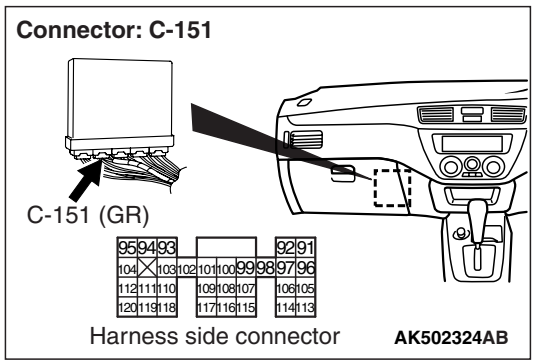
STEP 5. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 6. Check harness between B-111 (terminal No. 2) engine coolant temperature sensor connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for open circuit and damage.

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

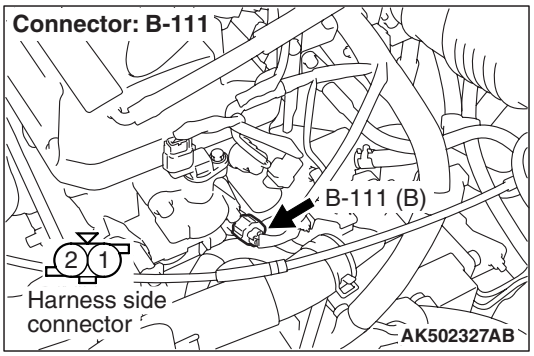
STEP 7. M.U.T.-II/III data list

- Item 21: Engine coolant temperature sensor

  OK:
  Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.
  Engine hot state: At 80 – 120 °C

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 8. Perform voltage measurement at B-111 engine coolant temperature sensor connector.

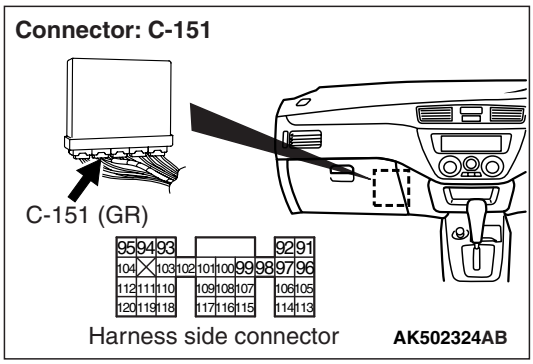


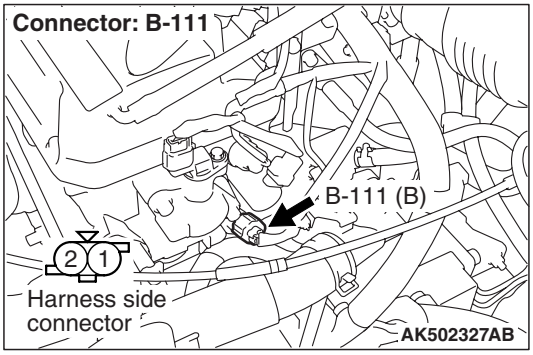
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

  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-151 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-111 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 .

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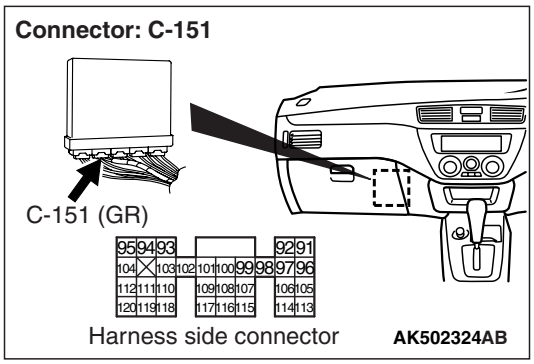
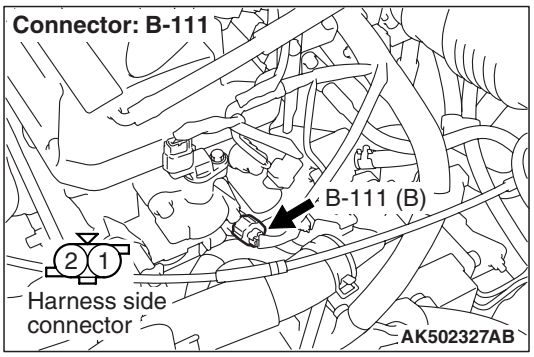
STEP 10. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





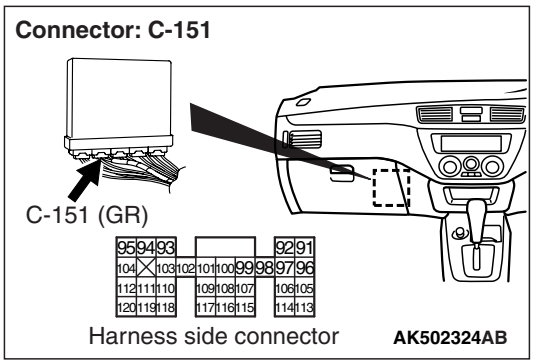
Q: Is the check result normal?

YES : Check and repair harness between B-111 (terminal No. 1) engine coolant temperature sensor connector and C-151 (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 the connector.

STEP 11. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

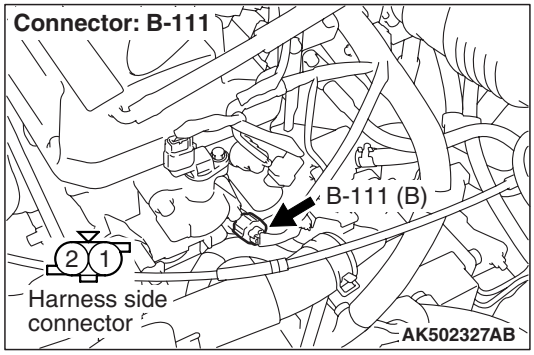


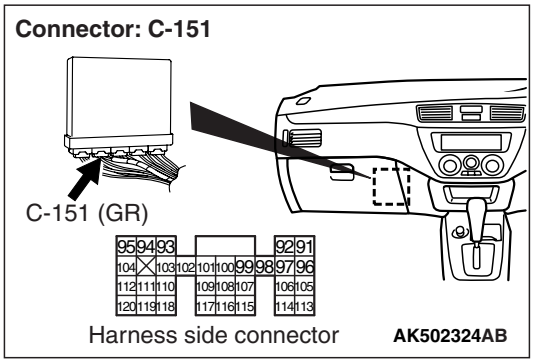
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace the connector.

STEP 12. Check harness between B-111 (terminal No. 1) engine coolant temperature sensor connector and C-151 (terminal No. 98) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





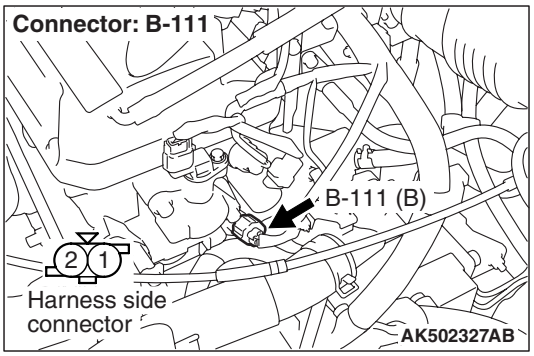
- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair the damaged harness wire.

STEP 13. Perform voltage measurement at B-111 engine coolant temperature sensor connector.



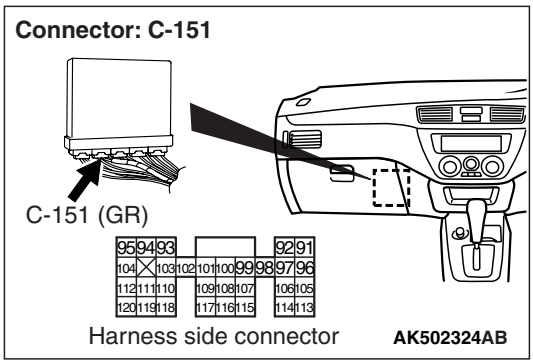
- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

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

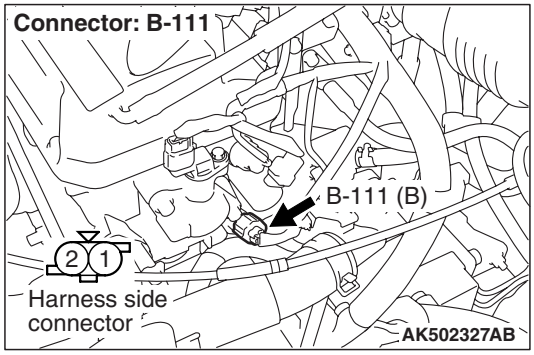
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 14 .

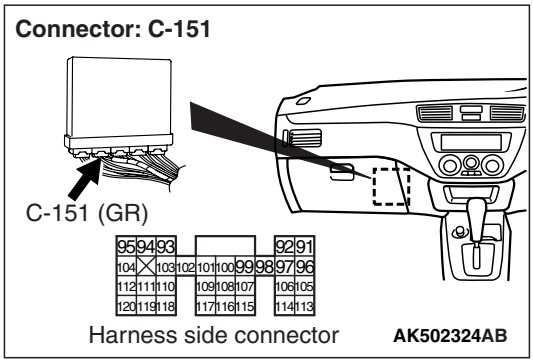
STEP 14. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 15. Check harness between B-111 (terminal No. 1) engine coolant temperature sensor connector and C-151 (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 the damaged harness wire.

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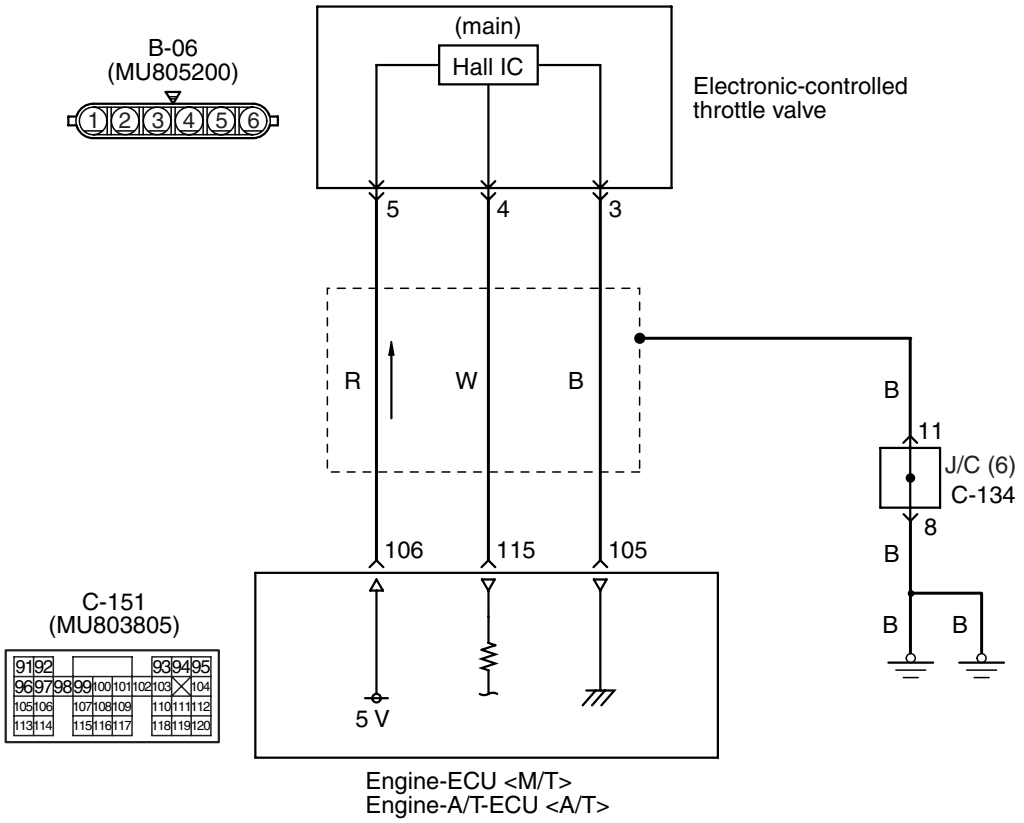
Code No. P0122: Throttle Position Sensor (Main) Circuit Low Input

Throttle position sensor (main) circuit



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

AK502012AB

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

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

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PROBABLE CAUSE

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

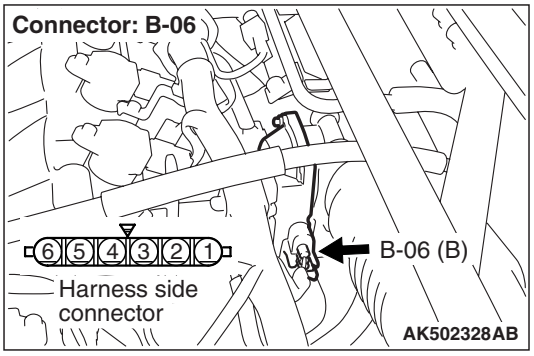
DIAGNOSIS PROCEDURE

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 79: Throttle position sensor (main)

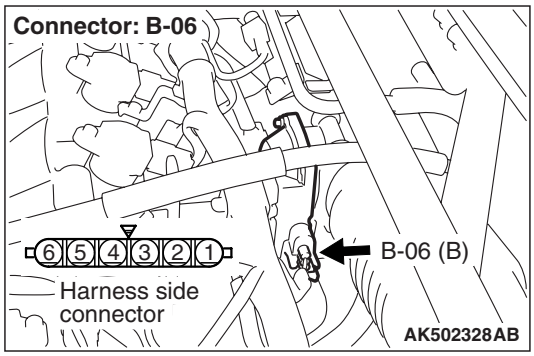
Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Go to Step 2 .

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



Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

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

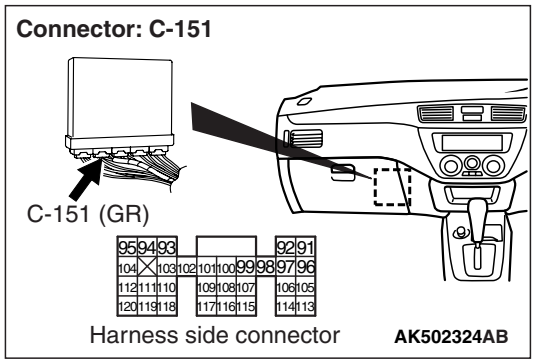


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 5 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

STEP 4. Connector check: C-151 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 the connector.

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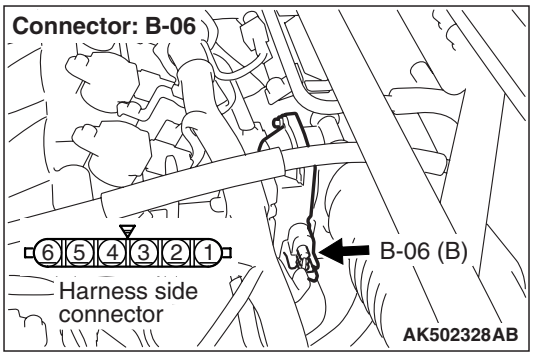
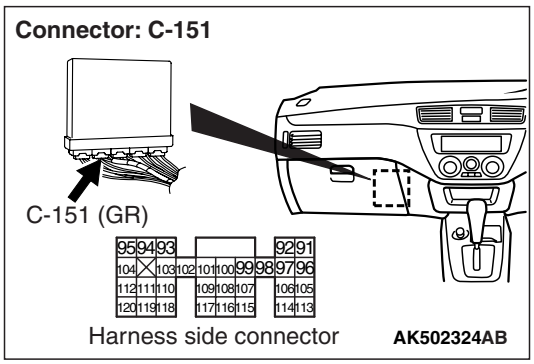
STEP 5. Check harness between B-06 (terminal No. 5) electronic-controlled throttle valve connector and C-151 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check power supply line for open/short circuit.

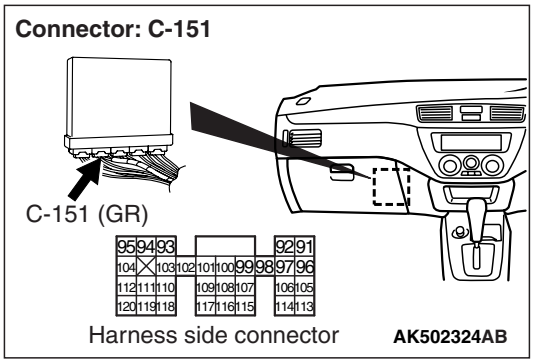
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair the damaged harness wire.

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 79: Throttle position sensor (main)

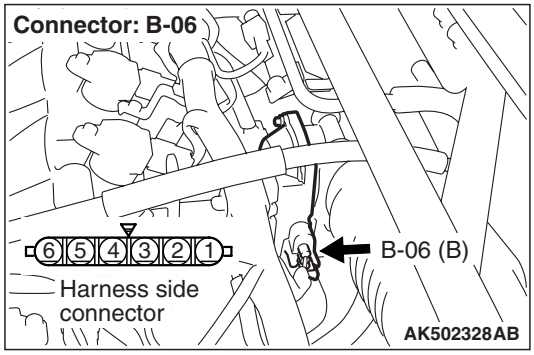
Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

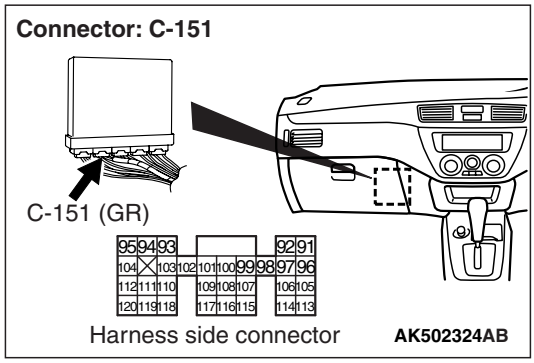
STEP 7. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 8. Check harness between B-06 (terminal No. 5) electronic-controlled throttle valve connector and C-151 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check power supply line for damage.

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

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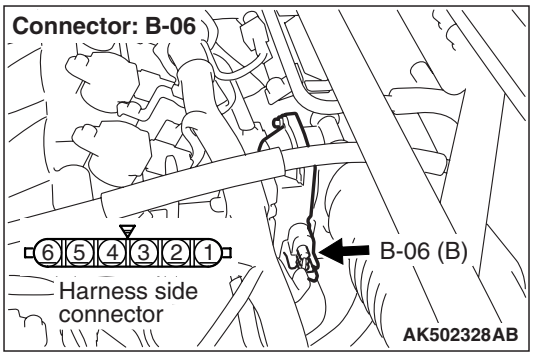
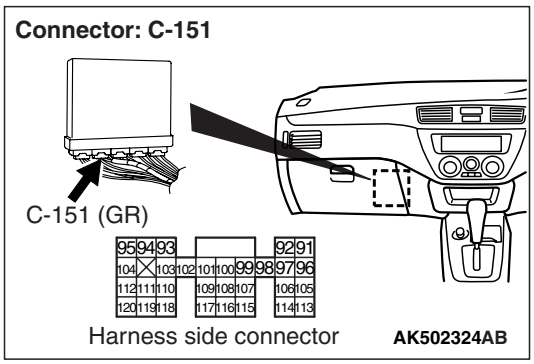
STEP 9. Check harness between B-06 (terminal No. 4) electronic-controlled throttle valve connector and C-151 (terminal No. 115) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





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

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

STEP 10. Replace the electronic-controlled throttle valve

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

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

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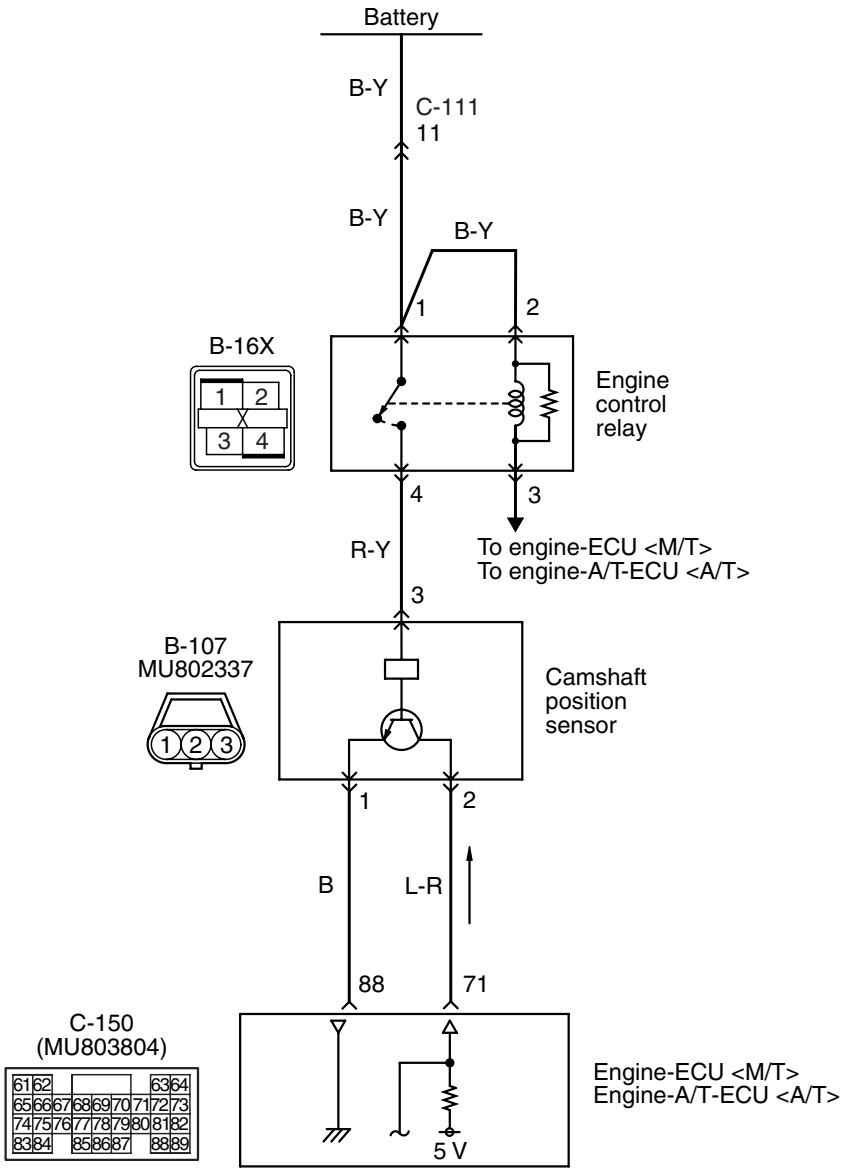
Code No. P0123: Throttle Position Sensor (Main) Circuit High Input

Camshaft position sensor circuit



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

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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).

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- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 115) from the electronic-controlled throttle valve output terminal (terminal No. 4).

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

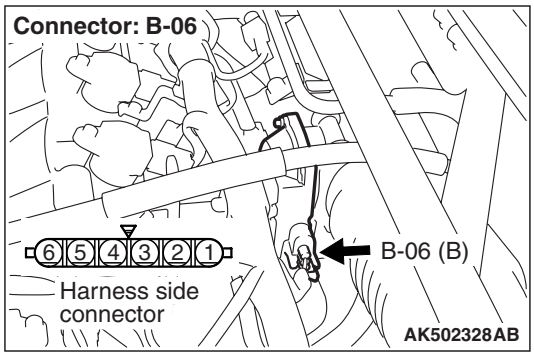
- Refer to Data List Reference Table P.13A-297.
  a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

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

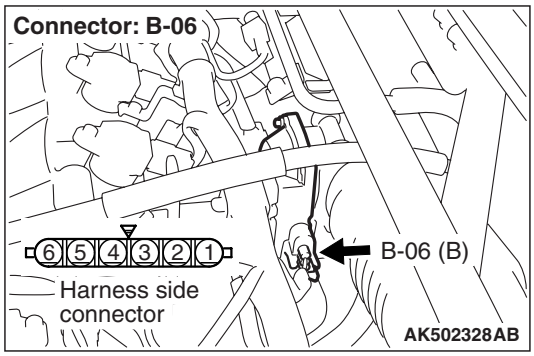


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

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



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

  OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

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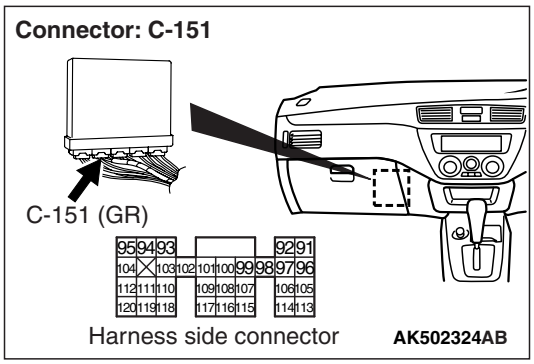
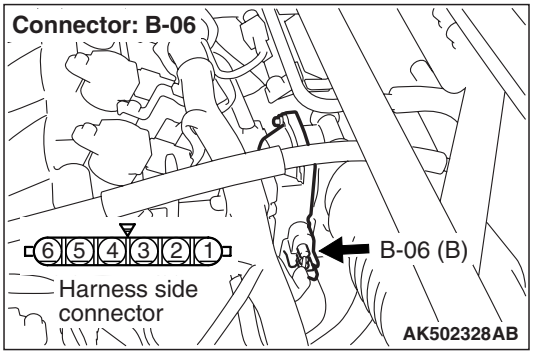
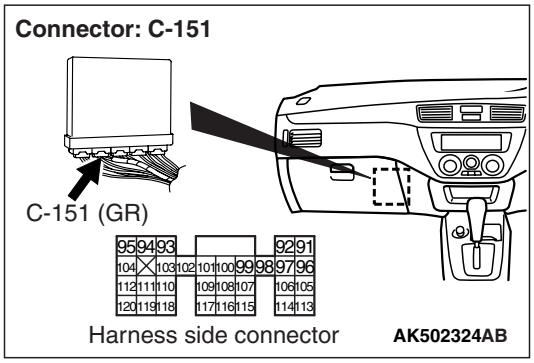
STEP 4. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 5. Check harness between B-06 (terminal No. 3) electronic-controlled throttle valve connector and C-151 (terminal No. 105) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for open circuit and damage.

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

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

- Refer to Data List Reference Table P.13A-297.
  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 –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Replace the electronic-controlled throttle valve

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

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

Code No. P0125: Feedback System Monitor

OPERATION

- Refer to Code No. P0201 No. 1 Injector System P.13A-82.
- Refer to Code No. P0202 No. 2 Injector System P.13A-86.
- Refer to Code No. P0203 No. 3 Injector System P.13A-90.
- Refer to Code No. P0204 No. 4 Injector System P.13A-94.
- Refer to Code No. P0130 Oxygen Sensor (Front) Circuit P.13A-57.

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- The engine coolant temperature approximately 60° C or more.
- Within the range of air-fuel ratio feedback operation.
- Not in low speed operation.

Judgment Criterion

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

PROBABLE CAUSE

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

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

- Failed fuel system
- Failed exhaust system
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

Q: Is any other diagnosis code than P0170 output?

YES : Inspection chart for diagnosis code (Refer to P.13A-19).

NO : Go to Step 2 .

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

- Refer to Data List Reference Table P.13A-297.

a. Item 12: Air flow sensor
b. Item 21: Engine coolant temperature sensor
c. Item 59: Oxygen sensor (front)
d. Item 95: Manifold absolute pressure sensor

Q: Are the check results normal?

YES : Go to Step 3 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data valve (Refer to Inspection Chart for Diagnosis Code P.13A-19).

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 4 .

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

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

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

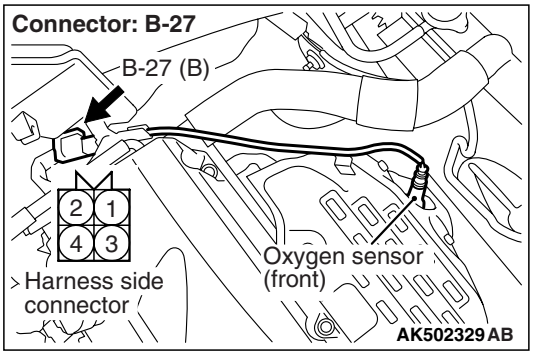
STEP 5. Check for leakage of exhaust emission from exhaust manifold.

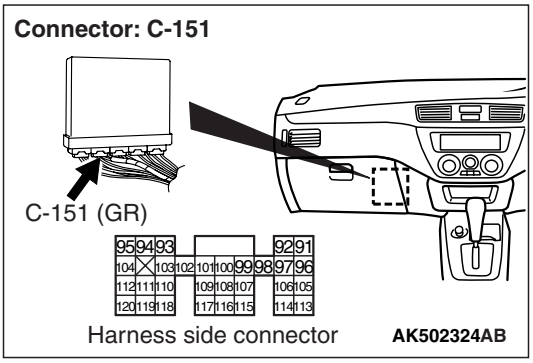
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair.

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

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-320).

STEP 7. Connector check: B-27 oxygen sensor (front) connector, C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





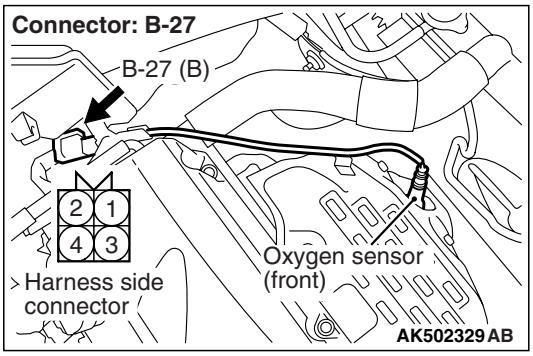
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair or replace the connector.

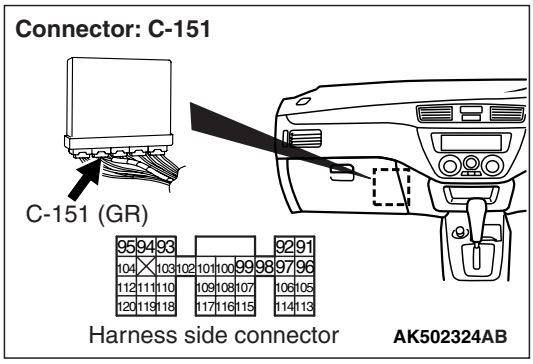
STEP 8. Check oxygen sensor (front) itself.

- Check oxygen sensor (front) itself (Refer to P.13A-328).

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Replace the oxygen sensor (front).

STEP 9. Check harness between B-27 (terminal No. 4) oxygen sensor (front) connector and C-151 (terminal No. 108) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for damage.

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

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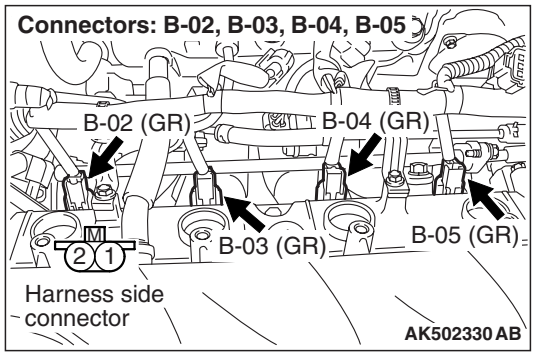
STEP 10. Connector check: Injector connector



a. B-02 (No. 1 injector connector)
b. B-03 (No. 2 injector connector)
c. B-04 (No. 3 injector connector)
d. B-05 (No. 4 injector connector)

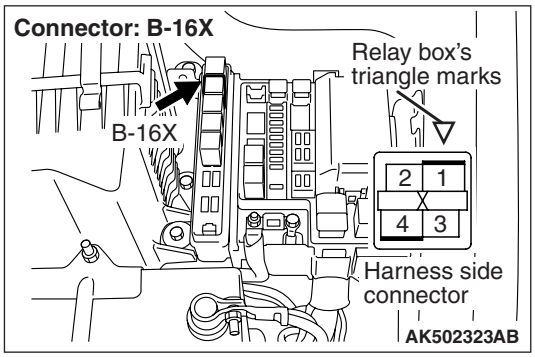
Q: Is the check result normal?
YES : Go to Step 11 .
NO : Repair or replace the connector.

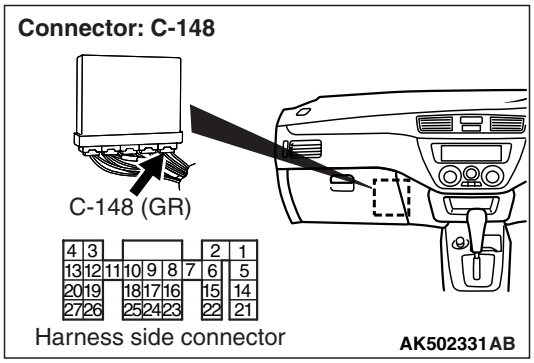
STEP 11. Check injector itself.

- Check Injector itself (Refer to P.13A-330).

Q: Is the check result normal?
YES : Go to Step 12 .
NO : Replace the injector.

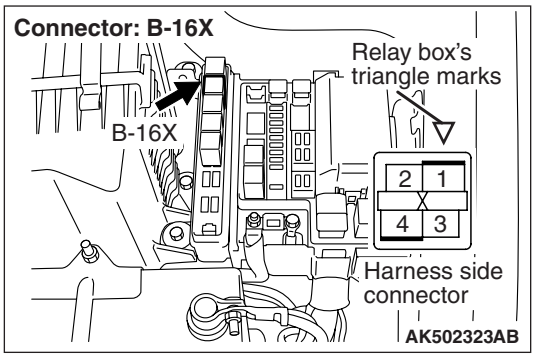
STEP 12. Connector check: B-16X engine control relay connector and C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

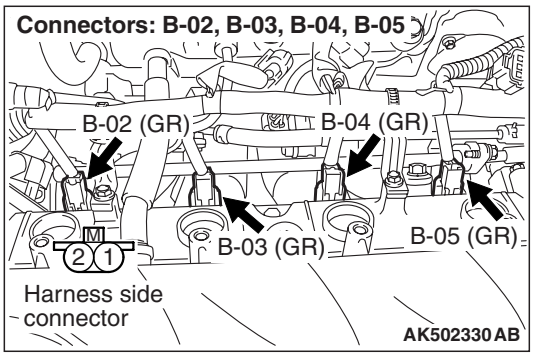




Q: Is the check result normal?
YES : Go to Step 13 .
NO : Repair or replace the connector.

STEP 13. Check harness between B-16X engine control relay connector and injector connector.





a. Check harness between B-16X (terminal No. 4) engine control relay connector and B-02 (terminal No. 1) No. 1 injector connector.
b. Check harness between B-16X (terminal No. 4) engine control relay connector and B-03 (terminal No. 1) No. 2 injector connector.
c. Check harness between B-16X (terminal No. 4) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.
d. Check harness between B-16X (terminal No. 4) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.
   - Check power supply line for damage.

Q: Are the check results normal?
YES : Go to Step 14 .
NO : Repair the damaged harness wire.

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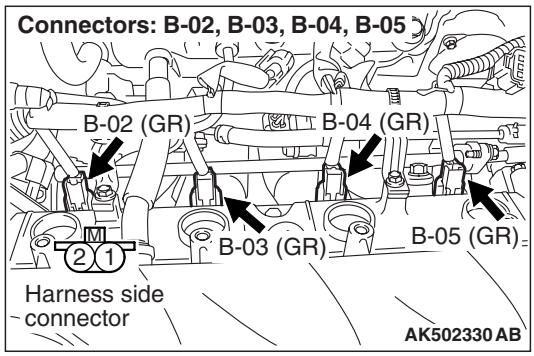
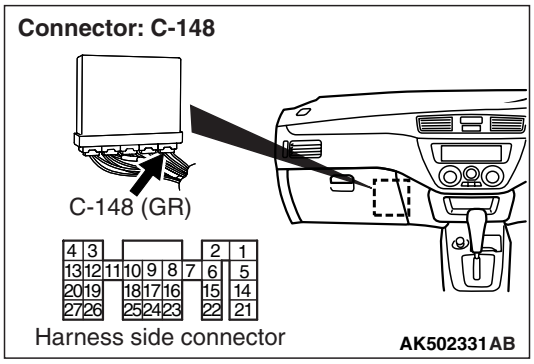
STEP 14. Check harness between injector connector and C-148 engine-ECU connector.





a. Check harness between B-02 (terminal No. 2) No. 1injector connector and C-148 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
b. Check harness between B-03 (terminal No. 2) No. 2 injector connector and C-148 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
c. Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-148 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
d. Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-148 (terminal No. 21) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Q: Are the check results normal?
YES : Go to Step 15 .
NO : Repair the damaged harness wire.

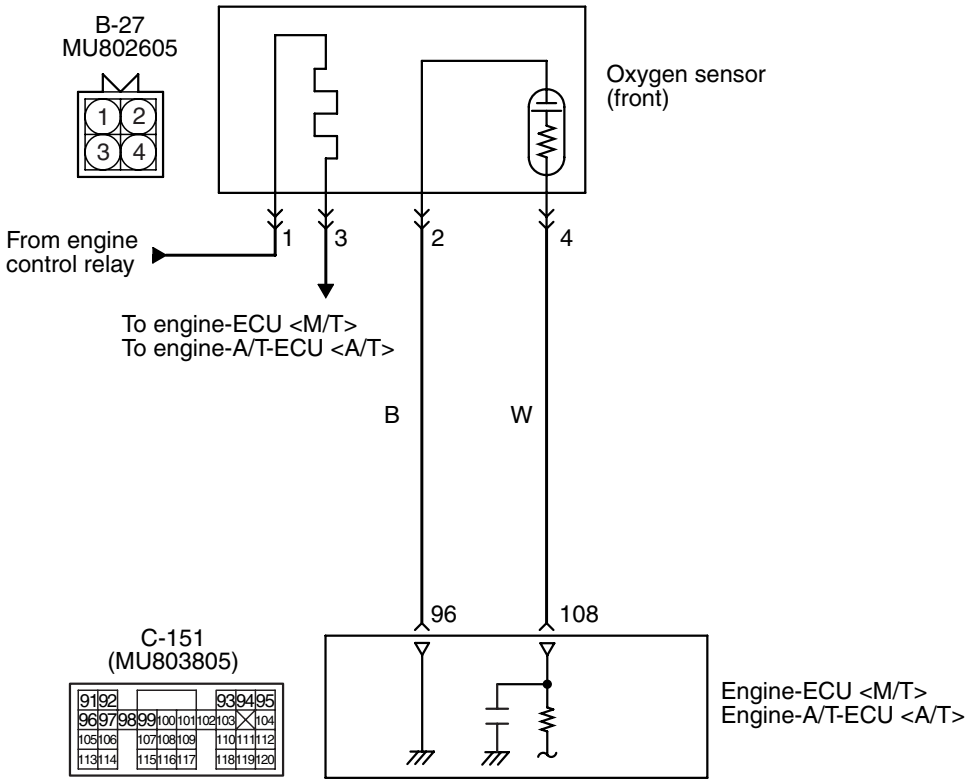
STEP 15. Fuel pressure measurement.

- Fuel pressure measurement (Refer to P.13A-320).

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

Code No. P0130: Oxygen Sensor (Front) System

Oxygen sensor (front) circuit



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

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OPERATION

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

FUNCTION

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

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TROUBLE JUDGMENT

Check Conditions

- Above 3 minutes later after the engine has started up.
- The engine coolant temperature is approximately 76° C or higher.
- The engine speed is 1,200 r/min or more.
- The monitoring time is 5 seconds.

Judgment Criteria

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

Check Conditions

- The engine speed is 1,200 – 3,500 r/min.
- The engine coolant temperature is approximately 60° C or higher.
- Volumetric efficiency is 20 – 60%.
- During the air-fuel ratio feedback control

Judgment Criterion

- When the oxygen sensor (front) output frequency is 9 or less for 10 seconds on the average.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

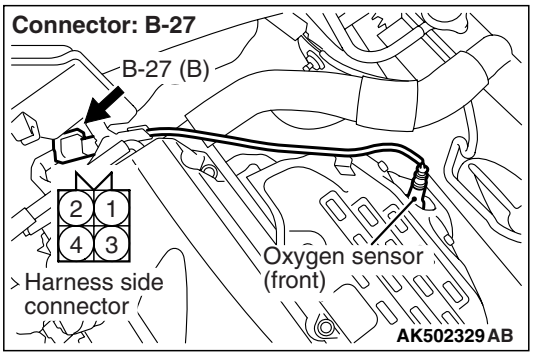
- Refer to Data List Reference Table P.13A-297.
  a. Item 11: oxygen sensor (front)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-27 oxygen sensor (front) connector

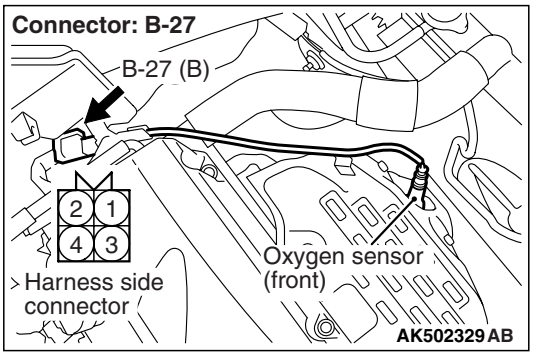


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at B-27 oxygen sensor (front) connector.



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

  OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

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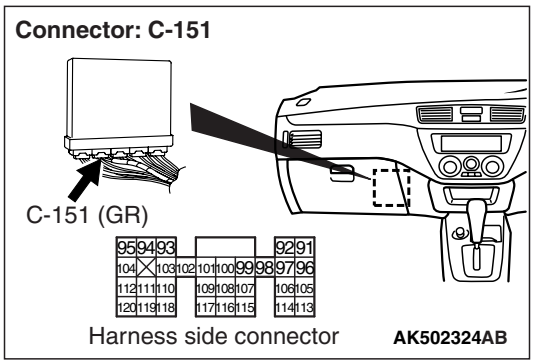
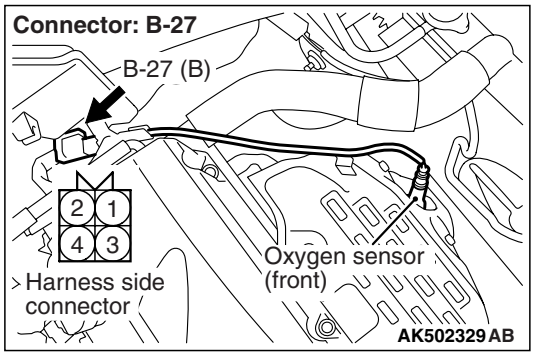
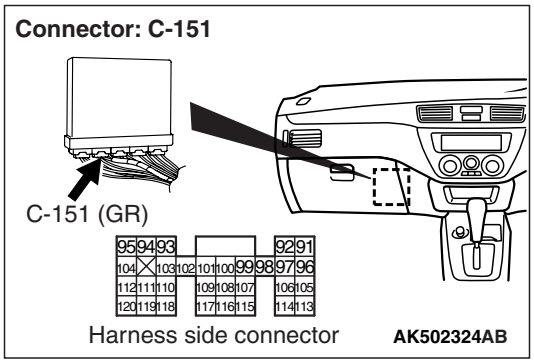
STEP 4. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 5. Check harness between B-27 (terminal No. 2) oxygen sensor (front) connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for open circuit and damage.

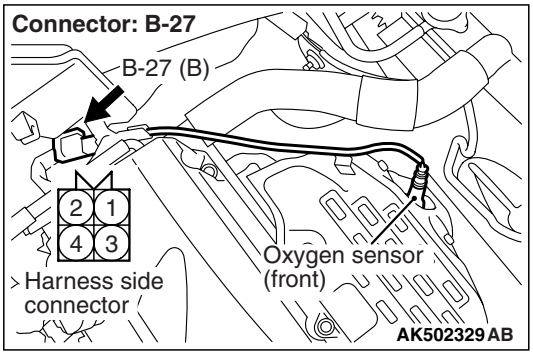
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair the damaged harness wire.

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 11: Oxygen sensor (front)

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Perform voltage measurement at B-27 oxygen sensor (front) connector.



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

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

Q: Is the check result normal?
YES : Go to Step 10 .
NO : Go to Step 8 .

STEP 8. Check oxygen sensor (front) itself.

- Check oxygen sensor (front) itself (Refer to P.13A-328).

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Replace the oxygen sensor (front).

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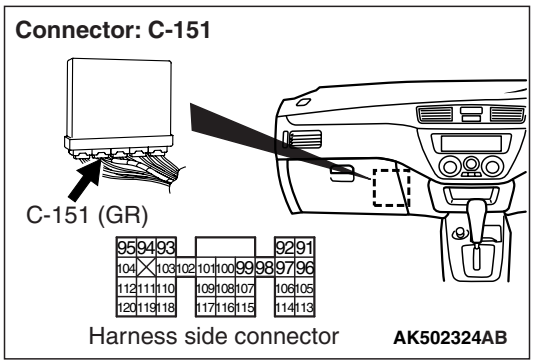
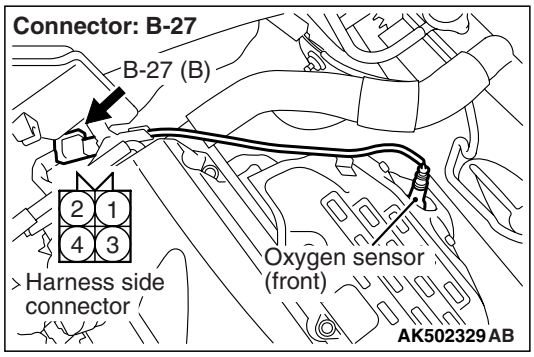
STEP 9. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





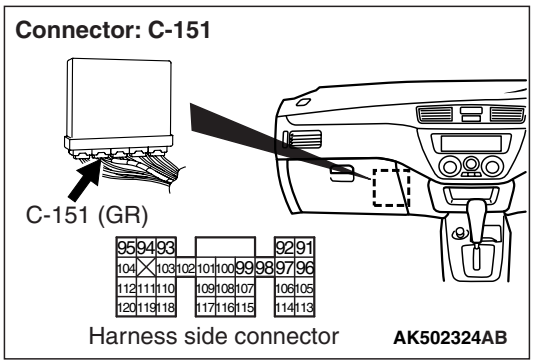
Q: Is the check result normal?

YES : Check and repair harness between B-27 (terminal No. 4) oxygen sensor (front) connector and C-151 (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 the connector.

STEP 10. Perform voltage measurement at C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

OK:

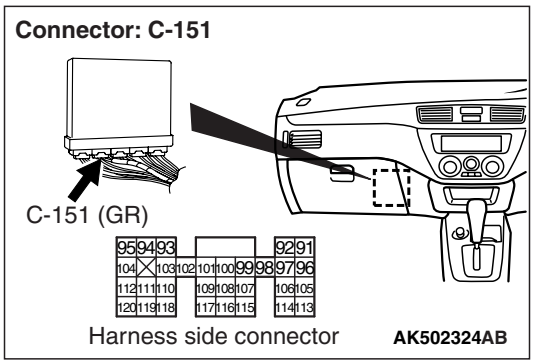
When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

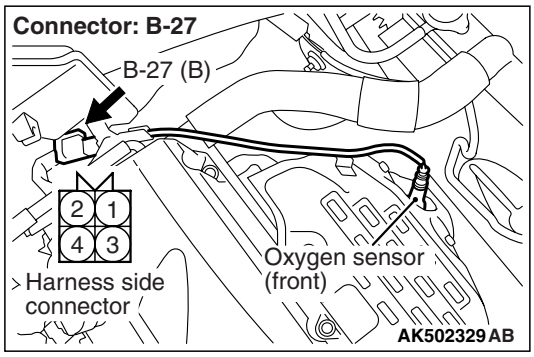
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .

STEP 11. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





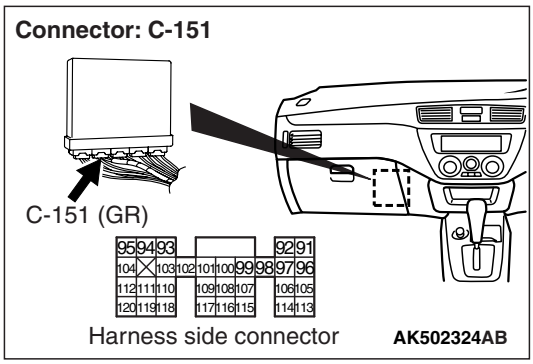
Q: Is the check result normal?

YES : Check and repair harness between B-27 (terminal No. 4) oxygen sensor (front) connector and C-151 (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 the connector.

STEP 12. Connector check: C-151 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 the connector.

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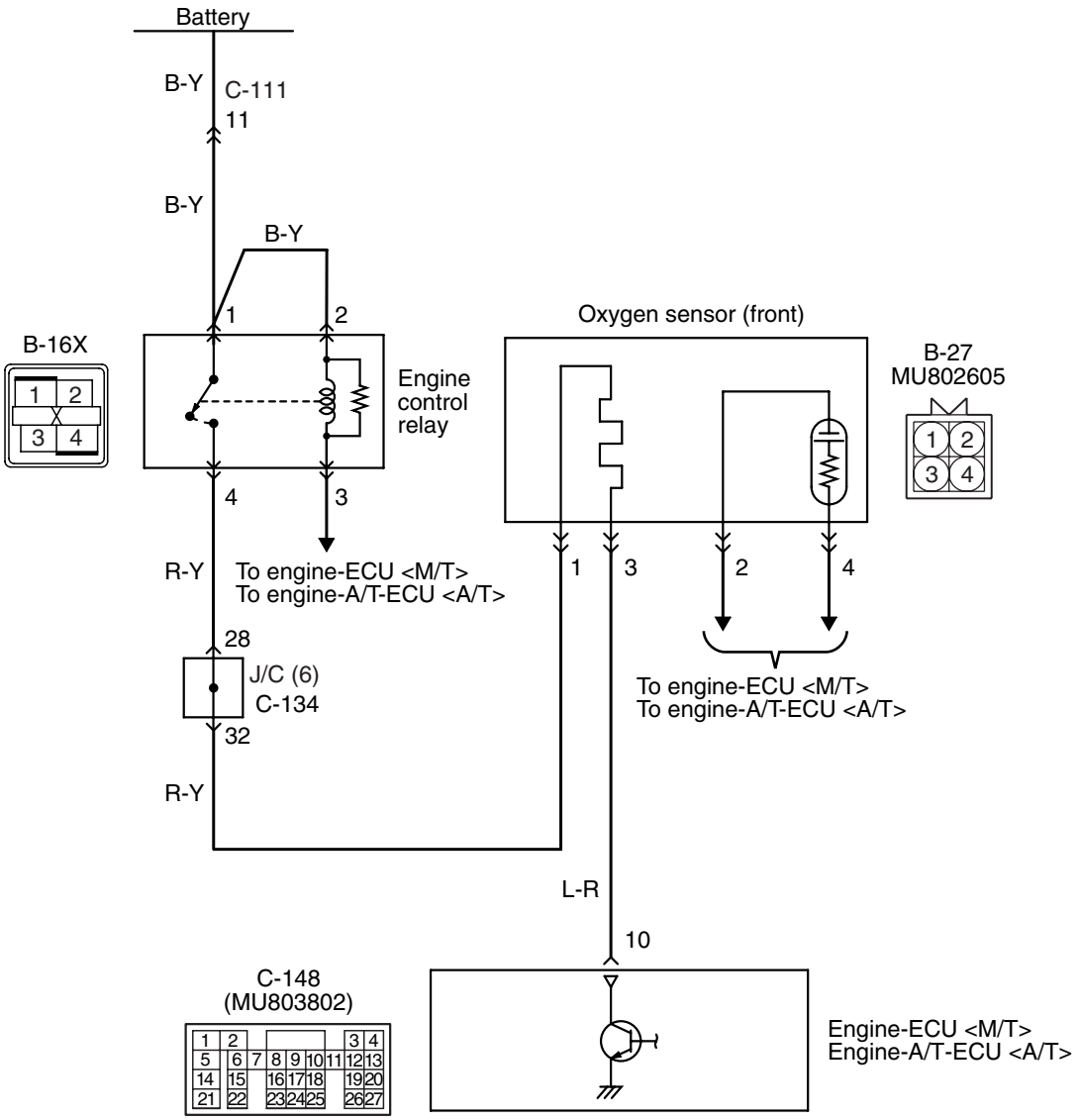
Code No. P0135: Oxygen Sensor (Front) Heater System

Oxygen sensor (front) heater circuit



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

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OPERATION

- Power is supplied to the heater power terminal (terminal No. 1) of the oxygen sensor (front) connector from the engine control relay (terminal No. 4).
- The heater (terminal No. 3) of the oxygen sensor (front) connector is controlled by the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 10).

FUNCTION

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

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TROUBLE JUDGMENT

Check Conditions

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

Judgment Criterion

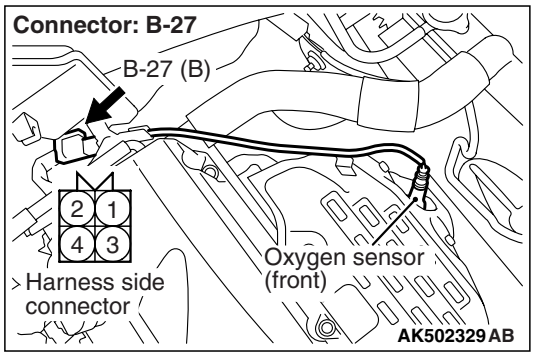
- Oxygen sensor (front) heater current has continued to be 0.16 A or lower, or 5 A or higher for 2 seconds.

PROBABLE CAUSE

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

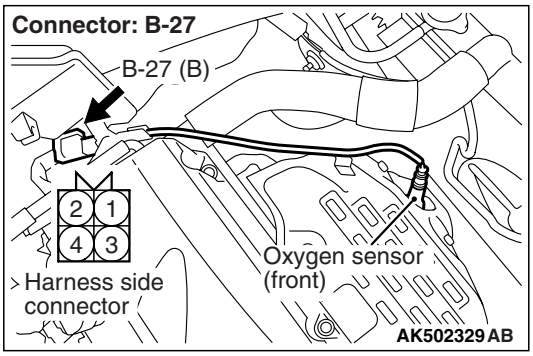
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-27 oxygen sensor (front) connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at B-27 oxygen sensor (front) connector.

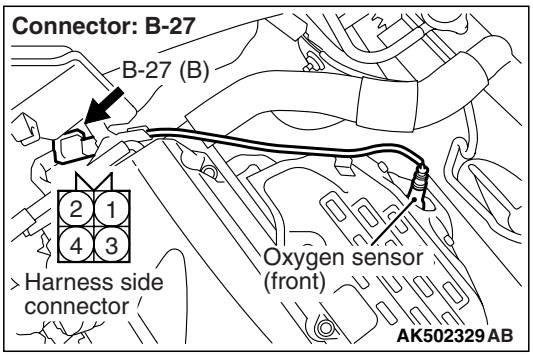


- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 3.

  OK: 4.5 – 8.0 Ω

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the oxygen sensor (front).

STEP 3. Perform voltage measurement at B-27 oxygen sensor (front) connector.



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

  OK: System voltage

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Go to Step 4 .

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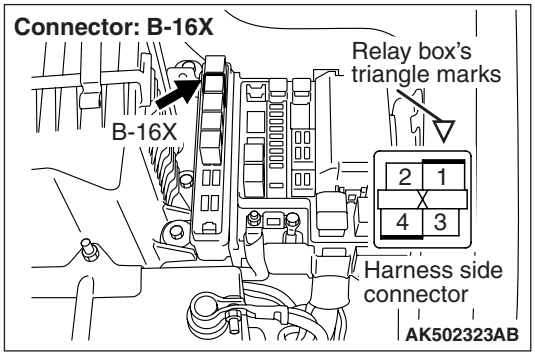
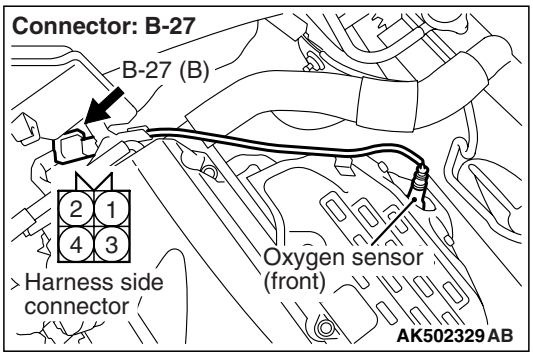
STEP 4. Connector check: B-16X engine control relay connector





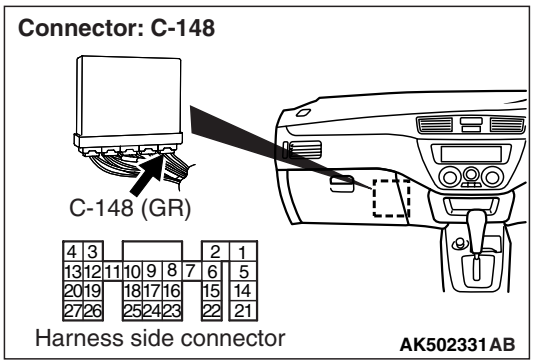
Q: Is the check result normal?

YES : Check intermediate connector C-134, and repair if necessary. If intermediate connector is normal, check and repair harness between B-27 (terminal No. 1) oxygen sensor (front) connector and B-16X (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Perform voltage measurement at C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

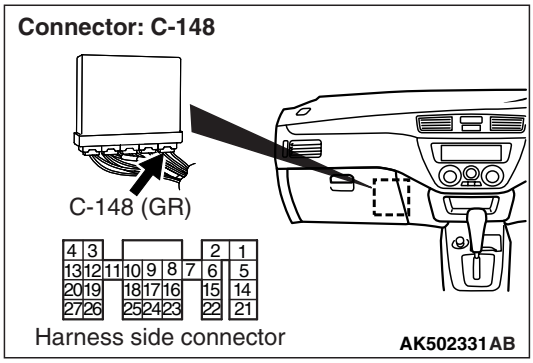
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 6 .

STEP 6. Connector check: C-148 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 the connector.

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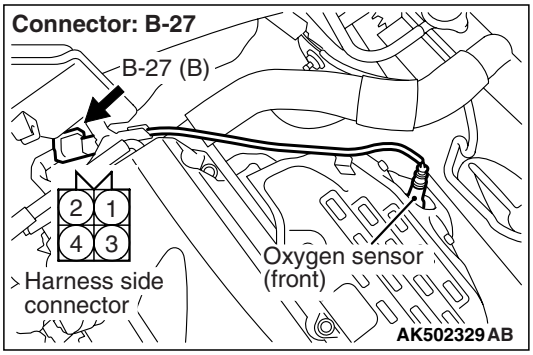
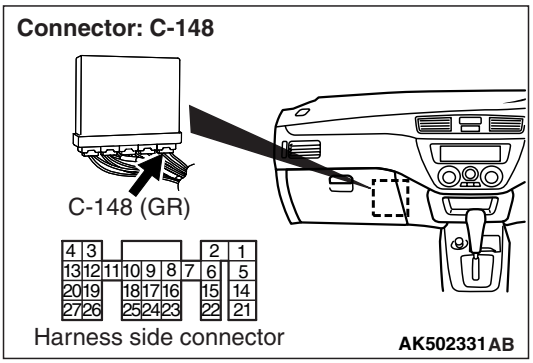
STEP 7. Check harness between B-27 (terminal No. 3) oxygen sensor (front) connector and C-148 (terminal No. 25) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

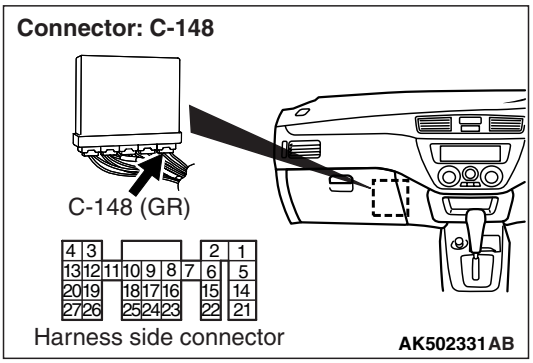




- Check earthing line for open/short circuit.

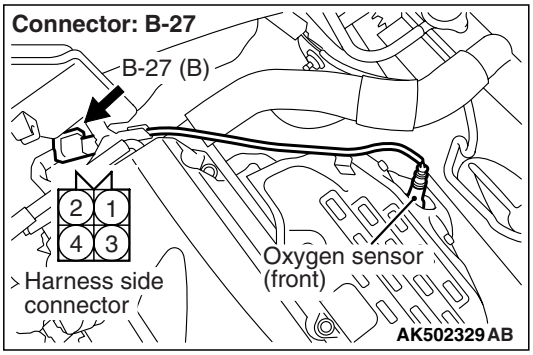
Q: Is the check result normal?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Repair the damaged harness wire.

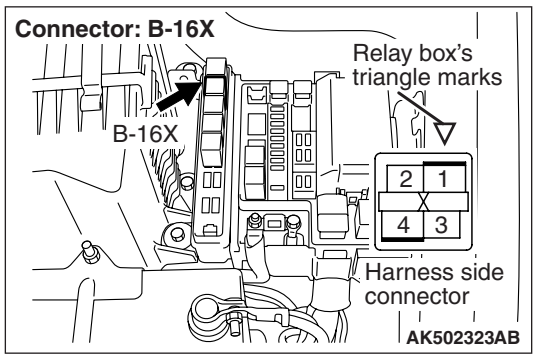
STEP 8. Connector check: C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 9. Check harness between B-27 (terminal No. 1) oxygen sensor (front) connector and B-16X (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connector C-134, and repair if necessary.

- Check power supply line for damage.

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

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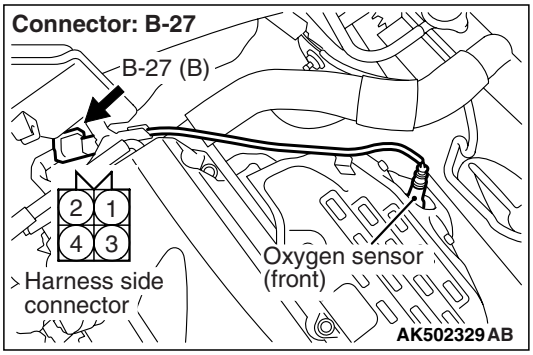
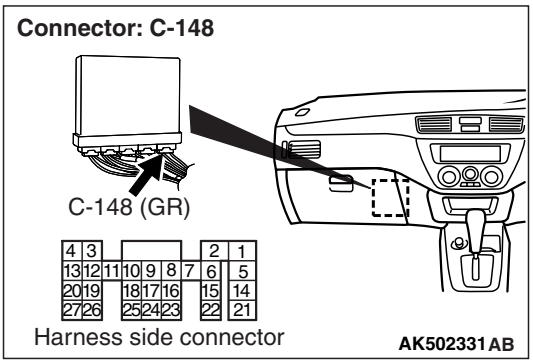
STEP 10. Check harness between B-27 (terminal No. 3) oxygen sensor (front) connector and C-148 (terminal No. 10) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for damage.

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

STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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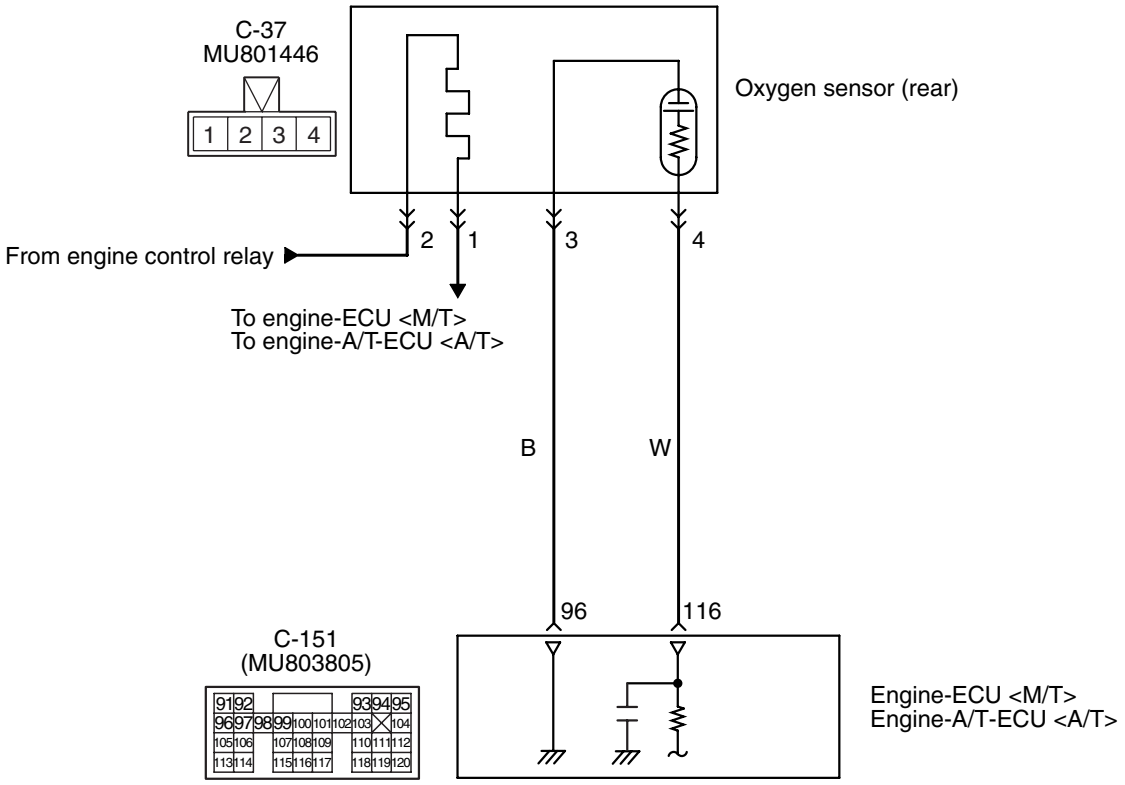
Code No. P0136: Oxygen Sensor (Rear) System

Oxygen sensor (rear) circuit



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

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OPERATION

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

FUNCTION

- The oxygen sensor (rear) converts the concentration of oxygen in the exhaust emission into a voltage and inputs the signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the oxygen sensor (rear) outputs a voltage of about 1 V. When it is leaner than the theoretical air-fuel ratio, it outputs a voltage of about 0 V.
- Based on this signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> corrects the deviation in the signal that is output by the oxygen sensor (rear).

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TROUBLE JUDGMENT

Check Conditions

- Above 3 minutes later after the engine has started up.
- The engine coolant temperature is approximately 76° C or higher.
- The engine speed is 1,200 r/min or more.
- The monitoring time is 5 seconds.

Judgment Criteria

- When the oxygen sensor (rear) output voltage is 0.15 V or less and a power voltage of 5 V is applied to the oxygen sensor (rear) in the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the sensor output voltage is 4.5 V or more.
- To be monitored once per driving cycle.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

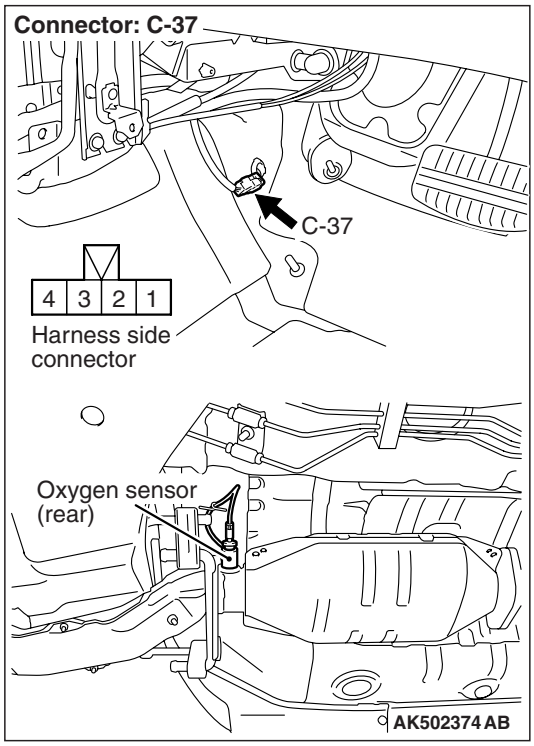
- Refer to Data List Reference Table P.13A-297.
  a. Item 59: Oxygen sensor (rear)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: C-37 oxygen sensor (rear) connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

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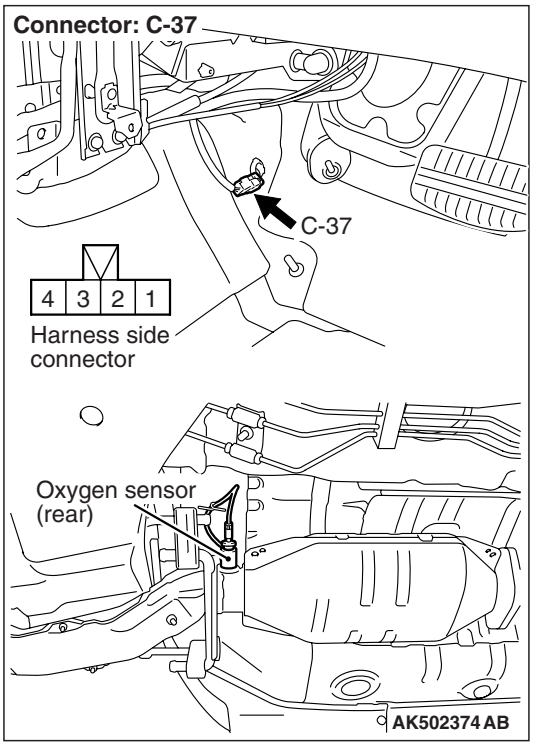
STEP 3. Perform resistance measurement at C-37 oxygen sensor (rear) connector.

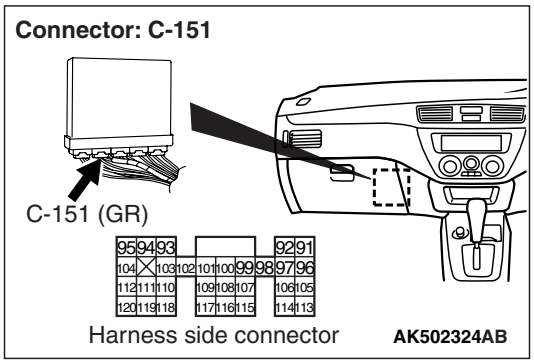


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 3 and earth.

  OK: 2 Ω or less

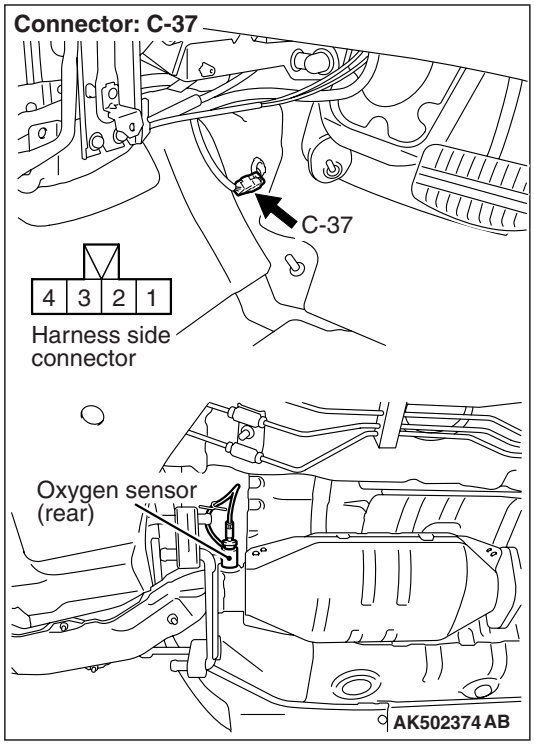
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

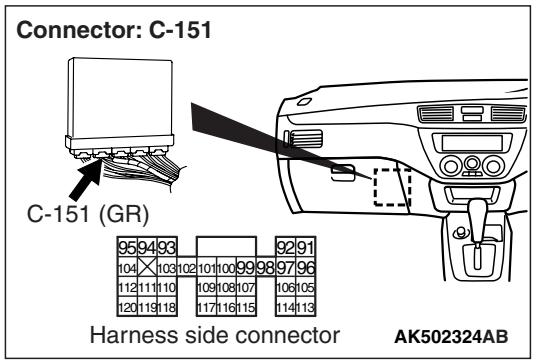
STEP 4. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 5. Check harness between C-37 (terminal No. 3) oxygen sensor (rear) connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for open circuit.

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

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 59: Oxygen sensor (rear)

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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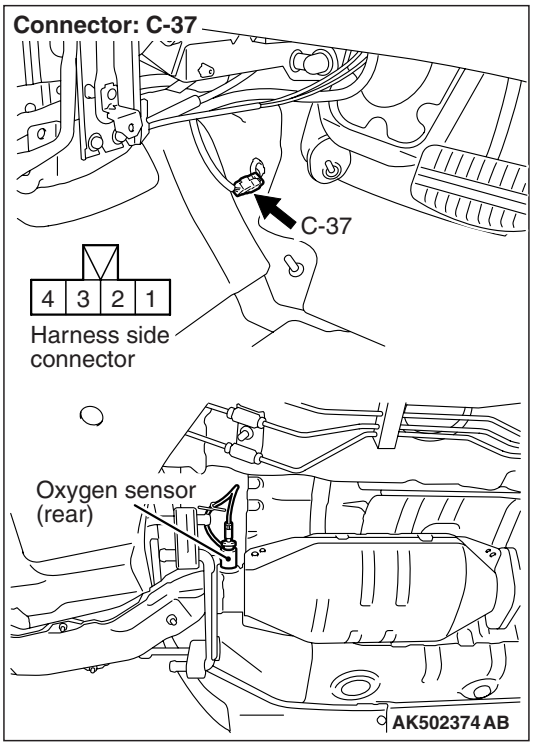
STEP 7. Perform voltage measurement at C-37 oxygen sensor (rear) connector.



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

OK:

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

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 .

STEP 8. Check oxygen sensor (rear) itself.

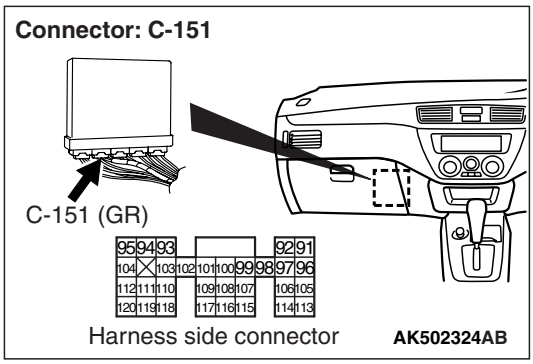
- Check oxygen sensor (rear) itself (Refer to P.13A-328).

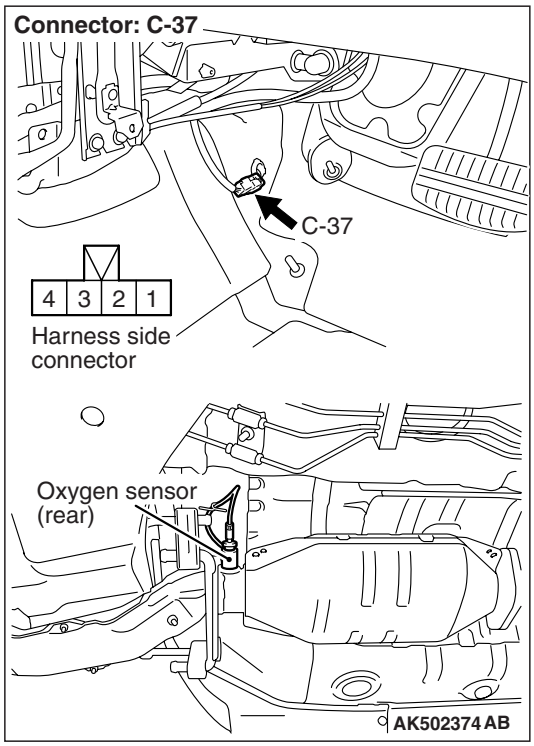
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace the oxygen (rear) sensor.

STEP 9. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





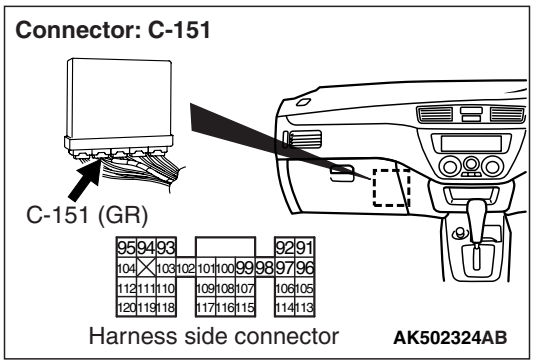
Q: Is the check result normal?

YES : Check and repair harness between C-37 (terminal No. 4) oxygen sensor (rear) connector and C-151 (terminal No. 116) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for damage.

NO : Repair or replace the connector.

STEP 10. Perform voltage measurement at C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

OK:

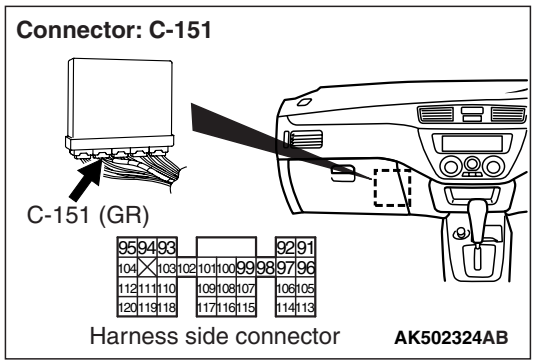
When the engine is 2,500 r/min, the output voltage should repeat 0 to 0.8 V alternately.

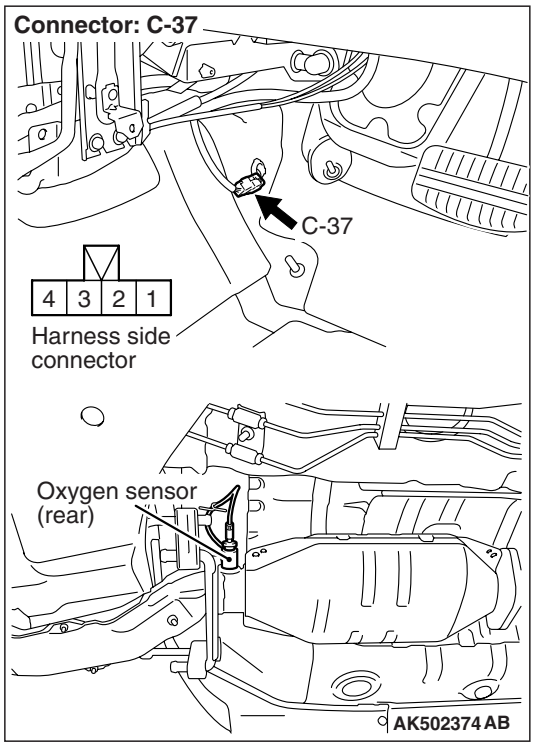
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .

STEP 11. Connector check: C-151 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 C-37 (terminal No. 4) oxygen sensor (rear) connector and C-151 (terminal No. 116) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair or replace the connector.

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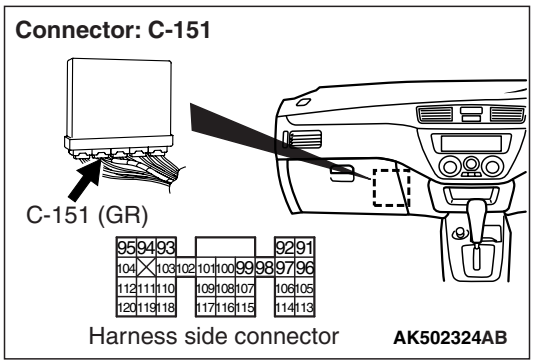
STEP 12. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



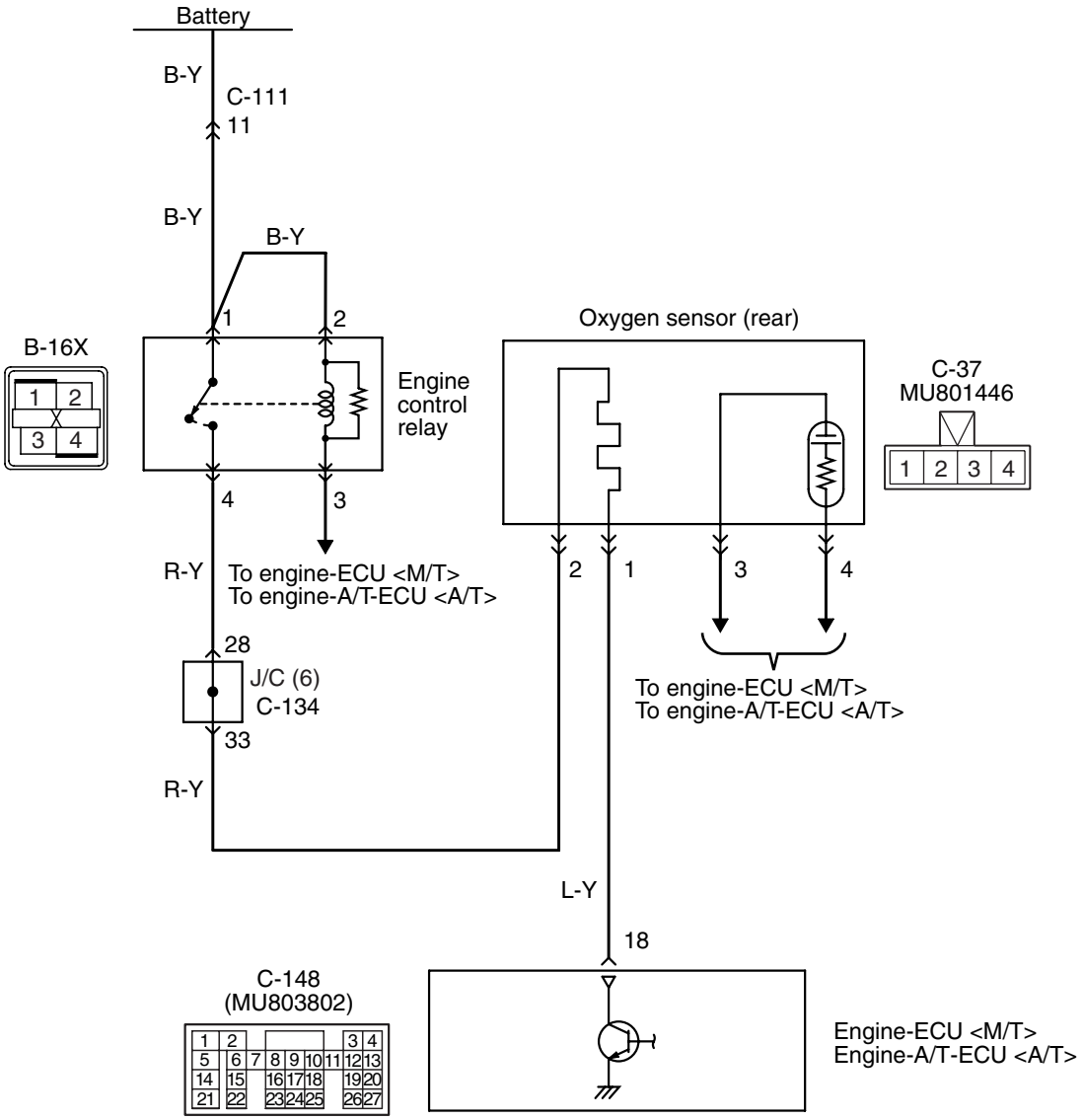
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace the connector.

Code No. P0141: Oxygen Sensor (Rear) Heater System

Oxygen sensor (rear) heater circuit



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

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OPERATION

- Power is supplied to the heater power terminal (terminal No. 2) of the oxygen sensor (rear) connector from the engine control relay (terminal No. 4).
- The heater (terminal No. 1) of the oxygen sensor (rear) connector is controlled by the power transistor in the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 18).

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FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criterion

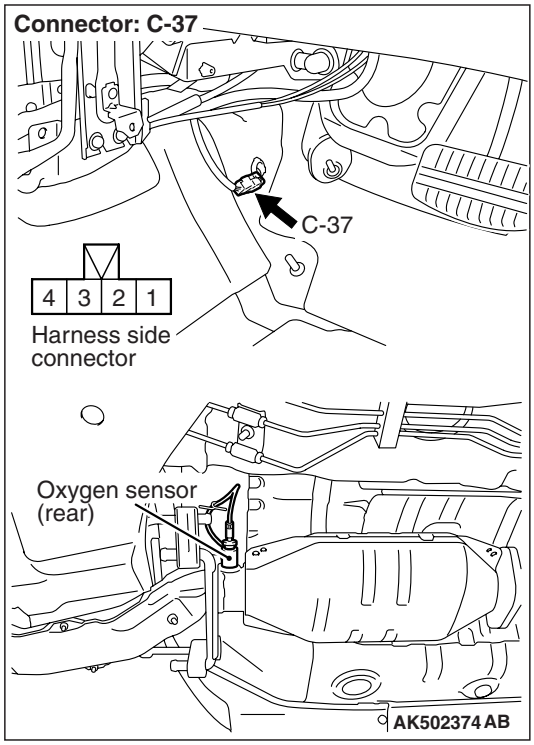
- Oxygen sensor (rear) heater currents have continued to be 0.16 A or lower, or 5.0 A or higher for 2 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-37 oxygen sensor (rear) connector

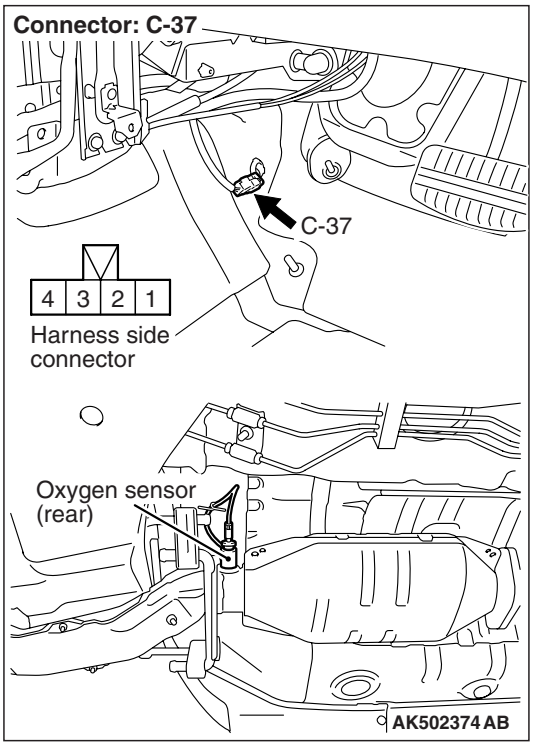


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at C-37 oxygen sensor (rear) connector.

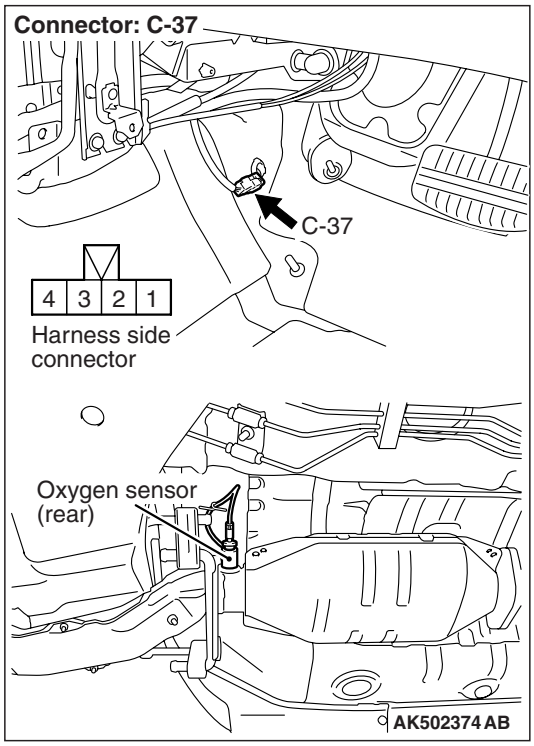


- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 2.

  OK: 11 – 18 Ω

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the oxygen sensor (rear).

STEP 3. Perform voltage measurement at C-37 oxygen sensor (rear) connector.



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

  OK: System voltage

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Go to Step 4 .

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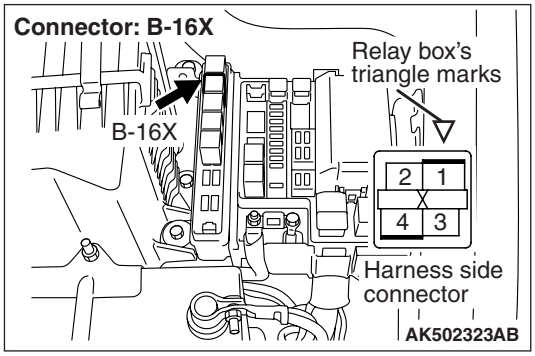
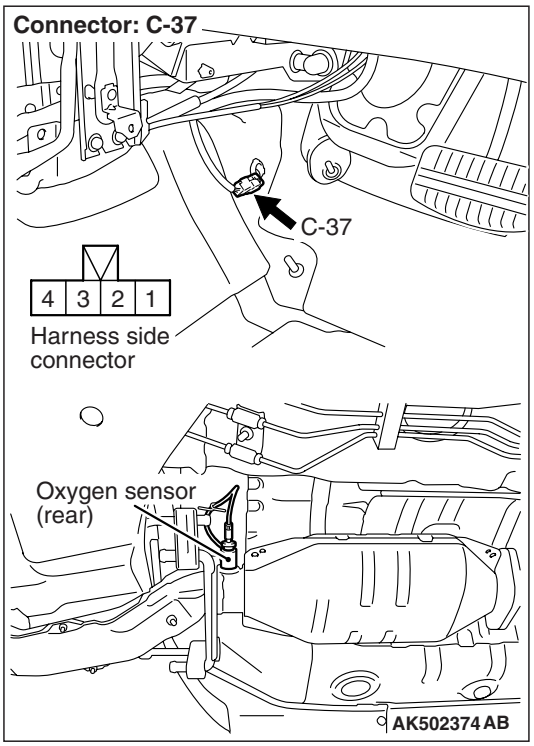
STEP 4. Connector check: B-16X engine control relay connector





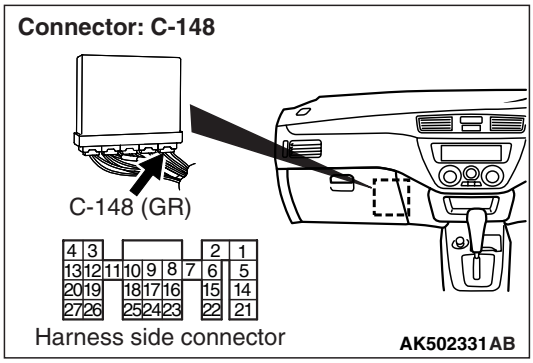
Q: Is the check result normal?

YES : Check intermediate connector C-134, and repair if necessary. If intermediate connector is normal, check and repair harness between C-37 (terminal No. 2) oxygen sensor (rear) connector and B-16X (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Perform voltage measurement at C-148 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. 18 and earth.

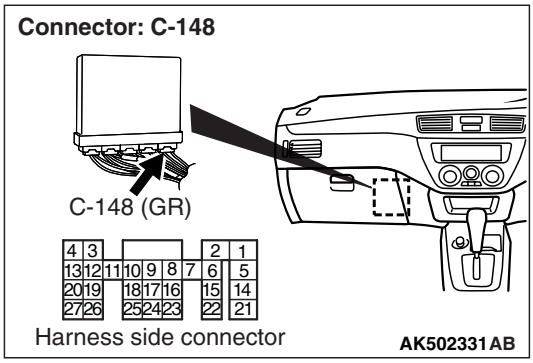
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 6 .

STEP 6. Connector check: C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

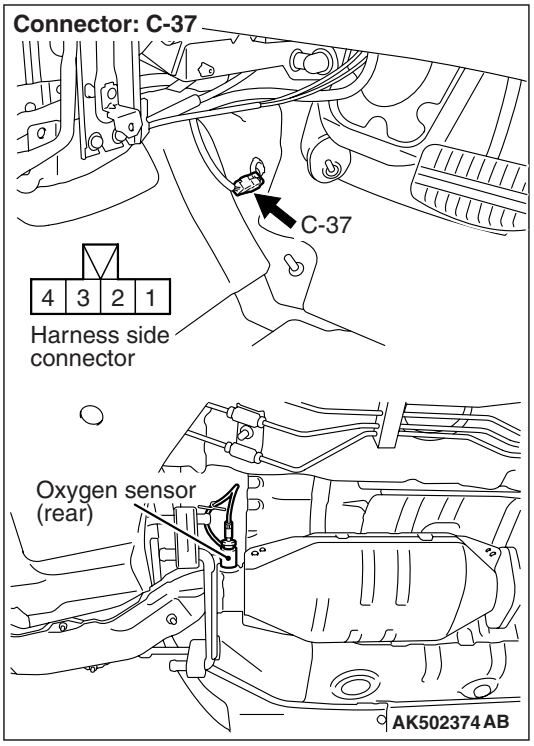


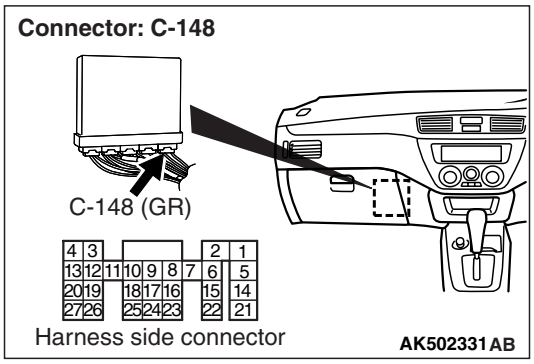
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between C-37 (terminal No. 1) oxygen sensor (rear) connector and C-148 (terminal No. 18) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

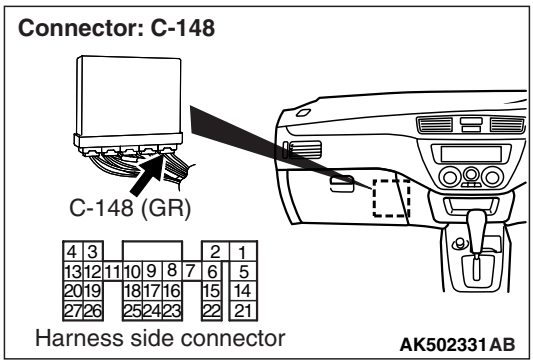




- Check earthing line for open/short circuit.

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

STEP 8. Connector check: C-148 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 the connector.

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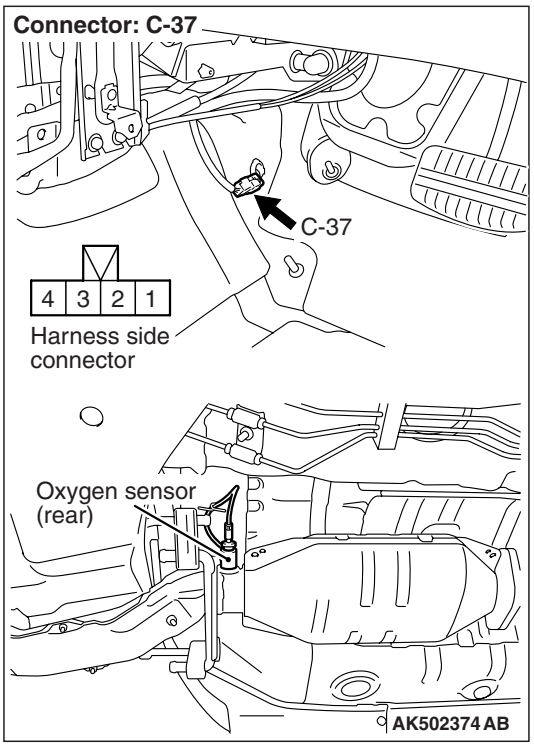
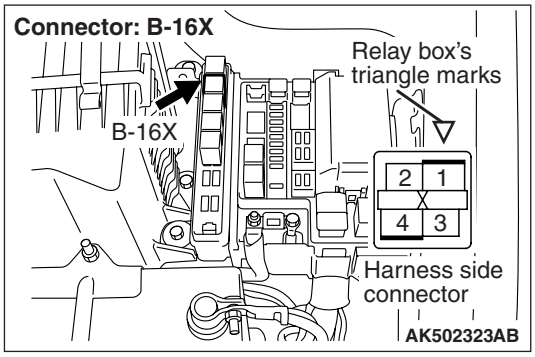
STEP 9. Check harness between C-37 (terminal No. 2) oxygen sensor (rear) connector and B-16X (terminal No. 4) engine control relay connector.



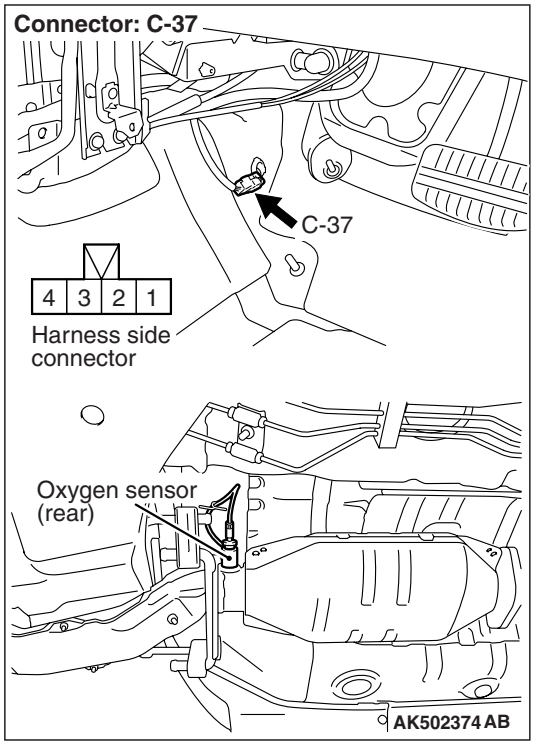


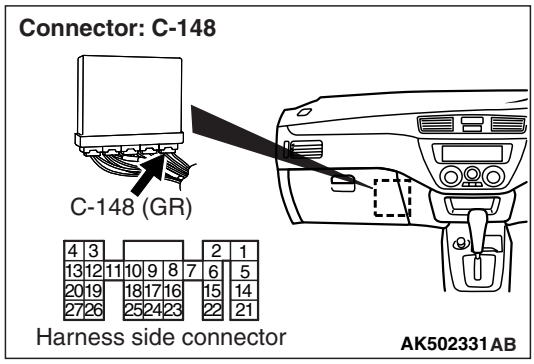
NOTE: Before checking harness, check intermediate connector C-134, and repair if necessary.

- Check power supply line for damage.

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

STEP 10. Check harness between C-37 (terminal No. 2) oxygen sensor (rear) connector and C-148 (terminal No. 18) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for damage.

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

STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0170: Abnormal Fuel System

OPERATION

- Refer to Code No. P0201: No. 1 Injector System P.13A-82.
- Refer to Code No. P0202: No. 2 Injector System P.13A-86.
- Refer to Code No. P0203: No. 3 Injector System P.13A-90.
- Refer to Code No. P0204: No. 4 Injector System P.13A-94.

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- In learning the air-fuel ratio.

Judgment Criteria

- Long-term fuel trim has continued to be +15% or higher for 10 seconds.

or

- Long-term fuel trim has continued to be –15% or higher for 10 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

Q: Is any other diagnosis code than P0170 output?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 12: Air flow sensor
  b. Item 13: Intake air temperature sensor
  c. Item 21: Engine coolant temperature sensor
  d. Item 95: Manifold absolute pressure sensor

Q: Are the check results normal?
YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-19).

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 25: Barometric pressure sensor

Q: Are the check results normal?
YES : Go to Step 4 .
NO : Replace the 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-320).

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.

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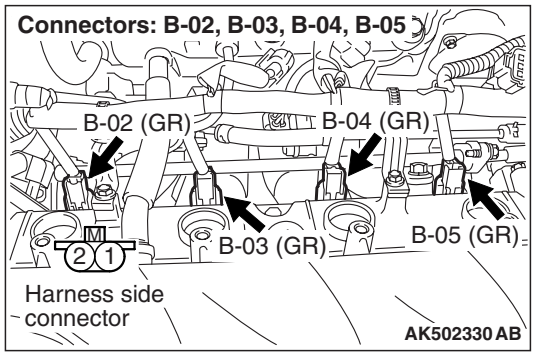
STEP 7. Connector Check: Injector connector



a. B-02 (No. 1 injector connector).
b. B-03 (No. 2 injector connector).
c. B-04 (No. 3 injector connector).
d. B-05 (No. 4 injector connector).

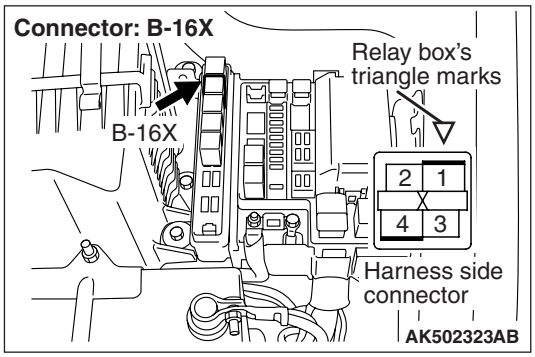
Q: Are the check results normal?
YES : Go to Step 8 .
NO : Replace.

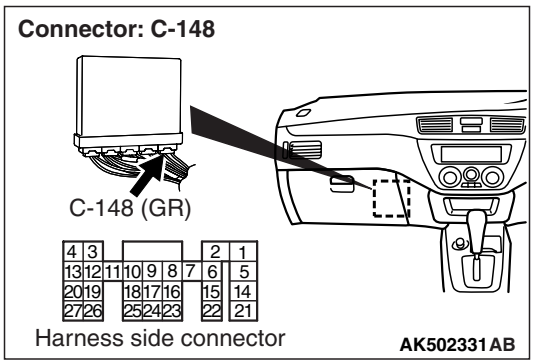
STEP 8. Check injector itself.

- Check Injector itself (Refer to P.13A-330).

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

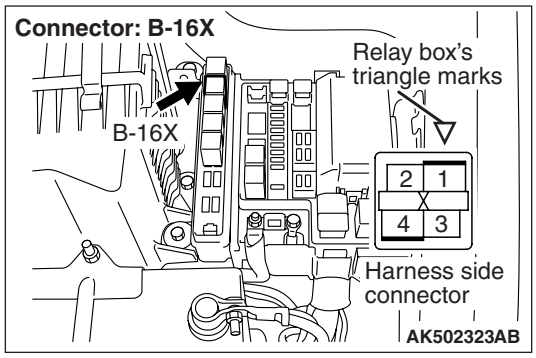
STEP 9. Connector check: B-16X engine control relay connector and C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

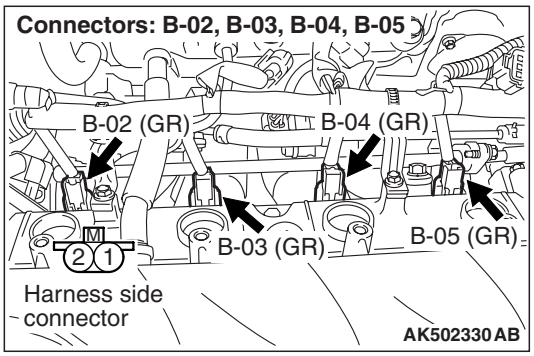




Q: Is the check result normal?
YES : Go to Step 10 .
NO : Repair or replace the connector.

STEP 10. Check harness between B-16X engine control relay connector and injector connector.





a. Check harness between B-16X (terminal No. 4) engine control relay connector and B-02 (terminal No. 1) No. 1 injector connector.
b. Check harness between B-16X (terminal No. 4) engine control relay connector and B-03 (terminal No. 1) No. 2 injector connector.
c. Check harness between B-16X (terminal No. 4) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.
d. Check harness between B-16X (terminal No. 4) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.
   - Check power supply line for damage.

Q: Are the check results normal?
YES : Go to Step 11 .
NO : Repair the damaged harness wire.

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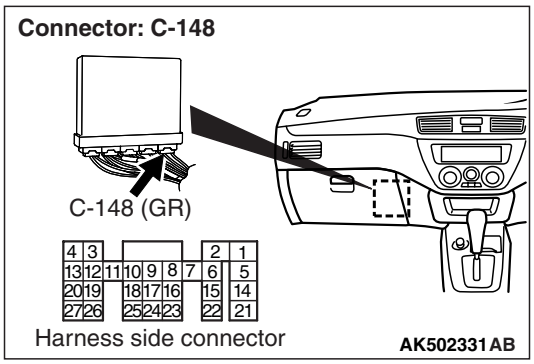
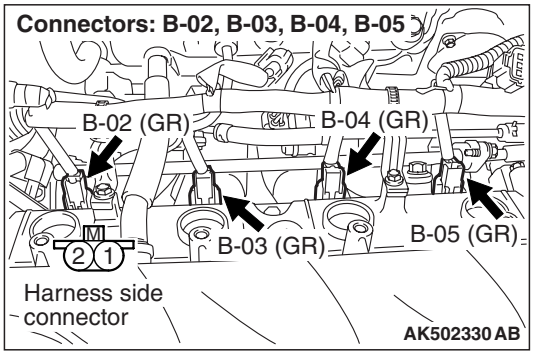
STEP 11. Check harness between injector connector and C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





a. Check harness between B-02 (terminal No. 2) No. 1 injector connector and C-148 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
b. Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-148 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
c. Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-148 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
d. Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-148 (terminal No. 21) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

Q: Are the check results normal?
YES : Go to Step 12 .
NO : Repair the damaged harness wire.

STEP 12. Check purge control solenoid valve itself.

- Check purge control solenoid valve itself (Refer to GROUP 17 –Emission Control System –Evaporative Emission Control System–Purge Control Solenoid Valve P.17-54).

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

STEP 13. Fuel pressure measurement.

- Fuel pressure measurement (Refer to P.13A-320).

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

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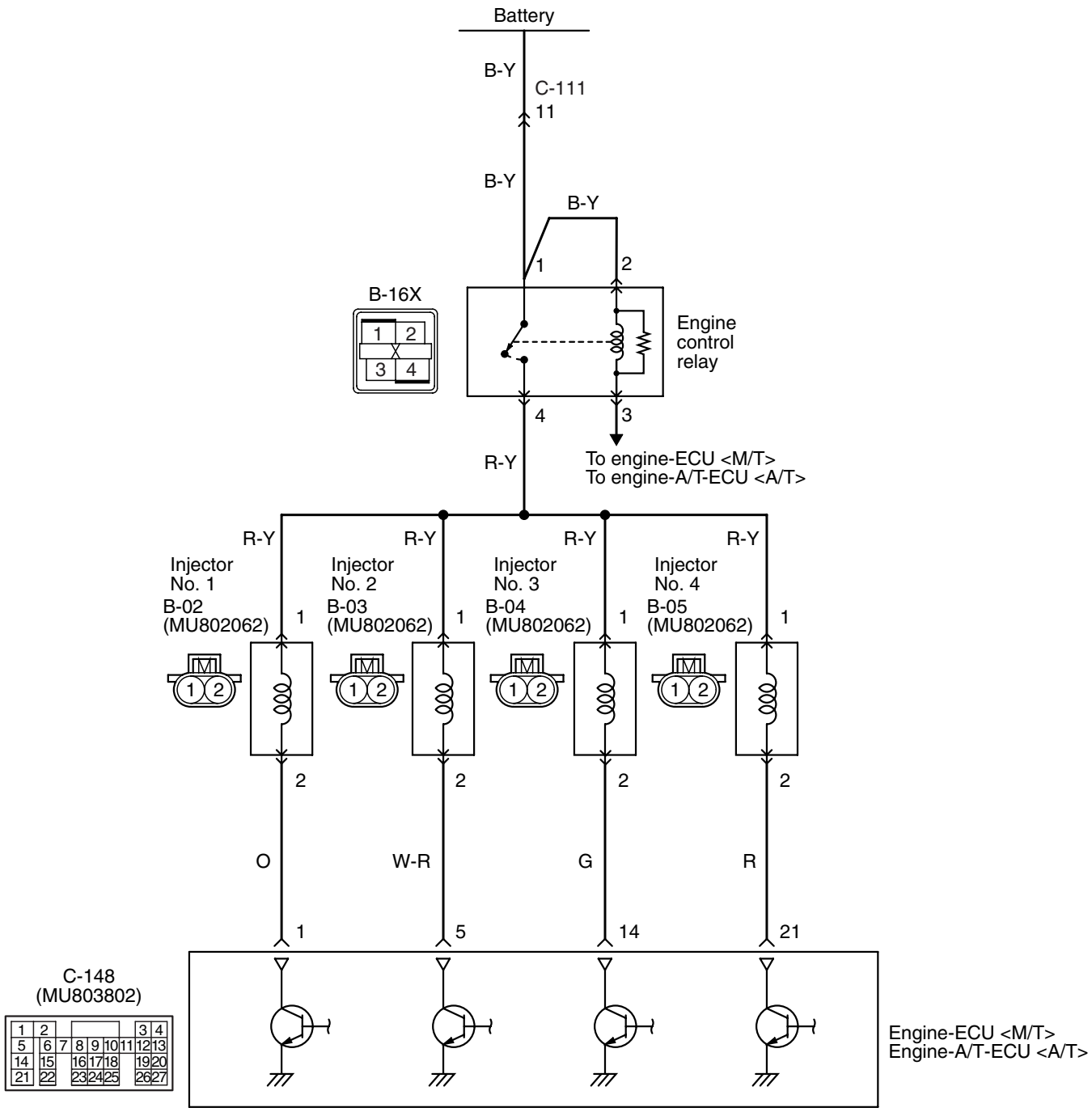
Code No. P0201: No. 1 Injector System

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 PU: Purple

AK502017AB

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- While engine is running.

Judgment Criterion

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

- Item 01: No. 1 injector

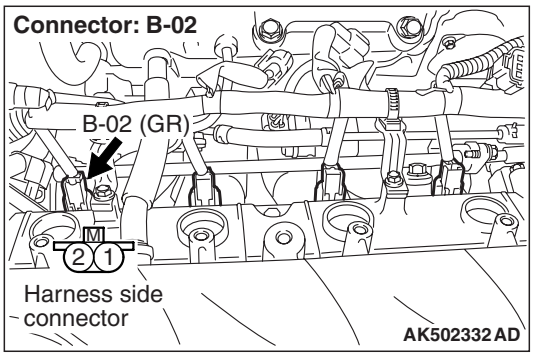
OK: Idling state varies.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-02 No. 1 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check No. 1 injector itself.

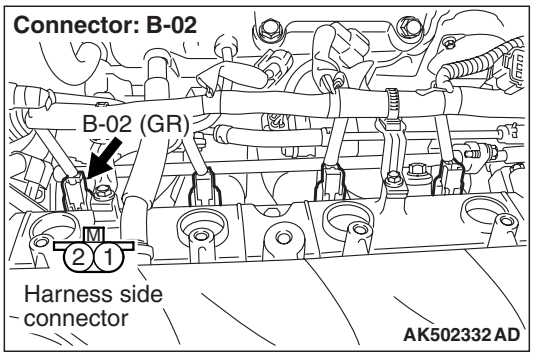
- Check No. 1 Injector itself (Refer to P.13A-330).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the No. 1 injector.

STEP 4. Perform voltage measurement at B-02 No. 1 injector connector.



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

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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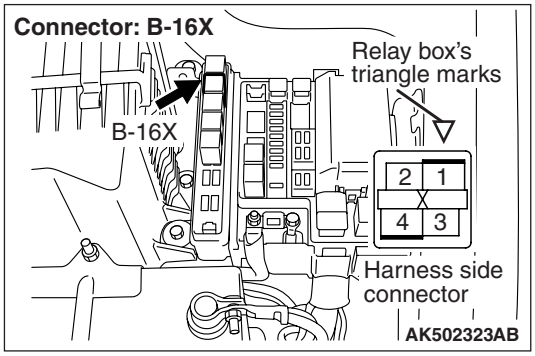
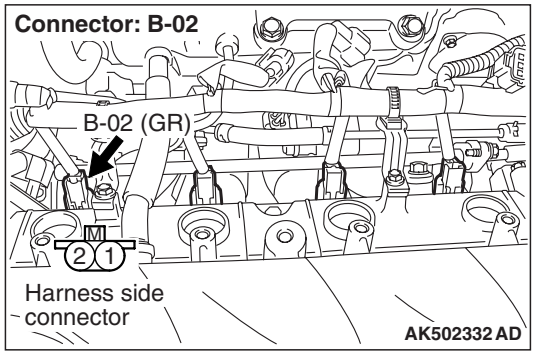
STEP 5. Connector check: B-16X engine control relay connector





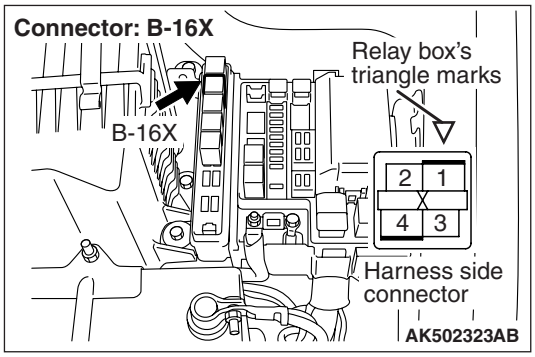
Q: Is the check result normal?

YES : Check and repair harness between B-16X (terminal No. 4) engine control relay connector and B-02 (terminal No. 1) No. 1 injector connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 6. Connector check: B-16X engine control relay connector

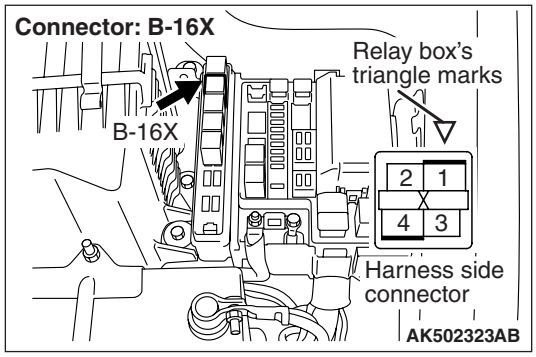


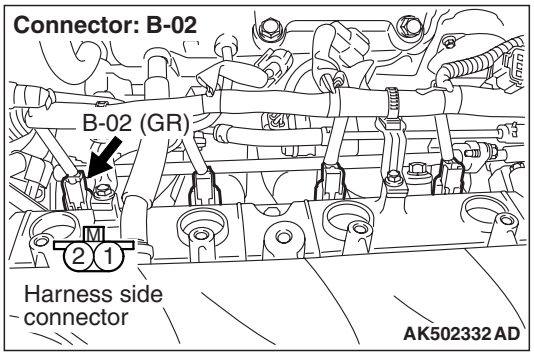
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between B-16X (terminal No. 4) engine control relay connector and B-02 (terminal No. 1) No. 1 injector connector.





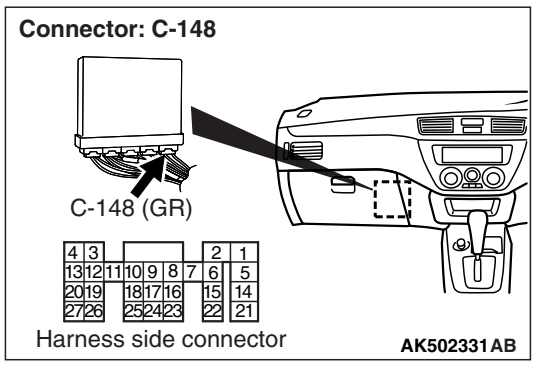
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

STEP 8. Connector check: C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

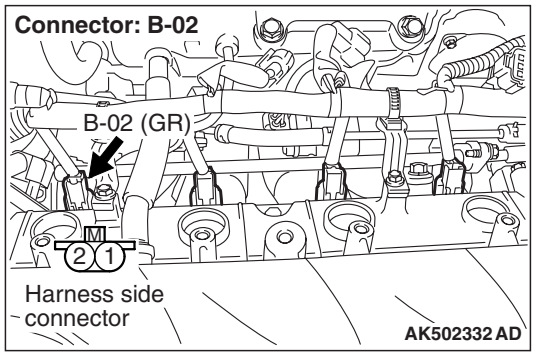


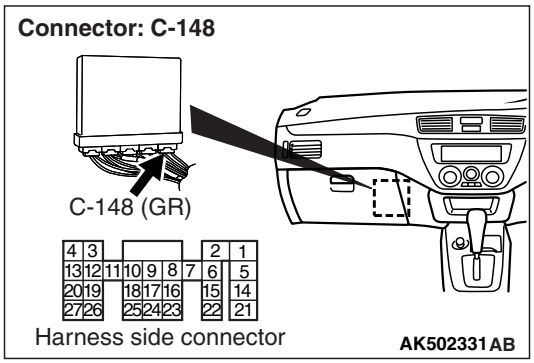
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace the connector.

STEP 9. Check harness between B-02 (terminal No. 2) No. 1 injector connector and C-148 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

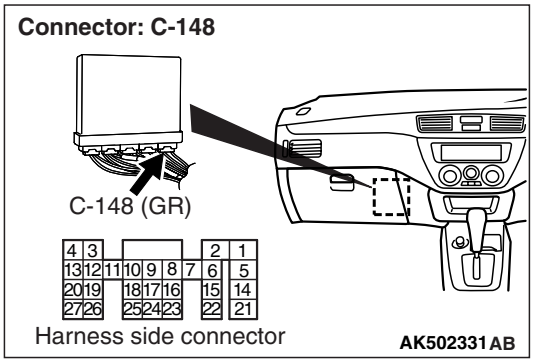




- Check output line for open/short circuit and damage.

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

STEP 10. Perform signal wave pattern measurement at C-148 engine-ECU <M/T> connector 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.

  OK: Waveforms should be display on Inspection procedure using an oscilloscope (Refer to P.13A-313).

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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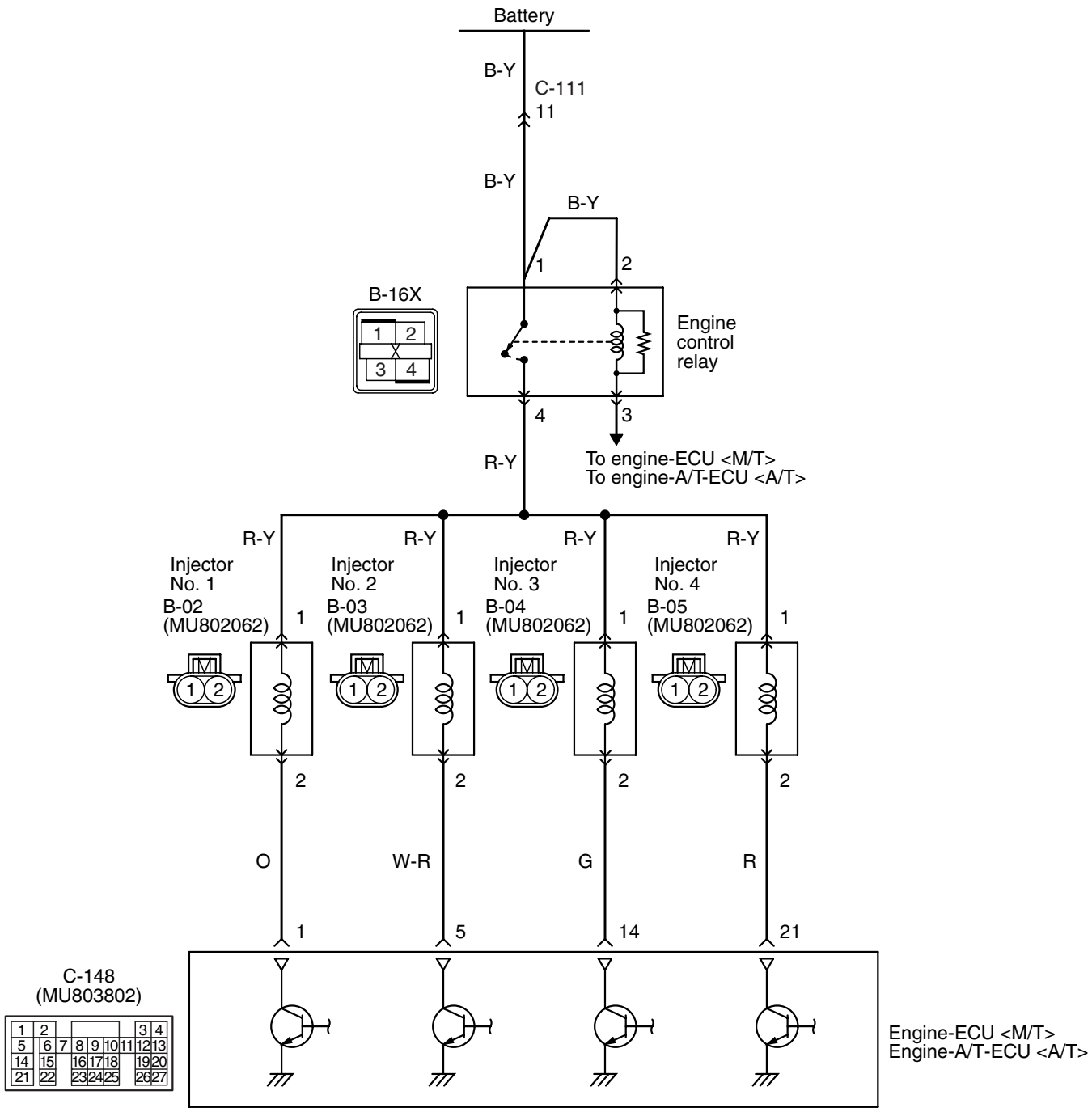
Code No. P0202: No. 2 Injector System

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 PU: Purple

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OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- While engine is running.

Judgment Criterion

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

PROBABLE CAUSE

- Failed No. 2 injector
- Open/short circuit in No. 2 injector circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

- Item 02: No. 2 injector

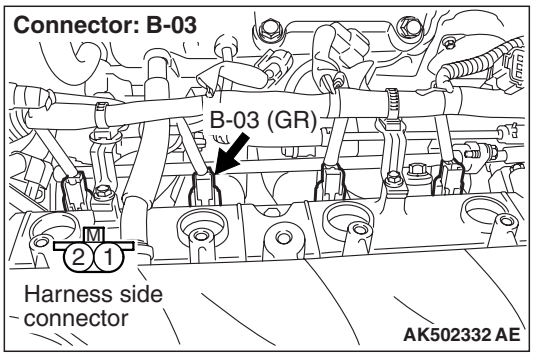
OK: Idling state varies.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-03 No. 2 injector connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check No. 2 injector itself.

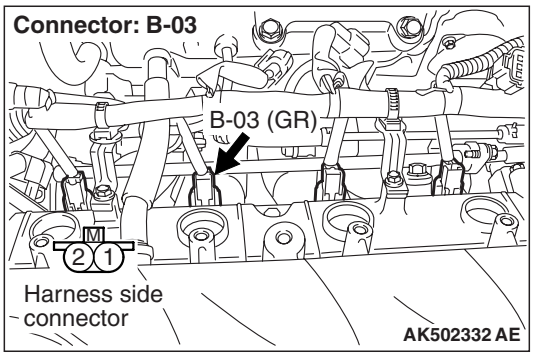
- Check No. 2 Injector itself (Refer to P.13A-330).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the No. 2 injector.

STEP 4. Perform voltage measurement at B-03 No. 2 injector connector.



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

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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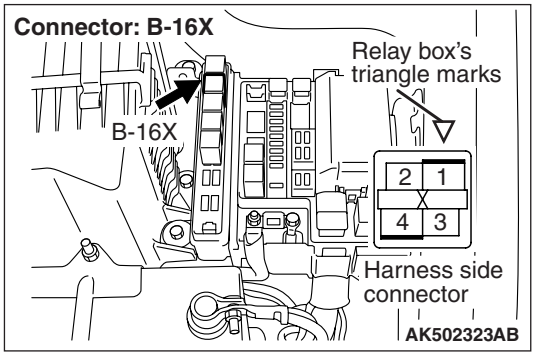
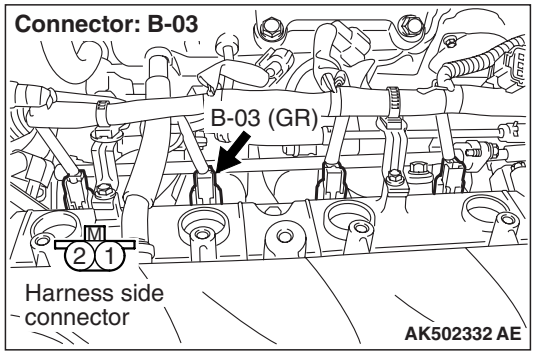
STEP 5. Connector check: B-16X engine control relay connector





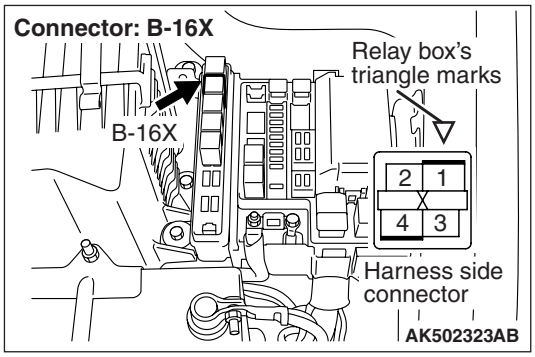
Q: Is the check result normal?

YES : Check and repair harness between B-16X (terminal No. 4) engine control relay connector and B-03 (terminal No. 1) No. 2 injector connector.

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

NO : Repair or replace the connector.

STEP 6. Connector check: B-16X engine control relay connector

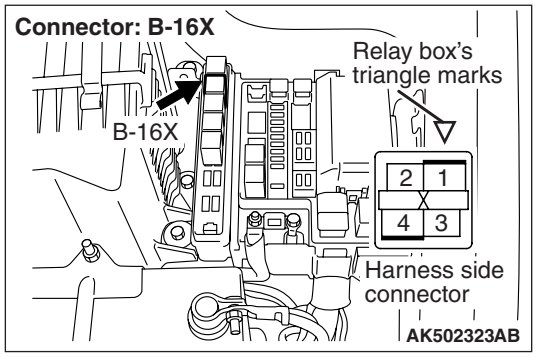


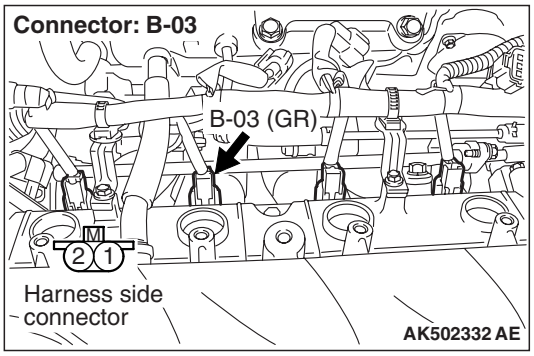
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between B-16X (terminal No. 4) engine control relay connector and B-03 (terminal No. 1) No. 2 injector connector.





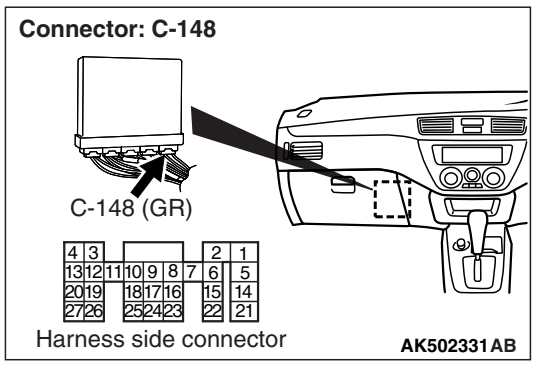
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

STEP 8. Connector check: C-148 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 the connector.

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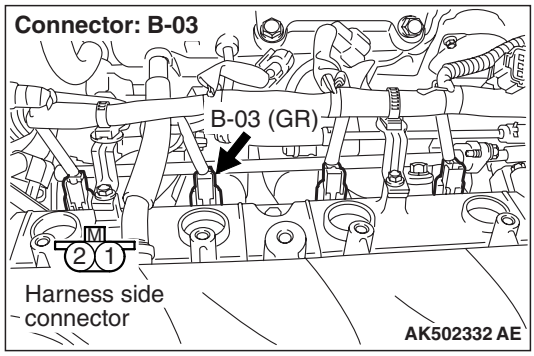
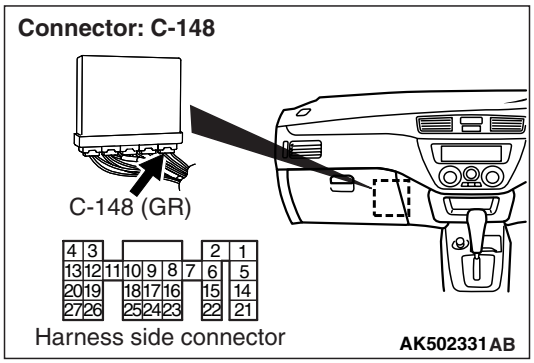
STEP 9. Check harness between B-03 (terminal No. 2) No. 2 injector connector and C-148 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

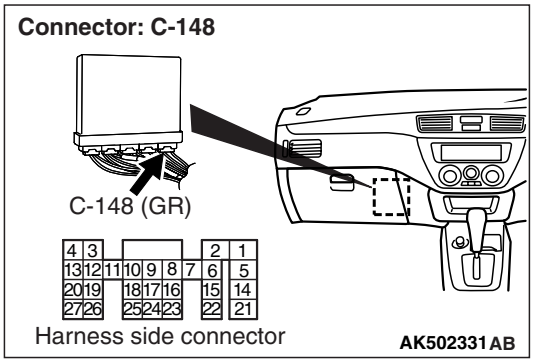




- Check output line for open/short circuit and damage.

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

STEP 10. Perform signal wave pattern measurement at C-148 engine-ECU <M/T> connector 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. 5 and earth.

  OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13A-313).

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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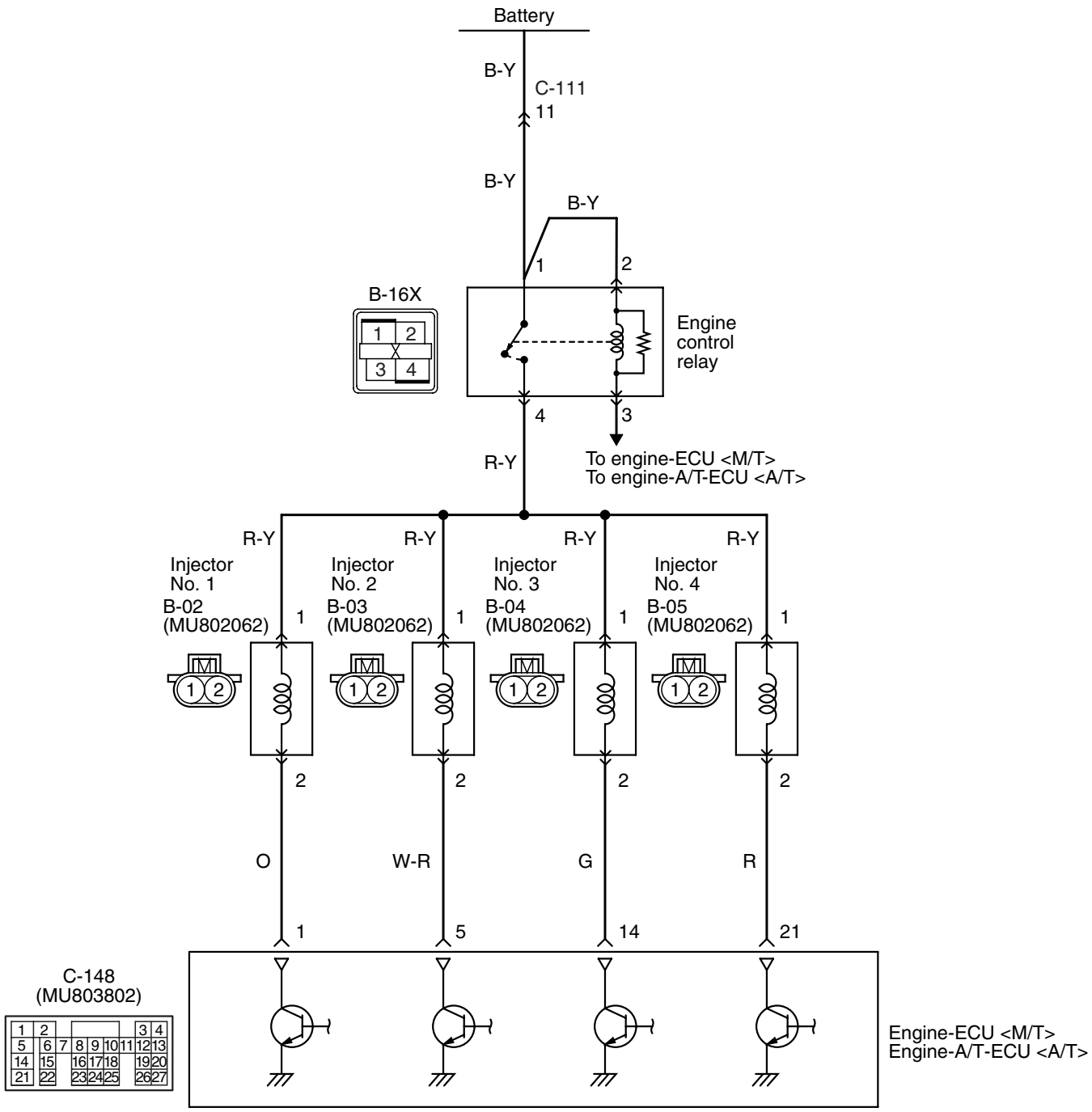
Code No. P0203: No. 3 Injector System

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 PU: Purple

AK502017AB

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 4).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 14) makes the power transistor in the unit be in "ON" position, and that makes currents go on the injector (terminal No. 2).

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- While engine is running.

Judgment Criterion

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

PROBABLE CAUSE

- Failed No. 3 injector
- Open/short circuit in No. 3 injector circuit or loose connector contact
- Failed engine-ECU<M/T>
- Failed engine-A/T-ECU<A/T>

DIAGNOSIS PROCEDURE

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

- Item 03: No. 3 injector

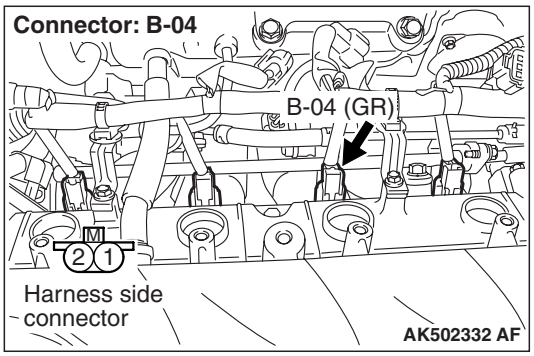
OK: Idling state varies.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check No. 3 injector itself.

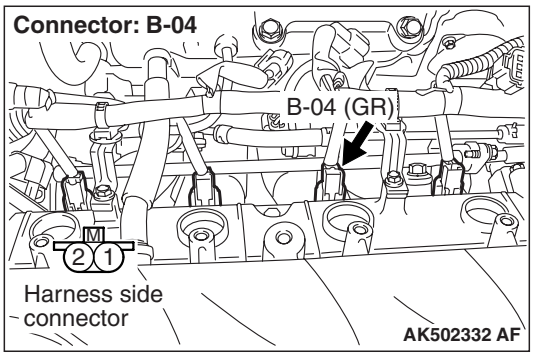
- Check No. 3 Injector itself (Refer to P.13A-330).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the No. 3 injector.

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



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

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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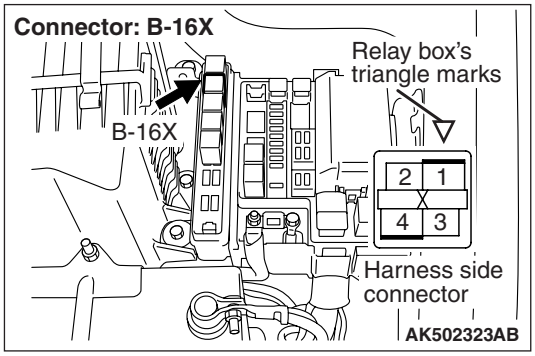
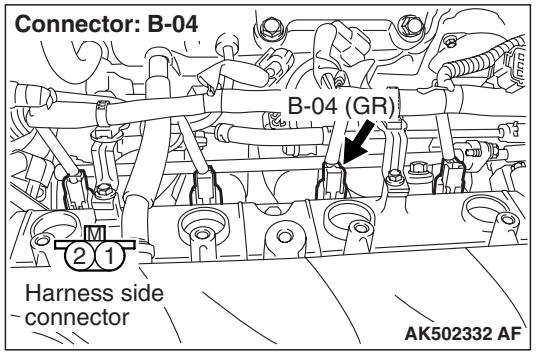
STEP 5. Connector check: B-16X engine control relay connector





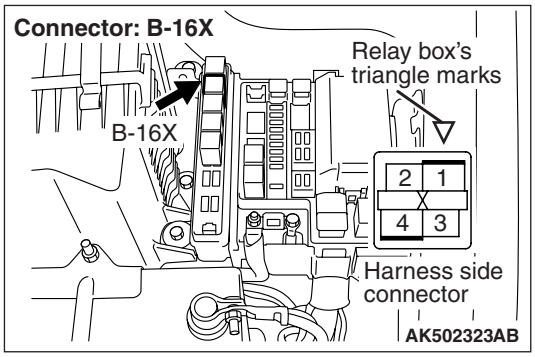
Q: Is the check result normal?

YES : Check and repair harness between B-16X (terminal No. 4) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 6. Connector check: B-16X engine control relay connector

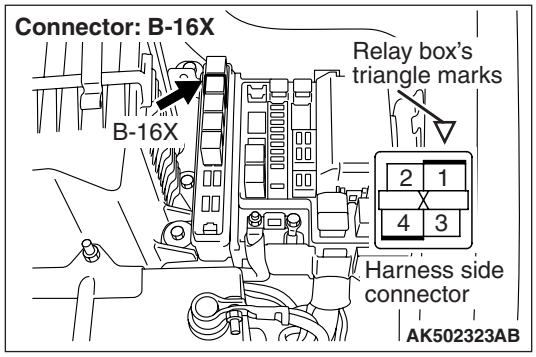


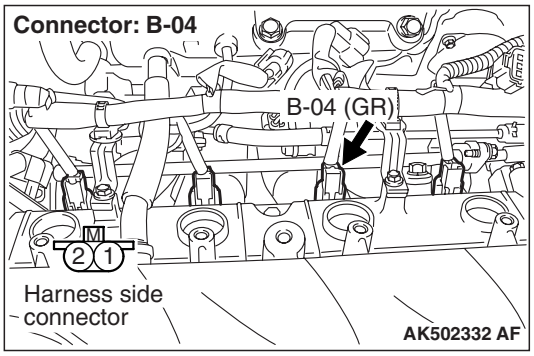
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between B-16X (terminal No. 4) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.





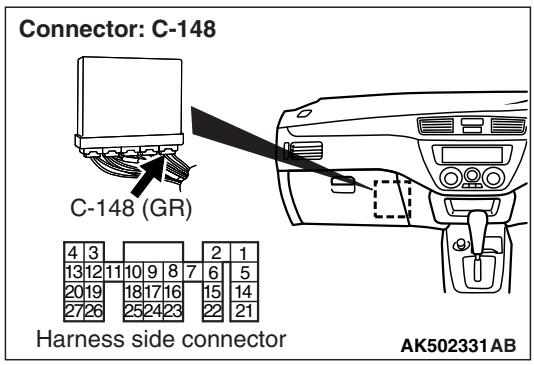
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

STEP 8. Connector check: C-148 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 the connector.

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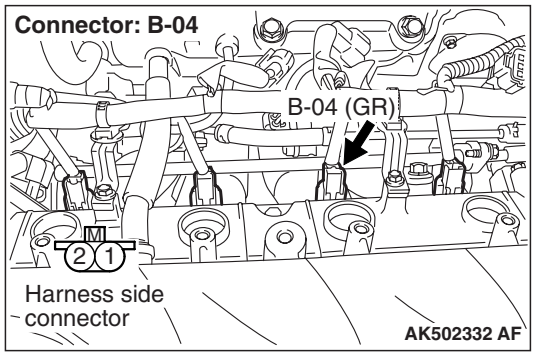
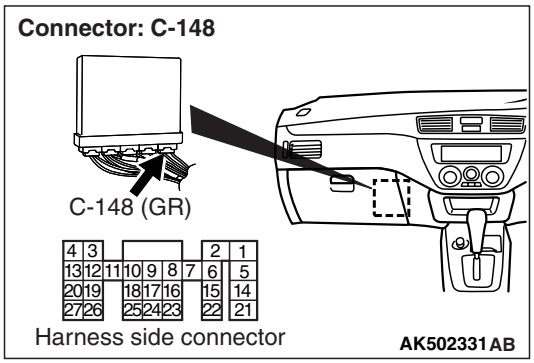
STEP 9. Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-148 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

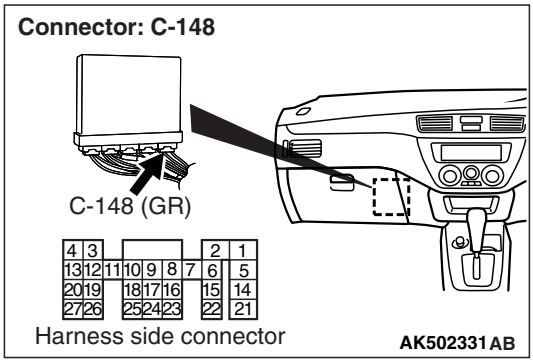




- Check output line for open/short circuit and damage.

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

STEP 10. Perform signal wave pattern measurement at C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector (Using on oscilloscope).



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

  OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13A-313).

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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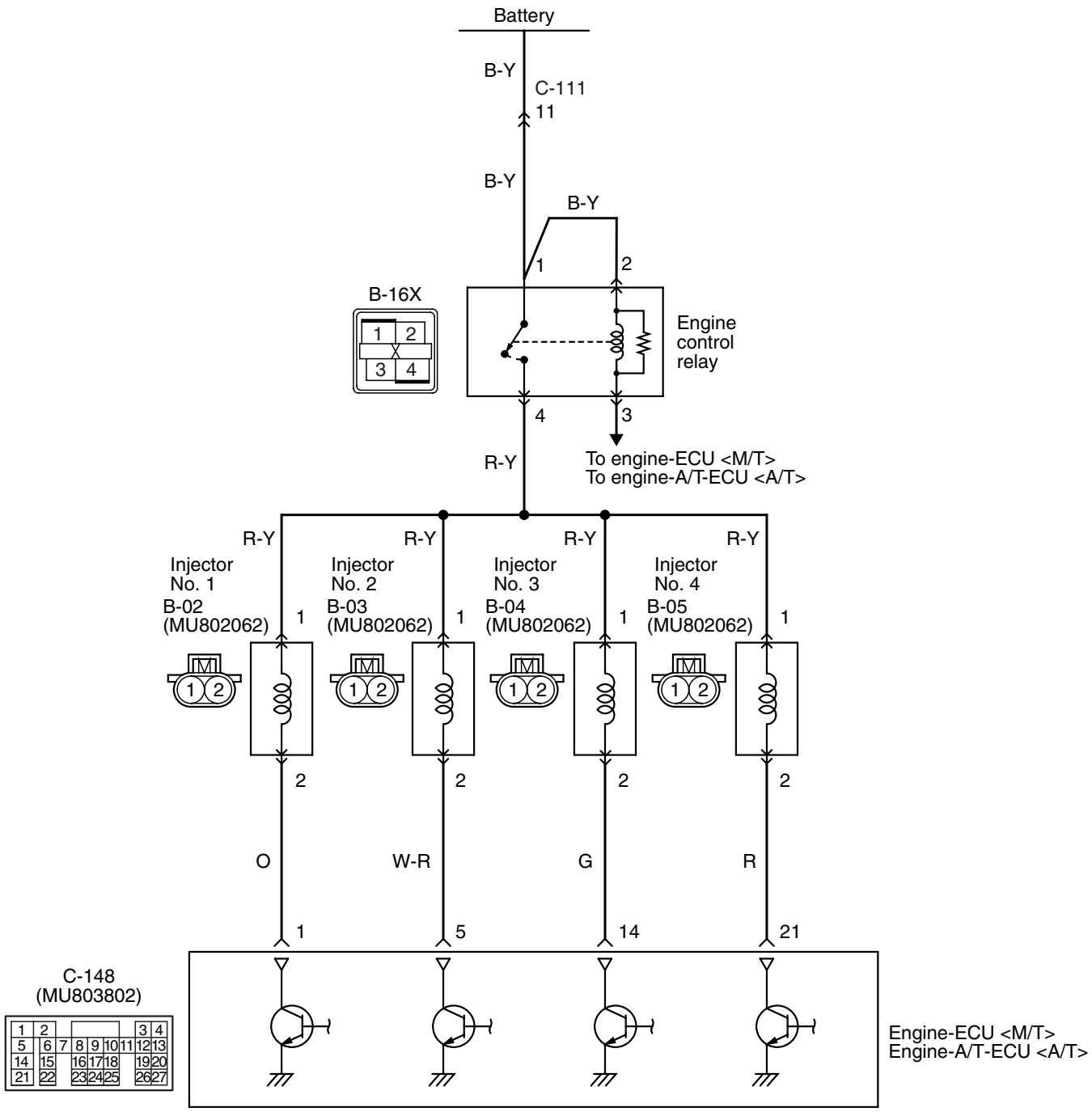
Code No. P0204: No. 4 Injector System

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 PU: Purple

AK502017AB

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 4).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 21) makes the power transistor in the unit be in "ON" position, and that makes currents go on the injector (terminal No. 2).

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- While engine is running.

Judgment Criterion

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

PROBABLE CAUSE

- Failed No. 4 injector
- Open/short circuit in No. 4 injector circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

- Item 04: No. 4 injector

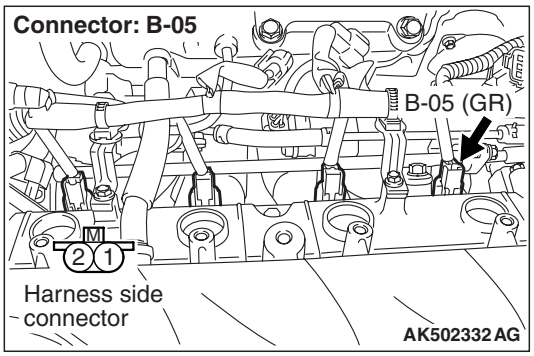
OK: Idling state varies.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check No. 4 injector itself.

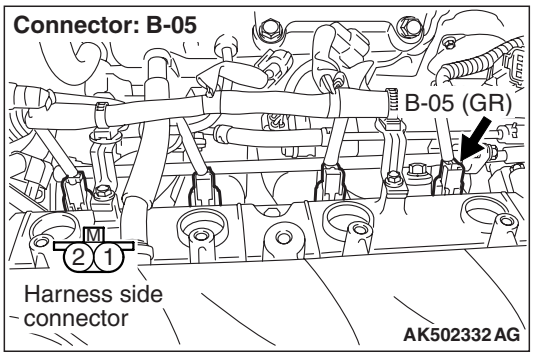
- Check No. 4 Injector (Refer to P.13A-330) itself.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the No. 4 injector.

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



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

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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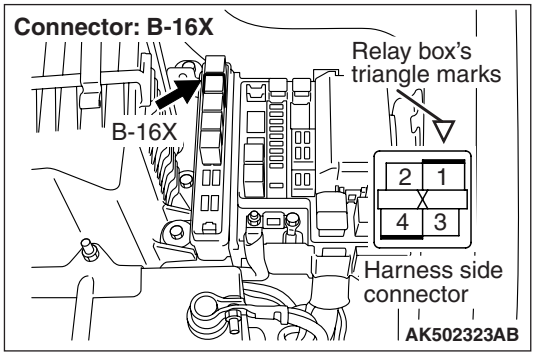
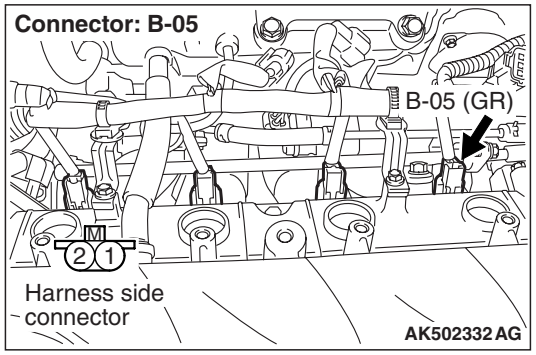
STEP 5. Connector check: B-16X engine control relay connector





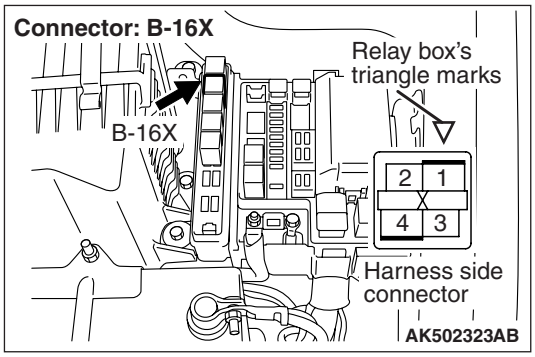
Q: Is the check result normal?

YES : Check and repair harness between B-16X (terminal No. 4) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.

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

NO : Repair or replace the connector.

STEP 6. Connector check: B-16X engine control relay connector

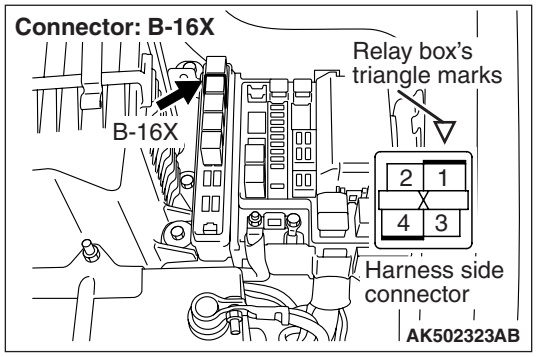


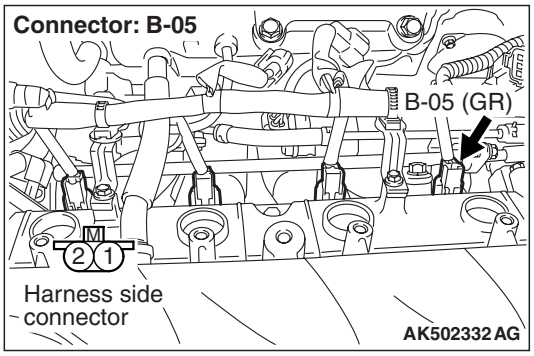
Q: Is the check result normal?

YES : Go to Step 7.

NO : Repair or replace the connector.

STEP 7. Check harness between B-16X (terminal No. 4) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.





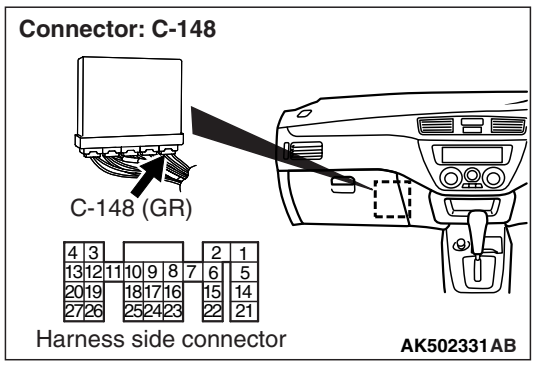
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair the damaged harness wire.

STEP 8. Connector check: C-148 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 the connector.

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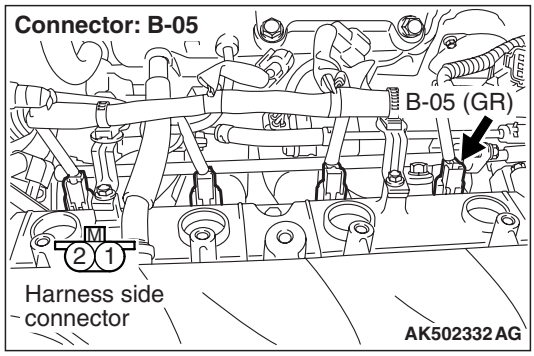
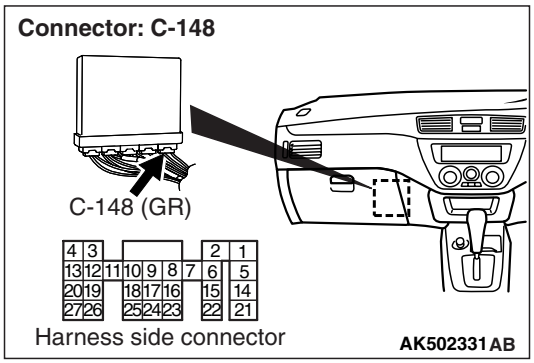
STEP 9. Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-148 (terminal No. 21) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





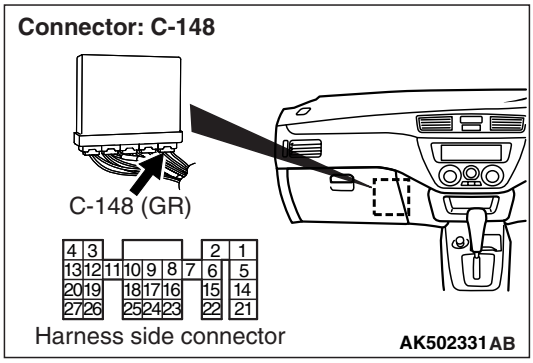
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair the damaged harness wire.

STEP 10. Perform signal wave pattern measurement at C-148 engine-ECU <M/T> connector 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. 21 and earth.

  OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13A-313).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

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

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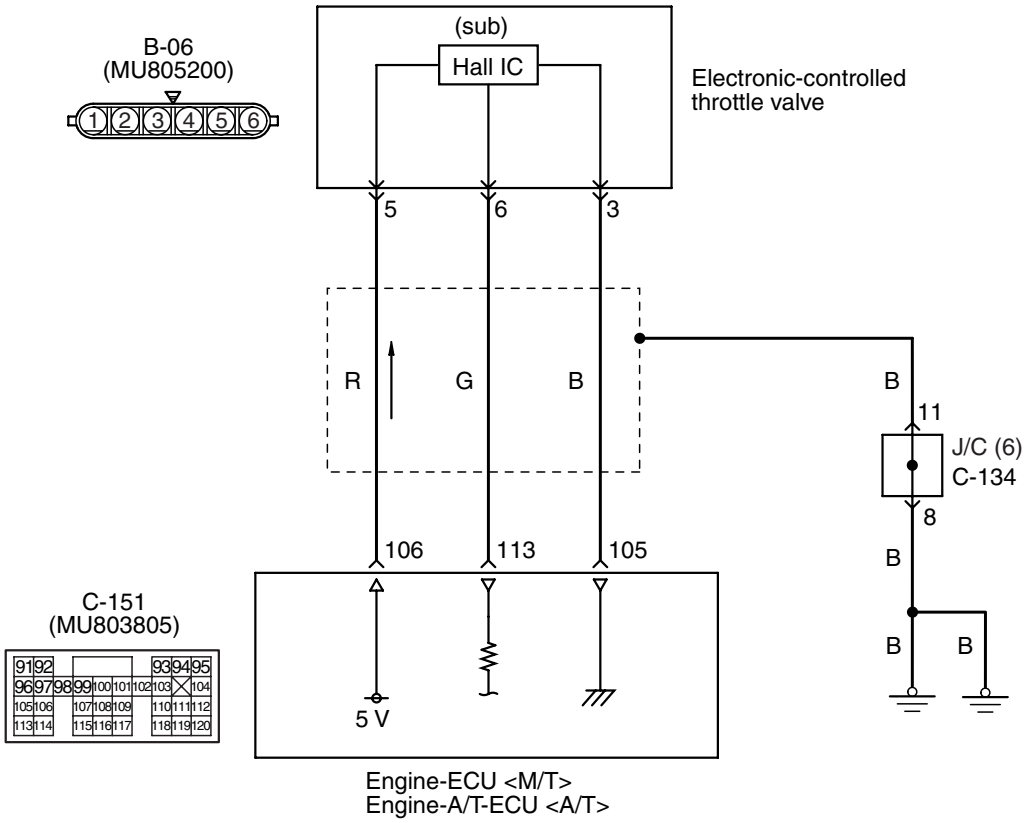
Code No. P0222: Throttle Position Sensor (Sub) Circuit Low Input

Throttle position sensor (sub) circuit



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

AK502018AB

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

- Throttle position sensor (sub) output voltage is 2.2 V or less for 0.5 second.

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PROBABLE CAUSE

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

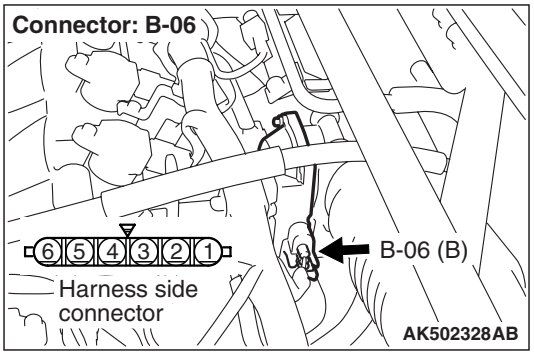
DIAGNOSIS PROCEDURE

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 14: Throttle position sensor (sub)

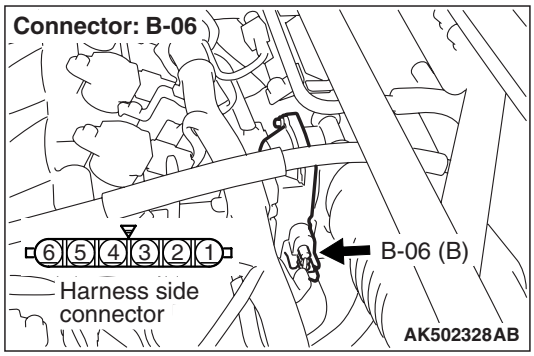
Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Go to Step 2 .

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



Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

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

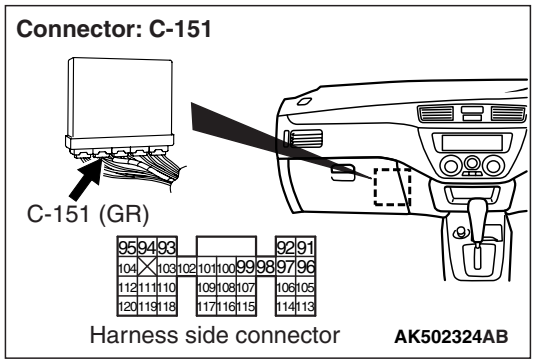


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 5 and earth.

  OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

STEP 4. Connector check: C-151 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 the connector.

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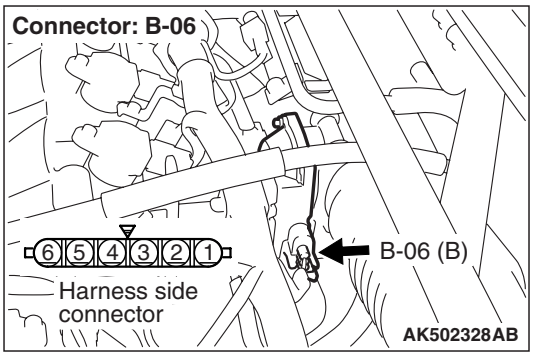
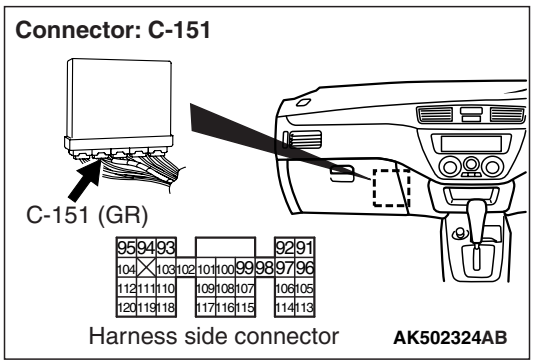
STEP 5. Check harness between B-06 (terminal No. 5) electronic-controlled throttle valve connector and C-151 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check power supply line for open/short circuit.

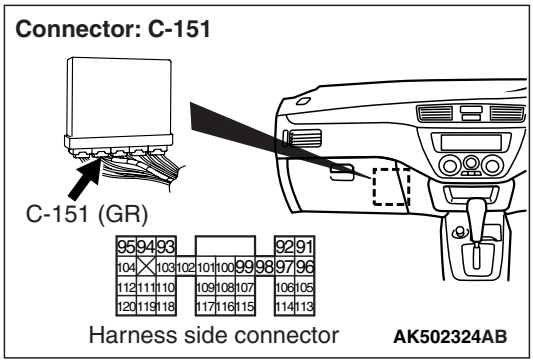
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair the damaged harness wire.

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 79: Throttle position sensor (main)

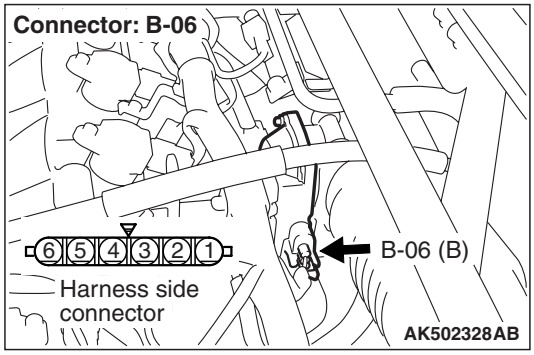
Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

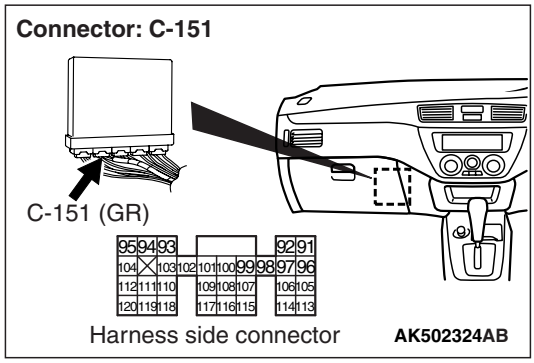
STEP 7. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 8. Check harness between B-06 (terminal No. 5) electronic-controlled throttle valve connector and C-151 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check power supply line for damage.

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

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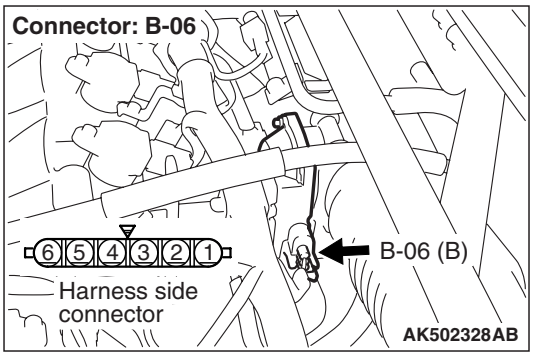
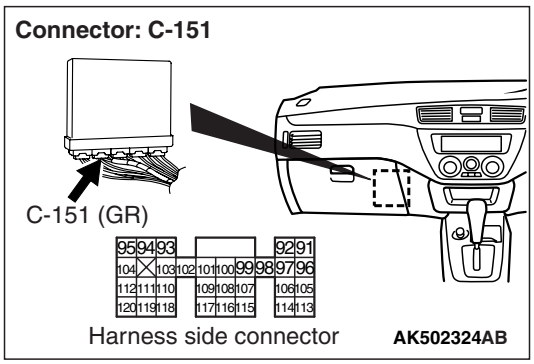
STEP 9. Check harness between B-06 (terminal No. 6) electronic-controlled throttle valve connector and C-151 (terminal No. 113) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





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

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

STEP 10. Replace the electronic-controlled throttle valve

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

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

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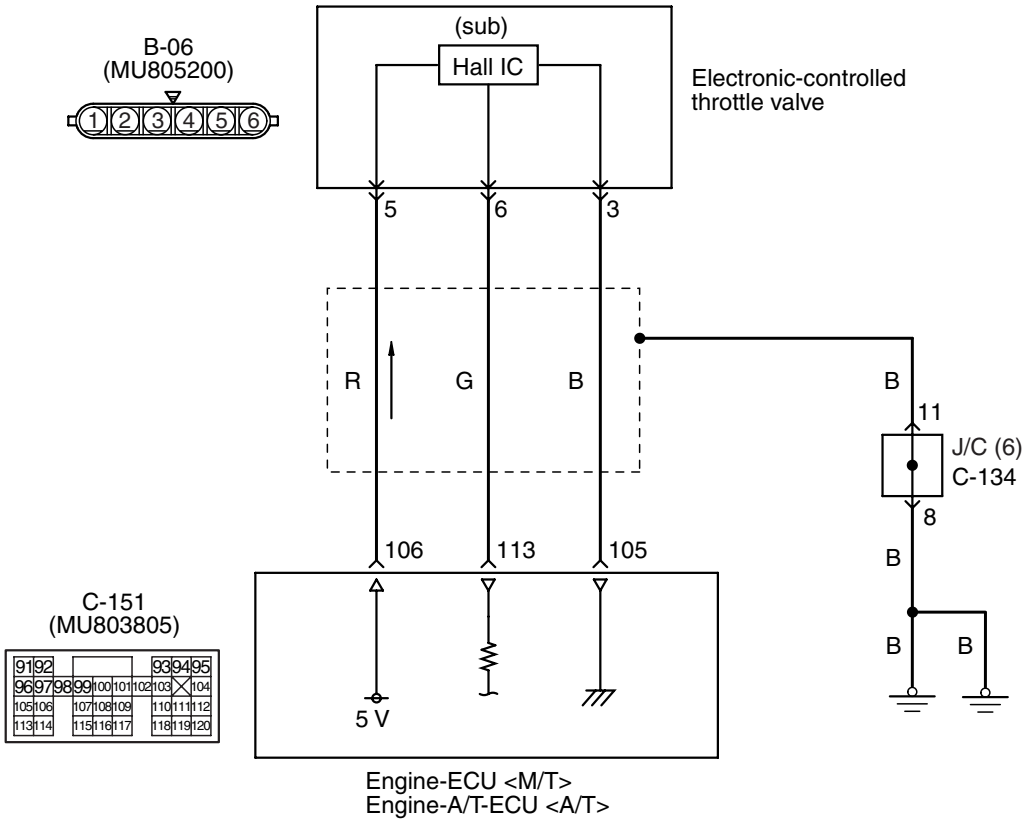
Code No. P0223: Throttle Position Sensor (Sub) Circuit High Input

Throttle position sensor (sub) circuit



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

AK502018AB

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

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

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PROBABLE CAUSE

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

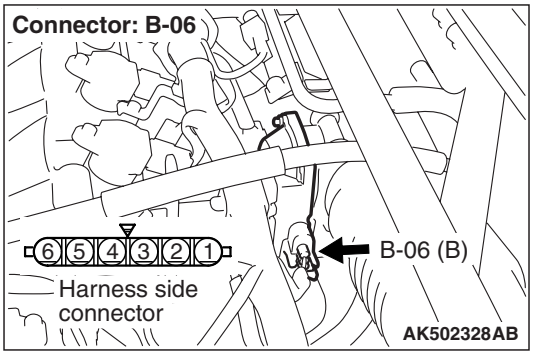
DIAGNOSIS PROCEDURE

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 14: Throttle position sensor (sub)

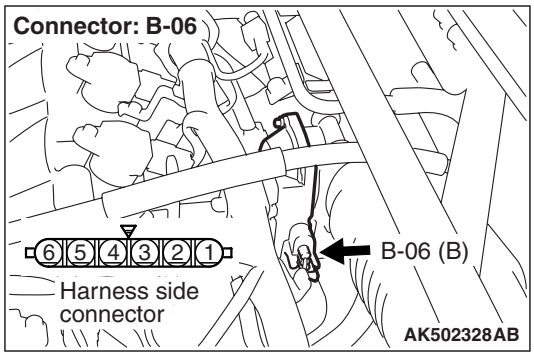
Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Go to Step 2 .

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



Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

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

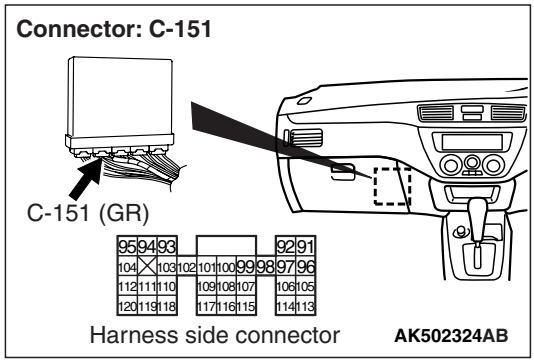


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 3 and earth.

OK: 2 Ω or less

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

STEP 4. Connector check: C-151 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 the connector.

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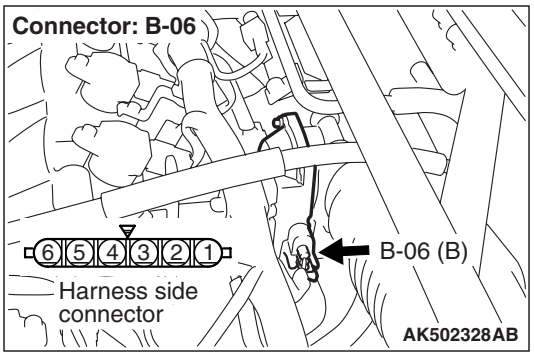
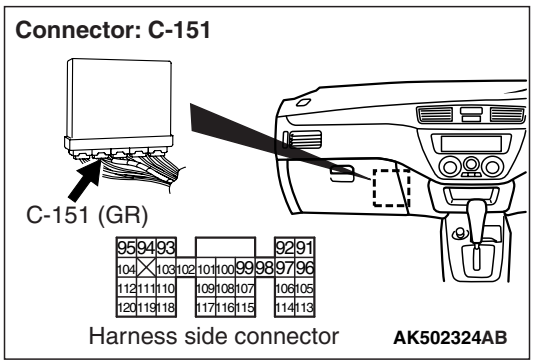
STEP 5. Check harness between B-06 (terminal No. 3) electronic-controlled throttle valve connector and C-151 (terminal No. 105) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for open circuit and damage.

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

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

- Refer to Data List Reference Table P.13A-297.
  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 –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Replace the electronic-controlled throttle valve

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

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

Code No. P0300: Random/Multiple Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0201: No. 1 injector system P.13A-82.
- Refer to Code No. P0202: No. 2 injector system P.13A-86.
- Refer to Code No. P0203: No. 3 injector system P.13A-90.
- Refer to Code No. P0204: No. 4 injector system P.13A-94.

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 4,500 r/min.
- Engine coolant temperature is –10° C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55%.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is – 0.06 V/10 ms to + 0.06 V/10 ms.

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

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

or

- Misfire has occurred 20 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

- Item 22: Crank angle sensor

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

Q: Is the check result normal?
YES : Go to Step 2 .
NO : Check crank angle sensor system (Refer to Code No. P0335 P.13A-118).

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

- Refer to Data List Reference Table P.13A-297.

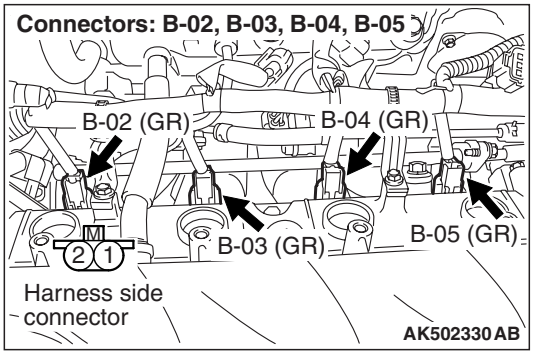
a. Item 21: Engine coolant temperature sensor
b. Item 81: Long-term fuel compensation
c. Item 82: Short-term fuel compensation

Q: Are the check results normal?
YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data valve (Refer to Inspection Chart for Diagnosis Code P.13A-19).

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 30 P.13A-284).

STEP 4. Connector check: Injector connector



a. B-02 (No. 1 injector connector)
b. B-03 (No. 2 injector connector)
c. B-04 (No. 3 injector connector)
d. B-05 (No. 4 injector connector)

Q: Are the check results normal?
YES : Go to Step 5 .
NO : Repair.

STEP 5. Check injector itself.

- Check Injector itself (Refer to P.13A-330).

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

STEP 6. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-320)

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

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

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

STEP 8. Check for skipped timing belt teeth.

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

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

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 –Exhaust Gas Recirculation (EGR) System –EGR Valve (Stepper Motor) Check P.17-56].

Q: Is the check result normal?
YES : Go to Step 10.
NO : Replace the EGR valve (stepper motor)

STEP 10. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0301: No. 1 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0201: No. 1 Injector System P.13A-82.

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 4,500 r/min.
- Engine coolant temperature is –10° C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55%.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is – 0.06 V/10 ms to + 0.06 V/10 ms.

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

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

or

- Misfire has occurred 20 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSE

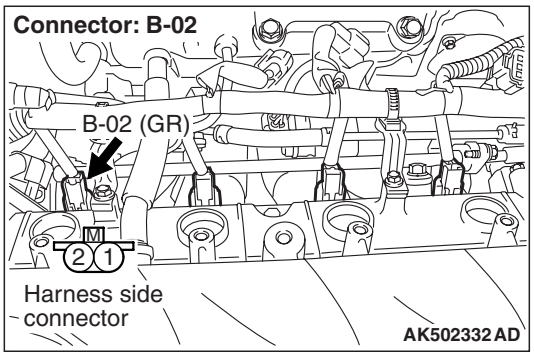
- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Check ignition coil spark.

Q: Is the check result normal?
YES : Go to Step 2 .
NO : Check ignition circuit system (Refer to Inspection procedure 30 P.13A-284)

STEP 2. Connector check: B-02 No. 1 injector connector



Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

STEP 3. Check No. 1 injector itself.

- Check Injector itself (Refer to P.13A-330).

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Replace the No. 1 injector.

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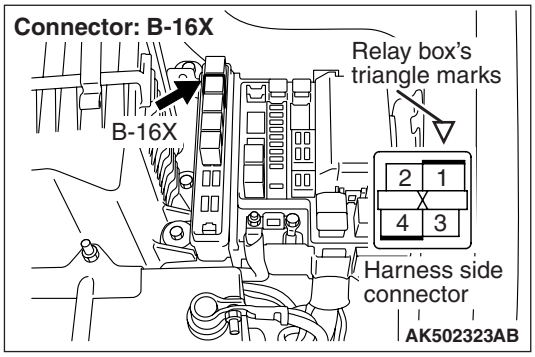
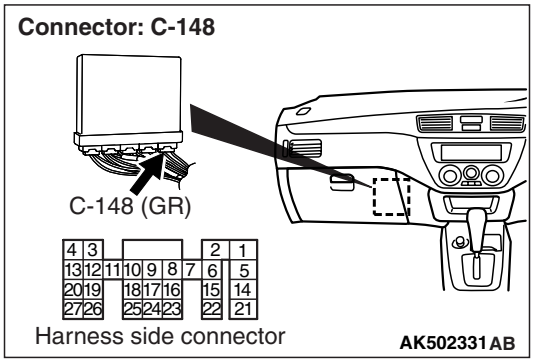
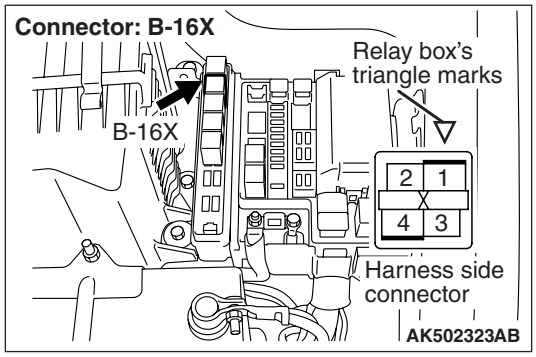
STEP 4. Connector check: B-16X engine control relay connector and C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

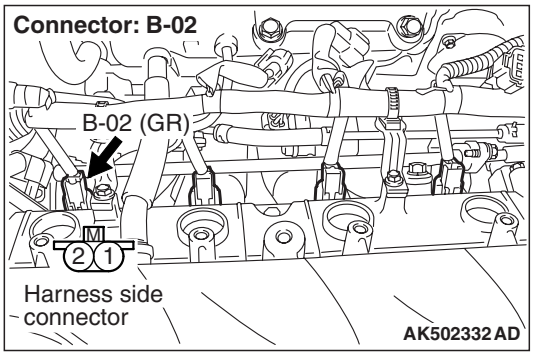




Q: Is the check result normal?
YES : Go to Step 5 .
NO : Repair or replace the connector.

STEP 5. Check harness between B-16X (terminal No. 4) engine control relay connector and B-02 (terminal No. 1) No. 1 injector connector.





- Check power supply line for damage.

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

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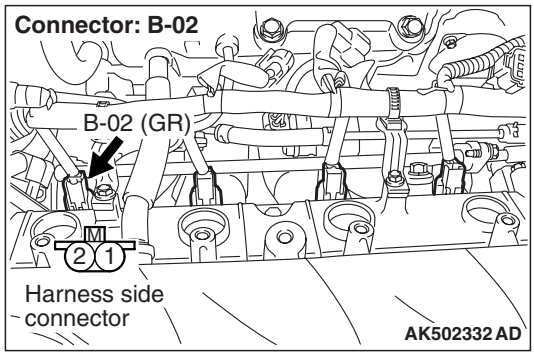
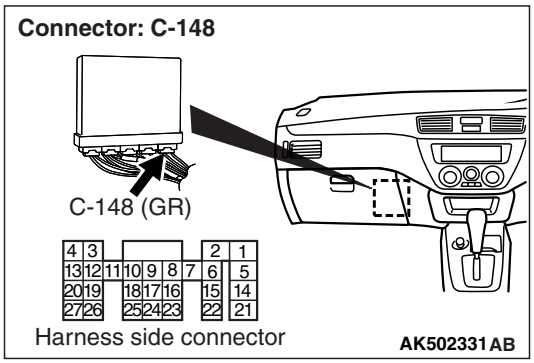
STEP 6. Check harness between B-02 (terminal No. 2) No. 1 injector connector and C-148 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





- Check output line for damage.

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

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test P.13A-320).

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

STEP 8. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0302: No. 2 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0202 No. 2 Injector System P.13A-86.

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 4,500 r/min.
- Engine coolant temperature is –10° C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55%.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is –0.06 V/10 ms to + 0.06 V/10 ms.

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

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

or

- Misfire has occurred 20 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

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PROBABLE CAUSE

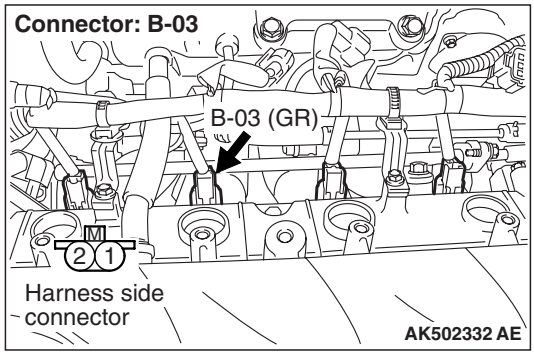
- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Check ignition coil spark.

Q: Is the check result normal?
YES : Go to Step 2 .
NO : Check ignition circuit system (Refer to Inspection Procedure 30 P.13A-284).

STEP 2. Check connector: B-03 No. 2 injector connector



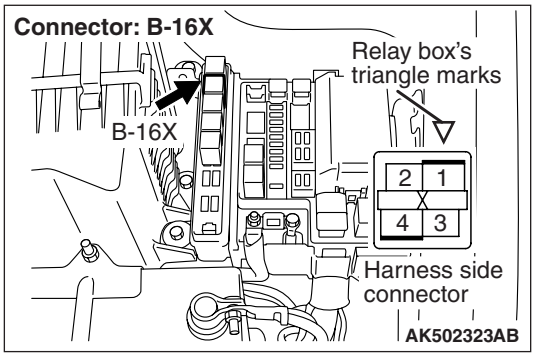
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

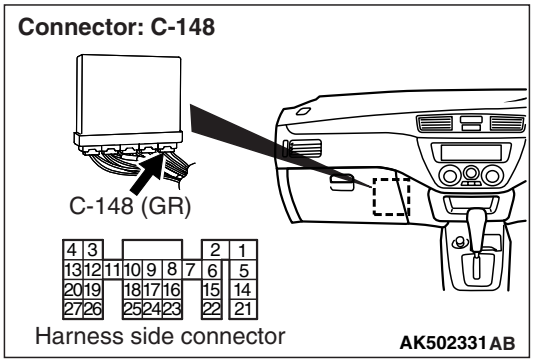
STEP 3. Check No. 2 injector itself.

- Check Injector itself (Refer to P.13A-330).

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

STEP 4. Connector check: B-16X engine control relay connector and C-148 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 the connector.

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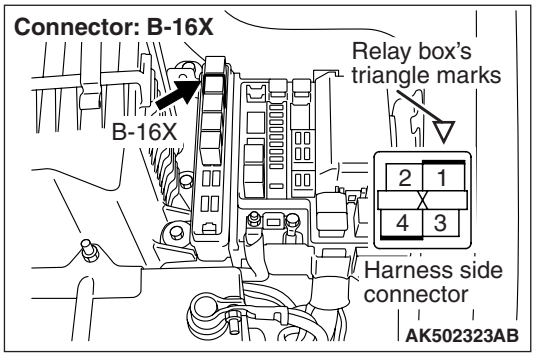
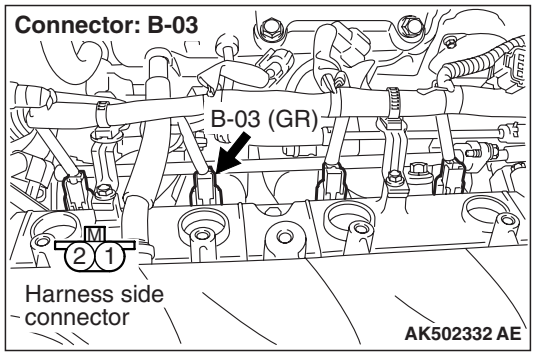
STEP 5. Check harness between B-16X (terminal No. 4) engine control relay connector and B-03 (terminal No. 1) No. 2 injector connector.

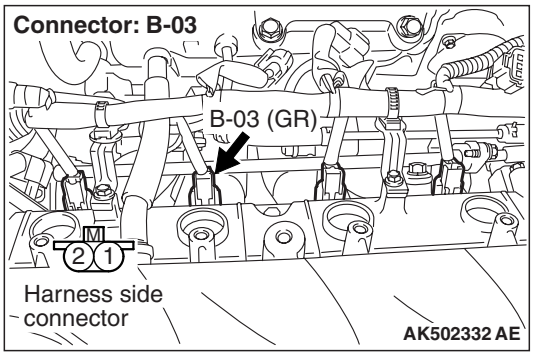


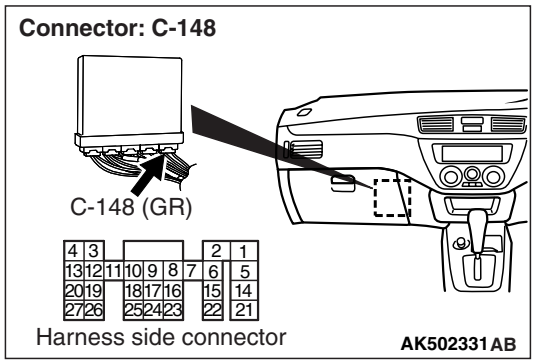


- Check power supply line for damage.

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

STEP 6. Check harness between B-03 (terminal No. 2) No. 2 injector connector and C-148 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





- Check output line for damage.

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

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test P.13A-320)

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

STEP 8. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0303: No. 3 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0203 No. 3 Injector System P.13A-90.

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 –4,500 r/min.
- Engine coolant temperature is -10° C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55%.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is -0.06 V/10 ms to +0.06 V/10 ms.

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

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

or

- Misfire has occurred 20 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

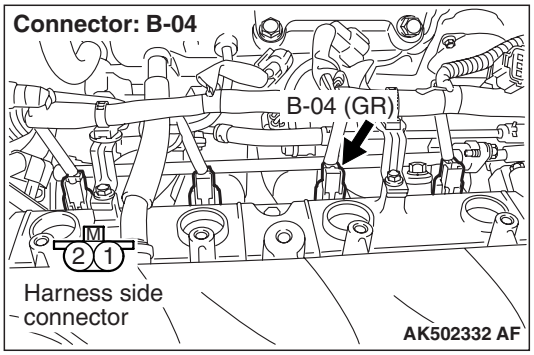
STEP 1. Check ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition circuit system (Refer to Inspection Procedure 30 P.13A-284).

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check No. 3 injector itself.

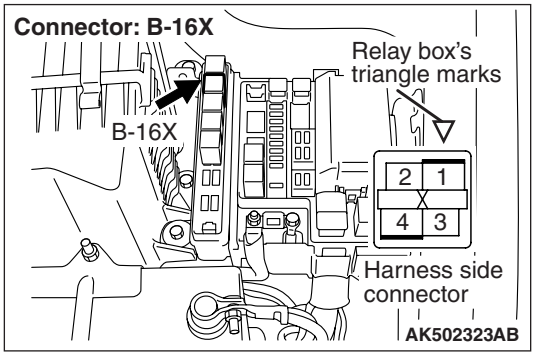
- Check Injector itself (Refer to P.13A-330).

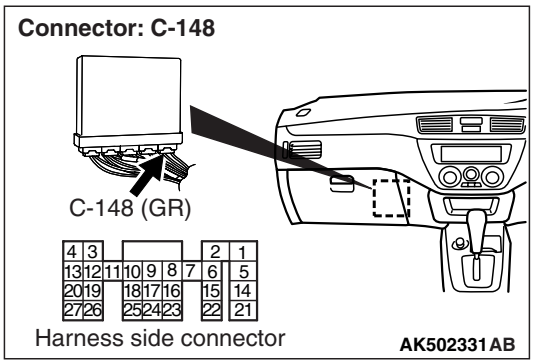
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the No. 3 injector.

STEP 4. Connector check: B-16X engine control relay connector and C-148 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 the connector.

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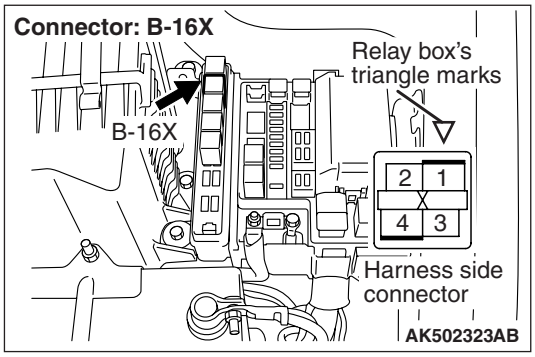
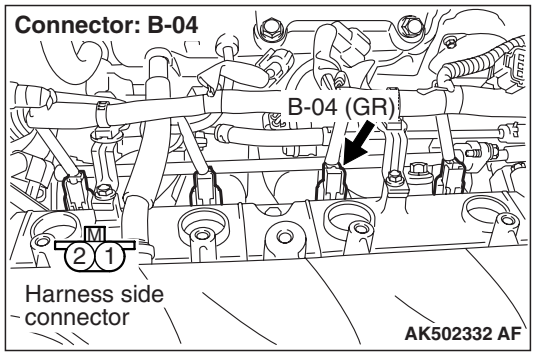
STEP 5. Check harness between B-16X (terminal No. 4) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.

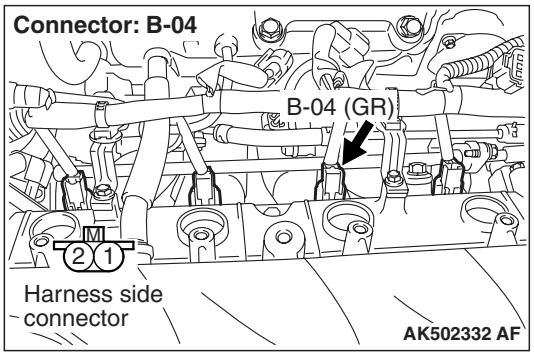


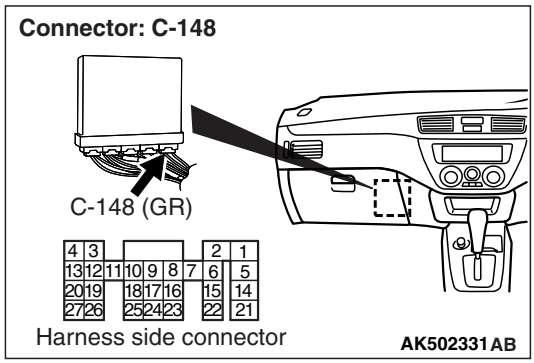


- Check power supply line for damage.

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

STEP 6. Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-148 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





- Check output line for damage.

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

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test P.13A-320)

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

STEP 8. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0304: No. 4 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0204 No. 4 Injector System P.13A-94.

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 500 – 4,500 r/min.
- Engine coolant temperature is –10° C or higher.
- Barometric pressure is 76 kPa or higher.
- Volumetric efficiency is between 30% and 55%.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is – 0.06 V/10 ms to + 0.06 V/10 ms.

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

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

or

- Misfire has occurred 20 times or more in the last 1,000 revolutions (that has been equivalent to approximately 1.5 times the emission standard).

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

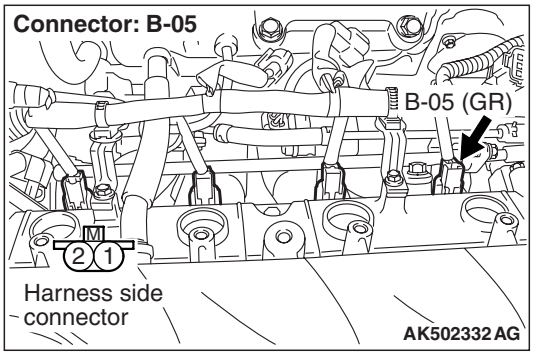
STEP 1. Check the ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition Circuit System (Refer to Inspection Procedure 30 P.13A-284).

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check No. 4 injector itself.

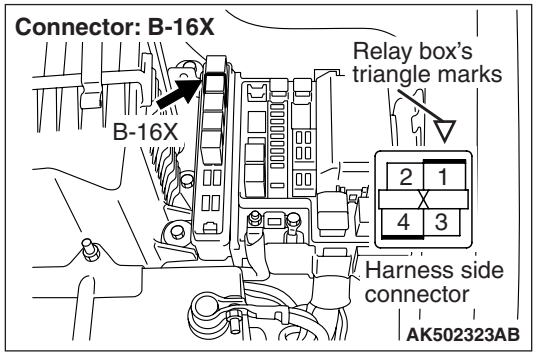
- Check Injector itself (Refer to P.13A-330).

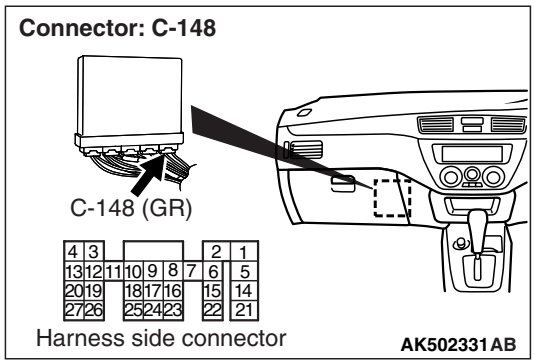
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the No. 4 injector.

STEP 4. Connector check: B-16X engine control relay connector and C-148 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 the connector.

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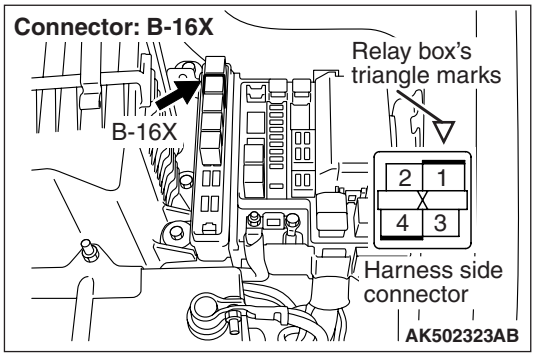
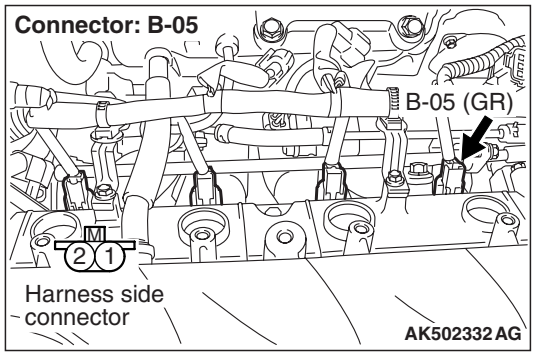
STEP 5. Check harness between B-16X (terminal No. 4) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.

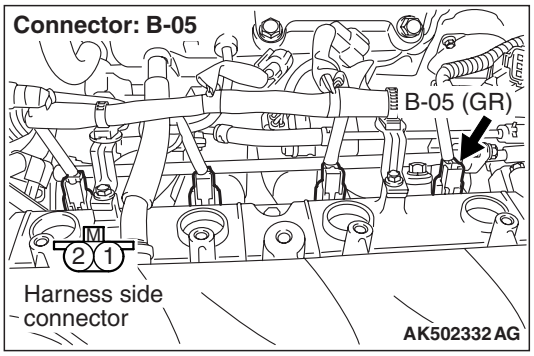


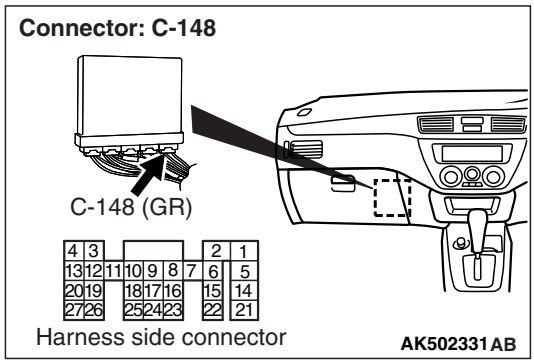


- Check power supply line for damage.

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

STEP 6. Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-148 (terminal No. 21) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for damage.

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

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test P.13A-320)

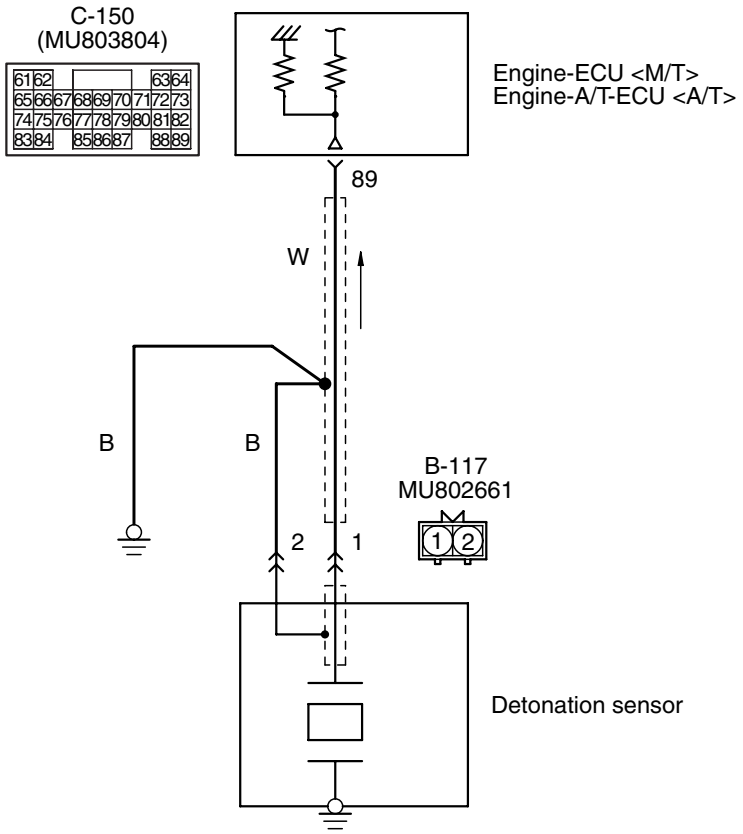
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair.

STEP 8. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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 PU: Purple

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OPERATION

- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 89) from the detonation sensor (terminal No. 1).

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criterion

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

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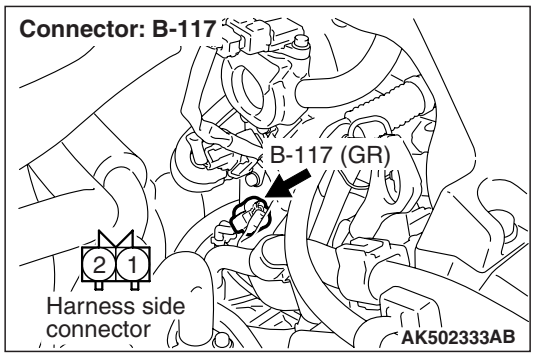
PROBABLE CAUSE

- 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>

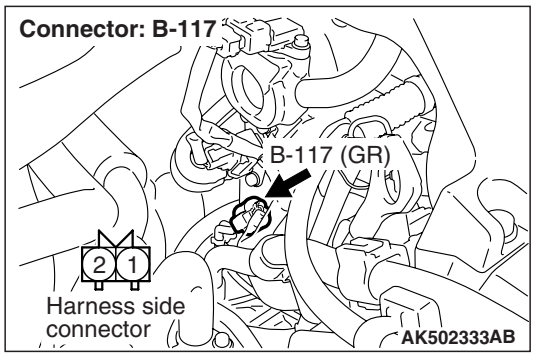
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-117 detonation sensor connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at B-117 detonation sensor connector.

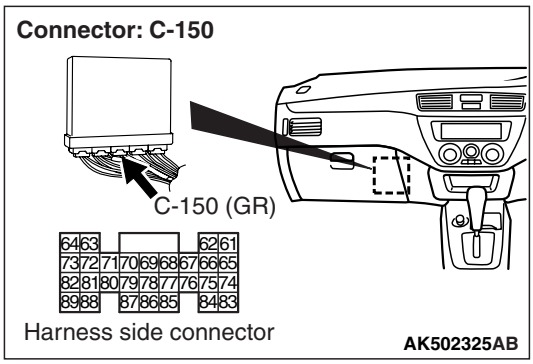


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

OK: 2 Ω or less

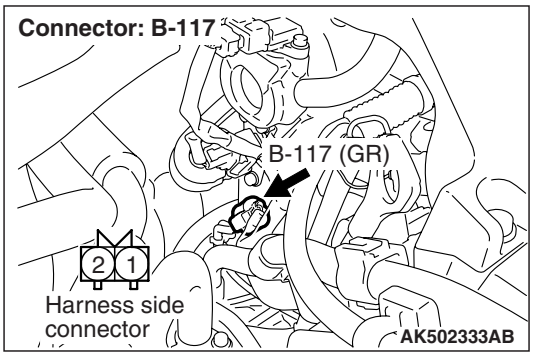
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Check and repair harness between B-117 (terminal No. 2) detonation sensor connector and body earth.
- Check earthing line for open circuit and damage.

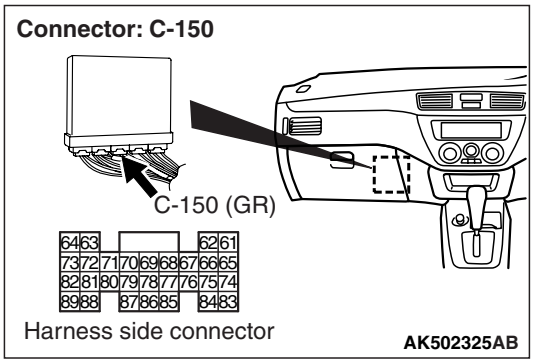
STEP 3. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 4. Check harness between B-117 (terminal No. 1) detonation sensor connector and C-150 (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 the damaged harness wire.

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STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Go to Step 6 .

NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

STEP 6. Replace the detonation sensor.

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

Q: Does trouble symptom persist?

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

NO : The check is end.

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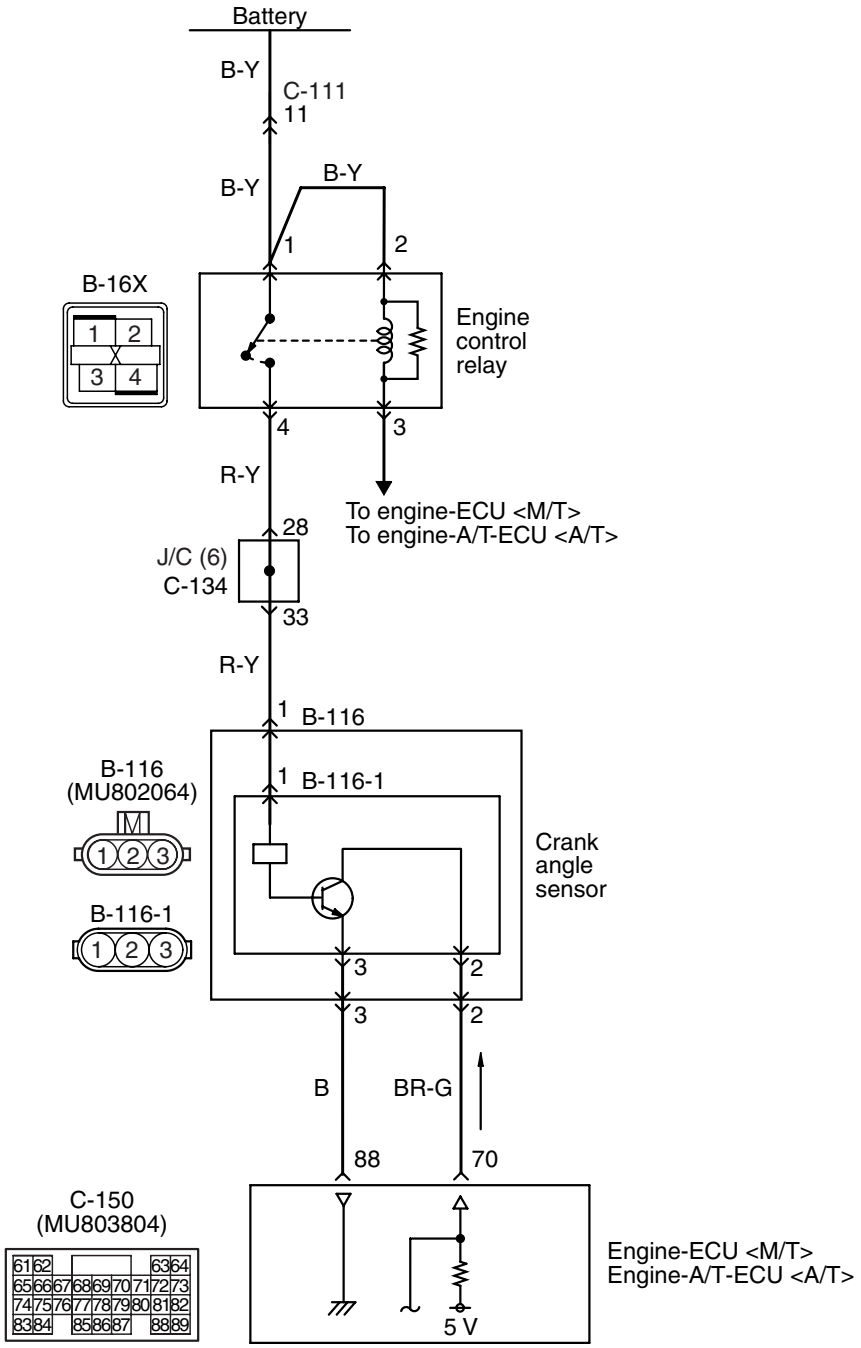
Code No. P0335: Crank Angle Sensor System

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 PU: Purple

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OPERATION

- Power is supplied to the crank angle sensor (terminal No. 1) from the engine control relay (terminal No. 4) 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.-II/III data list

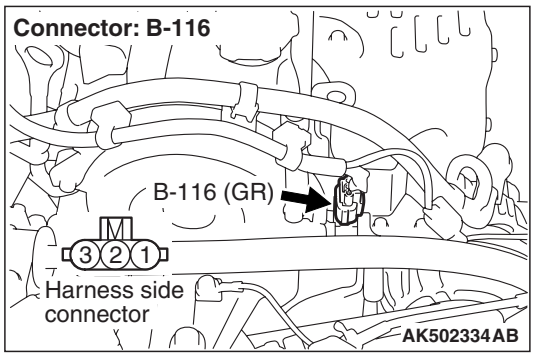
- Refer to Data List Reference Table P.13A-297.
  a. Item 22: Crank angle sensor

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-116 crank angle sensor intermediate connector

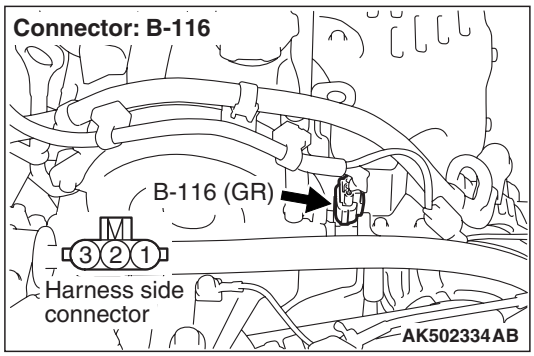


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at B-116 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 .

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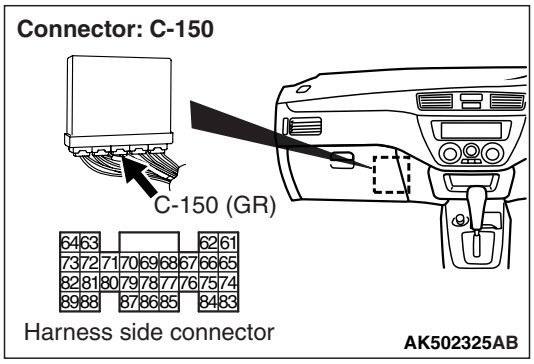
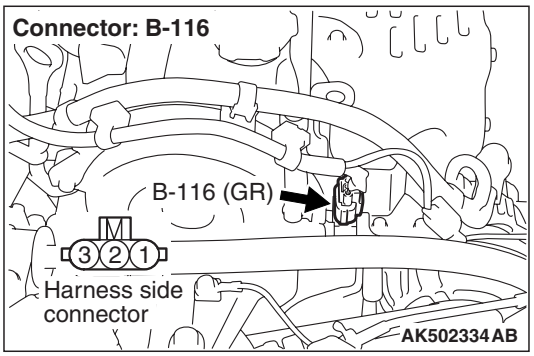
STEP 4. Perform voltage measurement at C-150 engine-ECU connector.





- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Disconnect B-116 crank angle sensor intermediate connector.
- Ignition switch: ON
- Voltage between terminal No. 70 and earth.

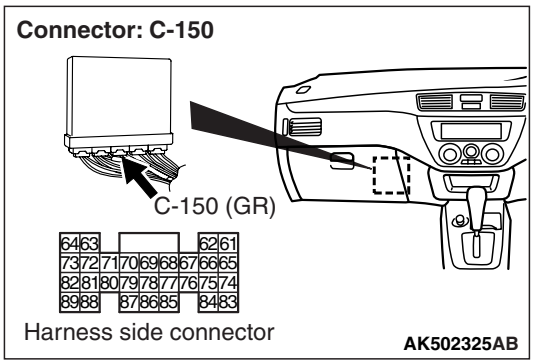
OK: 4.9 – 5.1 V

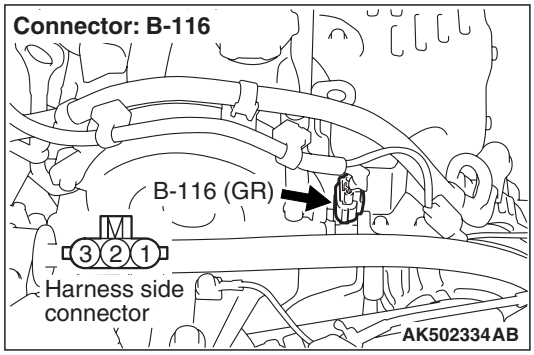
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





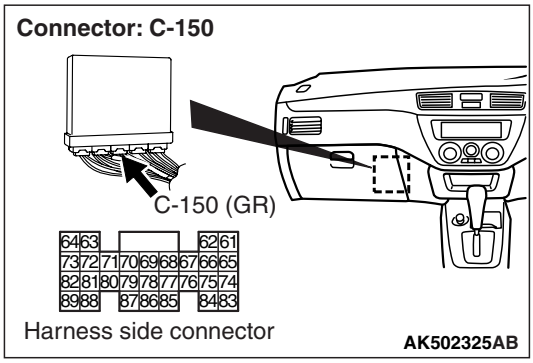
Q: Is the check result normal?

YES : Check and repair harness between B-116 (terminal No. 2) crank angle sensor intermediate connector and C-150 (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 the connector.

STEP 6. Connector check: C-150 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 the connector.

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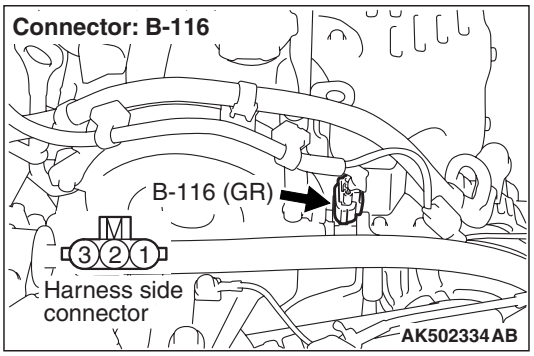
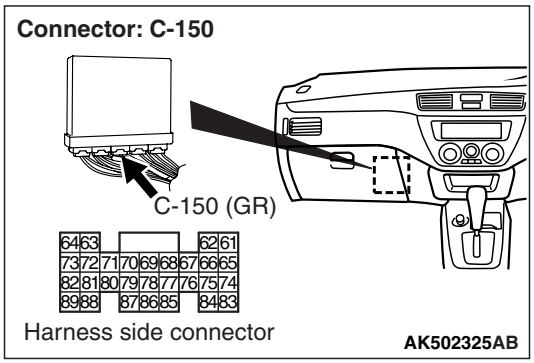
STEP 7. Check harness between B-116 (terminal No. 2) crank angle sensor intermediate connector and C-150 (terminal No. 70) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for short circuit.

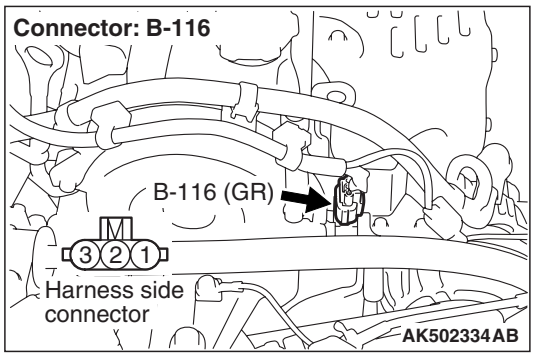
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair the damaged harness wire.

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

- Refer to Data List Reference Table P.13A-297.
  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 –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 9. Perform voltage measurement at B-116 crank angle sensor intermediate connector.

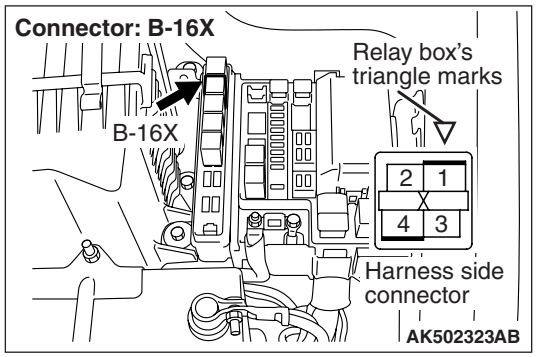


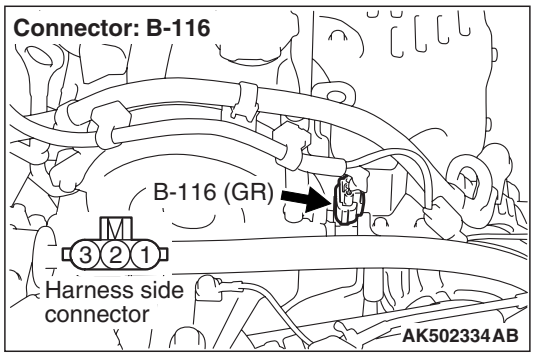
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 11 .
NO : Go to Step 10 .

STEP 10. Connector check: B-16X engine control relay connector





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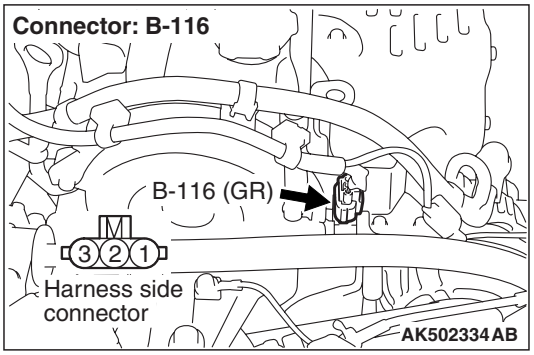
Q: Is the check result normal?

YES : Check intermediate connectors C-134, and repair if necessary. If intermediate connector is normal, check and repair harness between B-116 (terminal No. 1) crank angle sensor intermediate connector and B-16X (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 11. Perform resistance measurement at B-116 crank angle sensor intermediate connector.



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

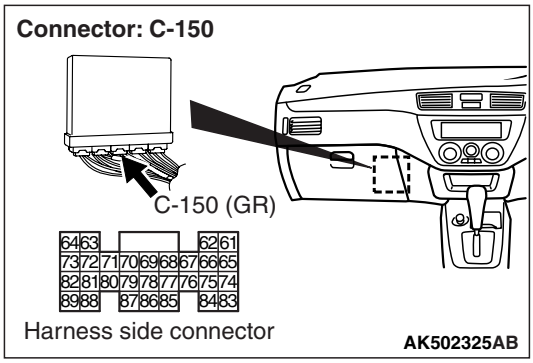
OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Go to Step 12 .

STEP 12. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

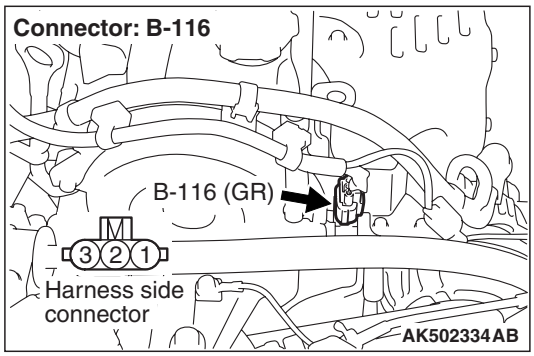


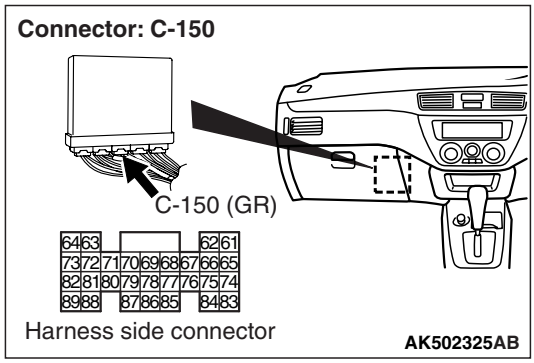
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair or replace the connector.

STEP 13. Check harness between B-116 (terminal No. 3) crank angle sensor intermediate connector and C-150 (terminal No. 88) 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 8 .

NO : Repair the damaged harness wire.

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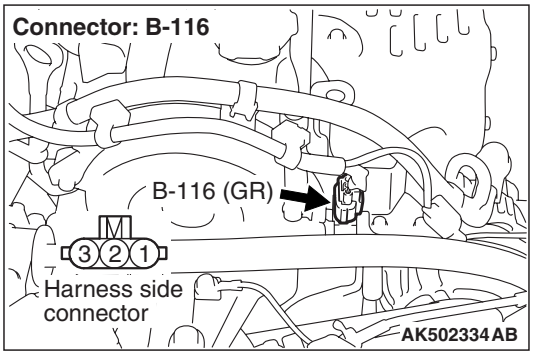
STEP 14. Perform output wave pattern measurement at B-116 crank angle sensor intermediate connector (Using an oscilloscope).

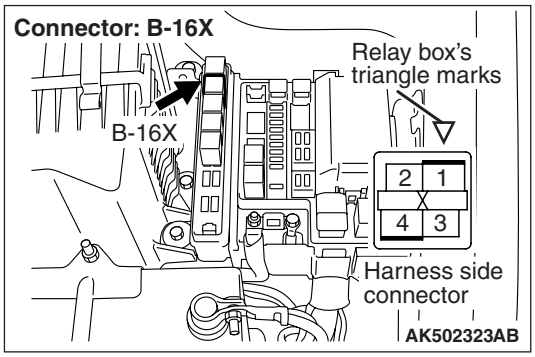


- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
- Voltage between terminal No. 2 and earth.

  OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-313), 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.

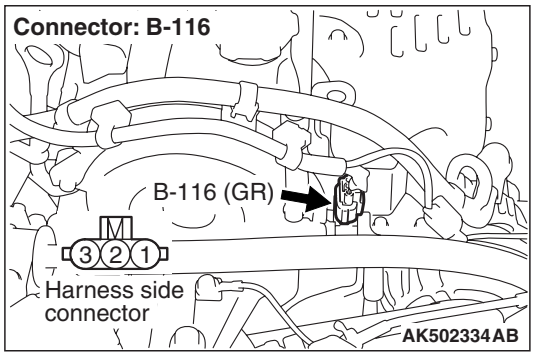
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 15 .

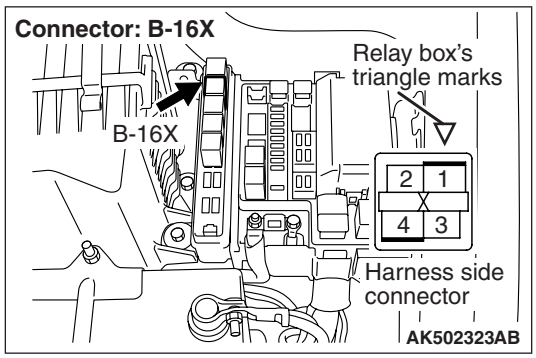
STEP 15. Connector check: B-16X engine control relay connector



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

STEP 16. Check harness between B-116 (terminal No. 1) crank angle sensor intermediate connector and B-16X (terminal No. 4) engine control relay connector.



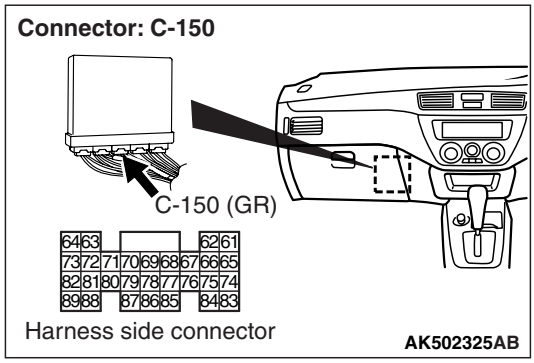


NOTE: Before checking harness, check intermediate connector C-134, and repair if necessary.

- Check power supply line for damage.

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

STEP 17. Connector check: C-150 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 the connector.

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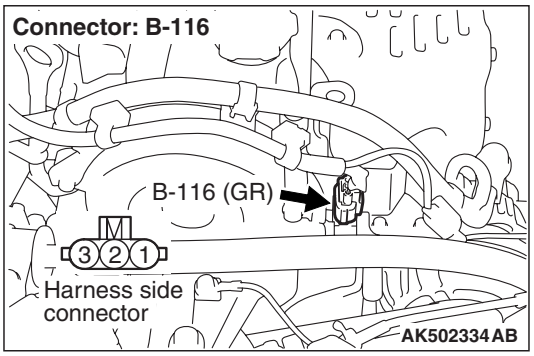
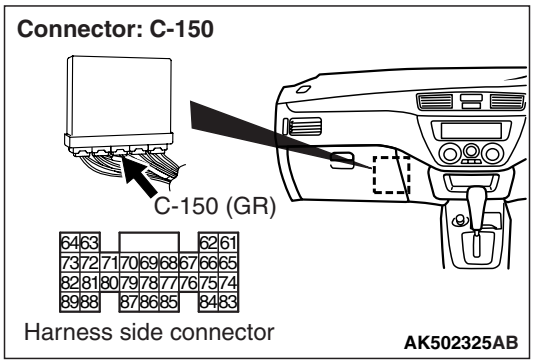
STEP 18. Check harness between B-116 (terminal No. 2) crank angle sensor intermediate connector and C-150 (terminal No. 70) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

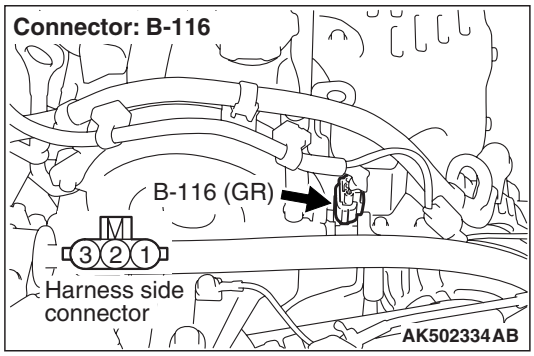


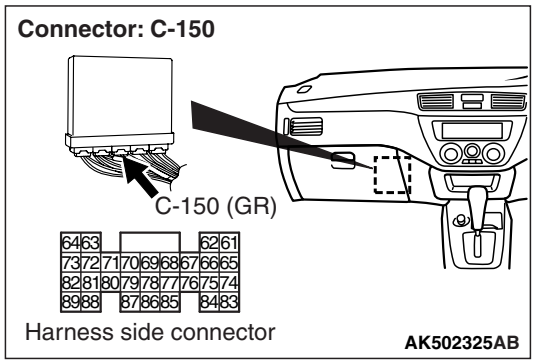


- Check output line for damage.

Q: Is the check result normal?
YES : Go to Step 19 .
NO : Repair the damaged harness wire.

STEP 19. Check harness between B-116 (terminal No. 3) crank angle sensor intermediate connector and C-150 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

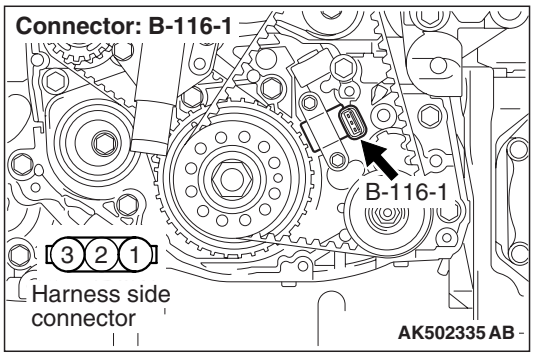




- Check earthing line for damage.

Q: Is the check result normal?
YES : Go to Step 20 .
NO : Repair the damaged harness wire.

STEP 20. Connector check: B-116-1 crank angle sensor connector



Q: Is the check result normal?
YES : Go to Step 21 .
NO : Repair or replace the connector.

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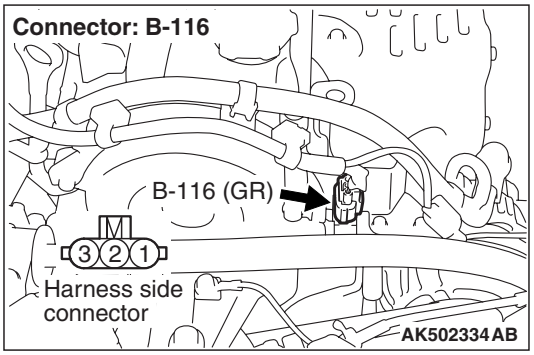
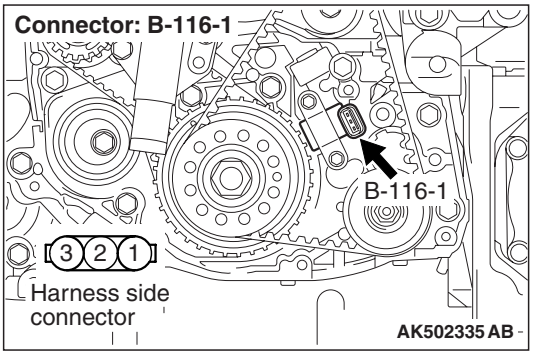
STEP 21. Check harness between B-116 crank angle sensor intermediate connector and B-116-1 crank angle sensor connector.





- 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.-II/III data list

- Refer to Data List Reference Table P.13A-297.
  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 –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the crank angle sensor.

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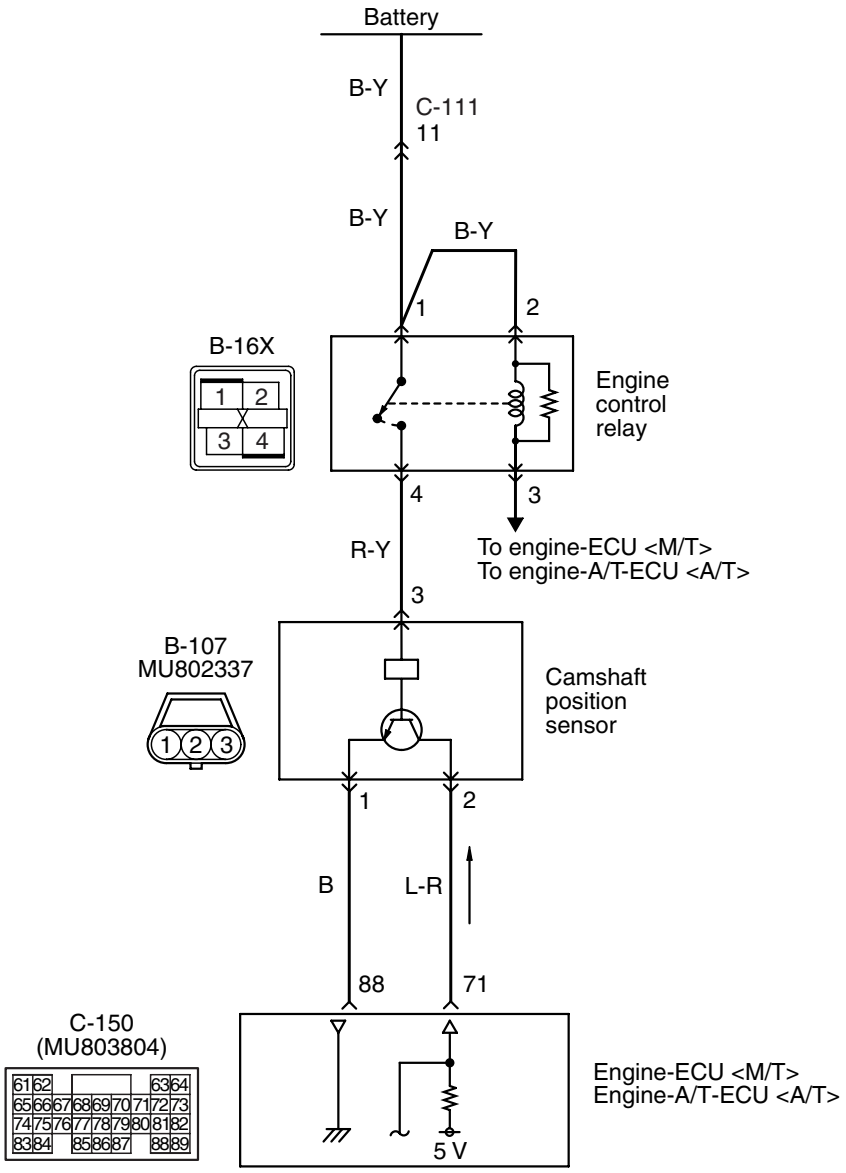
Code No. P0340: Camshaft Position Sensor System

Camshaft position sensor circuit



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

AK502021AB

OPERATION

- Power is supplied to the camshaft position sensor (terminal No. 3) from the engine control relay (terminal No. 4) and is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 88) from the camshaft position sensor (terminal No. 1).
- A power voltage of 5 V is applied to the camshaft position sensor output terminal (terminal No. 2) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 71).

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- Engine speed is 440 r/min or higher.

Judgment Criterion

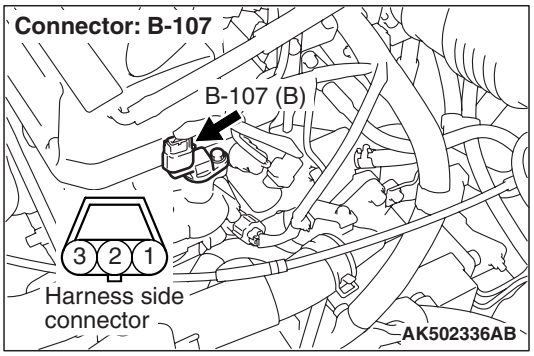
- Camshaft position sensor output voltage has not been changed (no pulse signal is has been input) for 2 seconds.

PROBABLE CAUSE

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

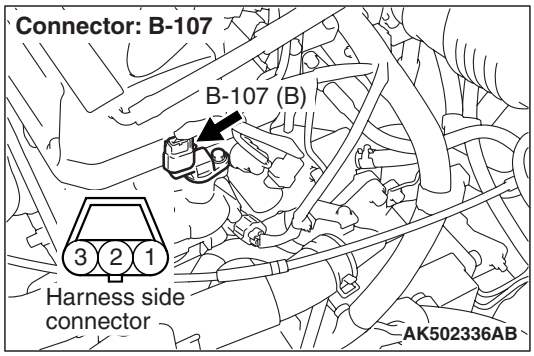
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-107 camshaft position sensor connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform voltage measurement at B-107 camshaft position sensor connector.

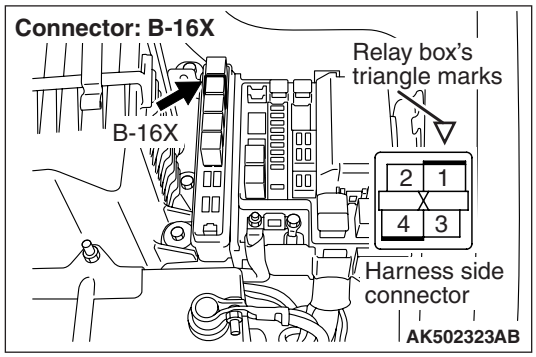


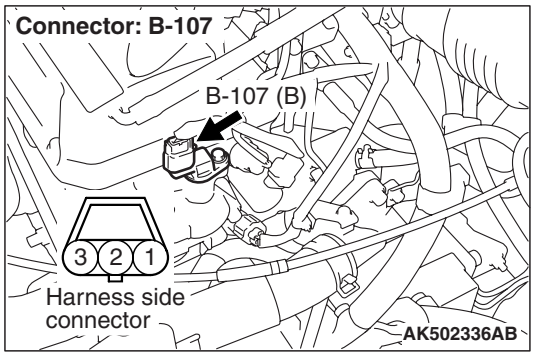
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Go to Step 3 .

STEP 3. Connector check: B-16X engine control relay connector





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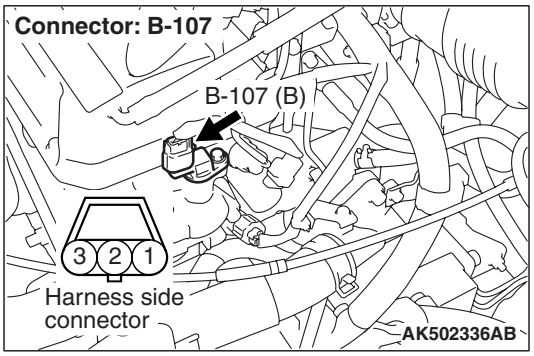
Q: Is the check result normal?

YES : Check and repair harness between B-107 (terminal No. 3) camshaft position sensor connector and B-16X (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 4. Perform voltage measurement at B-107 camshaft position sensor connector.



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

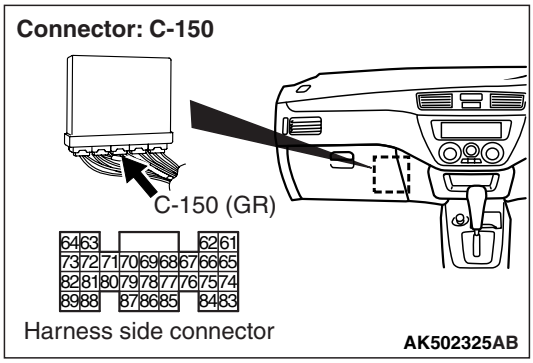
OK: 4.9 – 5.1 V

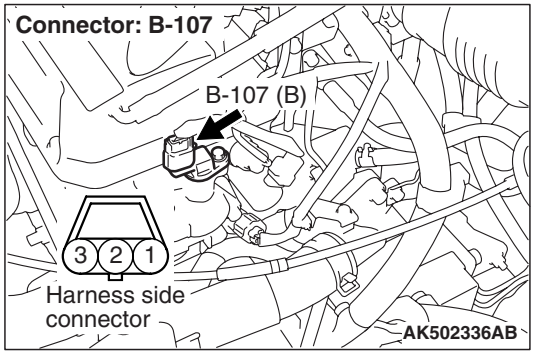
Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 5 .

STEP 5. Perform voltage measurement at C-150 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-107 camshaft position sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 71 and earth.

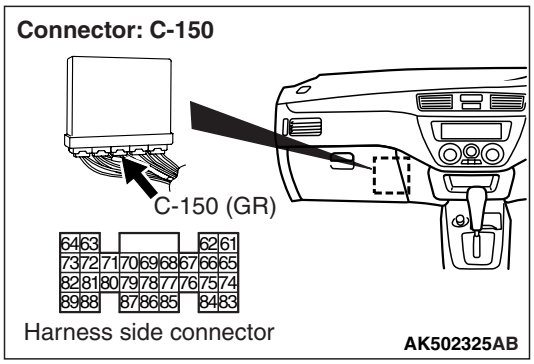
OK: 4.9 – 5.1 V

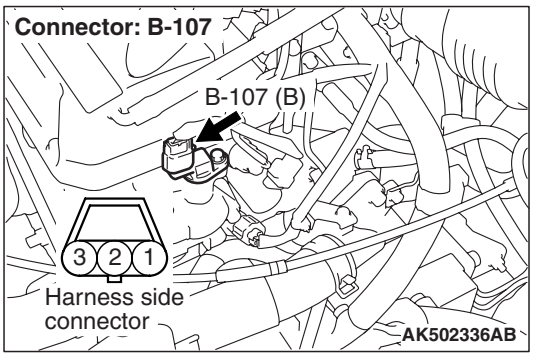
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 7 .

STEP 6. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





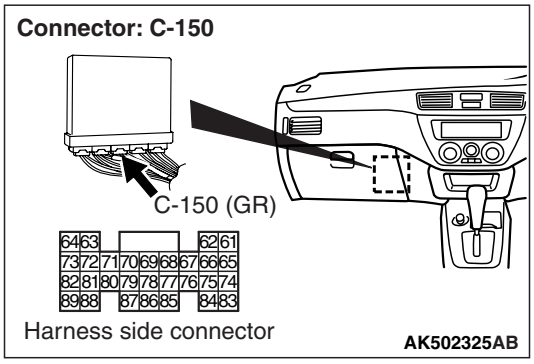
Q: Is the check result normal?

YES : Check and repair harness between B-107 (terminal No. 2) camshaft position sensor connector and C-150 (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 the connector.

STEP 7. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

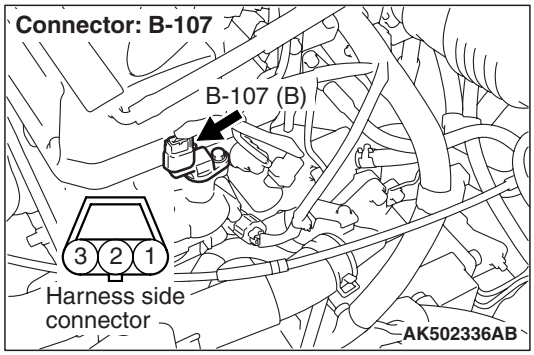


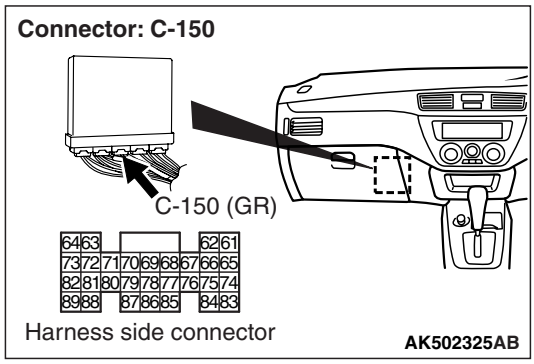
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace the connector.

STEP 8. Check harness between B-107 (terminal No. 2) camshaft position sensor connector and C-150 (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 the damaged harness wire.

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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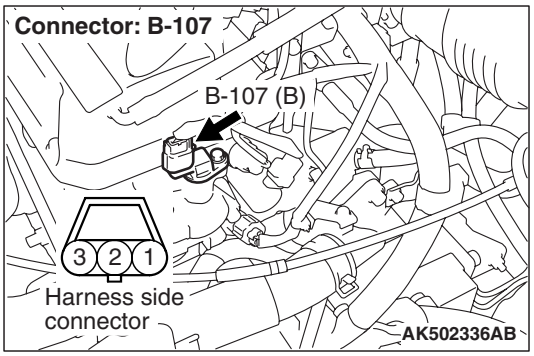
STEP 10. Perform resistance measurement at B-107 camshaft position sensor connector.

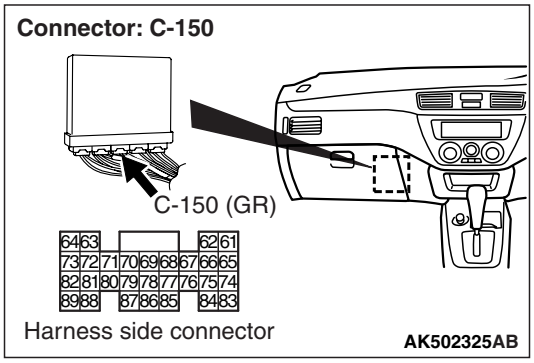


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

  OK: 2 Ω or less

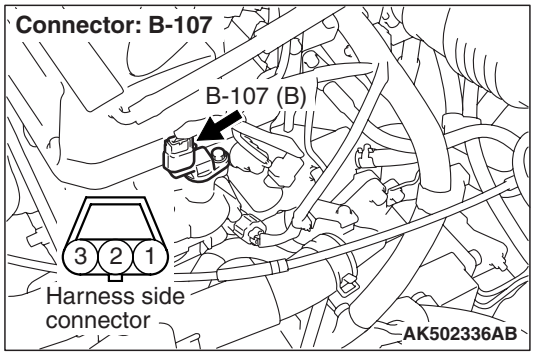
Q: Is the check result normal?
YES : Go to Step 13 .
NO : Go to Step 11 .

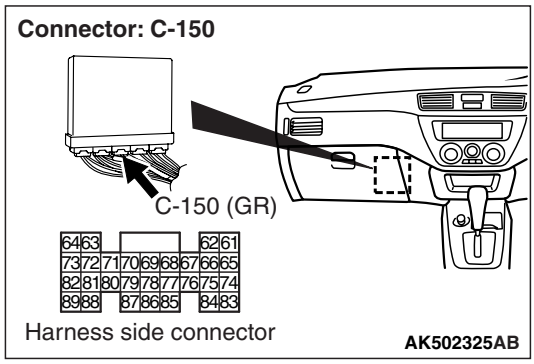
STEP 11. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 12. Check harness between B-107 (terminal No. 1) camshaft position sensor connector and C-150 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

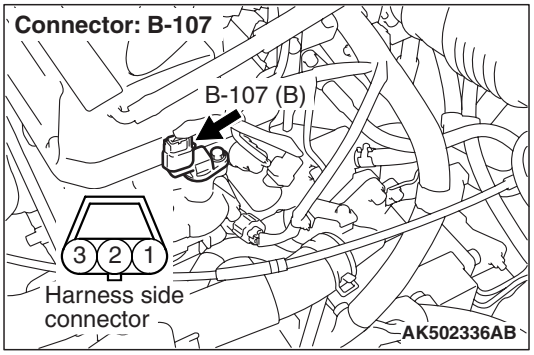




- Check earthing line for open circuit and damage.

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

STEP 13. Perform output wave pattern measurement at B-107 camshaft position sensor connector (Using an oscilloscope).

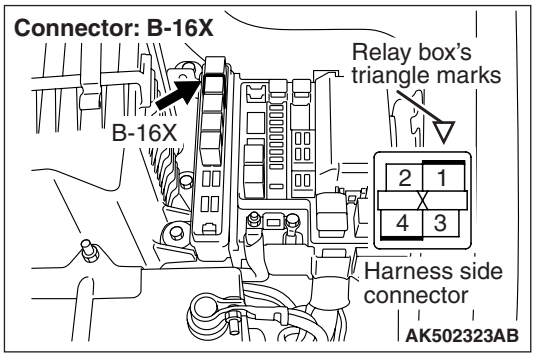


- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral <M/T> or P range <A/T>
- Voltage between terminal No. 2 and earth.

  OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13A-313), 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.

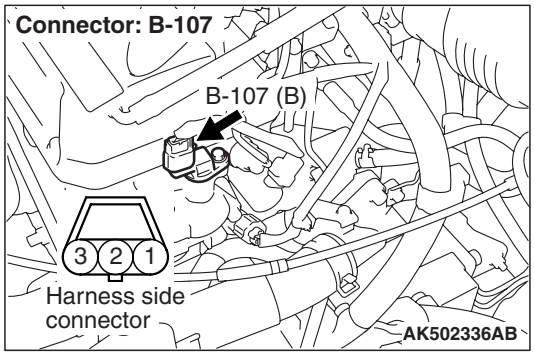
Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 14 .

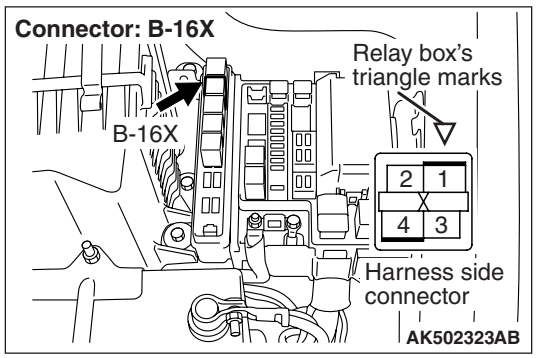
STEP 14. Connector check: B-16X engine control relay connector.



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

STEP 15. Check harness between B-107 (terminal No. 3) camshaft position sensor connector and B-16X (terminal No. 4) engine control relay connector.

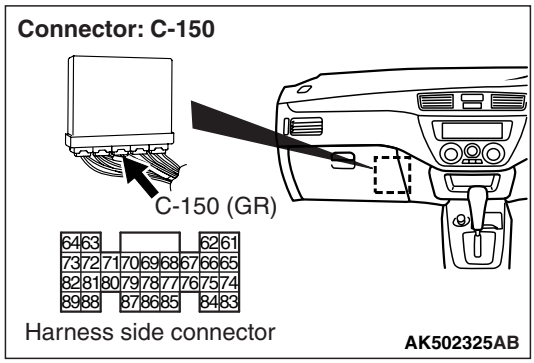




- Check power supply line for damage.

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

STEP 16. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

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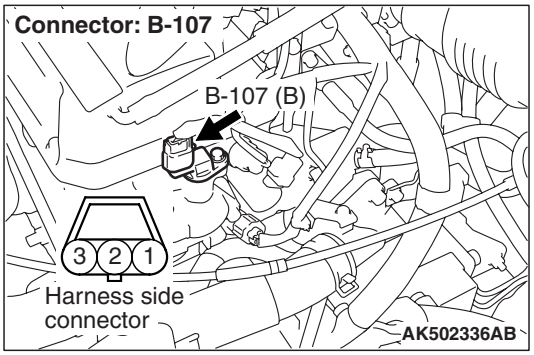
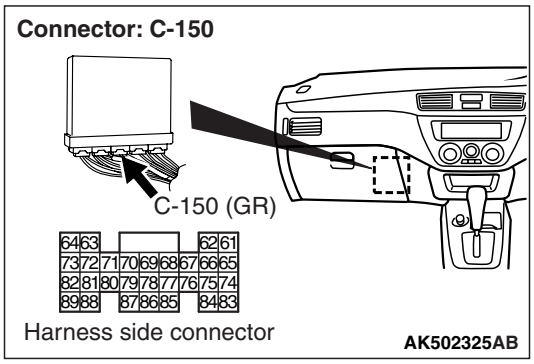
STEP 17. Check harness between B-107 (terminal No. 2) camshaft position sensor connector and C-150 (terminal No. 71) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

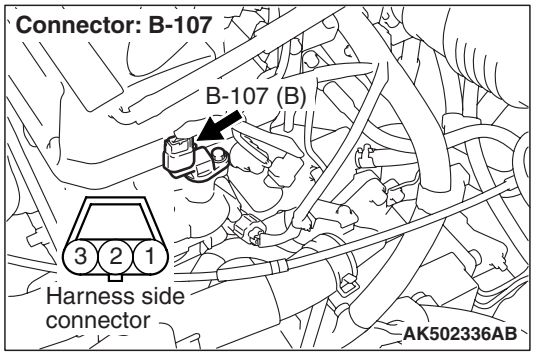


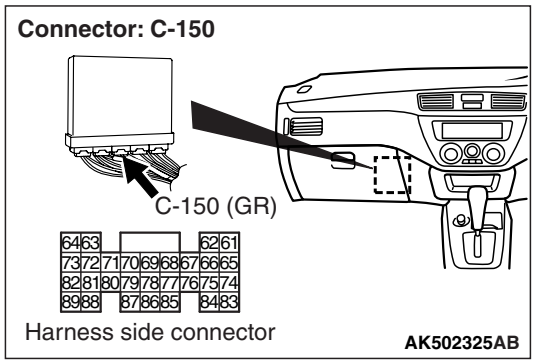


- Check output line for damage.

Q: Is the check result normal?
YES : Go to Step 18 .
NO : Repair the damaged harness wire.

STEP 18. Check harness between B-107 (terminal No. 1) camshaft position sensor connector and C-150 (terminal No. 88) 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 19 .
NO : Repair the damaged harness wire.

STEP 19. Check camshaft position sensing cylinder.

Q: Is the check result normal?
YES : Go to Step 20 .
NO : Replace the camshaft position sensing cylinder.

STEP 20. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the camshaft position sensor.
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

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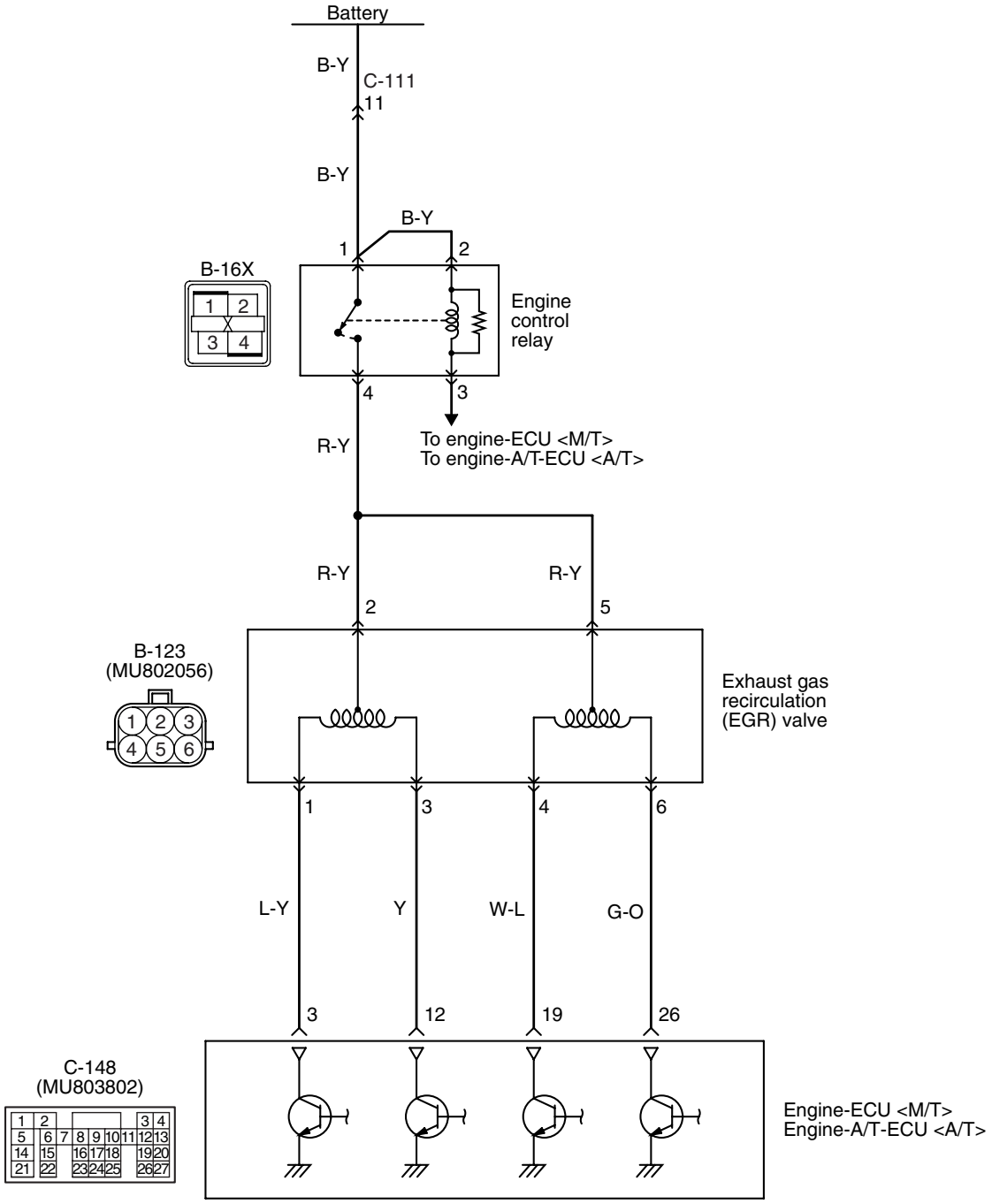
Code No. P0403: Exhaust Gas Recirculation Control System

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 PU: Purple

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OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 10.3 V or higher.

Judgment Criterion

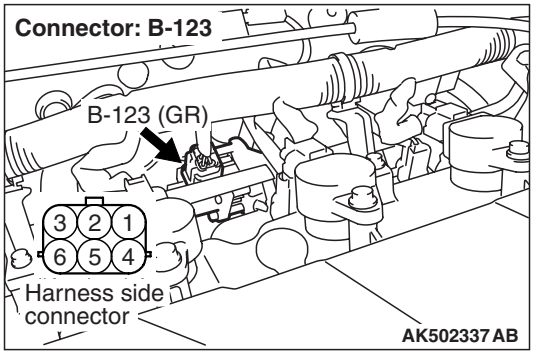
- The EGR valve motor coil surge voltage (battery positive voltage +2 V) is not detected for 3 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-123 EGR valve connector



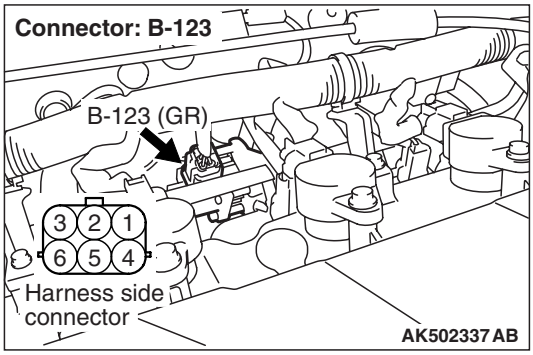
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check EGR valve itself.

- Check EGR control solenoid valve itself [Refer to GROUP 17 –Emission Control System –Exhaust Gas Recirculation (EGR) System –EGR Valve (stepper motor) Check P.17-56.

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the EGR valve (stepper motor).

STEP 3. Perform voltage measurement at B-123 EGR valve connector.

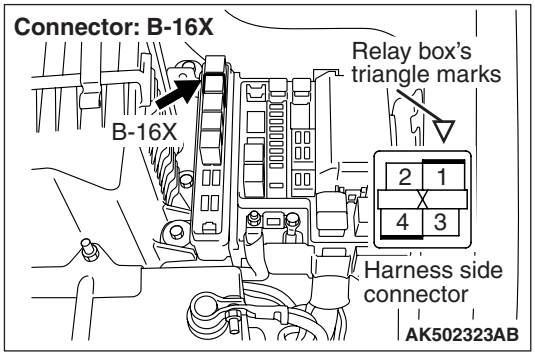


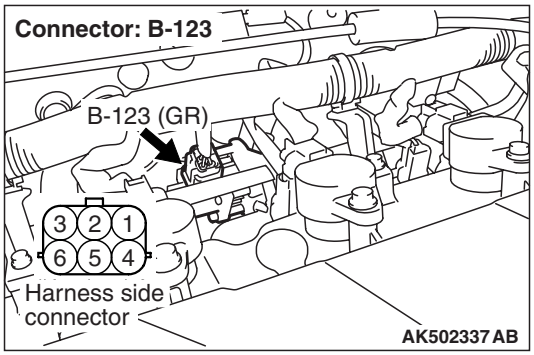
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2, No. 5 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Go to Step 4 .

STEP 4. Connector check: B-16X engine control relay connector





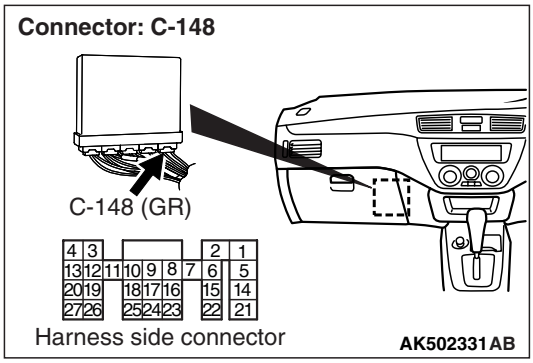
Q: Is the check result normal?

YES : Check and repair harness between B-123 (terminal No. 2, No. 5) EGR valve connector and B-16X (terminal No. 4) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Perform voltage measurement at C-148 engine-ECU connector or engine-A/T-ECU <A/T> connector.



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

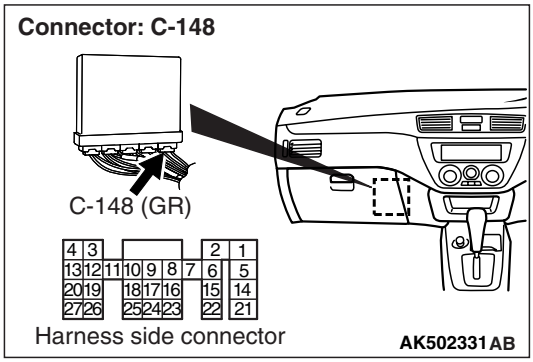
OK: System voltage

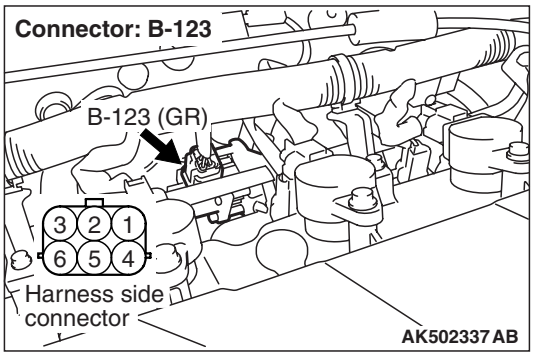
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 6 .

STEP 6. Connector check: C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





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Q: Is the check result normal?

YES : Check and repair harness between B-123 EGR valve connector and C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

a. Check harness between B-123 (terminal No. 1) EGR valve connector and C-148 (terminal No. 3) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

b. Check harness between B-123 (terminal No. 3) EGR valve connector and C-148 (terminal No. 12) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

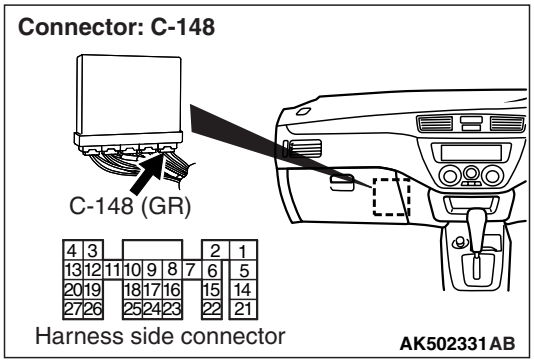
c. Check harness between B-123 (terminal No. 4) EGR valve connector and C-148 (terminal No. 19) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

d. Check harness between B-123 (terminal No. 6) EGR valve connector and C-148 (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 the connector.

STEP 7. Connector check: C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

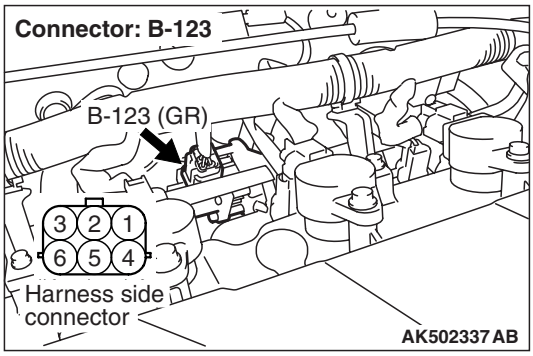


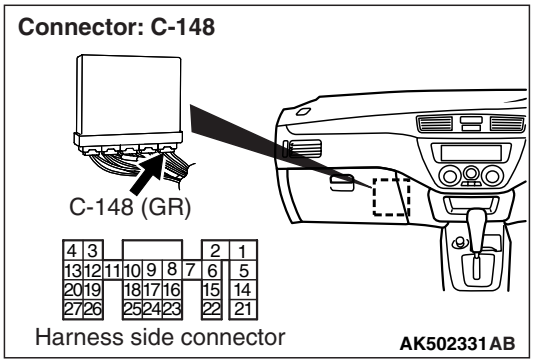
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace the connector.

STEP 8. Check harness between B-123 EGR valve connector and C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





a. Check harness between B-123 (terminal No. 1) EGR valve connector and C-148 (terminal No. 3) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

b. Check harness between B-123 (terminal No. 3) EGR valve connector and C-148 (terminal No. 12) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

c. Check harness between B-123 (terminal No. 4) EGR valve connector and C-148 (terminal No. 19) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

d. Check harness between B-123 (terminal No. 6) EGR valve connector and C-148 (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 the damaged harness wire.

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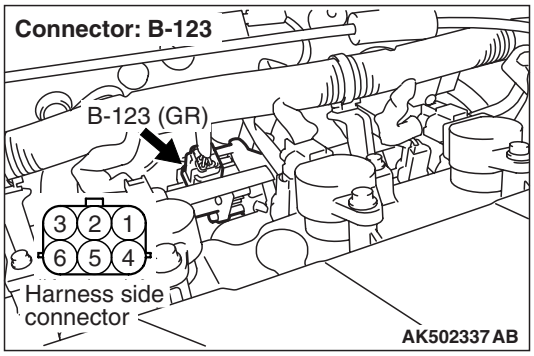
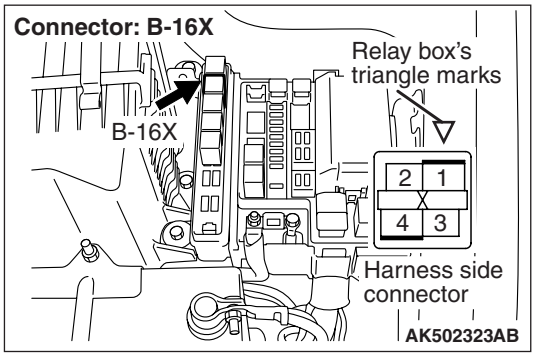
STEP 9. Check harness between B-123 (terminal No. 2, No. 5) EGR valve connector and B-16X (terminal No. 4) engine control relay connector.





- Check power supply line for damage.

Q: Is the check result normal?

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

NO : Repair the damaged harness wire.

Code No. P0421: Warm Up Catalyst Malfunction

FUNCTION

- The signal from the oxygen sensor (rear) differs from the oxygen sensor (front). That is because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the oxygen sensor (front) becomes similar to the oxygen sensor (rear).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> compares the output of the oxygen sensor signals (front and rear).

TROUBLE JUDGMENT

Check Conditions

- Engine speed is 3,000 r/min or lower.
- The accelerator pedal is open.
- Air flow sensor output is 8 gm/s or higher.
- 3 seconds or more elapsed after the abovementioned conditions were satisfied.
- Intake air temperature is – 10° C or higher after the engine is started.
- Barometric pressure is 76 kPa or higher.
- Under the closed loop air/fuel ratio control.
- Vehicle speed is 1.5 km/h or higher.
- For 10 seconds per cycle, the engine-ECU <M/T> or engine-A/T-ECU <A/T> monitors 7 cycles of this condition during the drive cycle.
- Short-term fuel trim is between – 25% or higher and +25% or lower.
- The cumulative air flow sensor output is 2,931 g or higher.

Judgment Criterion

- The oxygen sensor (rear) signal frequency divided by oxygen sensor (front) signal frequency is 0.8 or more.

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PROBABLE CAUSE

- Catalytic converter deteriorated
- Failed oxygen sensor (front)
- Failed oxygen sensor (rear)
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Check for leakage of exhaust emission from exhaust manifold.

Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair.

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 11: Oxygen sensor (front)
  b. Item 59: Oxygen sensor (rear)

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data valve (Refer to Inspection Chart for Diagnosis Code P.13A-19).

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

a. Item 11: Oxygen sensor (front)

OK: 0 – 0.4 and 0.6 – 1.0 volt should alternate 15 times or more within 10 seconds (engine speed at 2,000 r/min).

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Replace the oxygen sensor (front).

STEP 4. Replace the oxygen sensor (rear).

- After replacing the oxygen sensor (rear), re-check the trouble symptoms.

Q: Is the check result normal?
YES : The check is end.
NO : Go to Step 5 .

STEP 5. Replace the catalytic converter.

- After replacing the catalytic converter, re-check the trouble symptoms.

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

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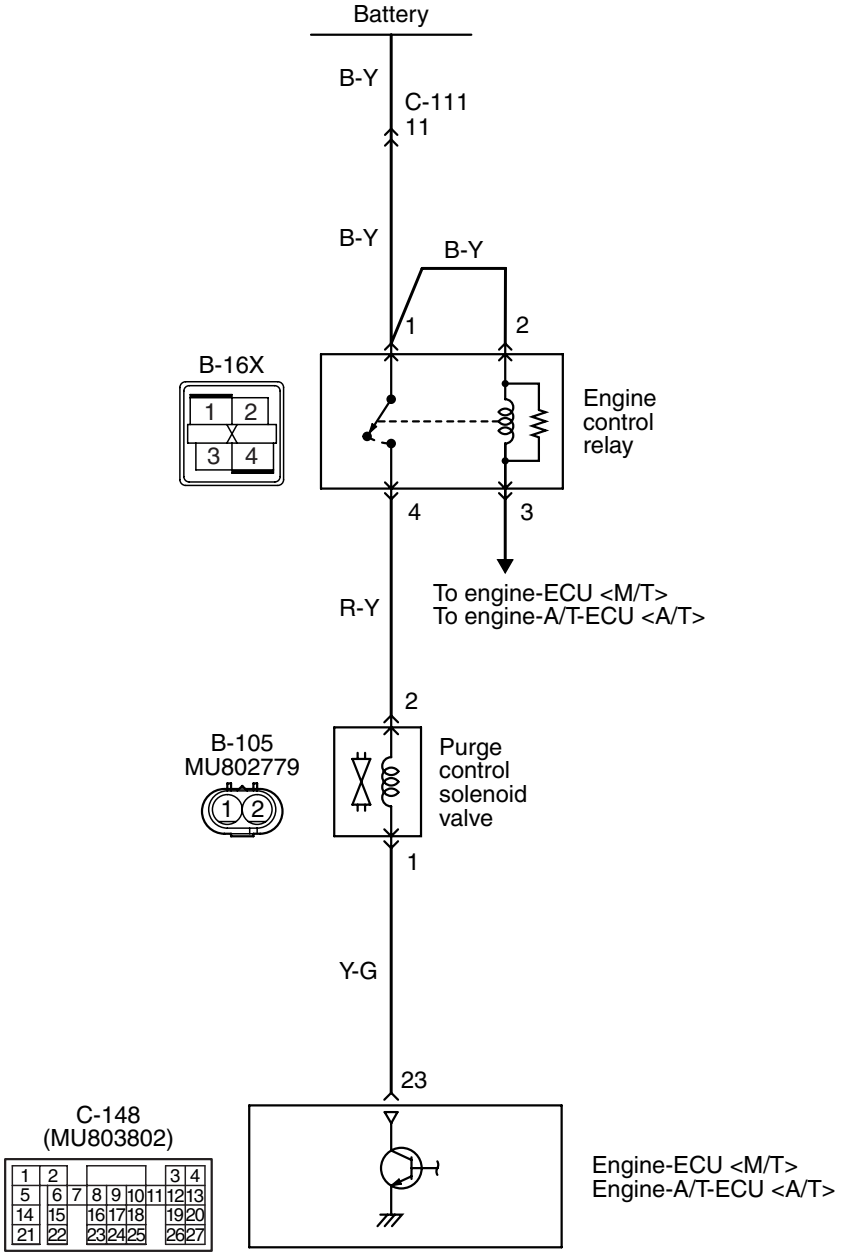
Code No. P0443: Purge Control Solenoid Valve System

Purge control solenoid valve circuit



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

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OPERATION

- Power is supplied to the purge control solenoid valve (terminal No. 2) from the engine control relay (terminal No. 4).
- 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).

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FUNCTION

- In response to a signal from the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the purge control solenoid valve controls the flow rate of the purge air to be introduced into the surge tank.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.
- Battery positive voltage is 10 V or higher.

Judgment Criterion

- The surge voltage (system voltage +2 V) of solenoid coil is not detected when the purge control solenoid valve is turned in OFF position from ON.

PROBABLE CAUSE

- Failed purge control solenoid valve
- Open/short circuit in purge control solenoid 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.-II/III actuator test

- Item 08: Purge control solenoid valve

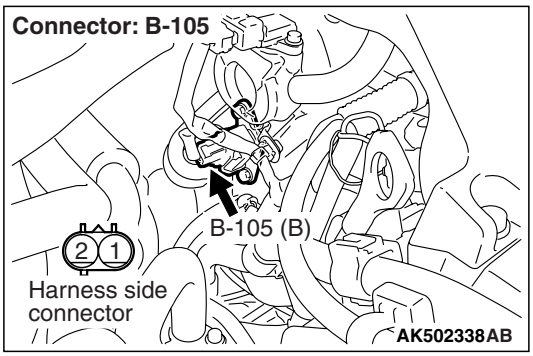
OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: B-105 purge control solenoid valve connector

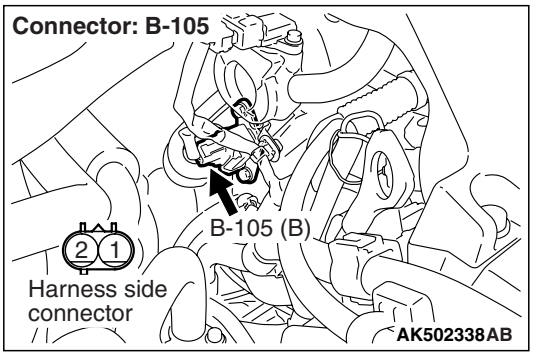


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform resistance measurement at B-105 purge control solenoid valve connector.



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

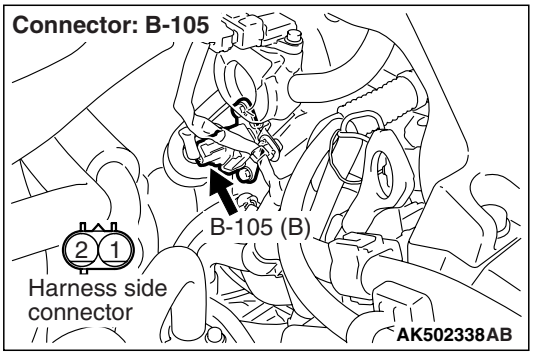
OK: 30 – 34 Ω (at 20° C)

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the purge control solenoid valve.

STEP 4. Perform voltage measurement at B-105 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 .

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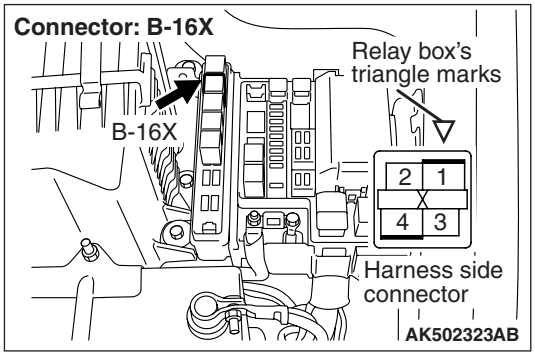
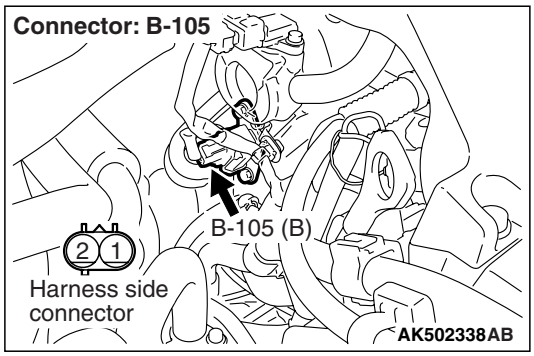
STEP 5. Connector check: B-16X engine control relay connector





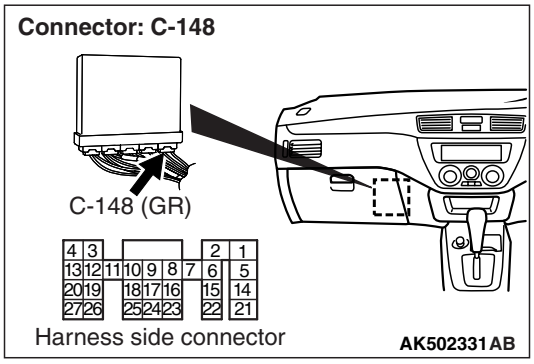
Q: Is the check result normal?

YES : Check and repair harness between B-105 (terminal No. 2) purge control solenoid valve connector and B-16X (terminal No. 4) engine control relay connector.

- Check power line for open/short circuit.

NO : Repair or replace the connector.

STEP 6. Perform voltage measurement at C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 23 and earth.

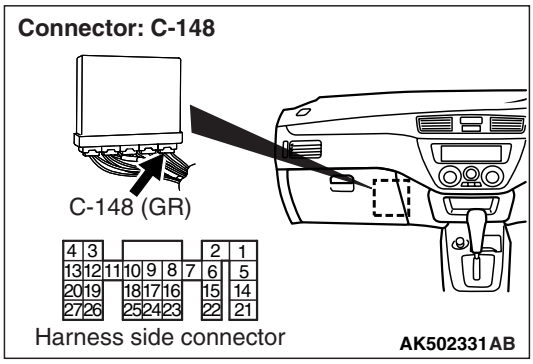
OK: System voltage

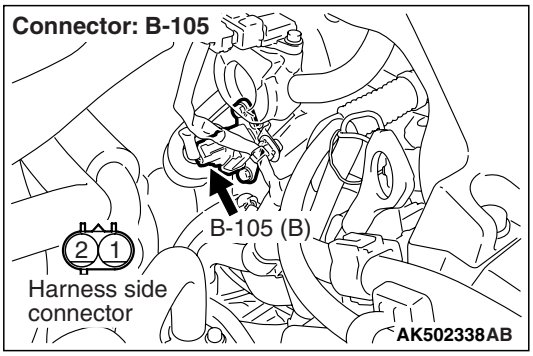
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Connector check: C-148 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-105 (terminal No. 1) purge control solenoid valve connector and C-148 (terminal No. 23) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open/short circuit.

NO : Repair or replace the connector.

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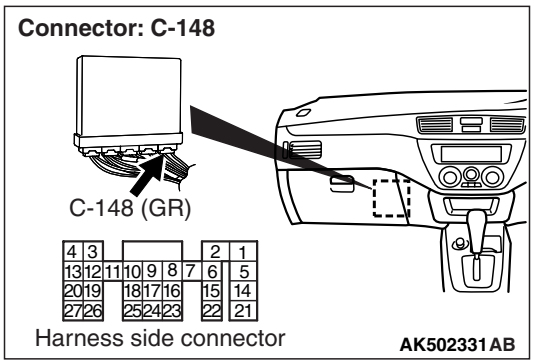
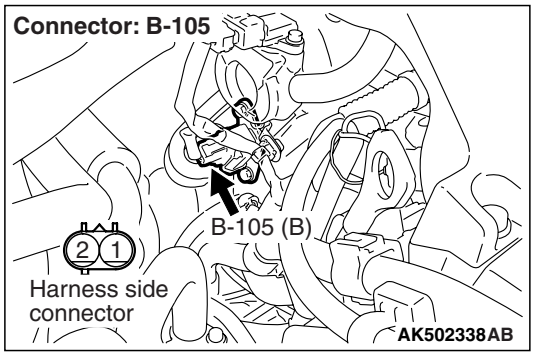
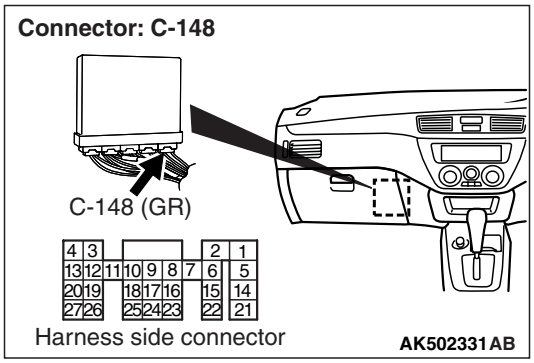
STEP 8. Connector check: C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 9. Check harness between B-105 (terminal No. 1) purge control solenoid valve connector and C-148 (terminal No. 23) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

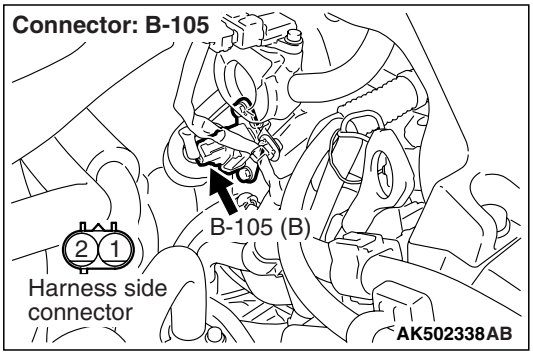


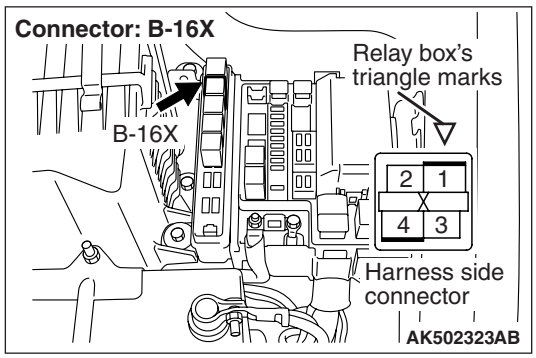


- Check output line for damage.

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

STEP 10. Check harness between B-105 (terminal No. 2) purge control solenoid valve connector and B-16X (terminal No. 4) engine control relay connector.





- Check power line for damage.

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

STEP 11. M.U.T.-II/III actuator test

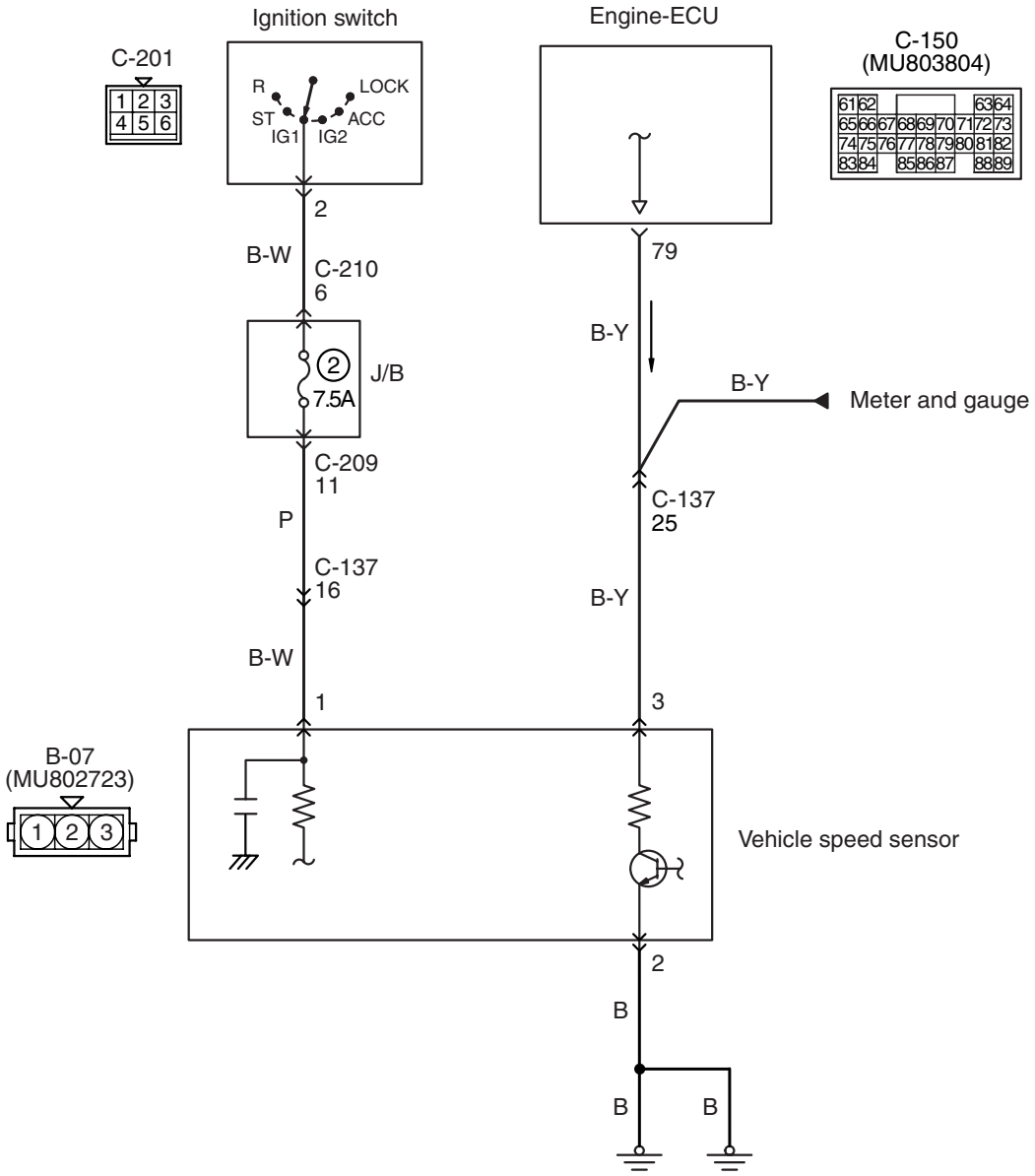
- Item 08: Purge control solenoid valve

  OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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 PU: Purple

AK502024 AB

OPERATION

- A power voltage of 5 V is applied to the vehicle speed sensor (terminal No. 3) from the engine-ECU (terminal No. 79).

FUNCTION

- The vehicle speed sensor converts the vehicle speed to the voltage, and then input it into the engine-ECU

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TROUBLE JUDGMENT

Check Conditions

- 2 seconds later after the engine has started up.
- Engine speed: 2,500 r/min or more.
- Idle switch: OFF
- 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

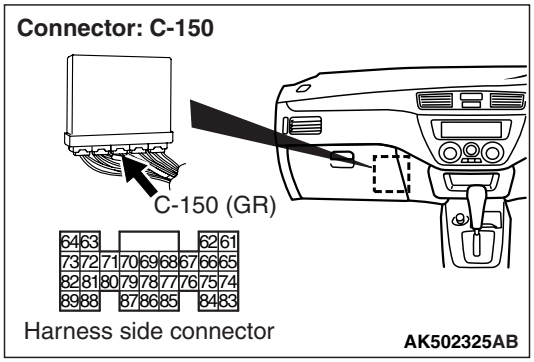
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Check the speedometer (Refer to GROUP 54A – Combination Meter Assembly – On-vehicle Service –Speedometer Check P.54A-51).

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 24: Vehicle speed sensor

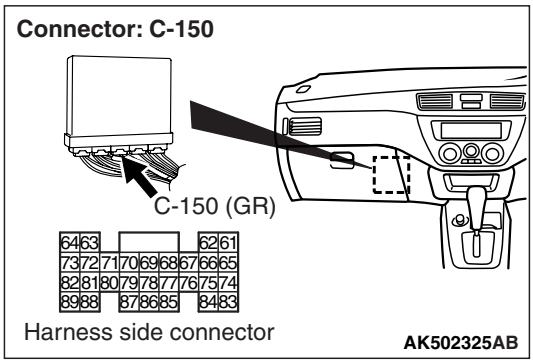
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

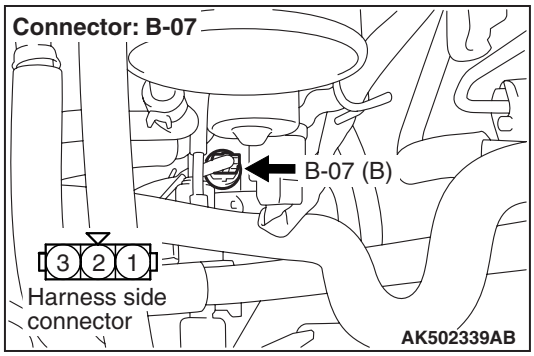
STEP 3. Connector check: C-150 engine-ECU connector



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

STEP 4. Check harness between C-150 (terminal No. 79) engine-ECU connector and B-07 (terminal No. 3) vehicle speed sensor connector.





NOTE: Before checking harness, check intermediate connector C-137, and repair if necessary.

- Check output line for open circuit and damage.

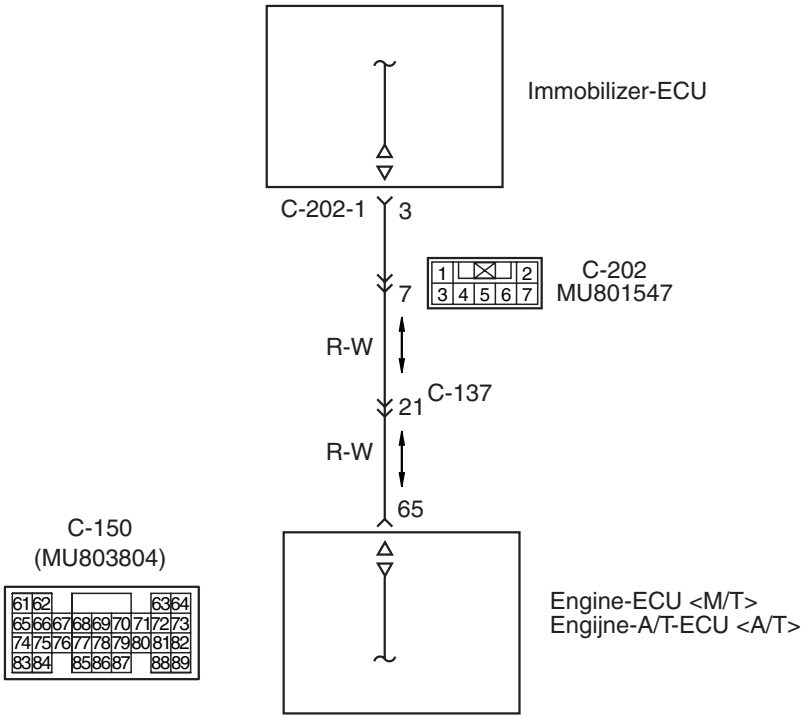
Q: Is the check result normal?
YES : Go to Step 5 .
NO : Repair the damaged harness wire.

STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replacing engine-ECU.
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0513: Immobilizer Malfunction

Immobilizer-ECU circuit



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

AK502025AB

OPERATION

- The signals are sent and received between engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 65) and immobilizer-ECU (terminal No. 7).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> sends or receives the control signals to or from immobilizer-ECU to certify the ignition key.

NOTE:

- *If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.*
- *This code may be displayed when registering the key encrypted code.*

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

- When the communication error between engine-ECU <M/T> or engine-A/T-ECU <A/T> and the immobilizer-ECU continues for 2 seconds or more.

PROBABLE CAUSE

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

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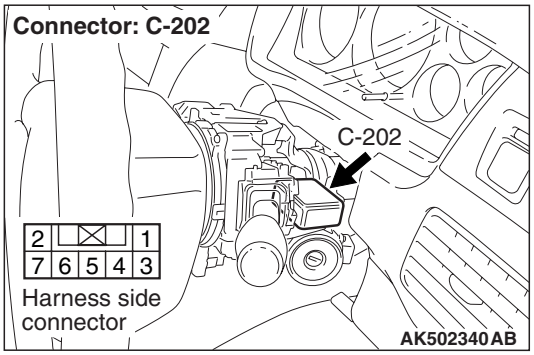
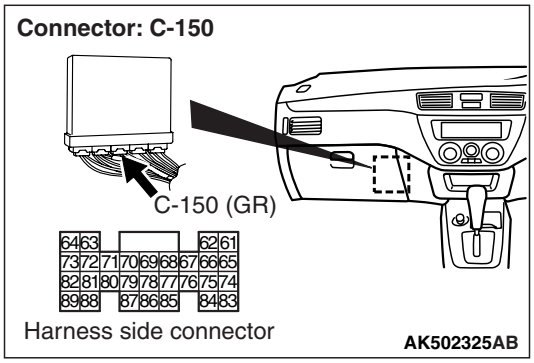
DIAGNOSIS PROCEDURE

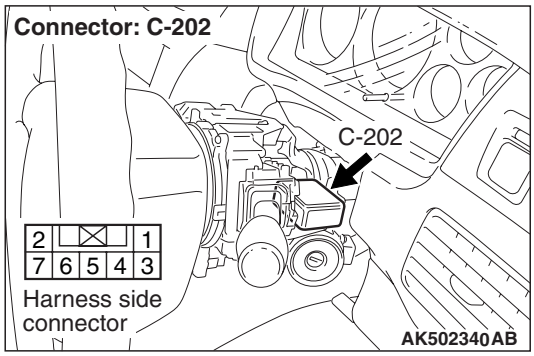
STEP 1. Connector check: C-202 immobilizer-ECU connector and C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

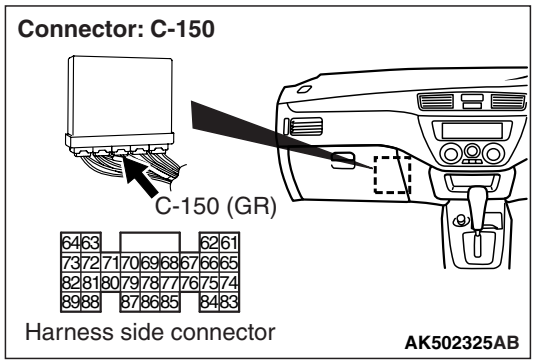




Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check harness between C-202 (terminal No. 7) immobilizer-ECU connector and C-150 (terminal No. 65) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





NOTE: Before checking harness, check intermediate connector C-137, 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 the damaged harness wire.

STEP 3. Check the trouble symptoms.

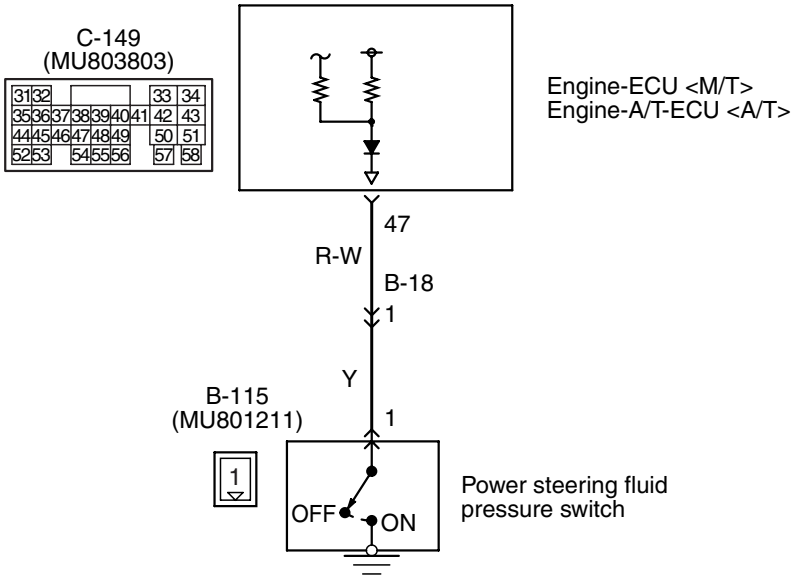
Q: Is the check result normal?
YES : Go to Step 4 .
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

STEP 4. After replacing the immobilizer-ECU, re-check the trouble symptoms.

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

Code No. P0551: Power Steering Fluid Pressure Switch System

Power steering fluid pressure switch circuit



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

AK502026 AB

CONDITION

- The battery voltage is applied to the power steering fluid pressure switch (terminal No. 1) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 47).

FUNCTION

- It is detected whether a load is applied on the power steering fluid pump by steering or not, and the signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T>. When the power steering fluid pressure switch "ON" signal (a large load on the power steering fluid pump) is inputted, the engine-ECU <M/T> or engine-A/T-ECU <A/T> provides the idle-up control.

TROUBLE JUDGMENT

Check Conditions

- Engine coolant temperature is 20° C or higher.
- Drive the vehicle of 50 km/h or more for 4 seconds or more. Stop the vehicle (of 1.5 km/h or less). Repeat 10 times or more.

Judgment Criterion

- Power steering pressure switch continues to be in "ON".

PROBABLE CAUSE

- Failed power steering fluid pressure switch
- Open/short circuit in power steering fluid pressure switch circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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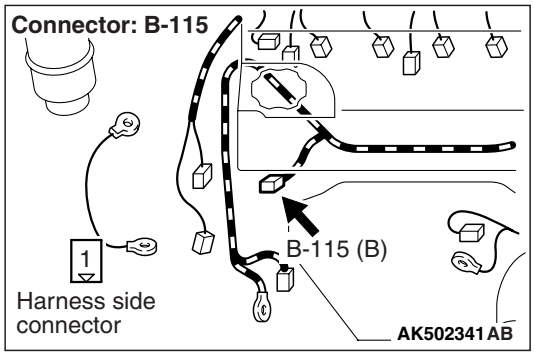
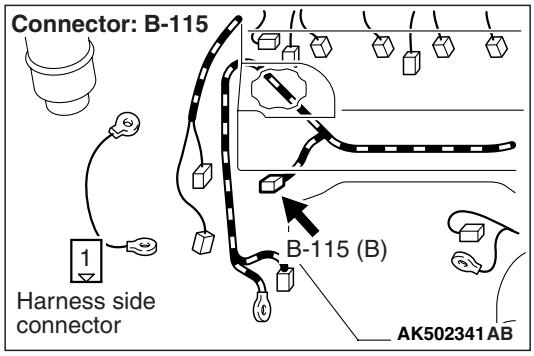
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-115 power steering fluid pressure switch connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform voltage measurement at B-115 power steering fluid pressure switch connector.

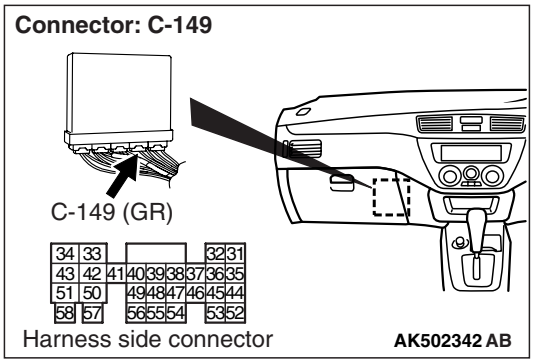


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 3 .

STEP 3. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

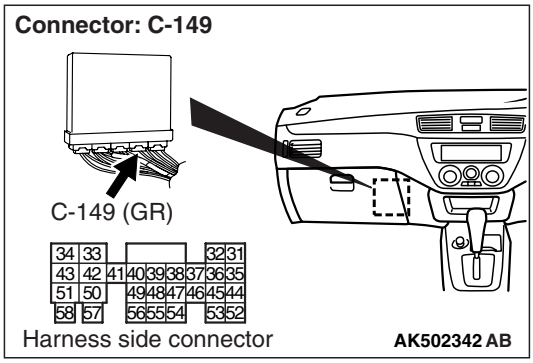


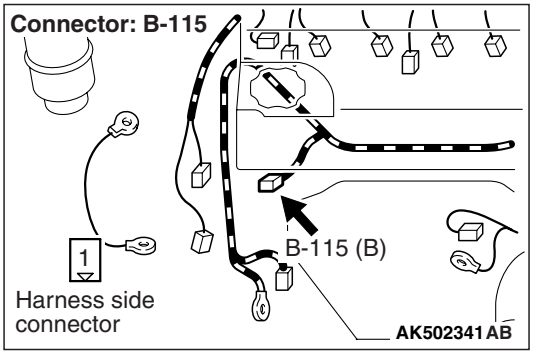
- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 47 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Go to Step 5 .

STEP 4. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





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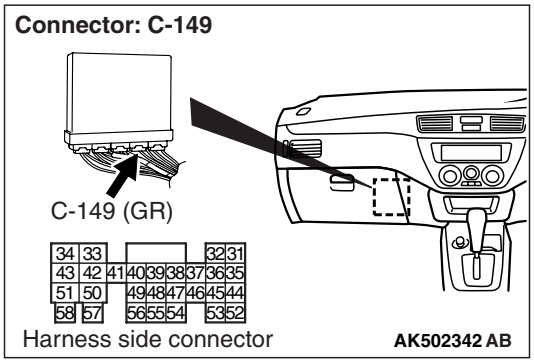
Q: Is the check result normal?

YES : Check intermediate connector B-18, and repair if necessary. If intermediate connector is normal, check and repair harness between B-115 (terminal No. 1) power steering fluid pressure switch connector and C-149 (terminal No. 47) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair or replace the connector.

STEP 5. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

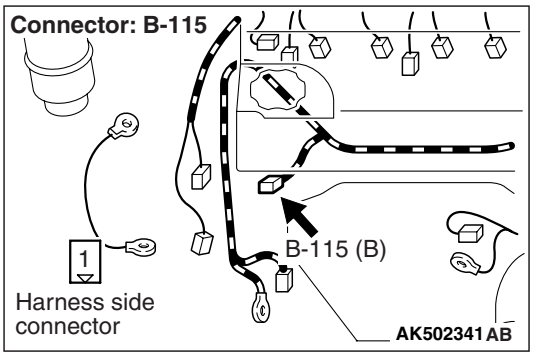


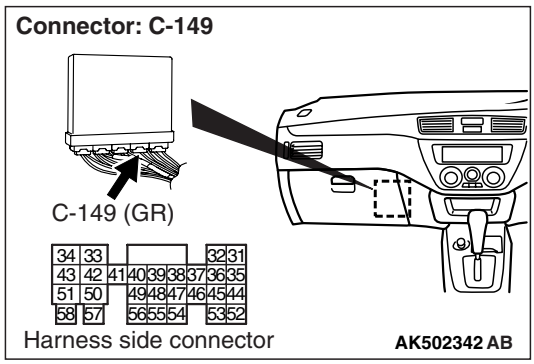
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace the connector.

STEP 6. Check harness between B-115 (terminal No. 1) power steering fluid pressure switch connector and C-149 (terminal No. 47) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





NOTE: Before checking harness, check intermediate connector B-18, and repair if necessary.

- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair the damaged harness wire.

STEP 7. M.U.T.-II/III data List

- Refer to Data List Reference Table P.13A-297.
  a. Item 27: Power steering fluid pressure switch

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

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

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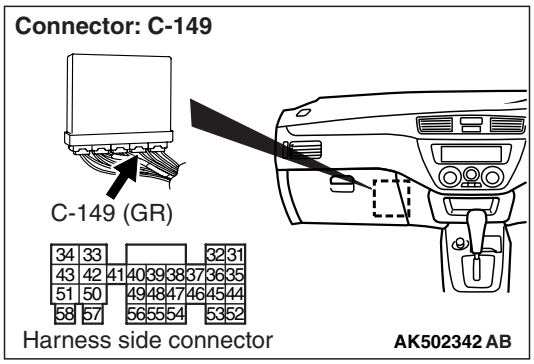
STEP 8. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

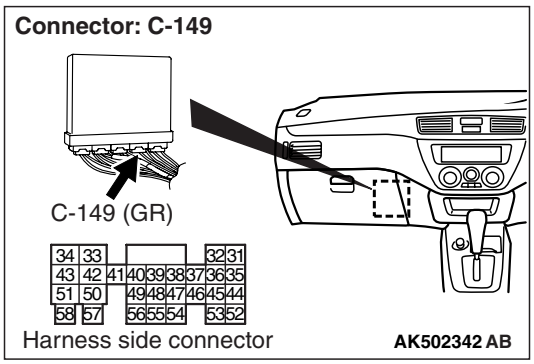


- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Engine: Idling
- Voltage between terminal No. 47 and earth.

OK:
System voltage (Steering wheel: Stationary)
1 V or less (Steering wheel: Turned)

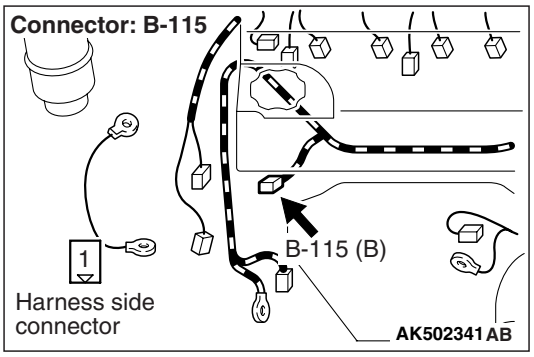
Q: Is the check result normal?
YES : Go to Step 11 .
NO : Go to Step 9 .

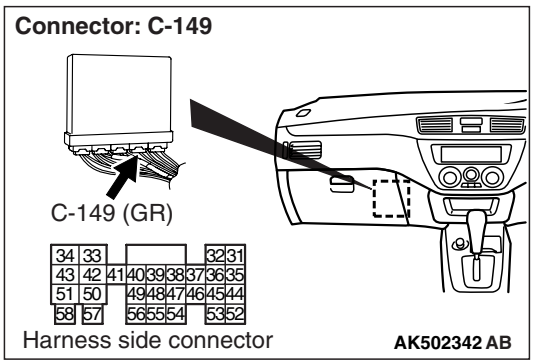
STEP 9. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 10. Check harness between B-115 (terminal No. 1) power steering fluid pressure switch connector and C-149 (terminal No. 47) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



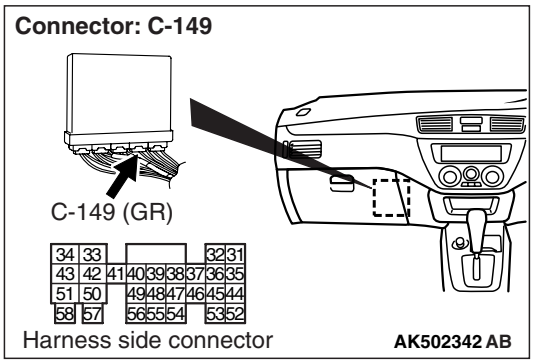


NOTE: Before checking harness, check intermediate connector B-18, and repair if necessary.

- Check output line for damage.

Q: Is the check result normal?
YES : Replace the power steering fluid pressure switch.
NO : Repair the damaged harness wire.

STEP 11. Connector check: C-149 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 the connector.

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Code No. P0603: EEP ROM MALFUNCTION

FUNCTION

- To check whether the information such as the idle learned value and so on is stored in the memory of engine-ECU <M/T> or engine-A/T-ECU <A/T>.

TROUBLE JUDGMENT

Check 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. Reconfirmation of diagnosis codes.

Q: Is the check result normal?

YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P0606: Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Main Processor Malfunction

FUNCTION

- System LSI checks the engine-ECU <M/T> or engine-A/T-ECU <A/T> for abnormal conditions.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is "ON" position.

Judgement Criterion

- No surveillance pulse signals is input for 0.5 second.

PROBABLE CAUSE

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

DIAGNOSIS

STEP 1. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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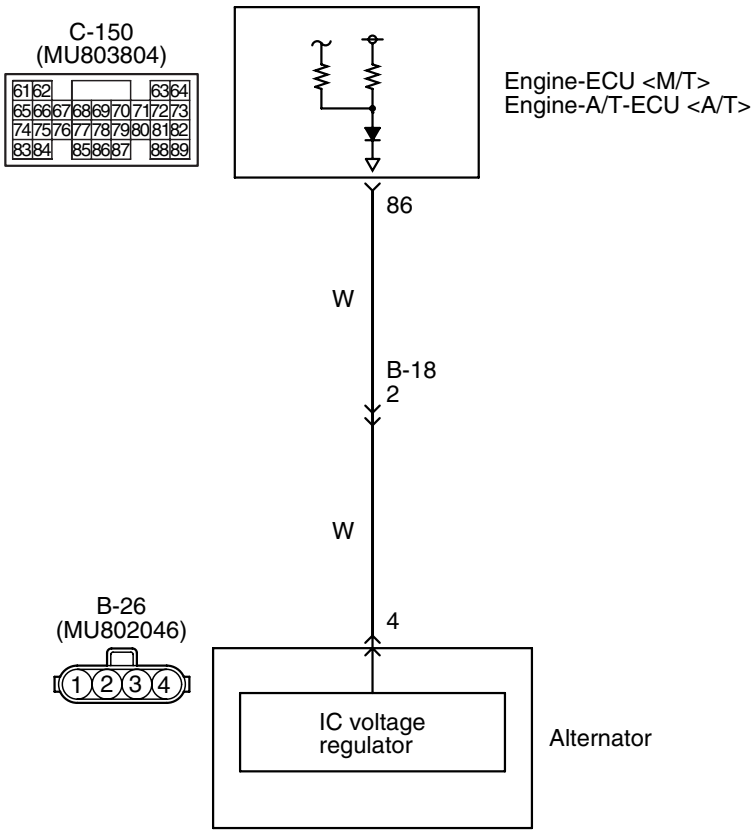
Code No. P0622: Alternator FR Terminal System

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 PU: Purple

AK304135AD

OPERATION

- The energized state of the alternator field coil is inputted from the alternator (terminal No. 4) to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 86).

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- Engine speed is 50 r/min or more.

Judgment Criterion

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

PROBABLE CAUSE

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

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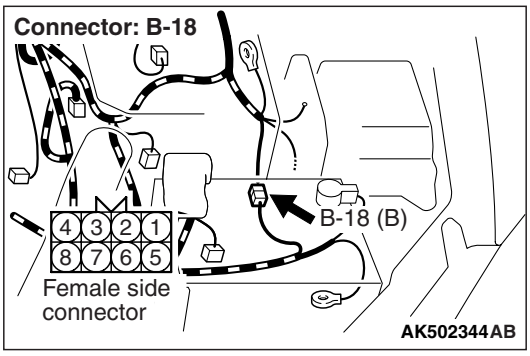
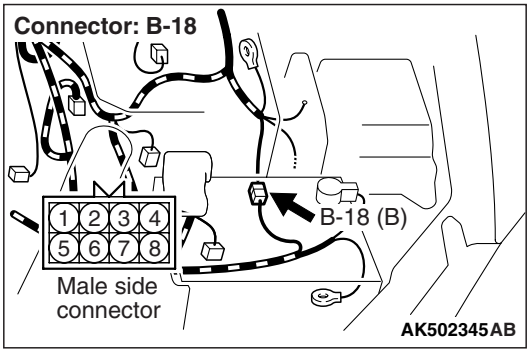
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-18 intermediate connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform voltage measurement at B-18 intermediate connector.

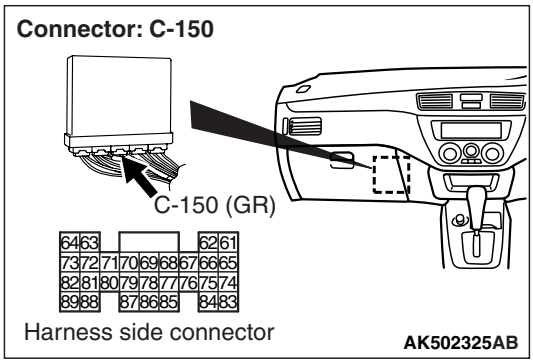


- Disconnect connector, and measure at male connector side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: System voltage

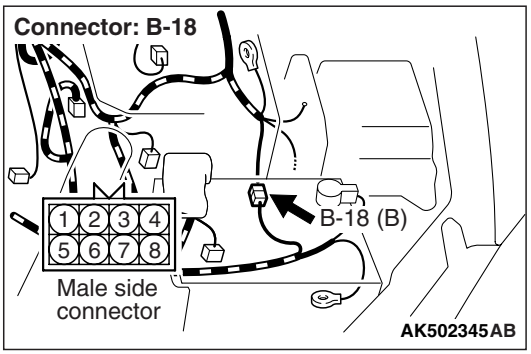
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Go to Step 3 .

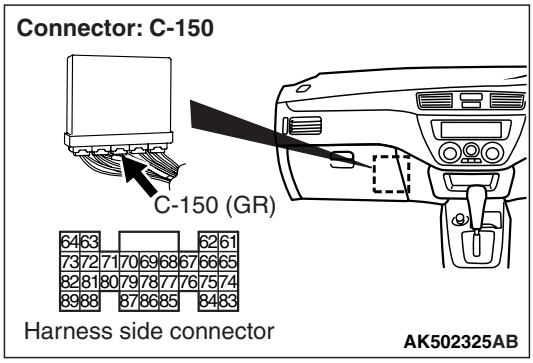
STEP 3. Connector check: C-150 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector



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

STEP 4. Check harness between B-18 (terminal No. 2) intermediate connector and C-150 (terminal No. 86) 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 5 .
NO : Repair the damaged harness wire.

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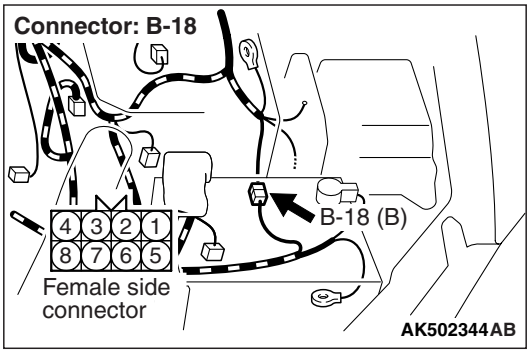
STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

STEP 6. Perform voltage measurement at B-18 intermediate connector.

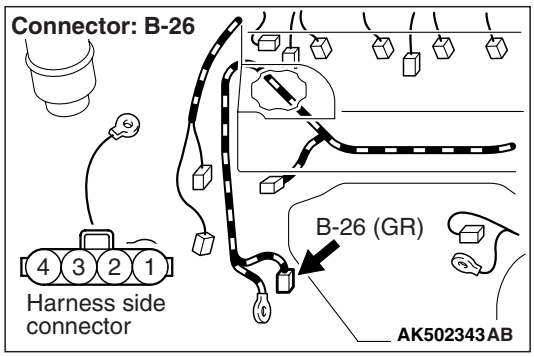


- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: System voltage

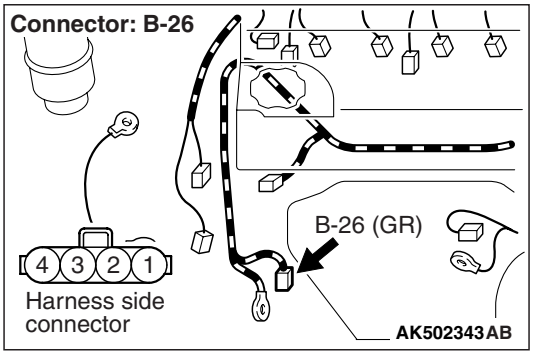
Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 7 .

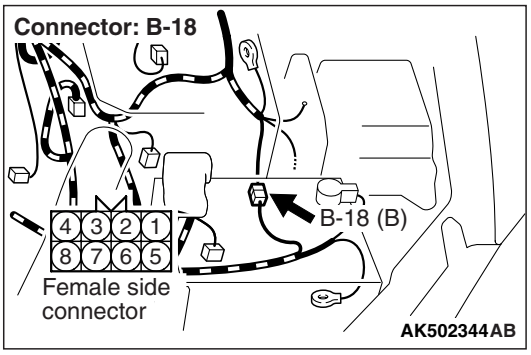
STEP 7. Connector check: B-26 alternator connector



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

STEP 8. Check harness between B-26 (terminal No. 4) alternator connector and B-18 (terminal No. 2) intermediate connector.

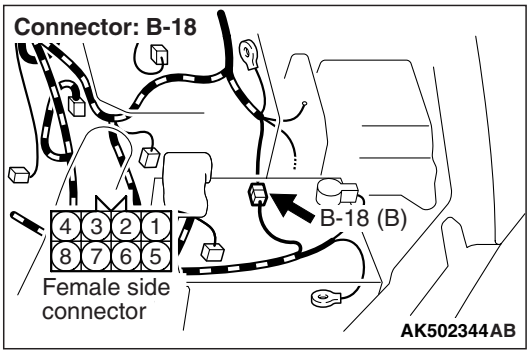




- Check output line for short circuit.

Q: Is the check result normal?
YES : Replace the alternator.
NO : Repair the damaged harness wire.

STEP 9. Perform voltage measurement at B-18 intermediate connector.



- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: Idle after warm-up
- Transmission: Neutral
- Radiator fan: Inactive
- Voltage between terminal No. 2 and earth.

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

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

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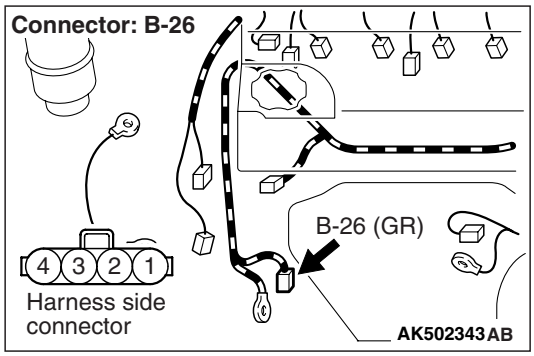
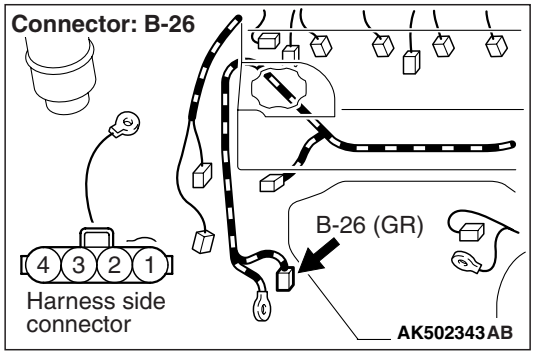
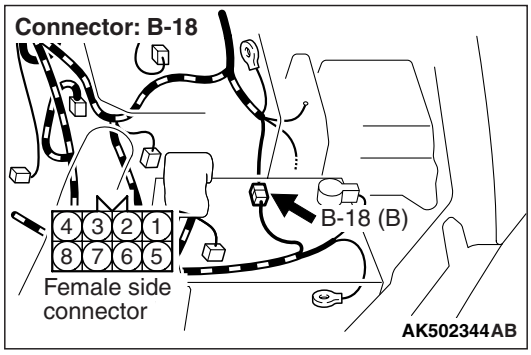
STEP 10. Connector check: B-26 alternator connector



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

STEP 11. Check harness between B-26 (terminal No. 4) alternator connector and B-18 (terminal No. 2) intermediate connector.

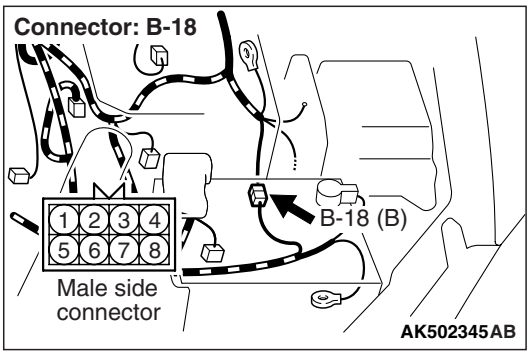


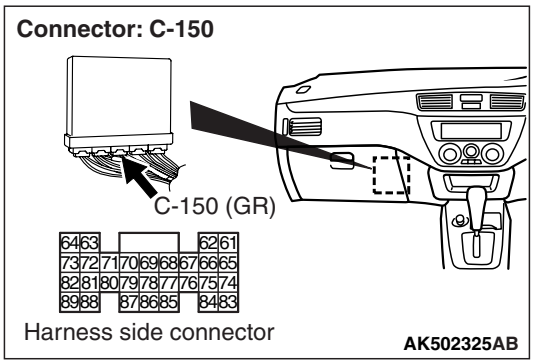


- Check output line for damage.

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

STEP 12. Check harness between B-18 (terminal No. 2) intermediate connector and C-150 (terminal No. 86) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.





- Check output line for damage.

Q: Is the check result normal?
YES : Go to Step 13 .
NO : Repair the damaged harness wire.

STEP 13. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the alternator.
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

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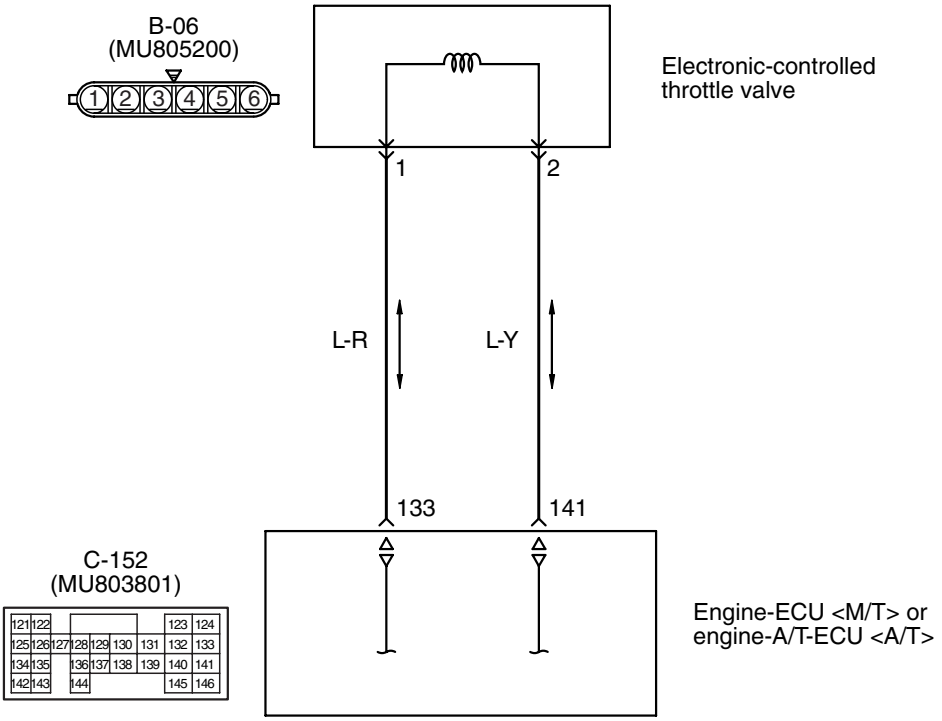
Code No. P0638: Throttle Valve Control Servo Circuit Range/Performance Problem

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 PU: Purple

AK305850 AC

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 higher.
- Throttle position sensor (main) output voltage is 2.2 – 4.8 V.
- Drop of throttle position sensor (main) output voltage per 100 milliseconds is 0.04 V or more.

Judgement Criterion

- Throttle position sensor (main) output voltage has continued to be above 0.5 V higher than the target throttle position sensor (main) voltage for 1.0 second.

Check Conditions

- Battery positive voltage is 8.3 V or higher.
- Throttle position sensor (main) output voltage is 2.2 – 4.8 V.

Judgement Criterion

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is 1 V or higher for 4 seconds.

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PROBABLE CAUSE

- Failed throttle valve return spring.
- Failed throttle valve operation.
- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo connector contact.
- Failed engine-ECU <M/T>.
- Failed engine-A/T-ECU <A/T>.

DIAGNOSIS

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 9A: Throttle position sensor (main) mid opening learning value

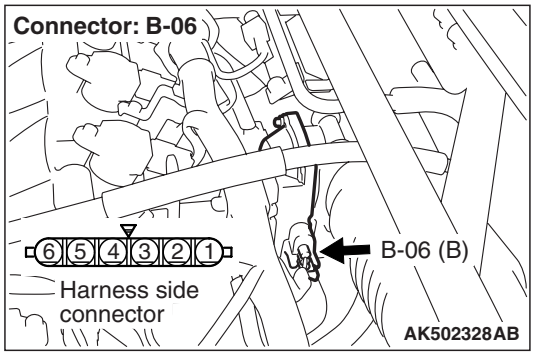
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Replace the throttle body assembly.

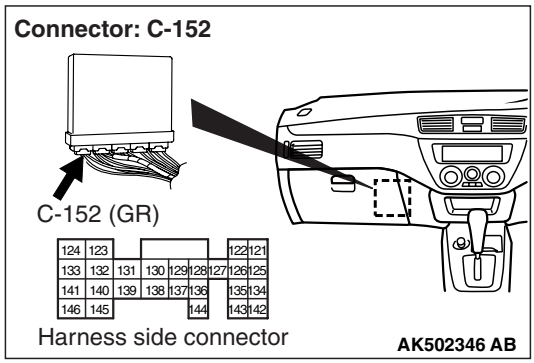
STEP 2. Check the throttle valve control servo itself.

- Check the throttle valve control servo control motor itself (Refer to P.13A-331).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the electronic-controlled throttle valve.

STEP 3. Connector check: B-06 electronic-controlled throttle valve connector and C-152 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 the connector.

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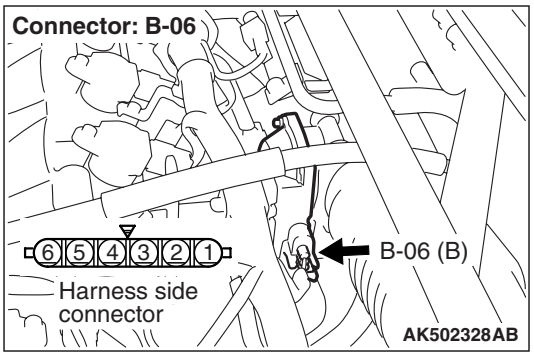
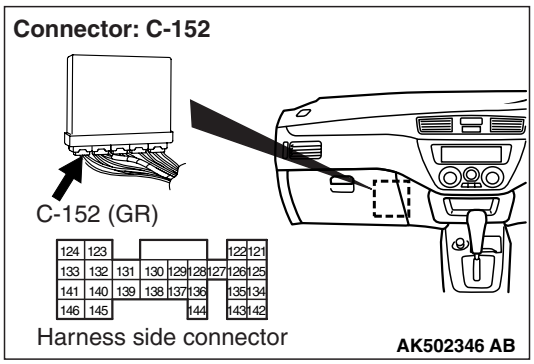
STEP 4. Check harness between B-06 (terminal No. 1) electronic-controlled throttle valve connector and C-152 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

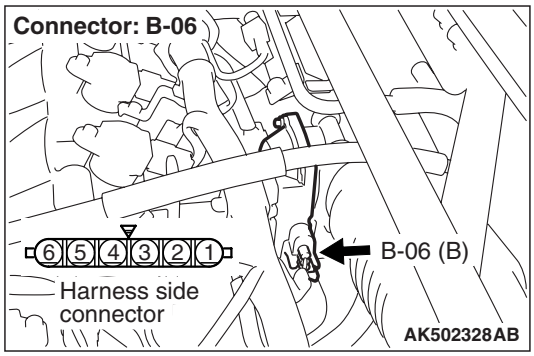


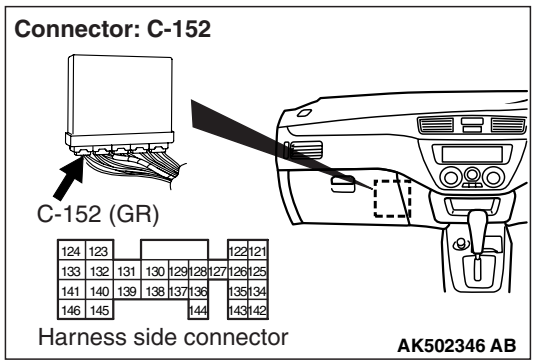


- Check output line for short circuit and damage.

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

STEP 5. Check harness between B-06 (terminal No. 2) electronic-controlled throttle valve connector and C-152 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for short circuit and damage.

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

STEP 6. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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Code No. P0642: Throttle Position Sensor Power Supply

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the throttle position sensor power voltage for abnormal conditions.

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 6.3 V or higher.

Judgement Criterion

- Throttle position sensor power voltage is 4.1 V or less for 0.5 second.

PROBABLE CAUSE

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

DIAGNOSIS

STEP 1. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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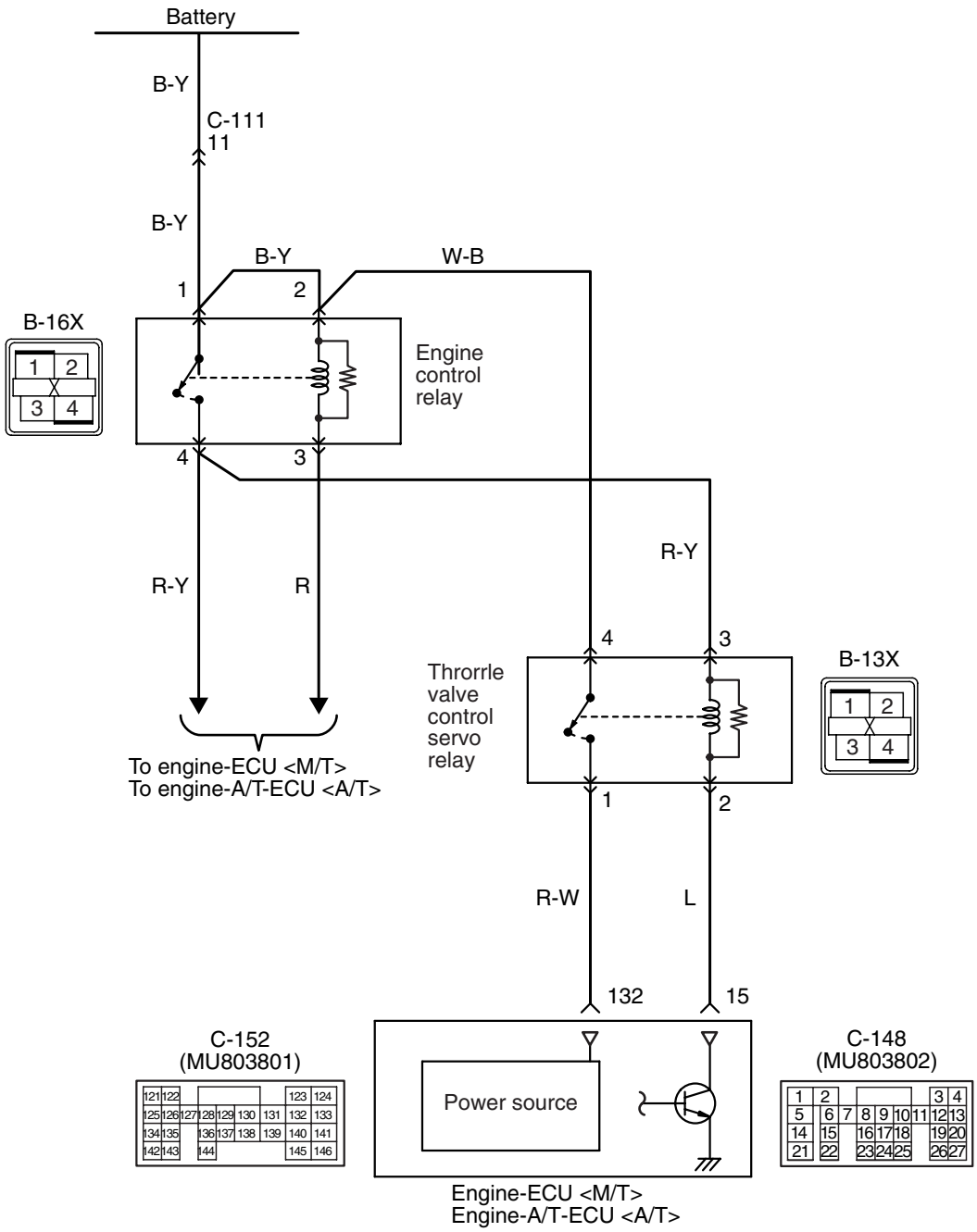
Code No. P0657: Throttle Valve Control Servo Relay Circuit Malfunction

Throttle valve control srvo 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 PU: Purple

AK502027AB

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. 4).

- 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.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgement Criterion

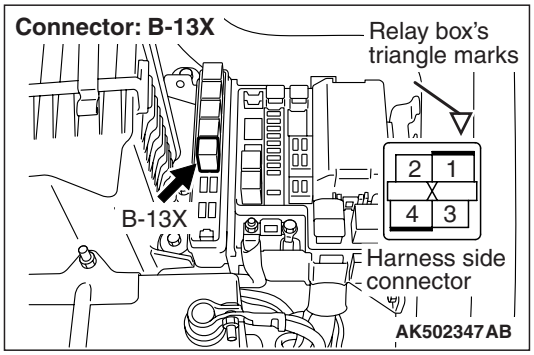
- The power line voltage of the electronic controlled throttle system is 6.0 V or less for 1 second.

PROBABLE CAUSE

- Failed throttle valve return spring
- Open/short circuit in throttle valve control servo circuit or loose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS

STEP 1. Connector check: B-13X throttle valve control servo relay connector



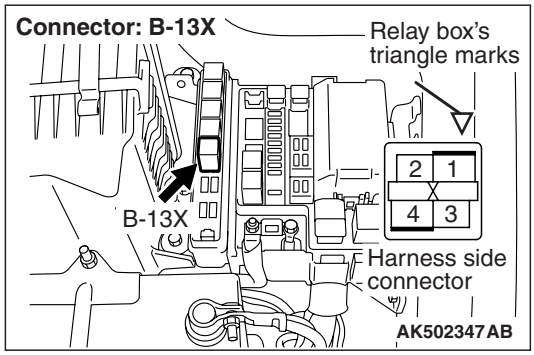
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check throttle valve control servo relay itself.

- Check throttle valve control servo relay (Refer to P.13A-326).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair.

STEP 3. Perform voltage measurement at B-13X 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 intermediate connector C-111, and repair if necessary. If intermediate connector is normal, check and repair harness between B-13X (terminal No. 4) throttle valve control servo relay connector and battery.
- Check power supply line for open/short circuit.

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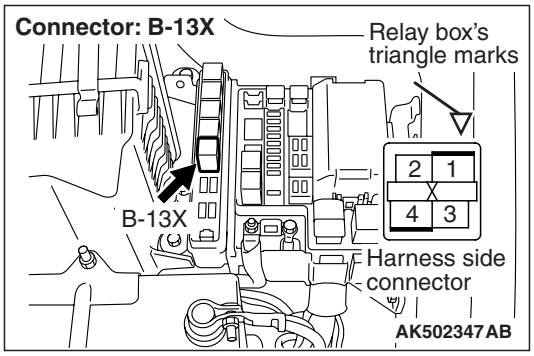
STEP 4. Perform voltage measurement at B-13X throttle valve control servo relay connector.



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

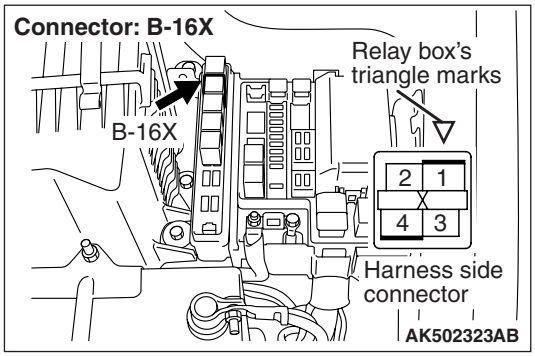
OK: System voltage

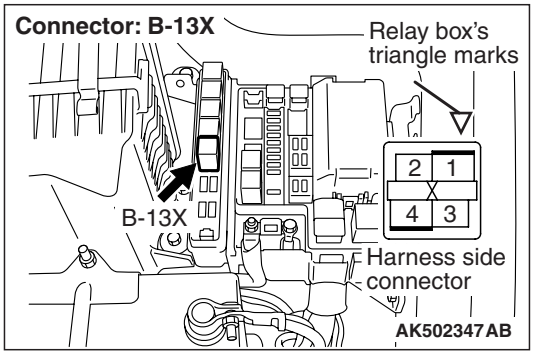
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: B-16X engine control relay connector





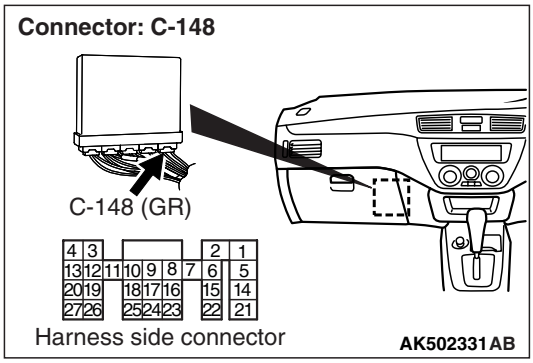
Q: Is the check result normal?

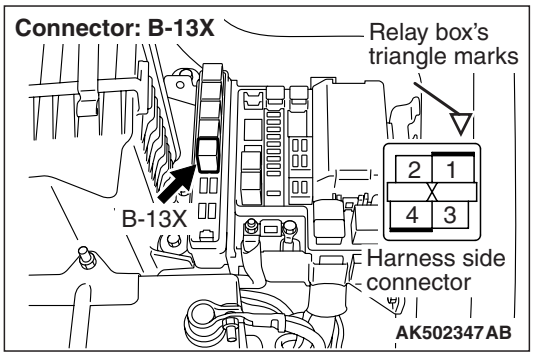
YES : Check and repair harness between B-16X (terminal No. 4) engine control relay connector and B-13X (terminal No. 3) throttle valve control servo relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 6. Perform voltage measurement at C-148 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. 15 and earth.

OK: System voltage

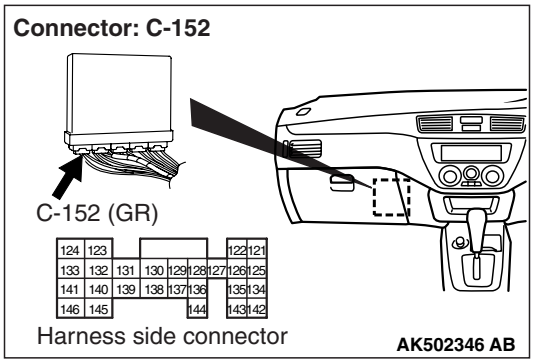
Q: Is the check result normal?

YES : Check and repair harness between B-13X (terminal No. 2) throttle valve control servo relay connector and C-148 (terminal No. 15) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

NO : Go to Step 7 .

STEP 7. Perform voltage measurement at C-152 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 132 and earth.

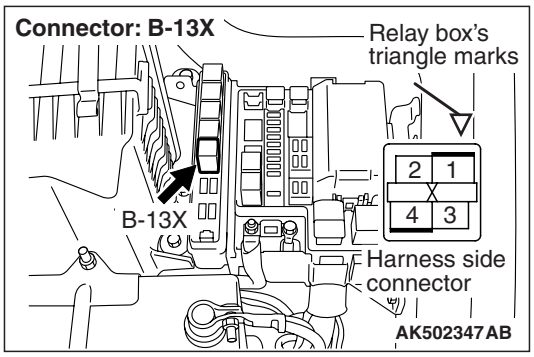
OK: System voltage

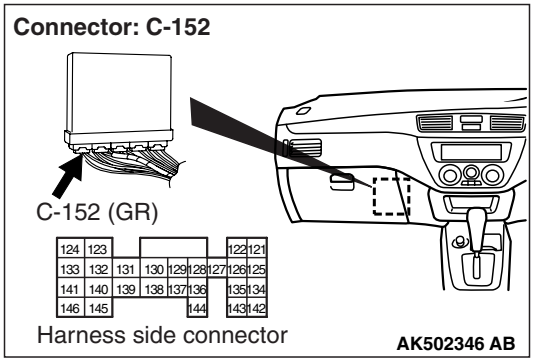
Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 .

STEP 8. Check harness between B-13X (terminal No. 1) throttle valve control servo relay connector and C-152 (terminal No. 132) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





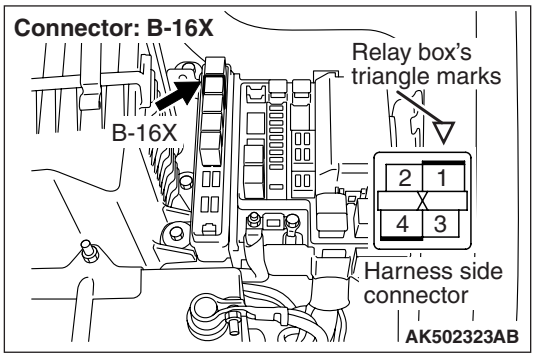
- Check output line for open/short circuit.

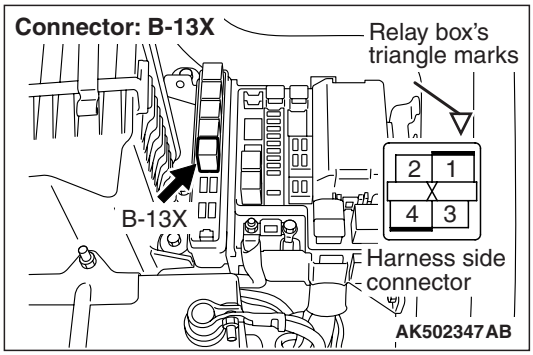
Q: Is the check result normal?

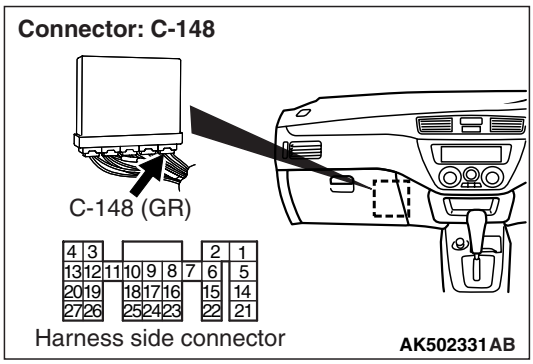
YES : Go to Step 9 .

NO : Repair the damaged harness wire.

STEP 9. Check harness between B-16X (terminal No. 4) engine control relay connector and B-13X (terminal No. 3) throttle valve control servo relay connector.







- Check output line for damage.

Q: Is the check result normal?

YES : Check and repair harness between B-13X (terminal No. 2) throttle valve control servo relay connector and C-148 (terminal No. 15) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
  - Check earthing line for open/short circuit.

NO : Repair the damaged harness wire.

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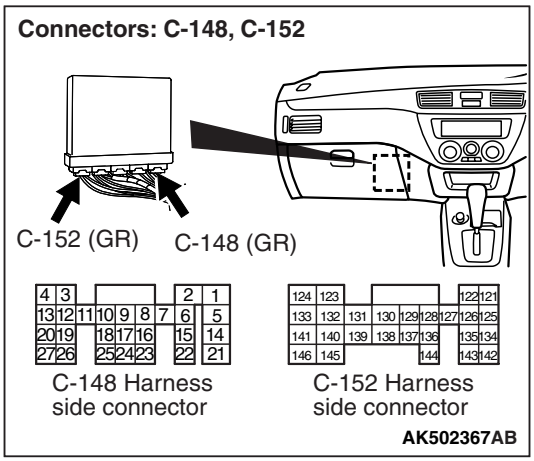
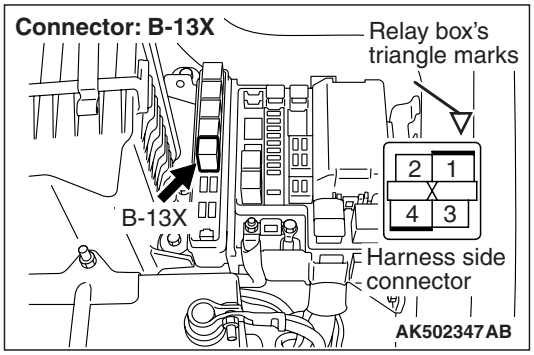
STEP 10. Connector check: C-148 and C-152 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?
YES : Go to Step 11 .
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

STEP 11. Check and repair harness between B-13X (terminal No. 4) throttle valve control servo relay connector and battery.

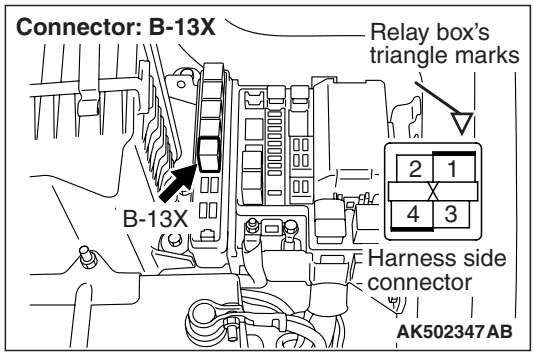


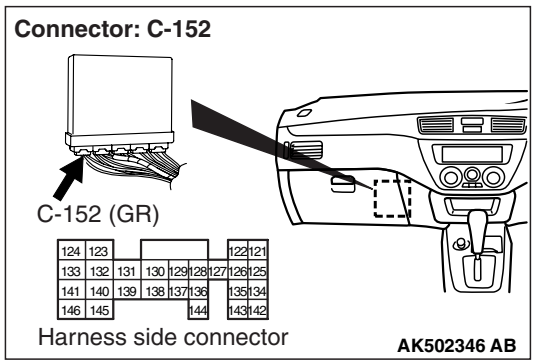
NOTE: Before checking harness, check intermediate connector C-111, and repair if necessary.

- Check power supply line for damage.

Q: Is the harness connector in good condition?
YES : Go to Step 12 .
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

STEP 12. Check and repair harness between B-13X (terminal No. 1) throttle valve control servo relay connector and C-152 (terminal No. 132) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check power supply line for damage.

Q: Is the harness connector in good condition?
YES : Go to Step 13 .
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

STEP 13. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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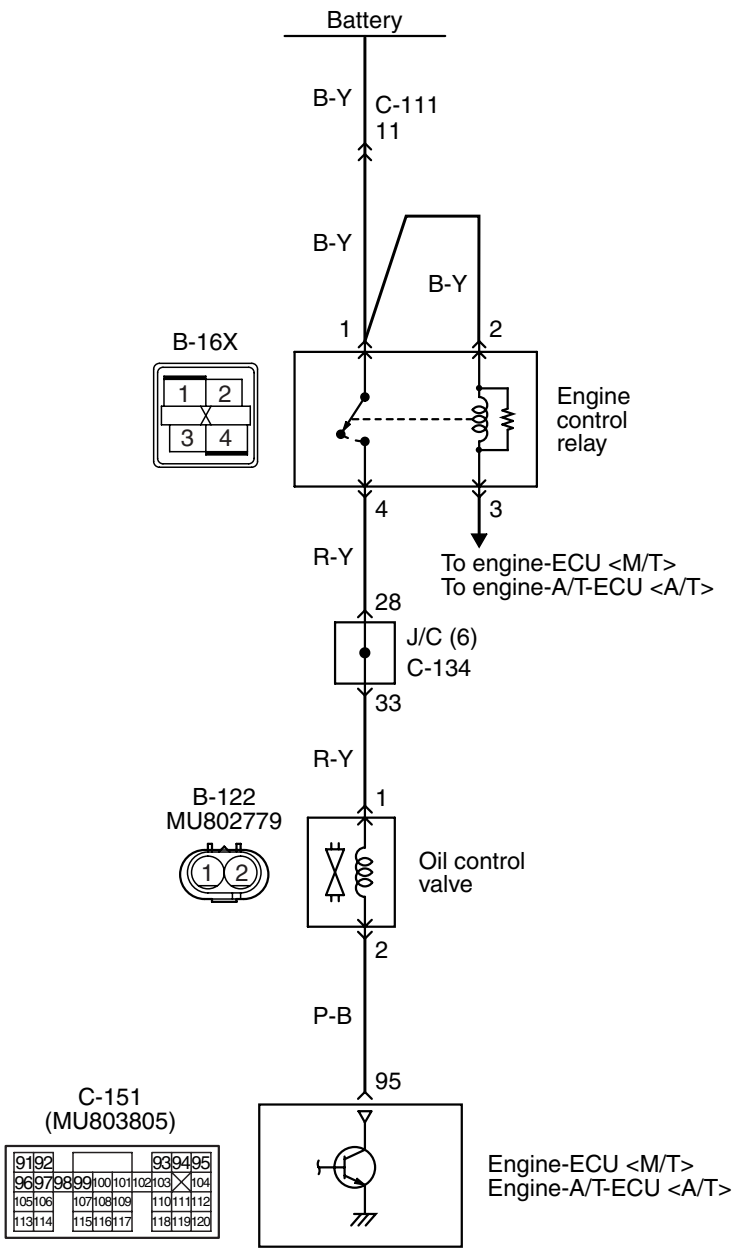
Code No. P1021: Oil Control Valve Circuit

Oil control valve circuit



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

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OPERATION

- Power is supplied to the oil control valve (terminal No. 1) from the engine control relay (terminal No. 4).
- 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 system in the low-speed or high-speed mode in accordance with the signals from the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is "ON" position
- Battery positive voltage is higher than 10 V.
- MIVEC operating in the low-speed mode.

Judgment Criterion

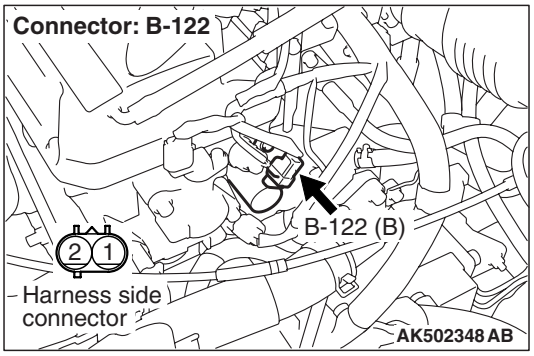
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage of oil control valve circuit is less than 1.5 V for 2 seconds.

PROBABLE CAUSE

- Failed 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>

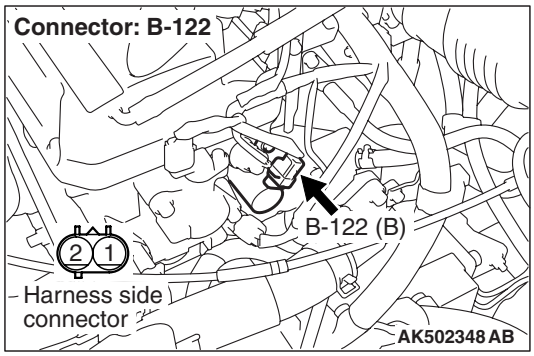
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-122 oil control valve connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at B-122 oil control valve connector.

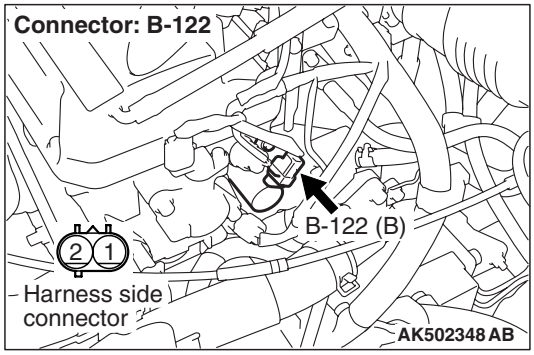


- Disconnect connector, and measure at oil control valve side.
- Resistance between terminal No. 1 and No. 2.

OK: 6.9 – 7.9 Ω (at 20° C)

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the oil control valve.

STEP 3. Perform voltage measurement at B-122 oil control valve connector.

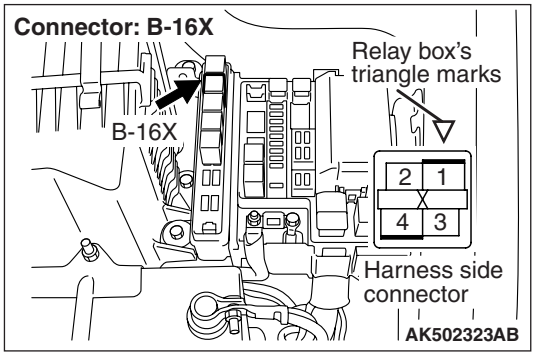


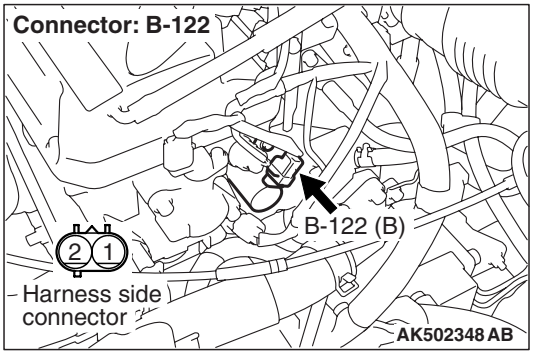
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Go to Step 4 .

STEP 4. Connector check: B-16X engine control relay connector





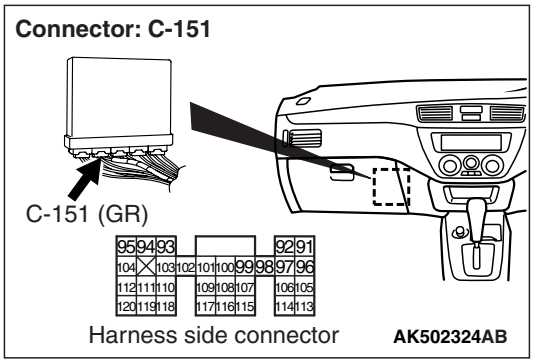
Q: Is the check result normal?

YES : Check intermediate connector C-134, and repair if necessary. If intermediate connector is normal, check and repair harness between B-122 (terminal No. 1) oil control valve connector and B-16X (terminal No. 4) engine control relay connector.

- Check power line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Perform voltage measurement at C-151 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.

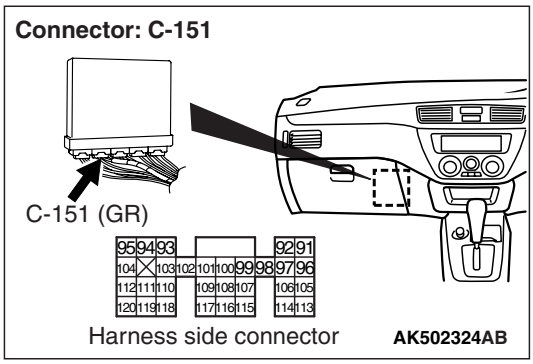
OK: System voltage

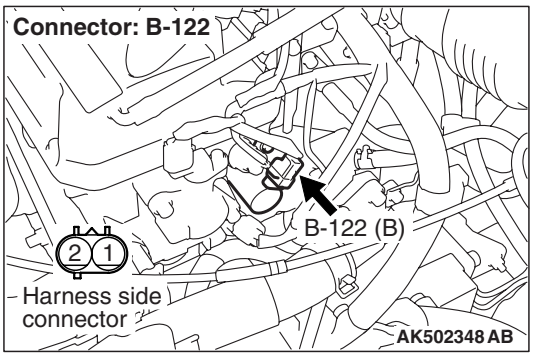
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 6 .

STEP 6. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





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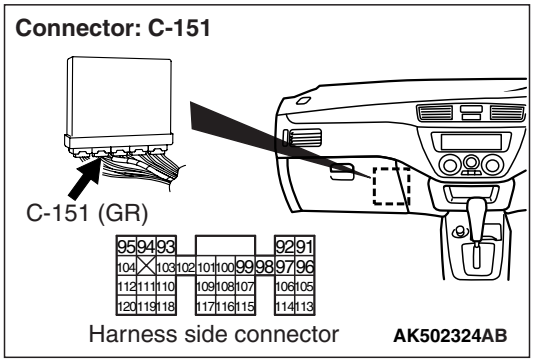
Q: Is the check result normal?

YES : Check and repair harness between B-122 (terminal No. 2) oil control valve connector and C-151 (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 the connector.

STEP 7. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

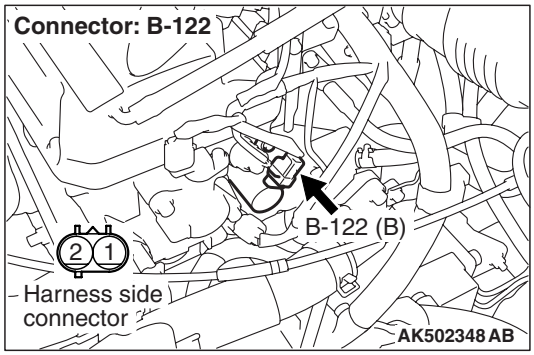


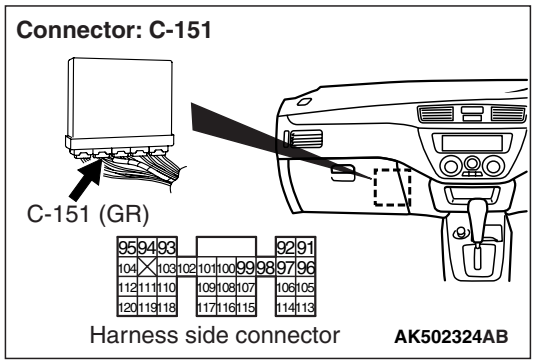
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace the connector.

STEP 8. Check harness between B-122 (terminal No. 2) oil control valve connector and C-151 (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 the damaged harness wire.

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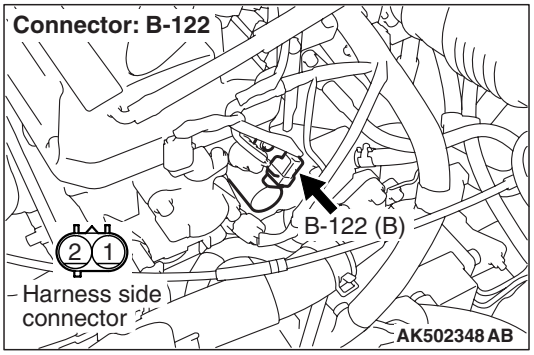
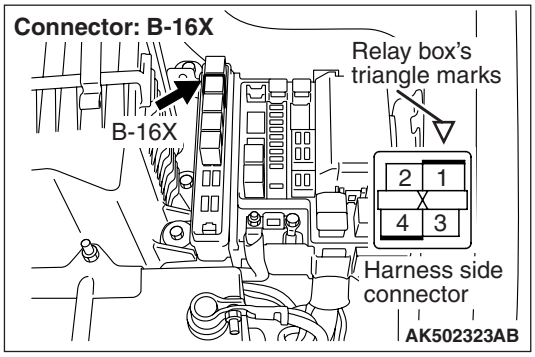
STEP 9. Check harness between B-122 (terminal No. 1) oil control valve connector and B-16X (terminal No. 4) engine control relay connector.





NOTE: Before checking harness, check intermediate connector C-134, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair the damaged harness wire.

STEP 10. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P1602: Communication Malfunction (between Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Main Processor and System LSI)

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the communication status for abnormal conditions.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is "ON" position.

Judgement Criterion

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> detects an error in communication with the throttle actuator control module for 0.07 second.

PROBABLE CAUSE

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

DIAGNOSIS

STEP 1. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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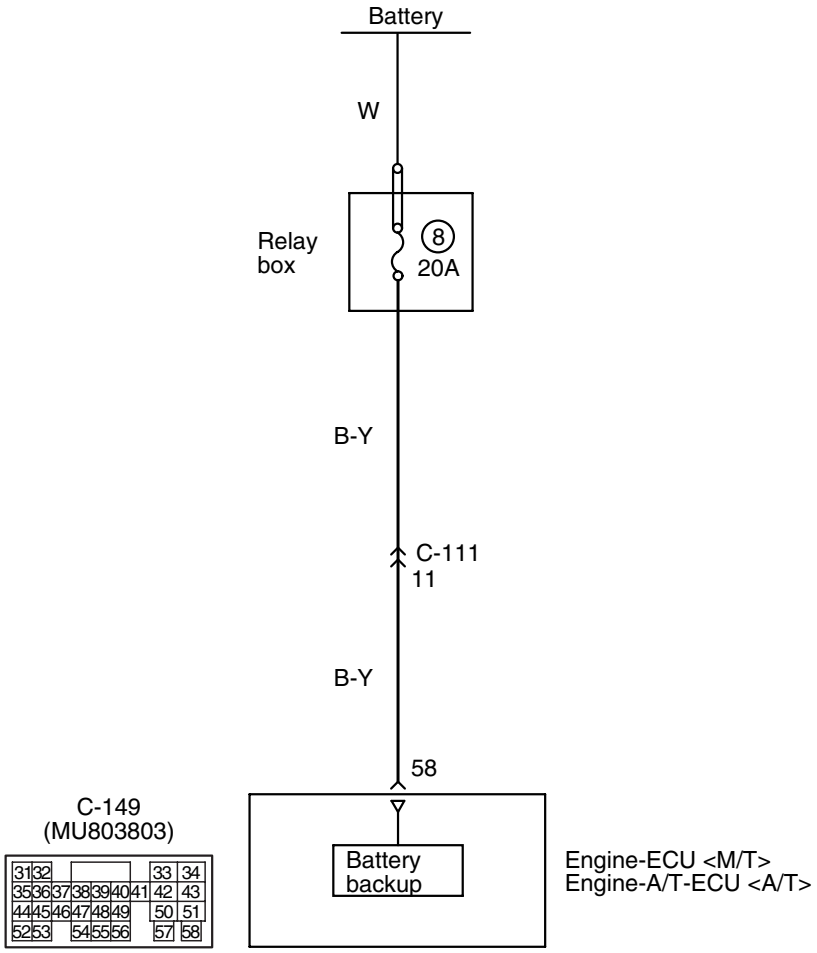
Code No. P1603: Battery Backup Circuit Malfunction

Battery backup circuit



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

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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

- After engine starting sequence is completed.
- Battery positive voltage is 10 V or higher.

Judgment Criterion

- Battery backup line voltage is 6 V or lower for 2 seconds.

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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>

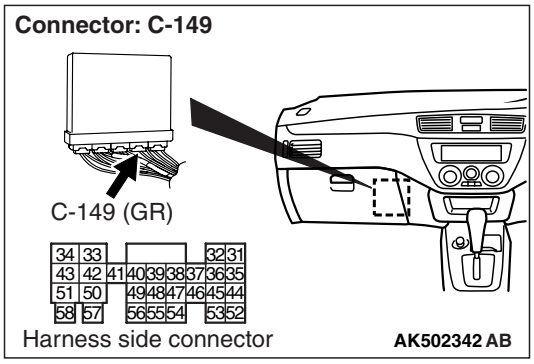
DIAGNOSIS PROCEDURE

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

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

Q: Is the diagnosis code P1603 set?
YES : Go to Step 2 .
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

STEP 2. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

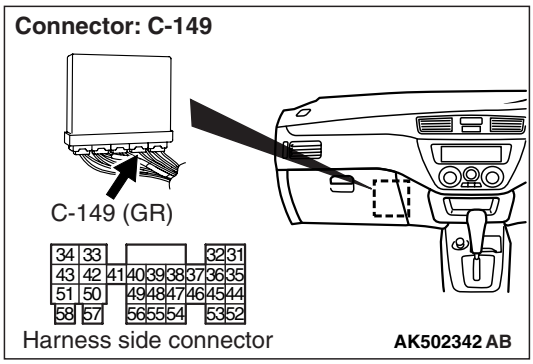


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 58 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Check intermediate connector C-111, and repair if necessary. If intermediate connector is normal, check and repair harness between battery and C-149 (terminal No. 58) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check power supply line for open/short circuit.

STEP 3. Check harness between battery and C-149 (terminal No. 58) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

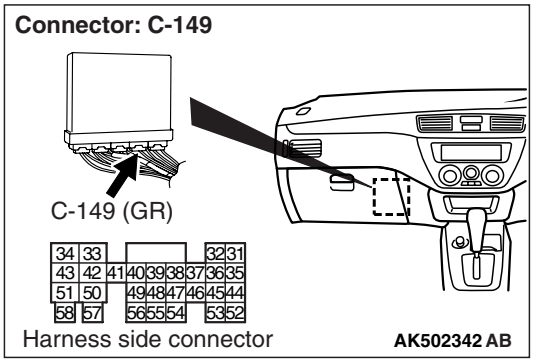


NOTE: Before checking harness, check intermediate connector C-111, and repair if necessary.

- Check earthing line for damage.

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

STEP 4. Connector check: C-149 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 the connector.

STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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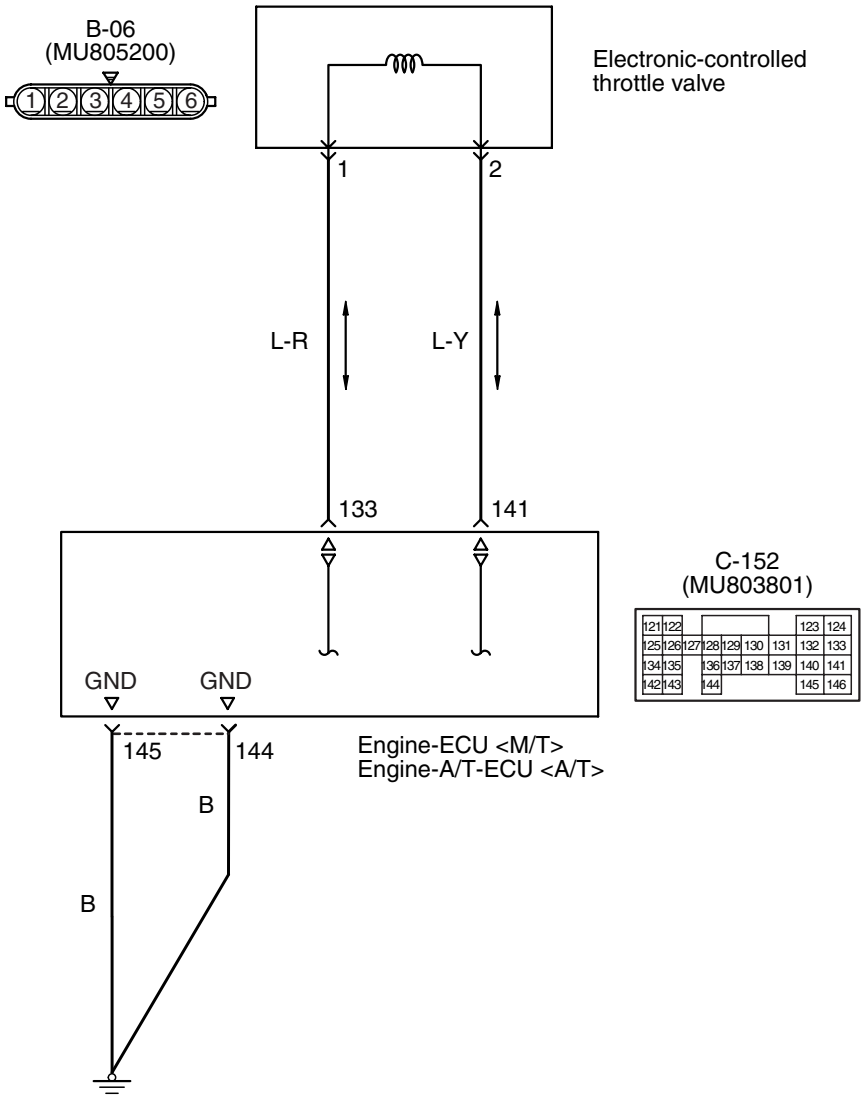
Code No. P2100: Throttle Valve Control Servo Circuit (open)

Throttle valve control servo circuit



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

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OPERATION

- Controls the current that is applied from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminals No. 133, No. 141) to the electronic-controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> varies the direction and the amperage of the current that is applied to the throttle valve control servo in order to control the opening of the throttle valve.

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TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 8.3 V or higher.

Judgement Criteria

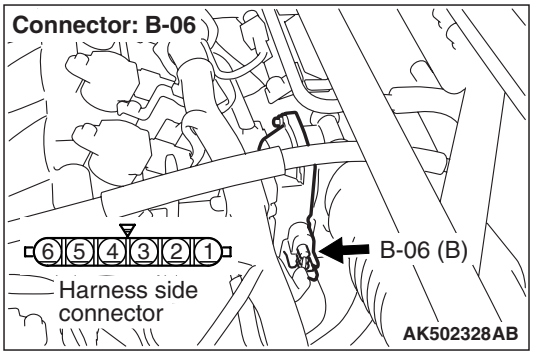
- Throttle actuator control motor current is 0.1 A or less for 0.72 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo circuit or lose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

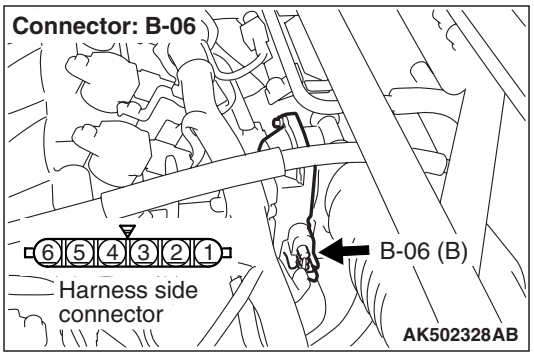
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronic-controlled throttle valve connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at B-06 electronic-controlled throttle valve connector.

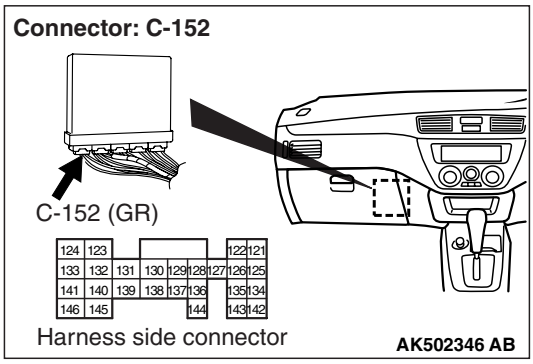


- Disconnect connector, and measure at electronic-controlled throttle valve side.
- Resistance between terminal No. 1 and No. 2.

OK: 0.3 – 80 kΩ (at 20 °C)

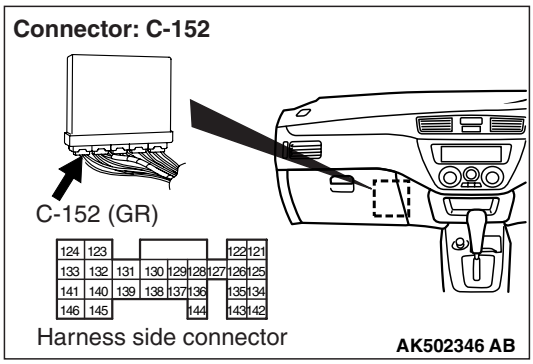
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the throttle body assembly.

STEP 3. Connector check: C-152 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 the connector.

STEP 4. Perform resistance measurement at C-152 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 or terminal No. 145 and earth.

OK: 2 Ω or less

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Check harness between C-152 (terminal No. 144 or No. 145) engine-ECU <M/T> or engine-A/T-ECU <A/T> and earth.

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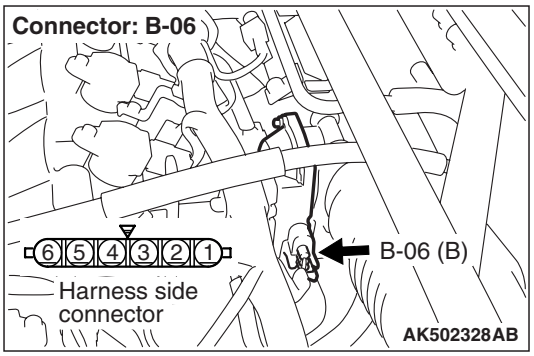
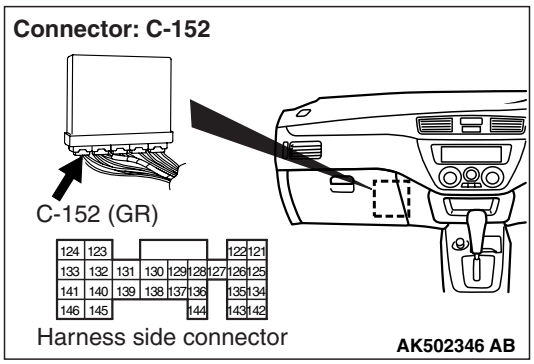
STEP 5. Check harness between B-06 (terminal No. 1) electronic-controlled throttle valve connector and C-152 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

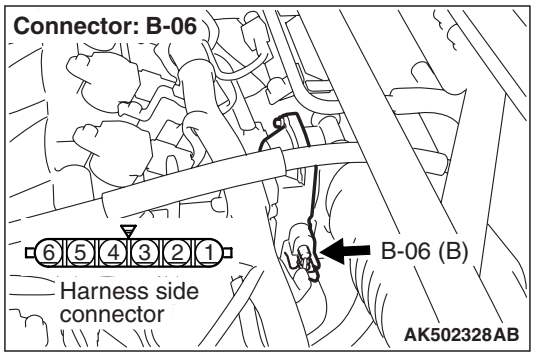


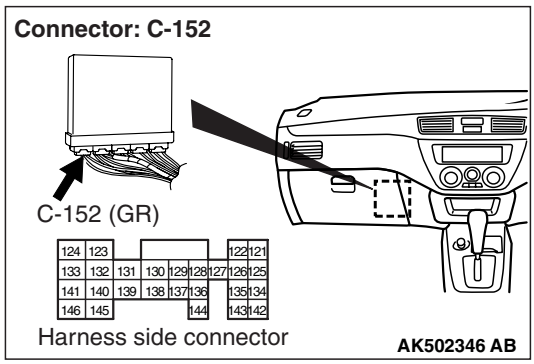


- Check output line for short circuit and damage.

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

STEP 6. Check harness between B-06 (terminal No. 2) electronic-controlled throttle valve connector and C-152 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for short circuit and damage.

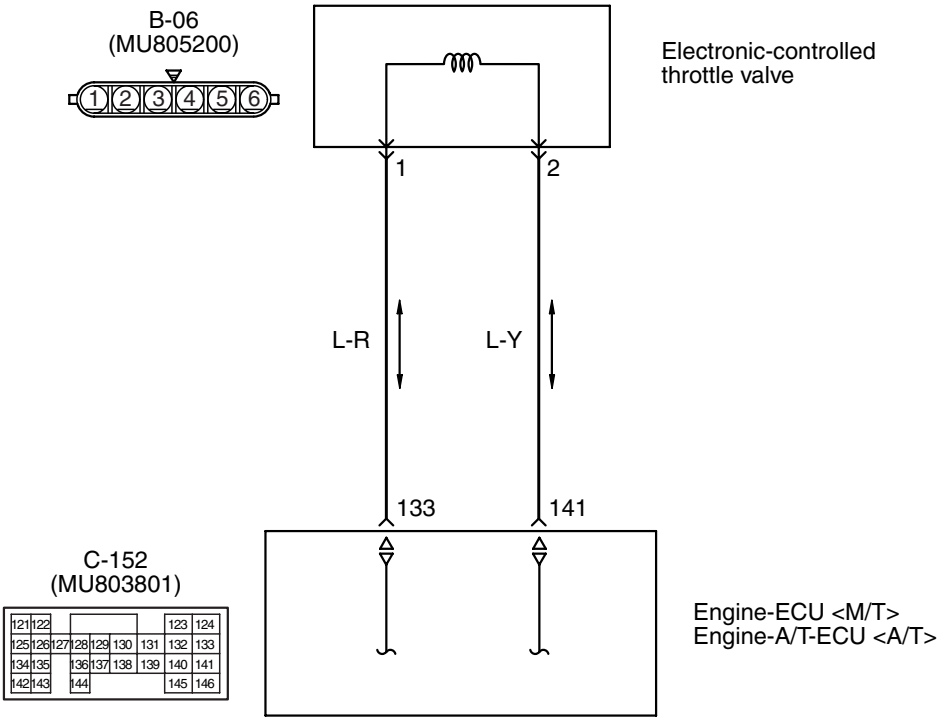
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Repair the damaged harness wire.

STEP 7. Check the trouble symptoms.

Q: Is the check result normal?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P2102: Throttle Valve Control Servo Circuit (Shorted Low)

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 PU: Purple

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OPERATION

- Controls the current that is applied from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminals No. 133, No. 141) to the electronic-controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> varies the direction and the amperage of the current that is applied to the throttle valve control servo in order to control the opening of the throttle valve.

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 8.3 V or higher.

Judgement Criterion

- Throttle valve control servo current is 12 A or higher for 0.8 second.

PROBABLE CAUSE

- Failed throttle valve control servo
- Short circuit in throttle valve control servo circuit or lose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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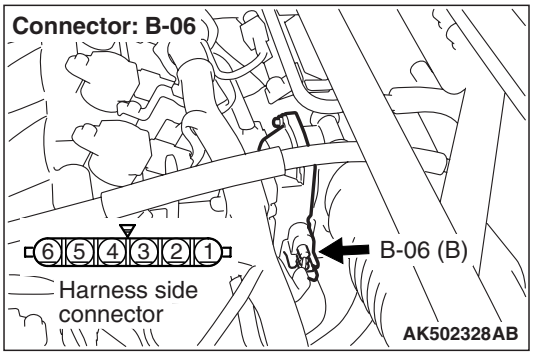
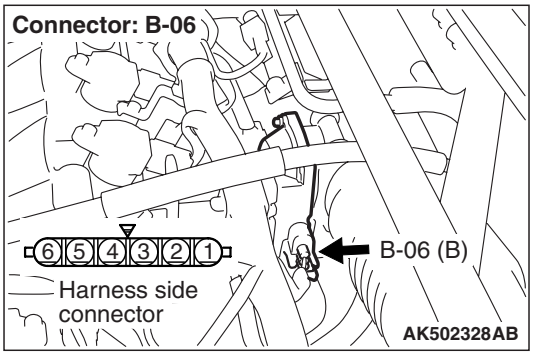
DIAGNOSIS PROCEDURE

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 the connector.

STEP 2. Perform resistance measurement at B-06 electronic-controlled throttle valve connector.

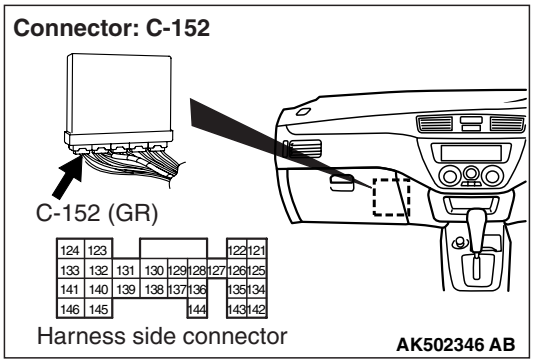


- Disconnect connector, and measure at electronic-controlled throttle valve side.
- Resistance between terminal No. 1 and No. 2.

OK: 0.3 – 80 Ω (at 20 °C)

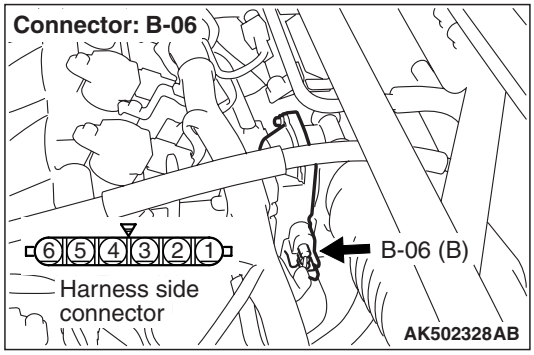
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the throttle body assembly.

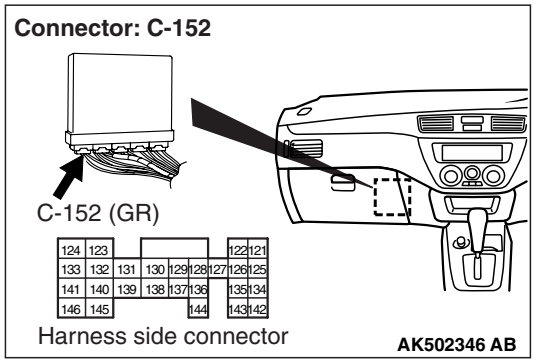
STEP 3. Connector check: C-152 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 4. Check harness between B-06 (terminal No. 1) electronic-controlled throttle valve connector and C-152 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for short circuit.

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

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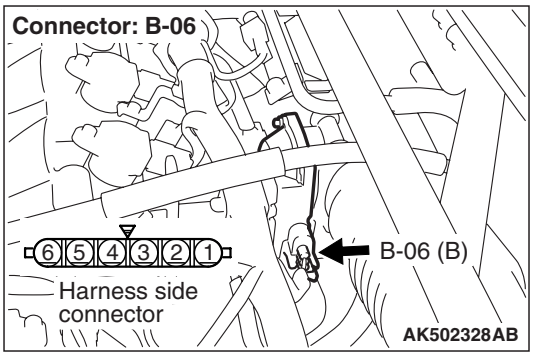
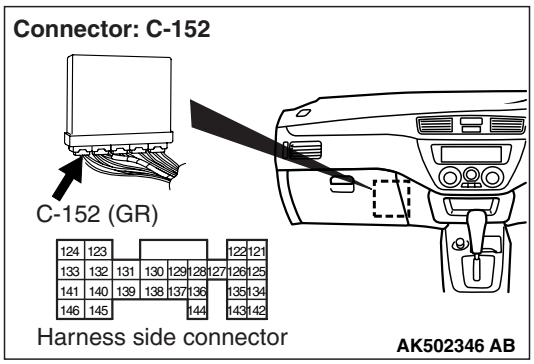
STEP 5. Check harness between B-06 (terminal No. 2) electronic-controlled throttle valve connector and C-152 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for short circuit.

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

STEP 6. Check the trouble symptoms.

Q: Is the check result normal?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

Code No. P2121: Accelerator Pedal Position Sensor (Main) Circuit Range/Performance Problem

OPERATION

- Refer to P2122 accelerator pedal position sensor (main) circuit P.13A-292.
- Refer to inspection procedure 31 accelerator pedal position switch circuit P.13A-292.

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the accelerator pedal position sensor (main) output signal characteristics for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position
- Idle switch: ON
- Accelerator pedal position sensor (sub) output voltage is 2.5 V or less.

Judgment Criterion

- Accelerator pedal position sensor (main) output voltage is 1.88 V or higher for 1 second.

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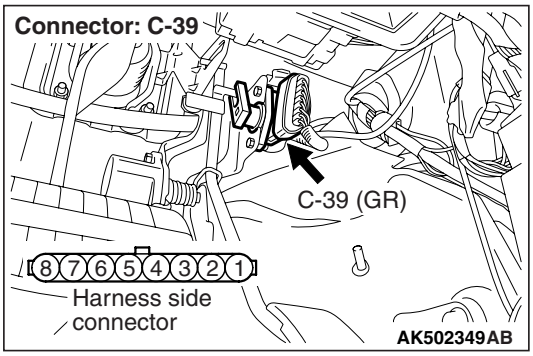
PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-39 accelerator pedal position sensor connector



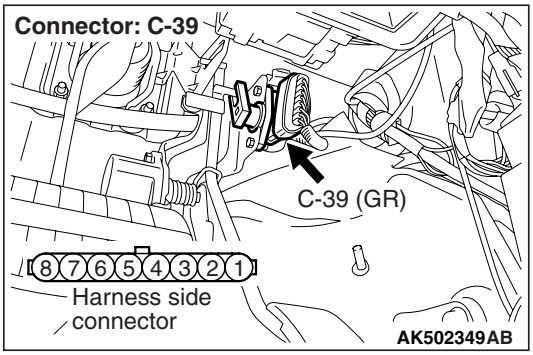
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check accelerator pedal position sensor itself.

- Check accelerator pedal position sensor itself (Refer to P.13A-327).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the accelerator pedal position sensor.

STEP 3. Perform resistance measurement at C-39 accelerator pedal position sensor connector.

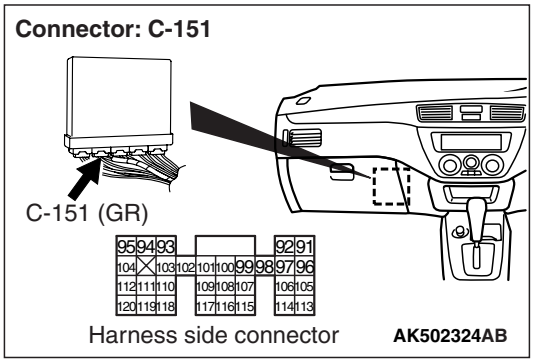


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

OK: 2 Ω or less

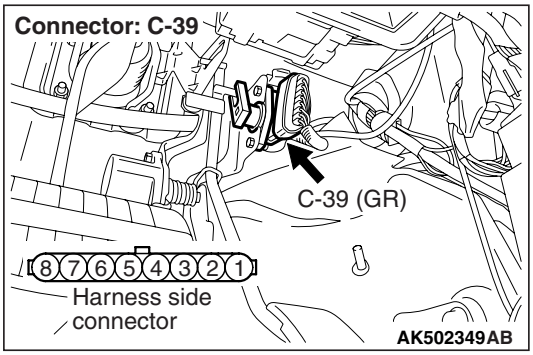
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

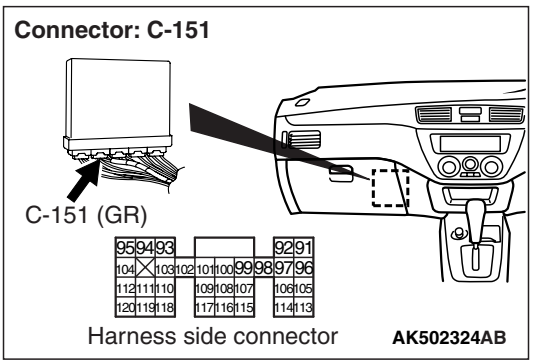
STEP 4. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 5. Check harness between C-39 (terminal No. 1) accelerator pedal position sensor connector and C-151 (terminal No. 91) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for damage.

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

STEP 6. Check the trouble symptoms.

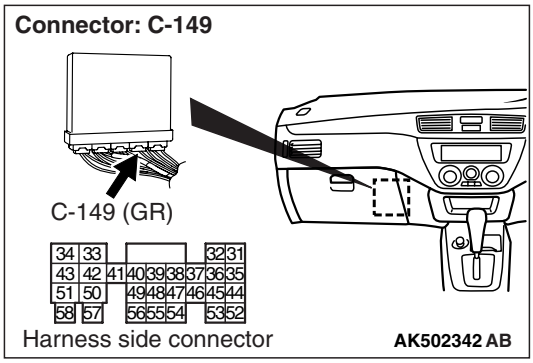
Q: Does trouble symptom persist?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

STEP 7. Check accelerator pedal position switch itself.

- Check accelerator pedal position switch itself (Refer to P.13A-328).

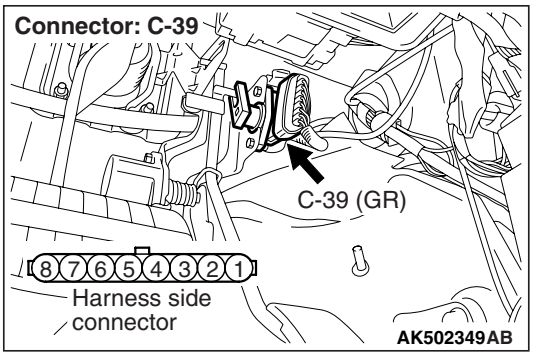
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Replace the accelerator pedal position sensor.

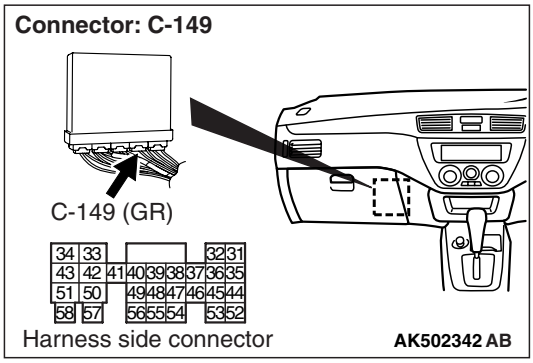
STEP 8. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 9. Check harness between C-39 (terminal No. 4) accelerator pedal position sensor connector and C-149 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check power supply line for short circuit.

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

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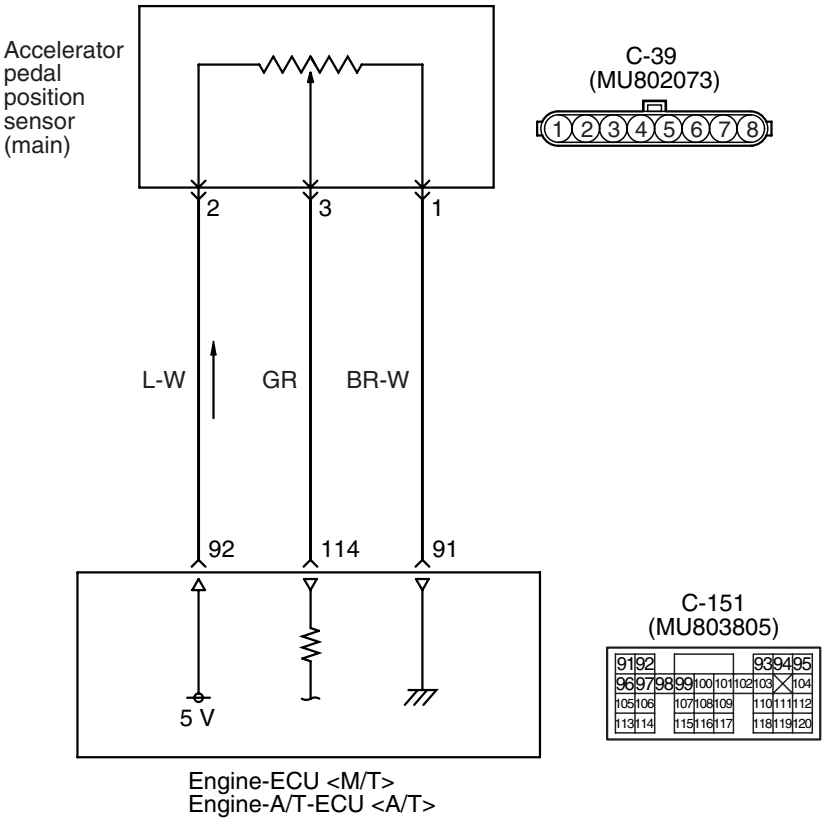
Code No. P2122: Accelerator Pedal Position Sensor (Main) Circuit Low Input

Accelerator pedal position sensor (main) circuit



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

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OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 2) 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. 1).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 114) from the accelerator pedal position sensor output terminal (terminal No. 3).

FUNCTION

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

- Accelerator pedal position sensor (main) output voltage is 0.2 volt or less for 0.3 second.

PROBABLE CAUSE

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

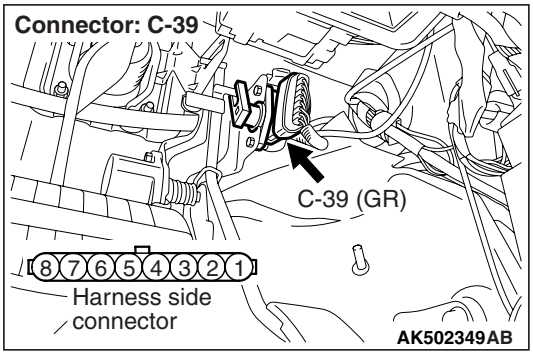
DIAGNOSIS PROCEDURE

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

- Refer to Data List Reference Table P.13A-297.
  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 –How to Cope with Intermittent Malfunctions P.00-13).
NO : Go to Step 2 .

STEP 2. Connector check: C-39 accelerator pedal position sensor connector



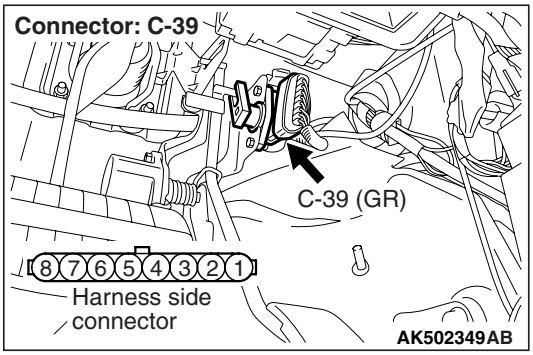
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

STEP 3. Check accelerator pedal position sensor itself.

- Check accelerator pedal position sensor itself (Refer to P.13A-327).

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Replace the accelerator pedal position sensor.

STEP 4. Perform voltage measurement at C-39 accelerator pedal position sensor connector.

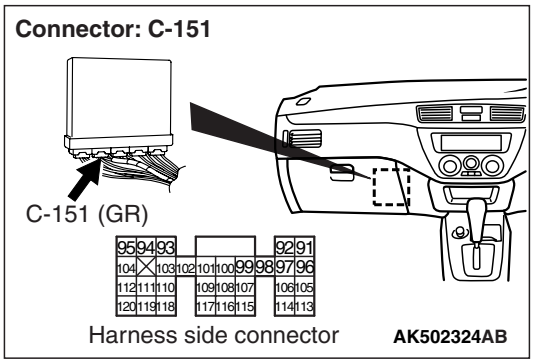


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 5 .

STEP 5. Connector check: C-151 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 the connector.

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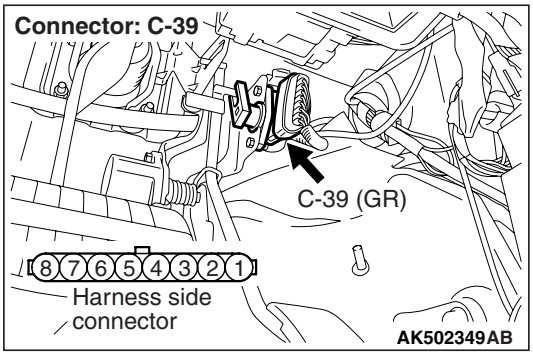
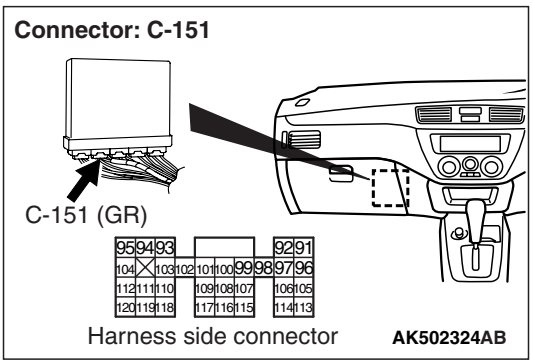
STEP 6. Check harness between C-39 (terminal No. 2) accelerator pedal position sensor connector and C-151 (terminal No. 92) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





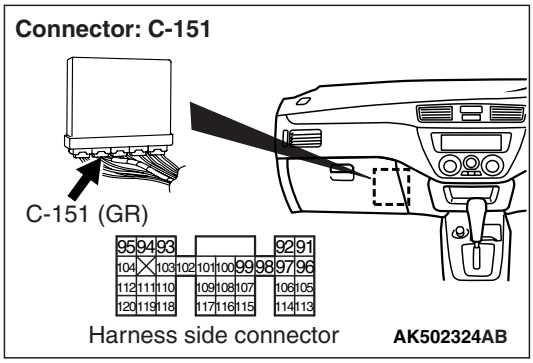
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Repair the damaged harness wire.

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 78: Accelerator pedal position sensor (main)

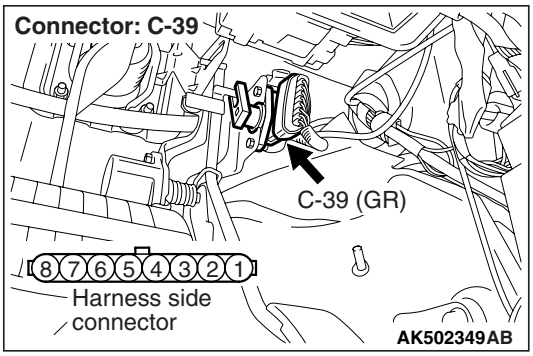
Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

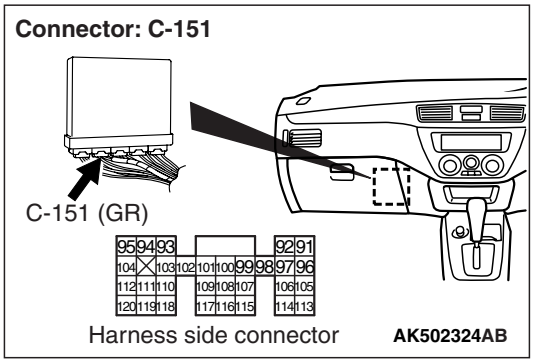
STEP 8. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 9. Check harness between C-39 (terminal No. 2) accelerator pedal position sensor connector and C-151 (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 10 .
NO : Repair the damaged harness wire.

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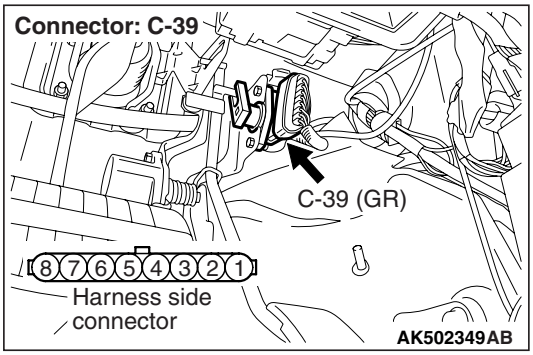
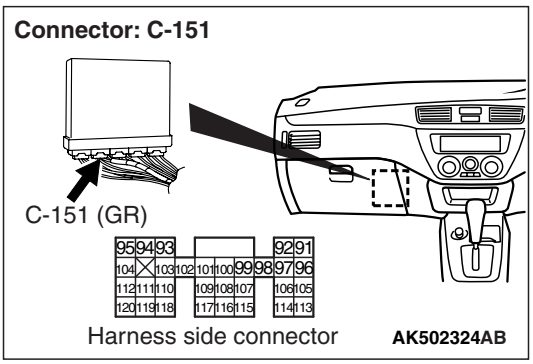
STEP 10. Check harness between C-39 (terminal No. 3) accelerator pedal position sensor connector and C-151 (terminal No. 114) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for damage.

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

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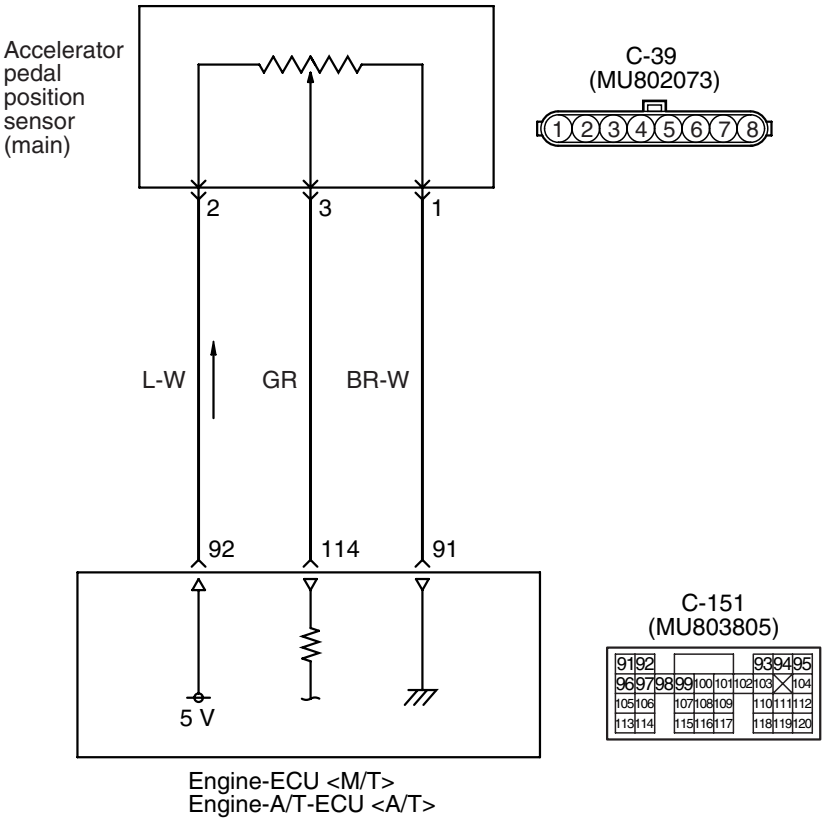
Code No. P2123: Accelerator Pedal Position Sensor (Main) Circuit High Input

Accelerator pedal position sensor (main) circuit



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

AK502030AB

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 2) 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. 1).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 114) from the accelerator pedal position sensor output terminal (terminal No. 3).

FUNCTION

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.
- Accelerator pedal position sensor (sub) output voltage is 0.2 – 2.5 V.

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Judgment Criterion

- Accelerator pedal position sensor (main) output voltage is 4.5 V or higher for is 1 second.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

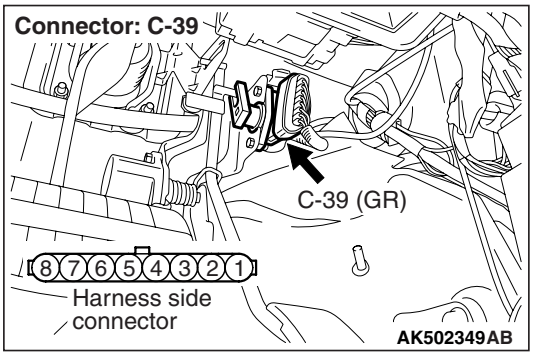
- Refer to Data List Reference Table P.13A-297.
  a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: C-39 accelerator pedal position sensor connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check accelerator pedal position sensor itself.

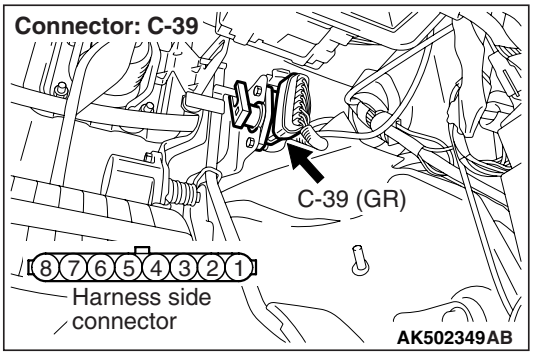
- Check accelerator pedal position sensor itself (Refer to P.13A-327).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the accelerator pedal position sensor.

STEP 4. Perform resistance measurement at C-39 accelerator pedal 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 5 .

NO : Go to Step 6 .

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

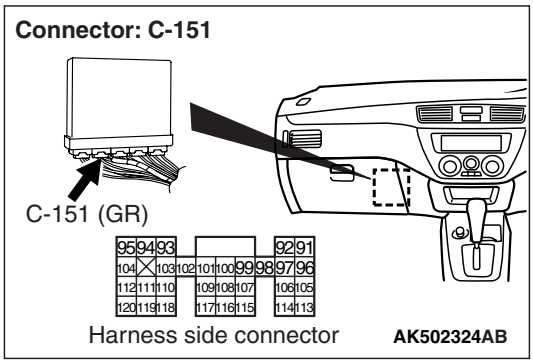
- Refer to Data List Reference Table P.13A-297.
  a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

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

STEP 6. Connector check: C-151 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 the connector.

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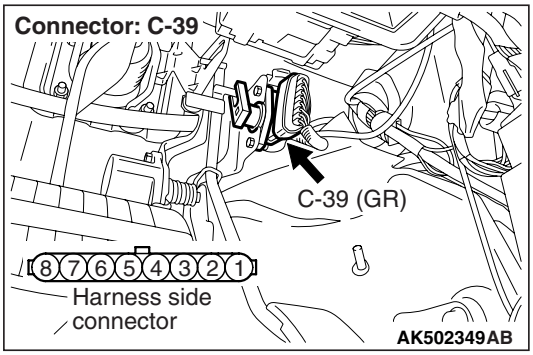
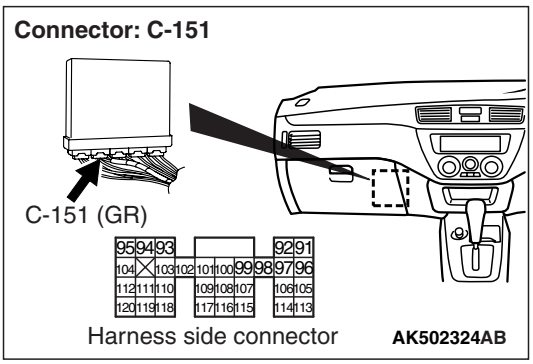
STEP 7. Check harness between C-39 (terminal No. 1) accelerator pedal position sensor connector and C-151 (terminal No. 91) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for open circuit and damage.

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

Code No. P2126: Accelerator Pedal Position Sensor (Sub) Circuit Range/Performance Problem

OPERATION

- Refer to Code No. P2127 Accelerator Pedal Circuit Position Sensor (sub) Circuit P.13A-189.
- Refer to Inspection Procedure 31: Accelerator Pedal Position Switch Circuit P.13A-292.

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the accelerator pedal position sensor (sub) output signal characteristics for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position
- Idle switch: ON
- Accelerator pedal position sensor (main) failure is detected.

Judgment Criterion

- Accelerator pedal position sensor (sub) output voltage is 1.88 V or higher for 1 second.

PROBABLE CAUSE

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

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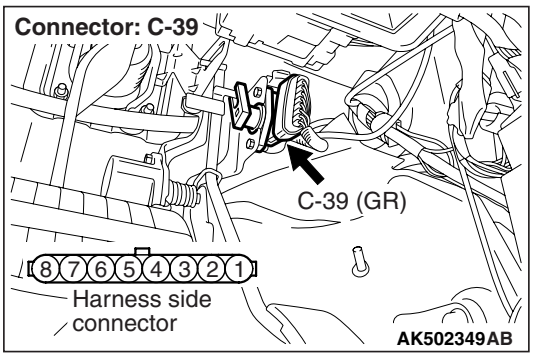
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-39 accelerator pedal position sensor connector



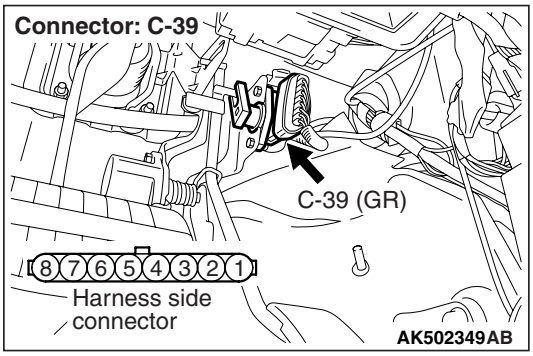
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check accelerator pedal position sensor itself.

- Check accelerator pedal position sensor itself (Refer to P.13A-327).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the accelerator pedal position sensor.

STEP 3. Perform resistance measurement at C-39 accelerator pedal position sensor connector.

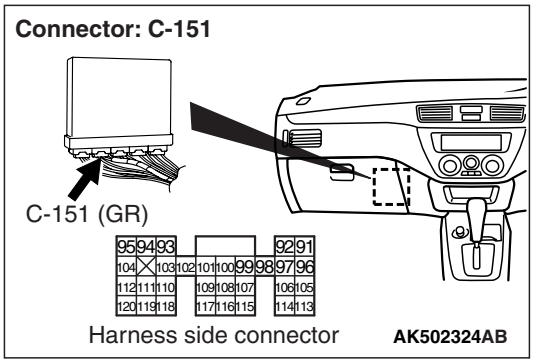


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 7 and earth.

OK: 2 Ω or less

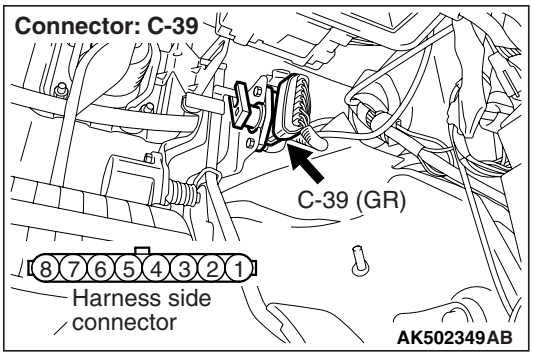
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

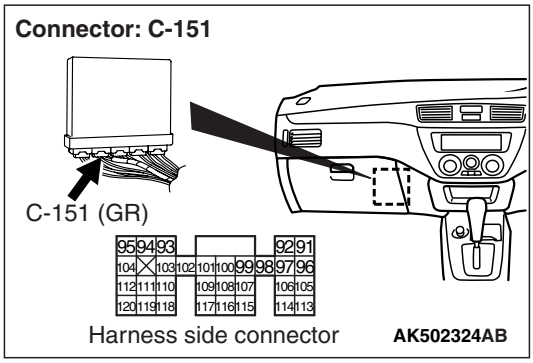
STEP 4. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 5. Check harness between C-39 (terminal No. 7) accelerator pedal position sensor connector and C-151 (terminal No. 96) 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 6 .
NO : Repair the damaged harness wire.

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STEP 6. Check the trouble symptoms.

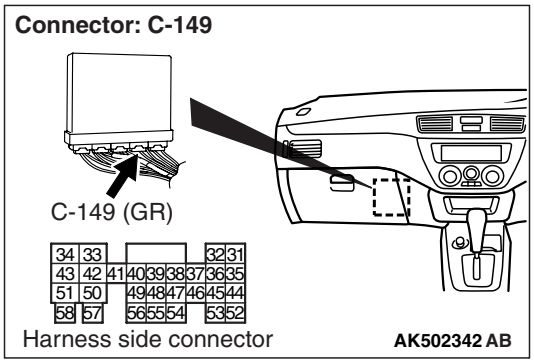
Q: Does trouble symptom persist?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

STEP 7. Check accelerator pedal position switch itself.

- Check accelerator pedal position switch itself (Refer to P.13A-328).

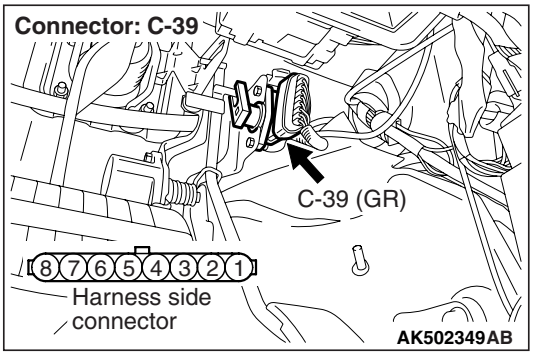
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Replace the accelerator pedal position sensor.

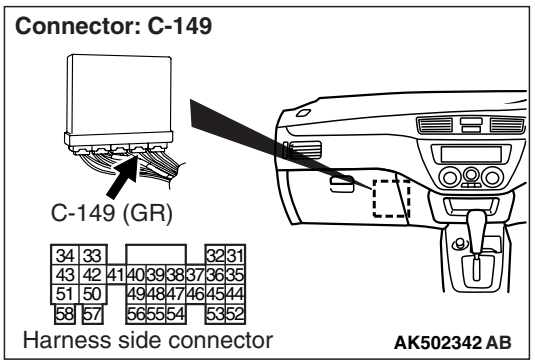
STEP 8. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 9. Check harness between C-39 (terminal No. 4) accelerator pedal position sensor connector and C-149 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



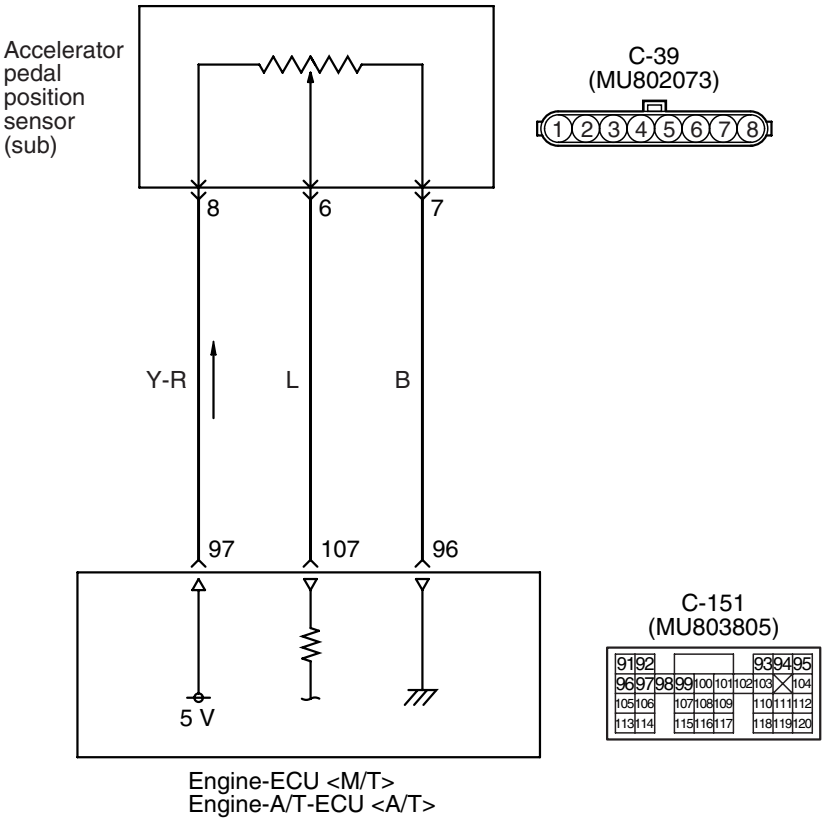


- Check power supply line for short circuit.

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

Code No. P2127: Accelerator Pedal Position Sensor (Sub) Circuit Low Input

Accelerator pedal position sensor (sub) circuit



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

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OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 8) 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. 7).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 107) from the accelerator pedal position sensor output terminal (terminal No. 6).

FUNCTION

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position

Judgment Criterion

- Accelerator pedal position sensor (sub) output voltage is 0.2 volt or less for 1 second.

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PROBABLE CAUSE

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

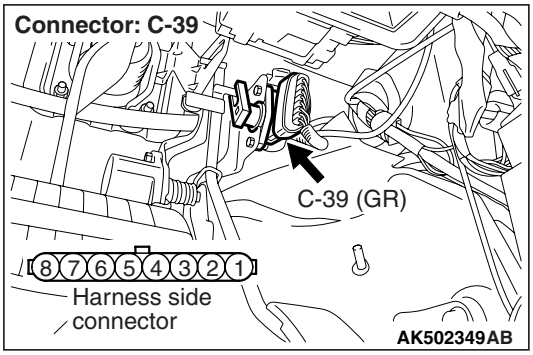
DIAGNOSIS PROCEDURE

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

- Refer to Data List Reference Table P.13A-297.
  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 –How to Cope with Intermittent Malfunctions P.00-13).
NO : Go to Step 2 .

STEP 2. Connector check: C-39 accelerator pedal position sensor connector



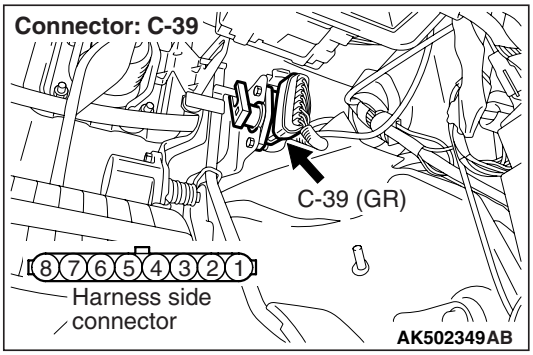
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

STEP 3. Check accelerator pedal position sensor itself.

- Check accelerator pedal position sensor itself (Refer to P.13A-327).

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Replace the accelerator pedal position sensor.

STEP 4. Perform voltage measurement at C-39 accelerator pedal position sensor connector.

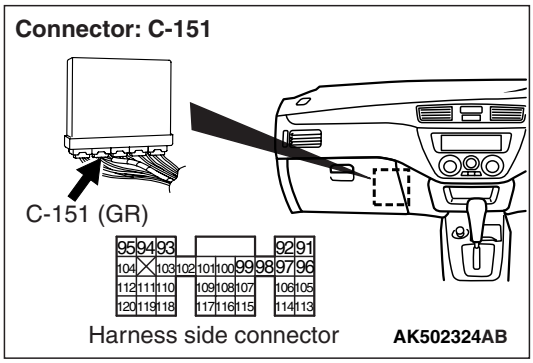


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 8 and earth.

OK: 4.9 – 5.1 V

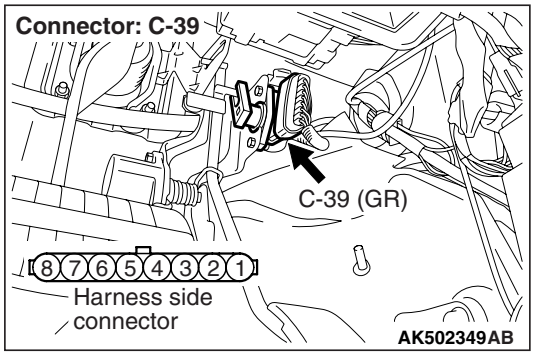
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 5 .

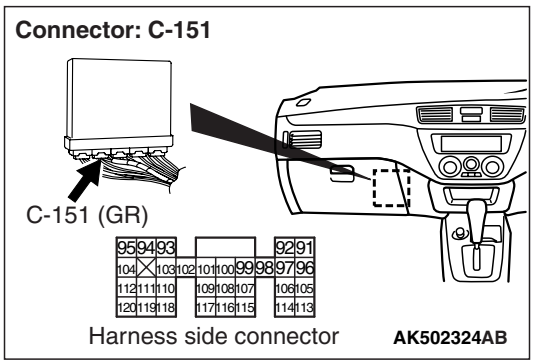
STEP 5. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 6. Check harness between C-39 (terminal No. 8) accelerator pedal position sensor connector and C-151 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check power supply line for open/short circuit.

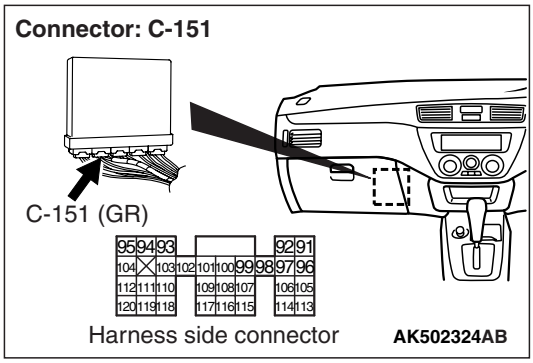
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Repair the damaged harness wire.

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 77: Accelerator pedal position sensor (sub)

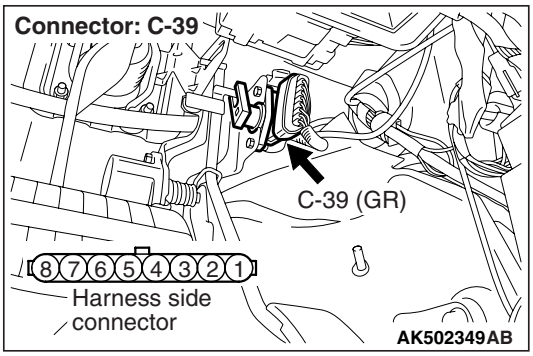
Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

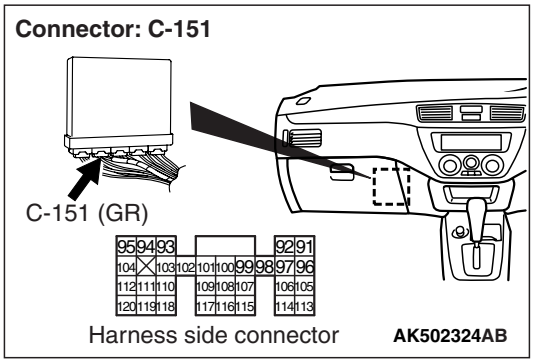
STEP 8. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 9. Check harness between C-39 (terminal No. 8) accelerator pedal position sensor connector and C-151 (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 10 .
NO : Repair the damaged harness wire.

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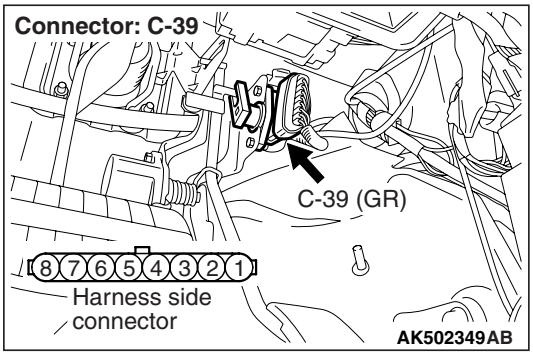
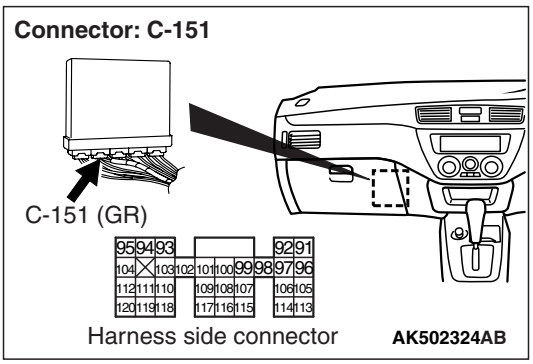
STEP 10. Check harness between C-39 (terminal No. 6) accelerator pedal position sensor connector and C-151 (terminal No. 107) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



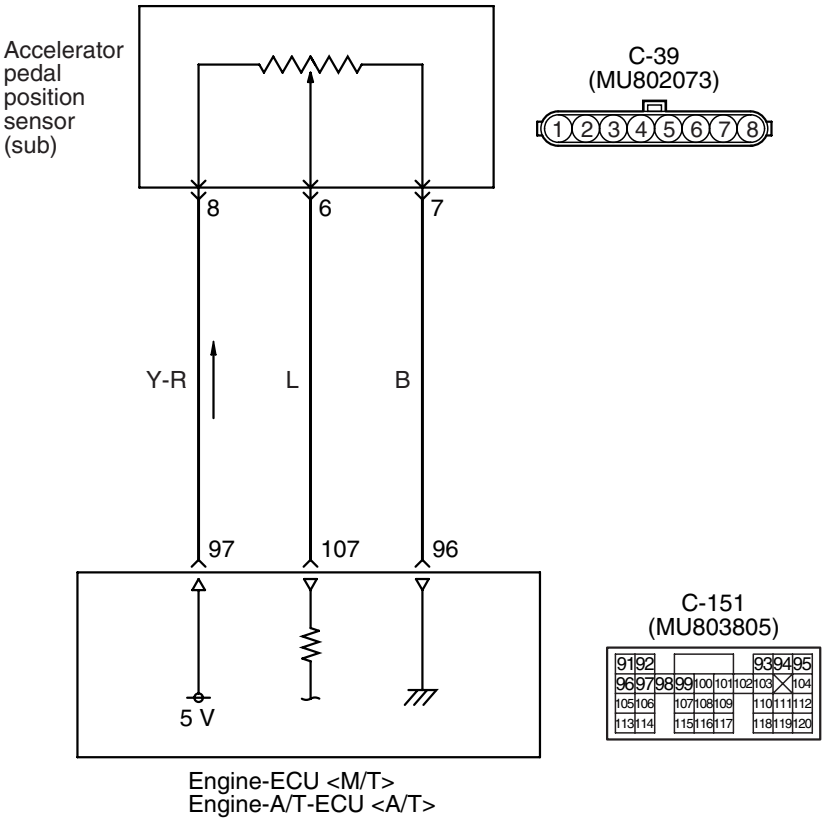


- Check earthing line for damage.

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

Code No. P2128: Accelerator Pedal Position Sensor (Sub) Circuit High Input

Accelerator pedal position sensor (sub) circuit



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

AK502031AB

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 8) 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. 7).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 107) from the accelerator pedal position sensor output terminal (terminal No. 6).

FUNCTION

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the voltage is within a specified range.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.
- Accelerator pedal position sensor (main) output voltage is 0.2 – 2.5 V.

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Judgment Criterion

- Accelerator pedal position sensor (main) output voltage is 4.5 V or higher for 1 second.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

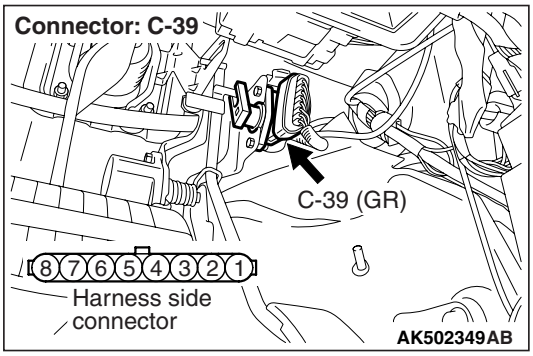
- Refer to Data List Reference Table P.13A-297.
  a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

NO : Go to Step 2 .

STEP 2. Connector check: C-39 accelerator pedal position sensor connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check accelerator pedal position sensor itself.

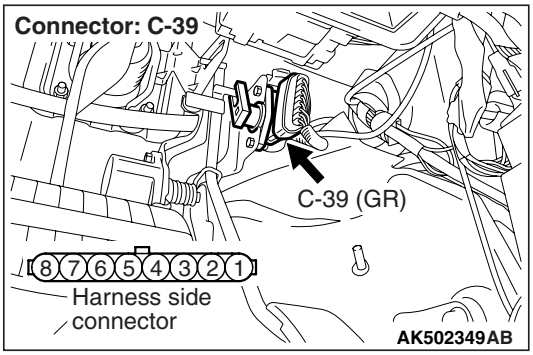
- Check accelerator pedal position sensor itself (Refer to P.13A-327).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the accelerator pedal position sensor.

STEP 4. Perform resistance measurement at C-39 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 7 and earth.

OK: 2 Ω or less

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .

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

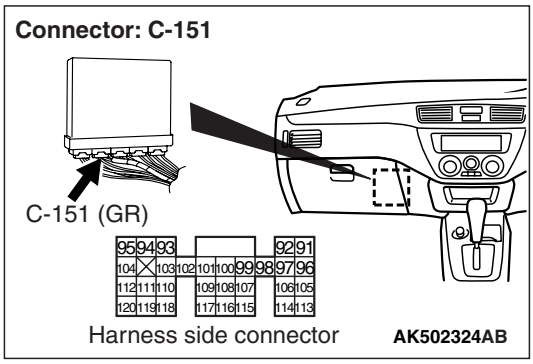
- Refer to Data List Reference Table P.13A-297.
  a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

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

STEP 6. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

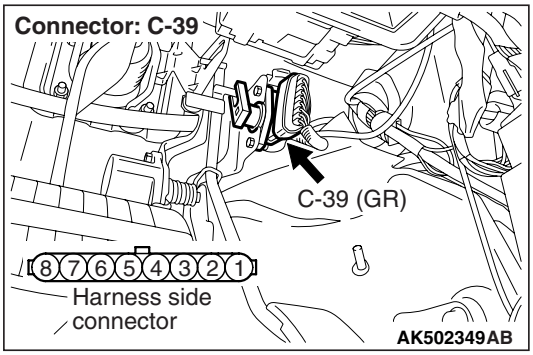


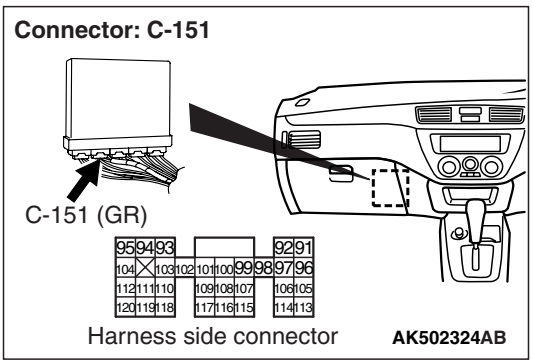
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between C-39 (terminal No. 7) accelerator pedal position sensor connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check earthing line for open circuit and damage.

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

Code No. P2135: Throttle Position Sensor (Main and Sub) Range/Performance Problem

OPERATION

- Refer to Code No. P0122: Throttle Position Sensor (main) Circuit Low Input P.13A-46.
- Refer to Code No. P0222: Throttle Position Sensor (sub) Circuit Low Input P.13A-98.

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the throttle position sensor output signal characteristics for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.
- Throttle position sensor (main) output voltage is 0.35 – 4.8 V.
- Throttle position sensor (sub) output voltage is 2.25 – 4.8 V

Judgment Criterion

- Using the formula given below, the voltage of 0.3 V or higher is obtained for 0.5 second: V* – V** – 2 V

V*: throttle position sensor (main) output voltage
V**: throttle position sensor (sub) output voltage.

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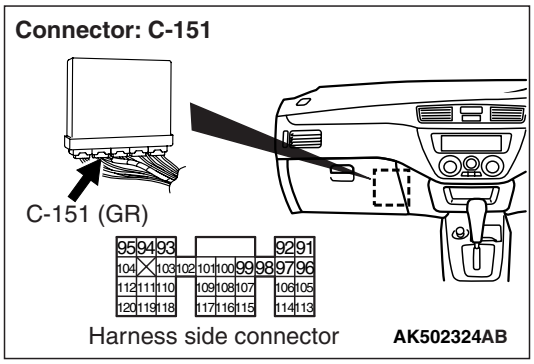
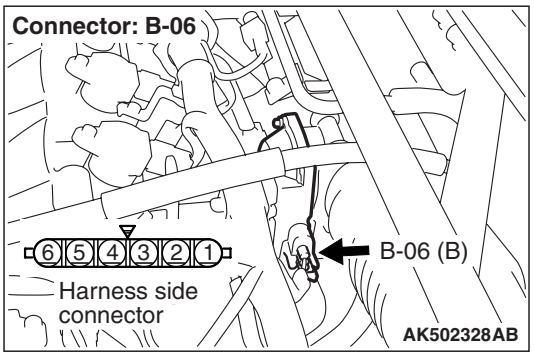
PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

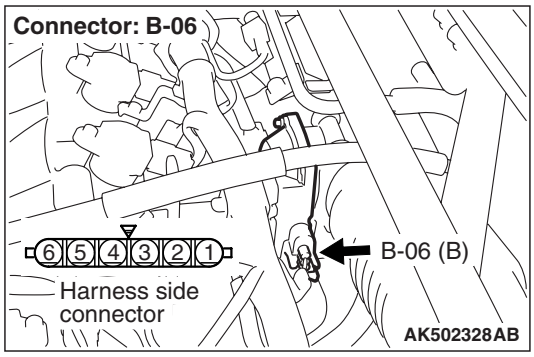
STEP 1. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-06 electronic-controlled throttle valve connector

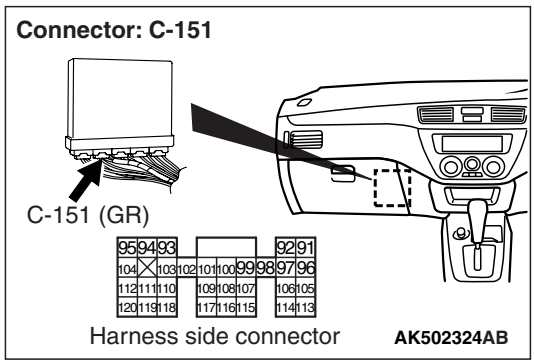




Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check harness between B-06 (terminal No. 4) electronic-controlled throttle valve connector and C-151 (terminal No. 115) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for short circuit.

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair the damaged harness wire.

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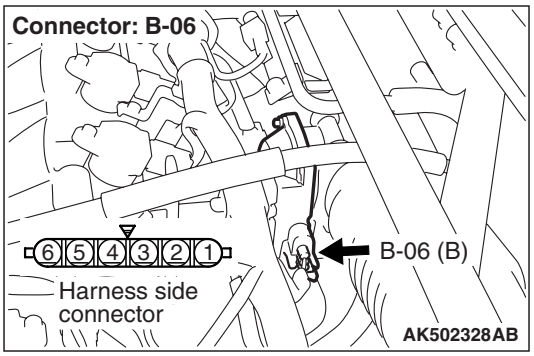
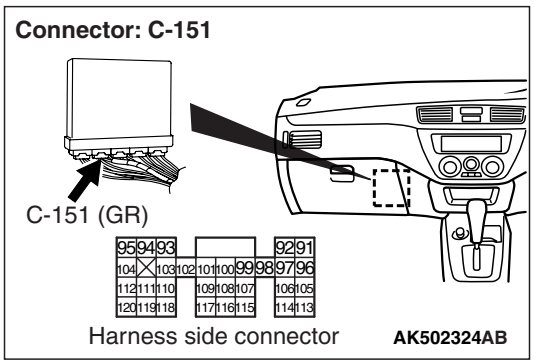
STEP 3. Check harness between B-06 (terminal No. 6) electronic-controlled throttle valve connector and C-151 (terminal No. 113) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for short circuit.

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

STEP 4. Replace the throttle body assembly.

- After throttle body assembly is replaced, re-check for trouble symptom.

Q: Does trouble system persist?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : The check is end.

Code No. P2138: Accelerator Pedal Position Sensor (Main and Sub) Range/Performance Problem

OPERATION

- Refer to Code No. P2122: Accelerator Pedal Position Sensor (main) Circuit Low Input P.13A-180.
- Refer to Code No. P2127: Accelerator Pedal Position Sensor (sub) Circuit Low Input P.13A-189.

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the accelerator pedal position sensor output signal characteristics for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position
- Accelerator pedal position sensor (main) output voltage is 0.2 – 4.5 V.
- Accelerator pedal position sensor (sub) output voltage is 0.2 – 4.5 V.

Judgment Criteria

- Accelerator pedal position sensor (sub) output voltage minus Accelerator pedal position sensor (main) output voltage is 1 volt or higher for 1 second.
- Accelerator pedal position sensor (main) output voltage minus Accelerator pedal position sensor (sub) output voltage is 1 volt or higher for 0.2 seconds.

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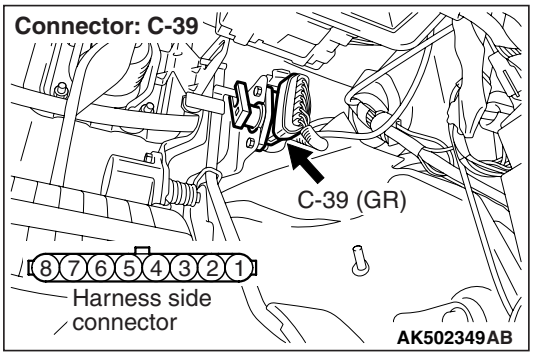
PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-39 accelerator pedal position connector



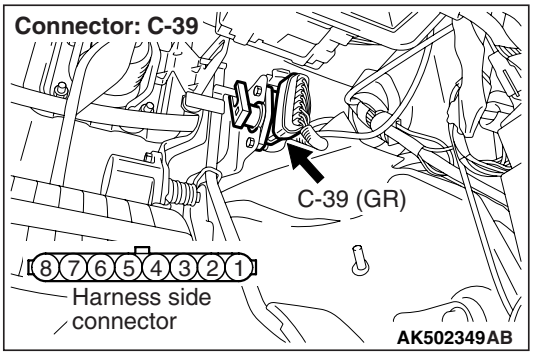
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check accelerator pedal position sensor itself.

- Check accelerator pedal position sensor itself (Refer to P.13A-327).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the accelerator pedal position sensor.

STEP 3. Perform resistance measurement at C-39 accelerator pedal position sensor connector.

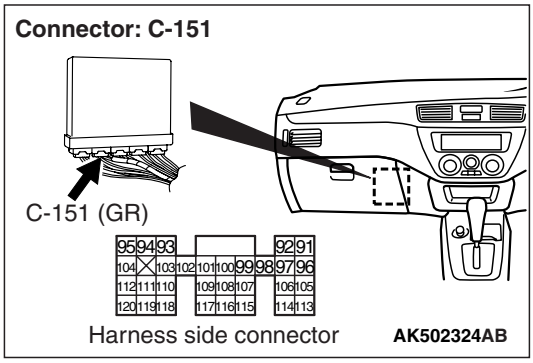


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

OK: 2 Ω or less

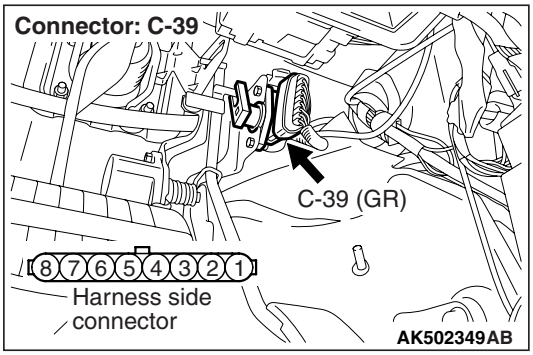
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

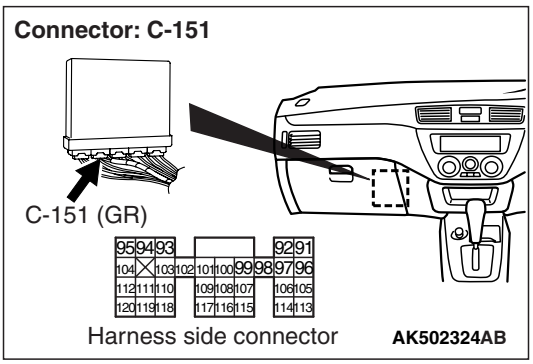
STEP 4. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 5. Check harness between C-39 (terminal No. 1) accelerator pedal position sensor connector and C-151 (terminal No. 91) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





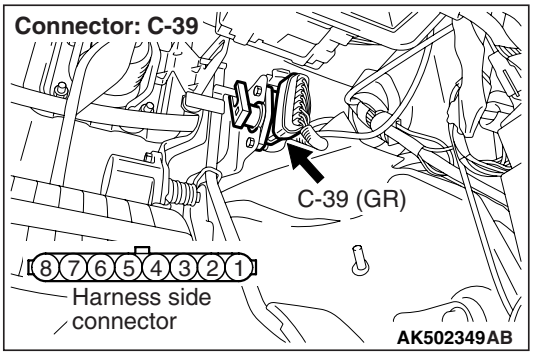
- Check earthing line for damage.

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

STEP 6. Check the trouble symptoms

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

STEP 7. Perform resistance measurement at C-39 accelerator pedal position sensor connector.

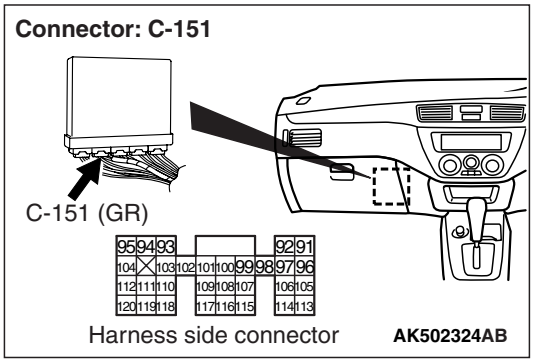


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 7 and earth.

OK: 2 Ω or less

Q: Is the check result normal?
YES : Go to Step 11 .
NO : Go to Step 8 .

STEP 8. Connector check: C-151 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 the connector.

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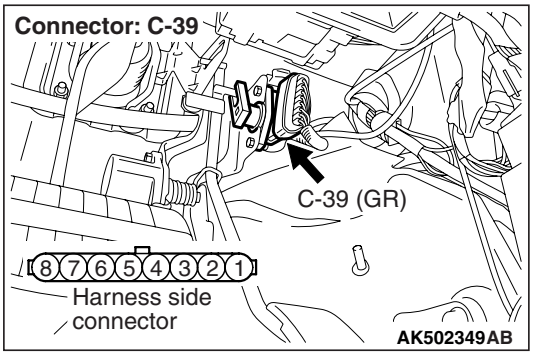
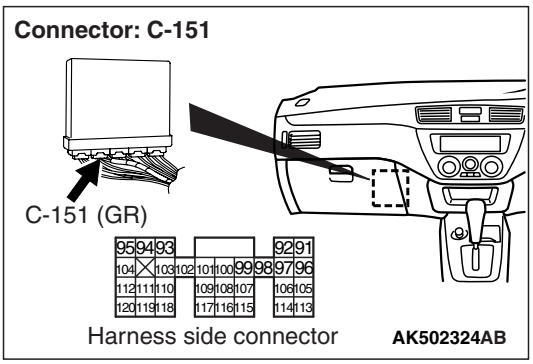
STEP 9. Check harness between C-39 (terminal No. 7) accelerator pedal position sensor connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

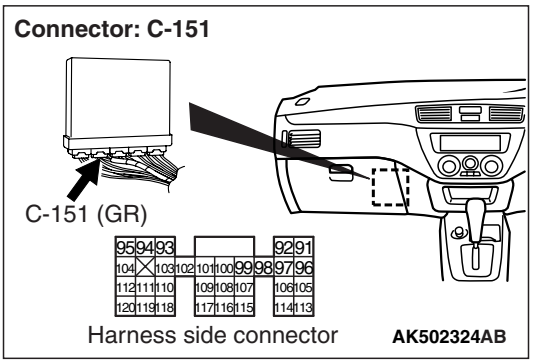




- Check earthing line for damage.

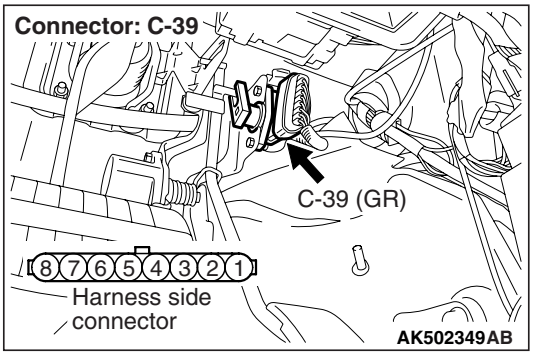
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair the damaged harness wire.

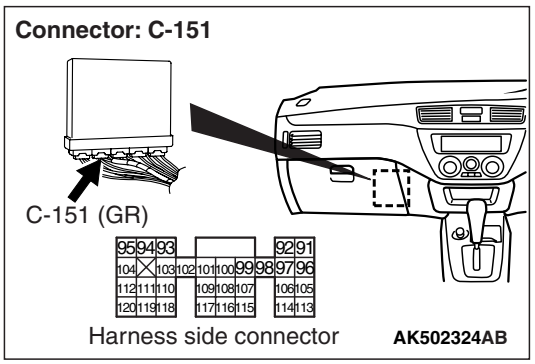
STEP 10. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 11. Check harness between C-39 (terminal No. 2) accelerator pedal position sensor connector and C-151 (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 12 .
NO : Repair the damaged harness wire.

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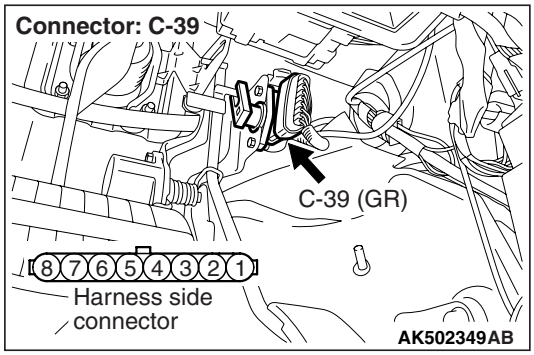
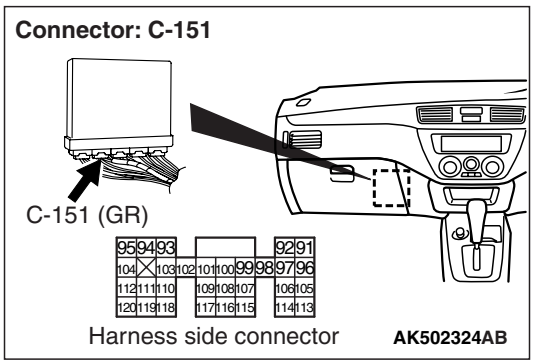
STEP 12. Check harness between C-39 (terminal No. 8) accelerator pedal position sensor connector and C-151 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

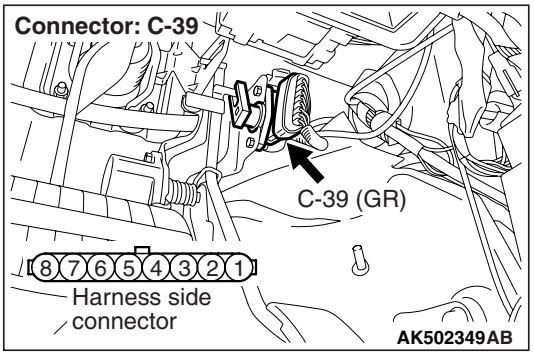


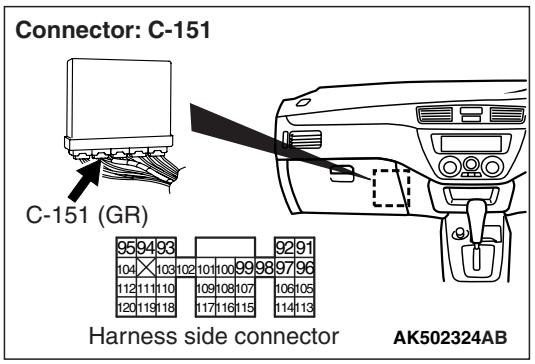


- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 13 .
NO : Repair the damaged harness wire.

STEP 13. Check harness between C-39 (terminal No. 3) accelerator pedal position sensor connector and C-151 (terminal No. 114) 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 14 .
NO : Repair the damaged harness wire.

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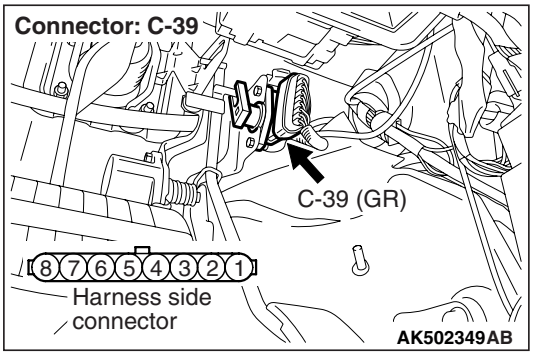
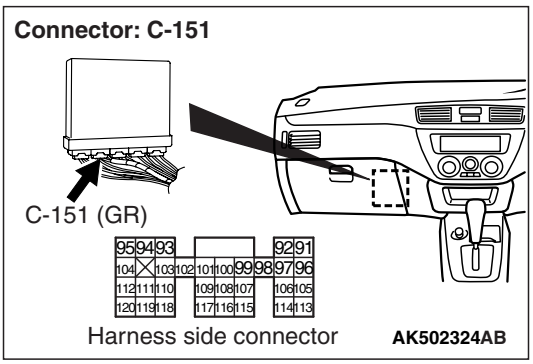
STEP 14. Check harness between C-39 (terminal No. 6) accelerator pedal position sensor connector and C-151 (terminal No. 107) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Check output line for damage.

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

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Code No. P2173: Abnormal Intake Air Amount

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> decides the allowable intake air amount in accordance with the engine speed and the target opening angle of throttle valve.
- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks whether the actual intake air amount is more than the allowable intake air amount.

TROUBLE JUDGMENT

Check Condition

- While engine is running.

Judgment Criterion

- The actual intake air amount is more than the allowable in take air amount for 3 seconds.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Failed air flow sensor.
- Throttle valve faulty operation.
- Failed throttle position sensor
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

STEP 2. Replace the air flow sensor.

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

Q: Is the check result normal?
YES : Go to Step 3 .
NO : The check is end.

STEP 3. Replace the throttle body assembly.

- After replacing the throttle body assembly, re-check the trouble symptoms.

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

Code No. P2226: 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 is 8 V or more.

Judgment Criteria

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

or

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

PROBABLE CAUSE

- Failed barometric pressure sensor

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Inspection chart for diagnosis code (Refer to P.13A-19).

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INSPECTION CHART FOR TROUBLE SYMPTOMS

M1131151501718

Items	Trouble symptom		Inspection procedure No.
Communication with M.U.T.-II/III is impossible	Communication with all system is not possible		1
	Communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> only is not possible		2
Engine warning lamp	The engine warning lamp does not illuminate right after the ignition switch is turned the "ON" position		3
	The engine warning lamp remains illuminating and never goes out		4
Starting	Starting impossible (No initial combustion)	The starter is impossible to operate.	5 <M/T>, 6 <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.	7
	Starting impossible (Initial combustion but no complete combustion)	The initial combustion occurs, but the engine stalls soon due to the incomplete combustion.	8
	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, sift lever, vehicle body and so on.	9
	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.	10
	The engine stalls when decelerating	The engine stalls at the deceleration.	11

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Items	Trouble symptom		Inspection procedure No.
Driving	Engine does not revolve up	The engine speed is not higher when the accelerator pedal is depressed.	12
	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".	13
	Poor acceleration	The engine cannot obtain the acceleration corresponding to the degree of throttle opening although the engine is smooth at the constant speed.	
	Stumble	The engine speed increase is delayed when the accelerator pedal is initially depressed at the starting.	
	Surge	The vehicle body is repeated to vibrate jollity in the forward and backward directions at the constant speed or acceleration.	
	The feeling of impact or vibration when accelerating	The large impact feeling occurs at the acceleration.	14
	The feeling of impact or vibration when decelerating	The large impact feeling occurs at the deceleration.	15
	Knocking	Sharp sound like a hammer striking on the cylinder walls during the driving can be heard and wrongly affects the driving.	16
	Ignition timing offset	The basic ignition timing is deviated from the datum value.	17
Stopping	Run on (Dieseling)	The engine continues to run after the ignition switch is in "LOCK (OFF)" position.	18
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.	19
Charging performance	Battery rundown	The battery is soon rundown or the charging ability of battery is small.	20

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Items	Trouble symptom		Inspection procedure No.
Cooling performance	Overheating	The temperature of engine cooling water is extremely high.	21
	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.	22
A/C performance	Poor A/C Performance	The temperature of air cooling from A/C is not efficient or very far from the target temperature.	23

PROBLEM SYMPTOMS TABLE

Inspection procedure No.	Trouble symptom	Reference page
1	Communication with all system is not possible	P.13A-208
2	Communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> only is not possible	P.13A-211
3	The engine warning lamp does not illuminate right after the ignition switch is turned the "ON" position	P.13A-213
4	The engine warning lamp remains illuminating and never goes out	P.13A-218
5	Starting impossible (No initial combustion) <M/T>	P.13A-221
6	Starting impossible (No initial combustion) <A/T>	P.13A-226
7	Starting impossible (Starter operative but no initial combustion)	P.13A-232
8	Starting impossible (Initial combustion but no complete combustion)	P.13A-234
	Starting impossible (Long time to start)	
9	Unstable idling (Rough idling, hunting)	P.13A-236
	Improper idling speed (Too high or too low)	
	Engine stalls during idling (Die out)	
10	The engine stalls when starting the car (pass out)	P.13A-240
11	The engine stalls when decelerating	P.13A-241
12	Engine does not revolve up	P.13A-242
13	Hesitation, sag	P.13A-242
	Poor acceleration	
	Stumble	
	Surge	
14	The feeling of impact or vibration when accelerating	P.13A-244
15	The feeling of impact or vibration when decelerating	P.13A-245
16	Knocking	P.13A-245
17	Ignition timing offset	P.13A-246
18	Run on (Dieseling)	P.13A-247

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Inspection procedure No.	Trouble symptom	Reference page
19	Odor, white smoke, black smoke, high-concentration CO/HC during idling	P.13A-248
20	Battery rundown	P.13A-250
21	Overheating	P.13A-252
22	Abnormal rotation of fan motor	P.13A-254
23	Poor A/C performance	P.13A-257
24	Engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply, engine control relay, ignition switch-IG1 system	P.13A-259
25	Fuel pump system	P.13A-264
26	Fan control relay system	P.13A-272
27	A/C switch system	P.13A-278
28	A/C compressor relay system	P.13A-279
29	A/C load signal system	P.13A-280
30	Ignition circuit system	P.13A-284
31	Accelerator pedal position switch circuit system	P.13A-292

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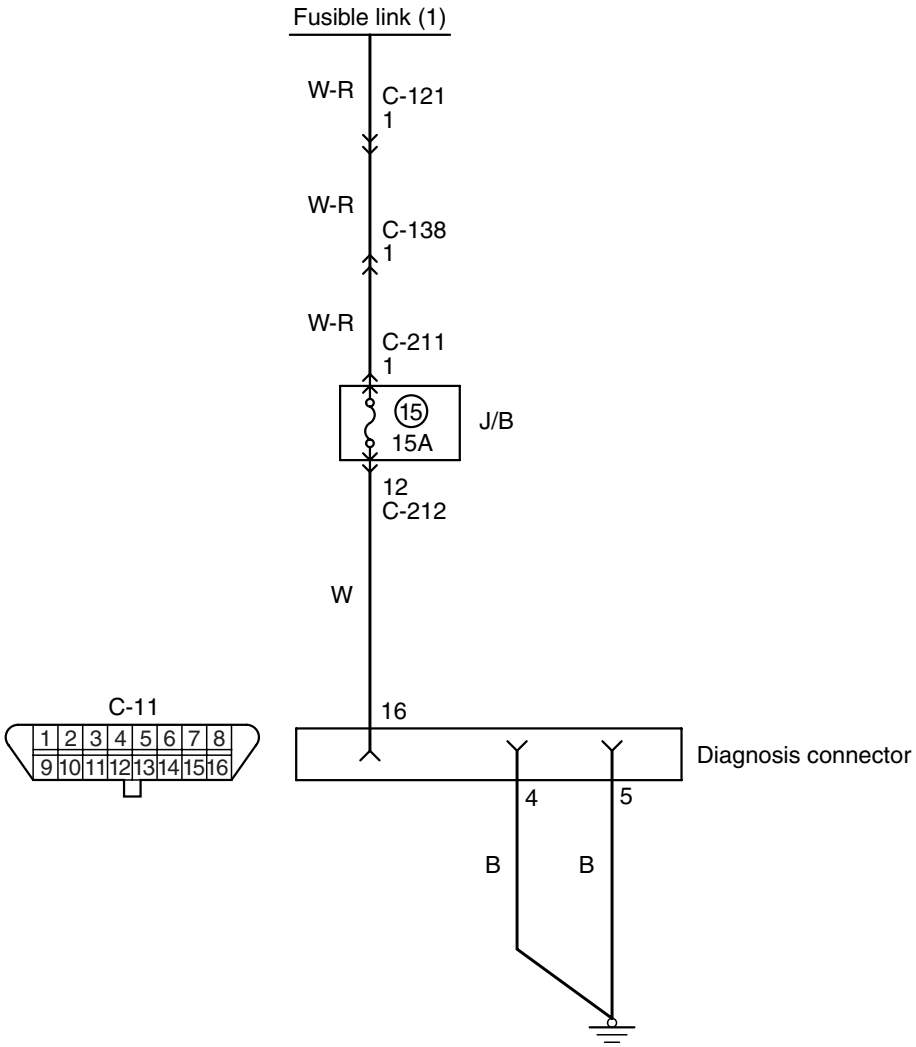
SYMPTOM PROCEDURES

Inspection Procedure 1: Communication with All System 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 PU: Purple

AK304141AD

OPERATION

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

COMMENT ON TROUBLE SYMPTOM

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

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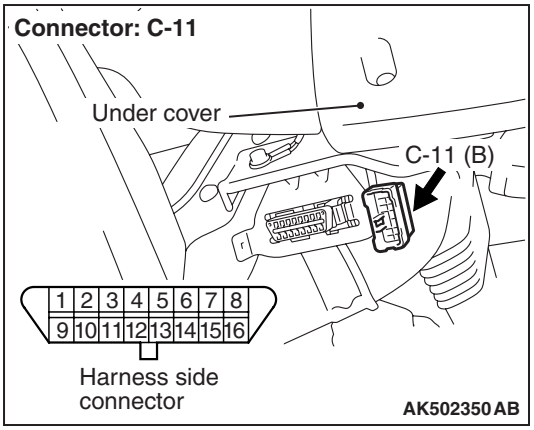
PROBABLE CAUSE

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

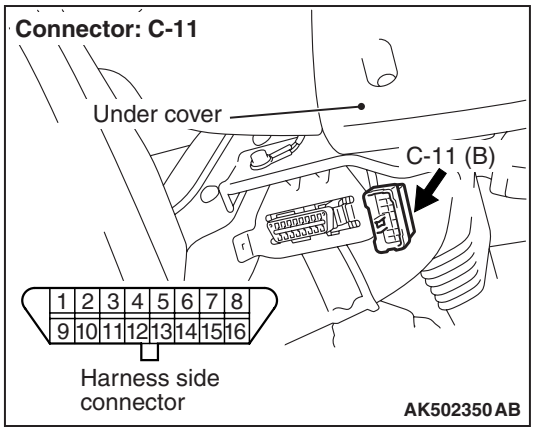
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-11 diagnosis connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Perform resistance measurement at C-11 diagnosis connector.



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

OK: 2 Ω or less

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Check and repair harness between C-11 (terminal No. 4) diagnosis connector and body earth, also between C-11 (terminal No. 5) diagnosis connector and body earth.
- Check earthing line for open circuit and damage.

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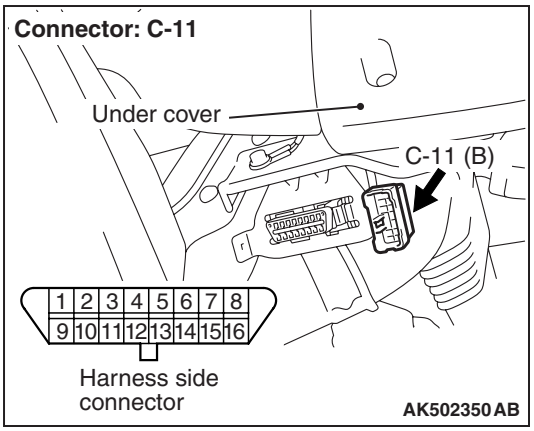
STEP 3. Perform voltage measurement at C-11 diagnosis connector.



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

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check intermediate connectors C-138, C-121, C-211 and C-212 and repair if necessary. If connectors are normal, check and repair harness between C-11 (terminal No. 16) diagnosis connector and battery.

- Check power supply line for open/short circuit.

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

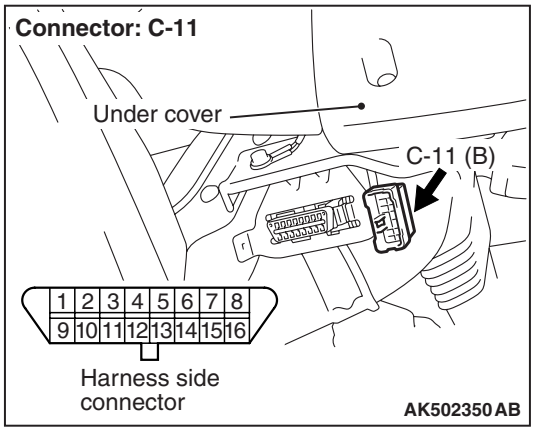
- After replacing the M.U.T.-II/III, re-check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Go to Step 5 .

NO : The check is end.

STEP 5. Check harness between C-11 (terminal No. 16) diagnosis connector and battery.



NOTE: Before checking harness, check intermediate connectors C138, C-121, C-211 and C-212, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Check and repair harness between C-11 (terminal No. 4 and No. 5) diagnosis connector and body earth.

- Check earthing line for damage.

NO : Repair the damaged harness wire.

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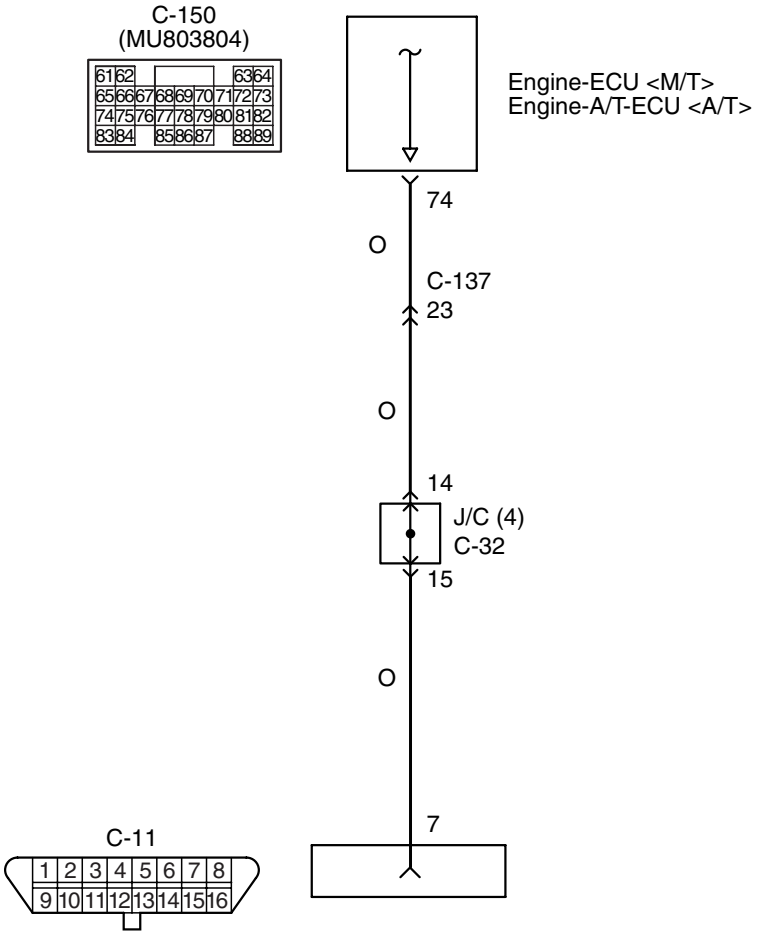
Inspection Procedure 2: Communication with Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Only is Not Possible.

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 PU: Purple

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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 <A/T> (terminal No. 74).

COMMENT ON TROUBLE SYMPTOM

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

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

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DIAGNOSIS PROCEDURE

STEP 1. Check engine warning lamp.

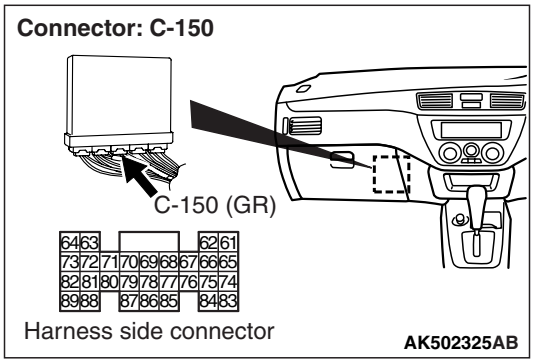
- Ignition switch: OFF → ON

Q: Is lamp illuminating for few seconds?

YES : Go to Step 2 .

NO : Check engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 24 P.13A-259).

STEP 2. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

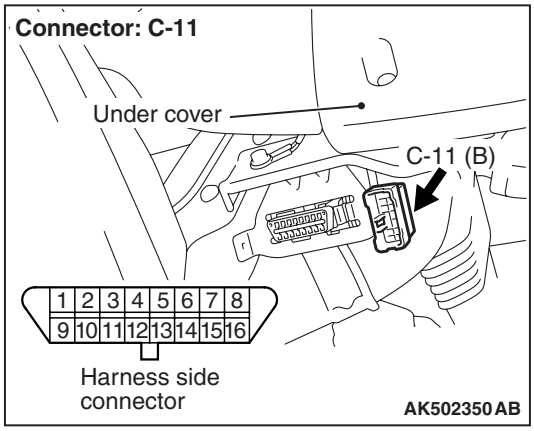


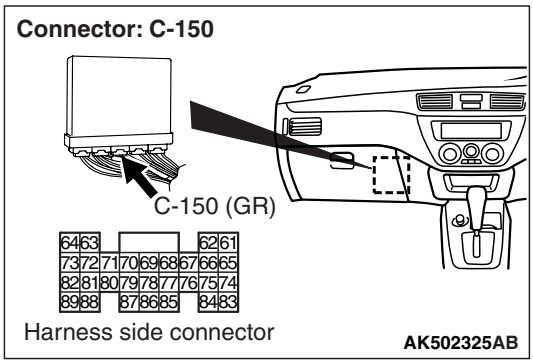
Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check harness between C-11 (terminal No. 7) diagnosis connector and C-150 (terminal No. 74) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





NOTE: Before Checking harness, check intermediate connectors C-32 and C-137, 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 the damaged harness wire.

STEP 4. Check the trouble symptom.

Q: Does trouble symptom persist?

YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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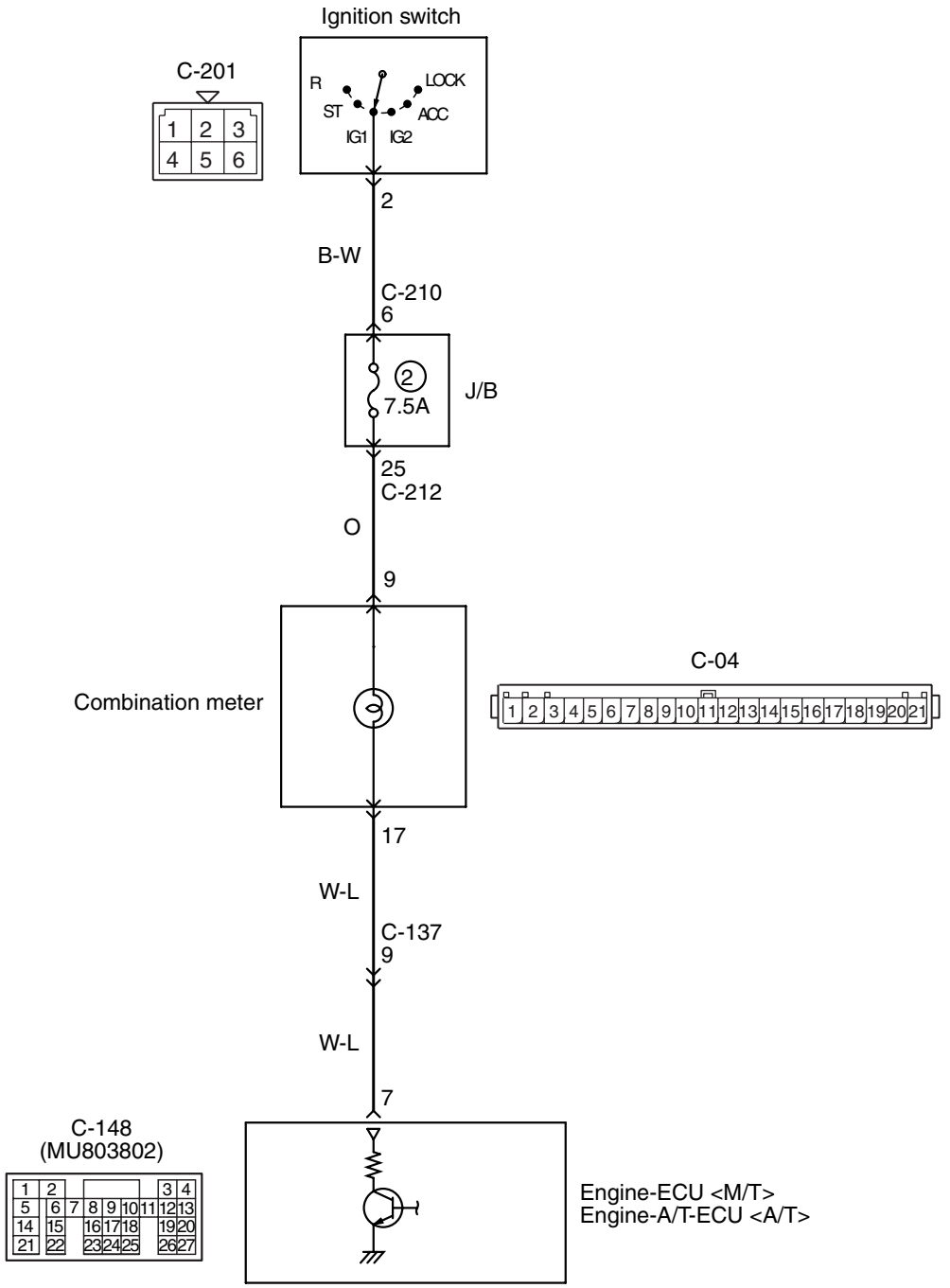
Inspection Procedure 3: The Engine Warning Lamp Does Not Illuminate Right after the Ignition Switch is Turned the "ON" Position

Combination meter 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 PU: Purple

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OPERATION

- Battery voltage is applied to engine warning lamp of combination meter connector (terminal No. 9) from ignition switch.
- Engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 7) makes power transistor in unit be in "ON" position, and that makes currents go on engine warning lamp of combination meter connector (terminal No. 17).

COMMENTS ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

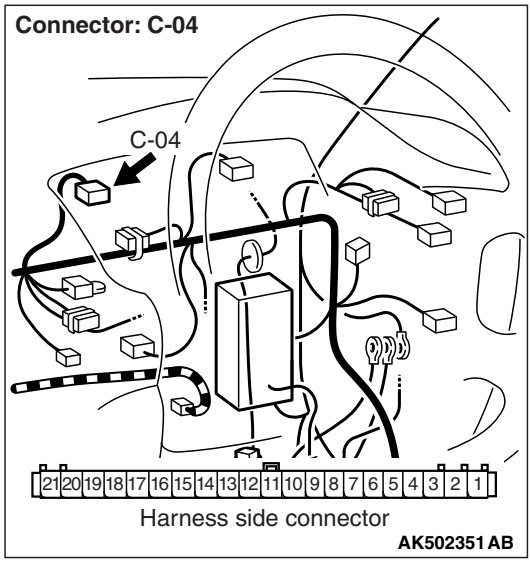
STEP 1. Check engine start-up.

Q: Is engine started?
YES : Go to Step 2 .
NO : Check engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 24 P.13A-259).

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

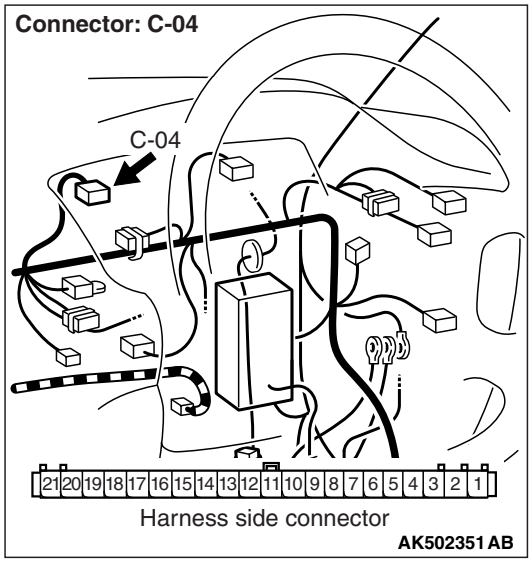
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the engine warning lamp.

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



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

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

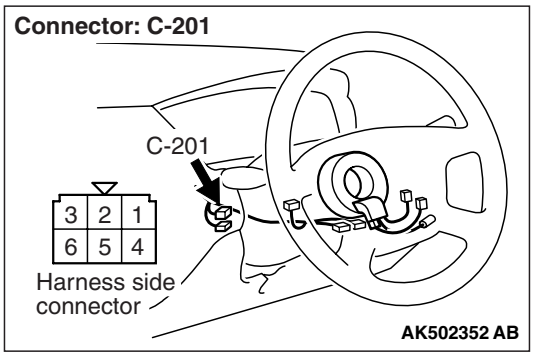


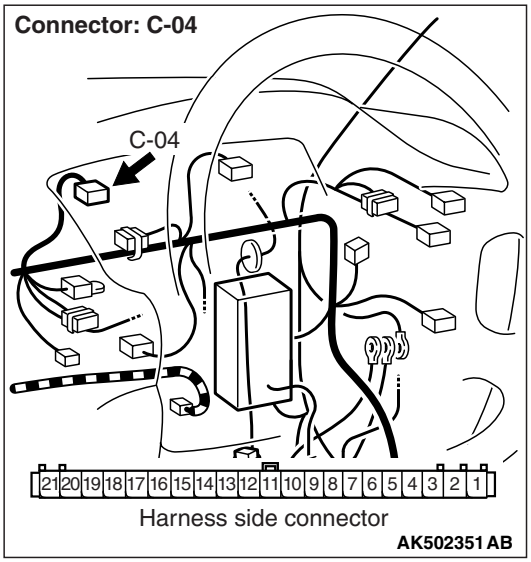
- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 9 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 6 .
NO : Go to Step 5 .

STEP 5. Connector check: C-201 ignition switch connector





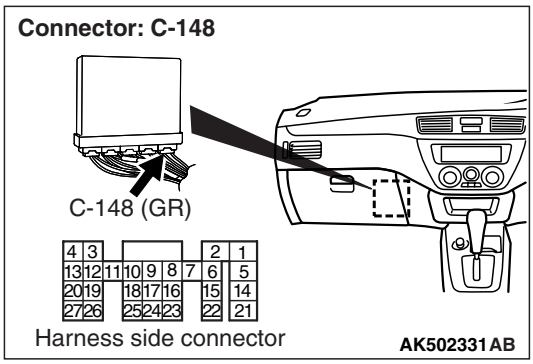
Q: Is the check result normal?

YES : Check intermediate connectors C-210 and C-212, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-04 (terminal No. 9) combination meter connector and C-201 (terminal No. 2) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 6. Connector check: C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

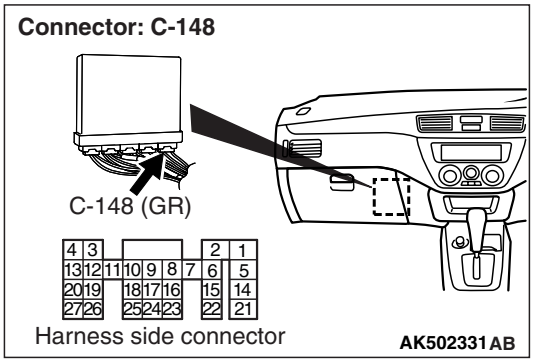


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Perform voltage measurement at C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 7 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 8 .

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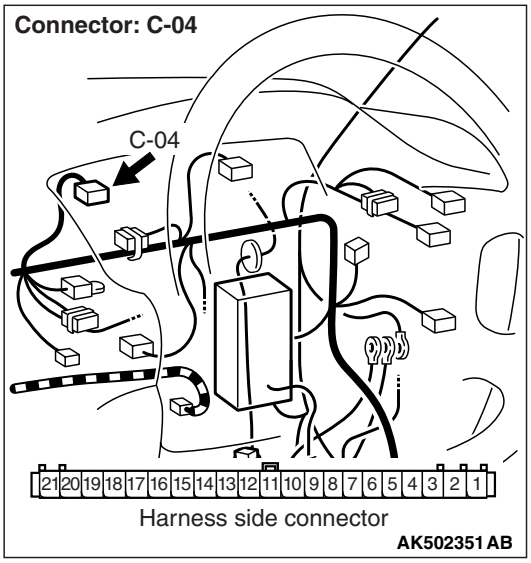
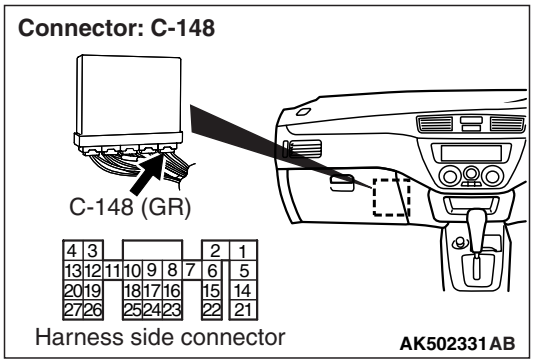
STEP 8. Connector check: C-04 combination meter connector





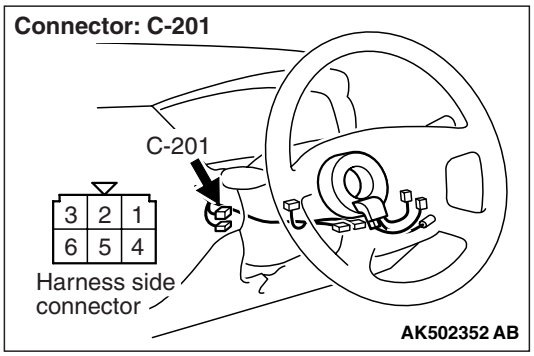
Q: Is the check result normal?

YES : Check intermediate connector C-137, and repair if necessary. If intermediate connector is normal, check and repair harness between C-04 (terminal No. 17) combination meter connector and C-148 (terminal No. 7) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open/short circuit.

NO : Repair or replace the connector.

STEP 9. Connector check: C-201 ignition switch connector

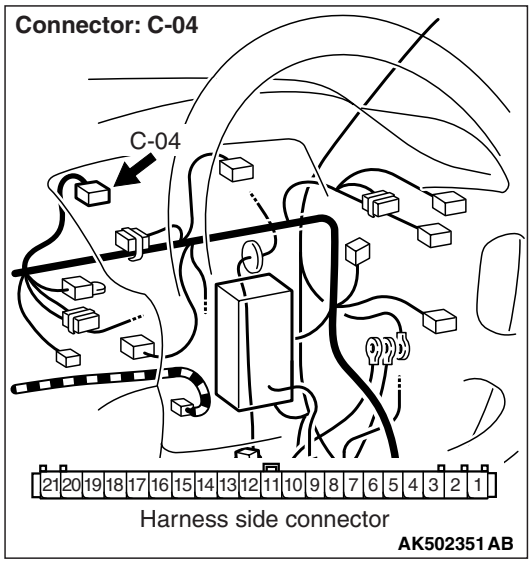


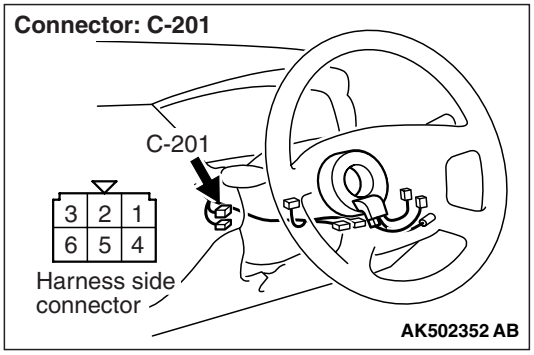
Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace the connector.

STEP 10. Check harness between C-04 (terminal No. 9) combination meter connector and C-201 (terminal No. 2) ignition switch connector.





NOTE: Before checking harness, check intermediate connectors C-210 and C-212, and repair if necessary.

- Check power supply line for damage.

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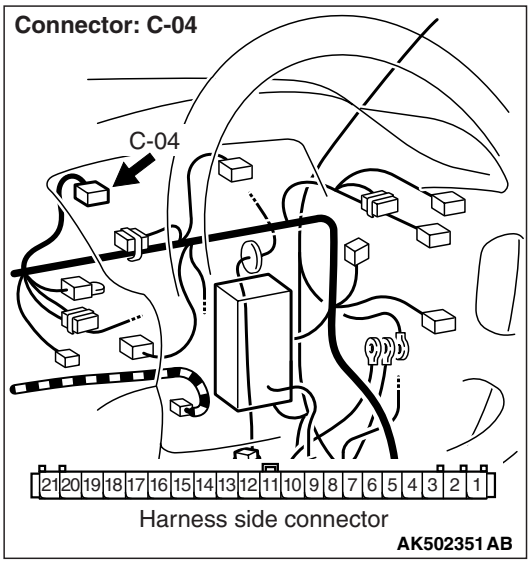
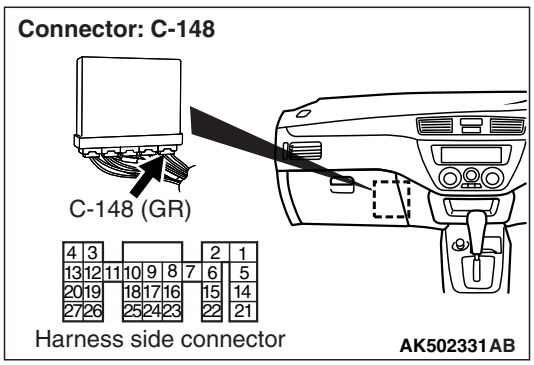
Q: Is the check result normal?
YES : Go to Step 11 .
NO : Repair the damaged harness wire.

STEP 11. Check harness between C-04 (terminal No. 17) combination meter connector and C-148 (terminal No. 7) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





NOTE: Before checking harness, check intermediate connector C-137, and repair if necessary.

- Check output line for damage.

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

STEP 12. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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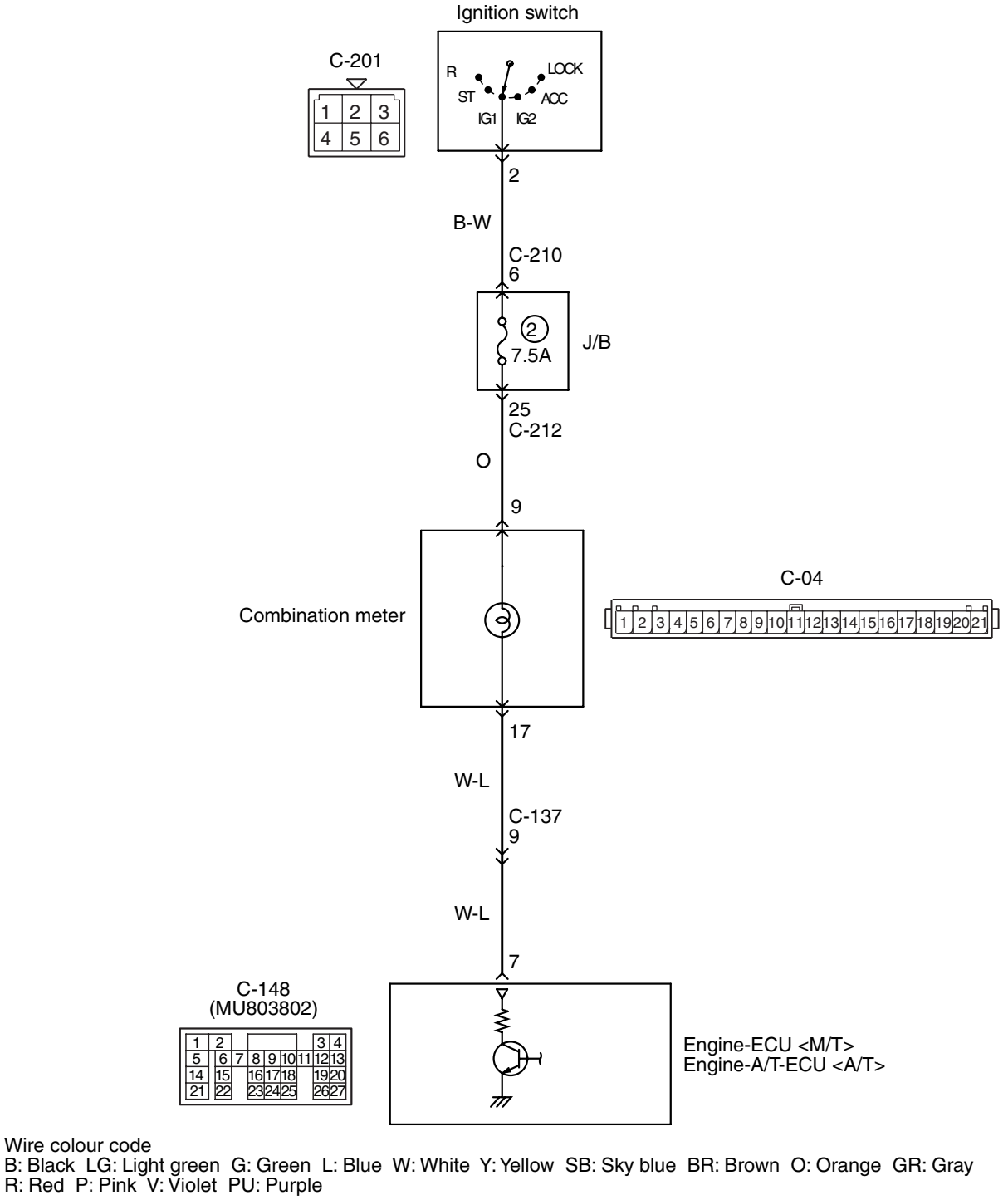
Inspection Procedure 4: The Engine Warning Lamp Remains Illuminating and Never Goes Out

Combination meter 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 PU: Purple

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OPERATION

- Battery voltage is applied to engine warning lamp of combination meter connector (terminal No. 9) from ignition switch.
- Engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 7) makes power transistor in unit be in "ON" position, and that makes currents go on engine warning lamp (terminal No. 17).

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COMMENT ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

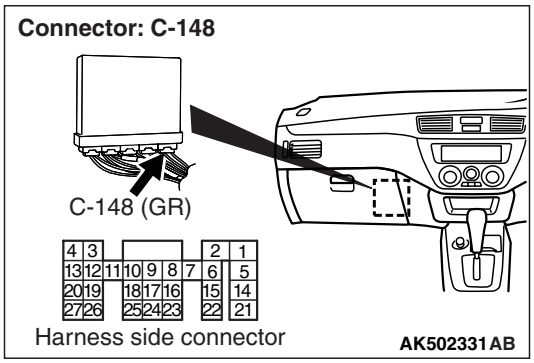
- Short circuit in between engine warning lamp and engine-ECU <M/T> or engine-A/T-ECU <A/T> circuit.
- Failed engine-ECU <A/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

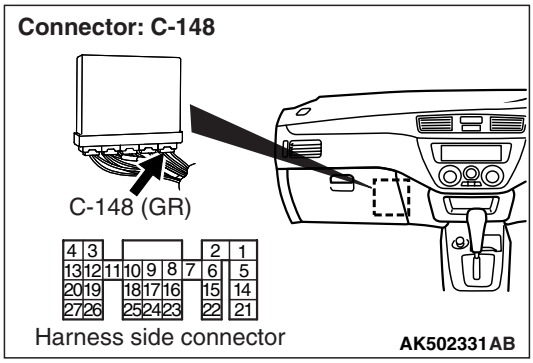
Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19.)
NO : Go to Step 2 .

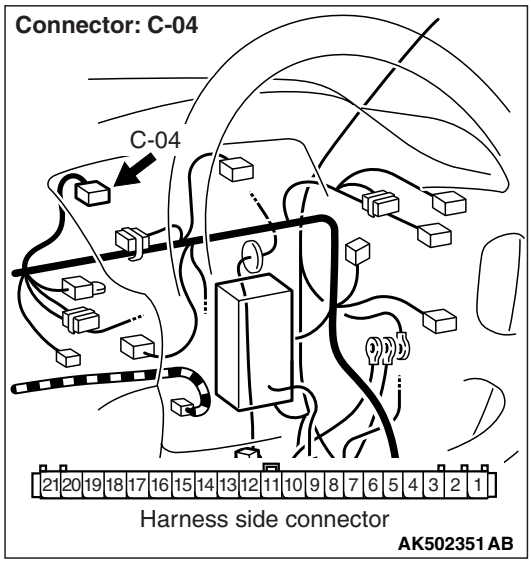
STEP 2. Connector check: C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 7 and earth.

  OK: System voltage

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Check intermediate connector C-137, and repair if necessary. If intermediate connector is normal, check and repair harness between C-04 (terminal No. 17) combination meter connector and C-148 (terminal No. 7) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check output line for short circuit.

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STEP 4. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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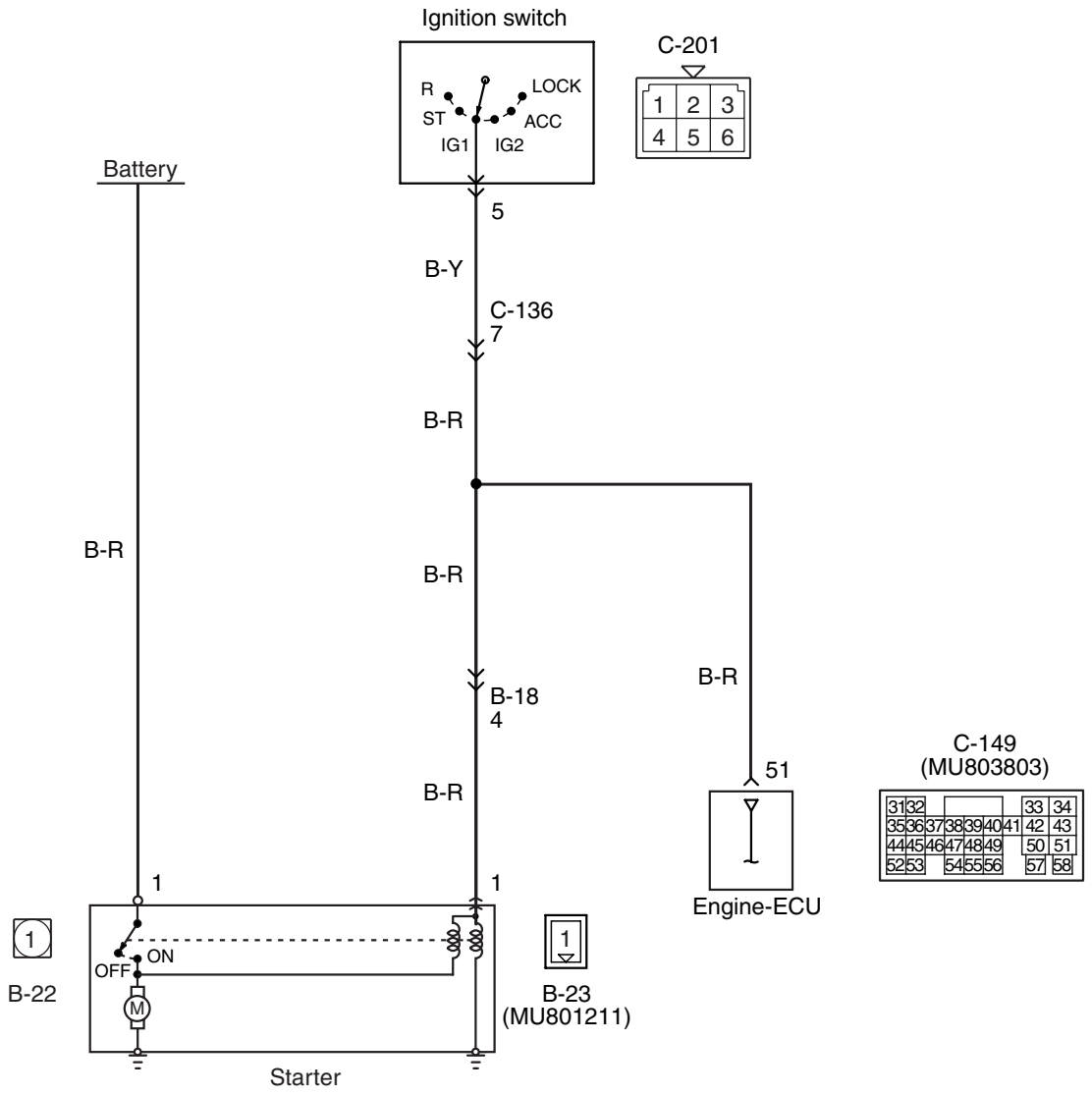
Inspection Procedure 5: Starting Impossible (No Initial Combustion) <M/T>

Stating 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 PU: Purple

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COMMENT ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

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

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DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?
YES : Go to Step 2 .
NO : Check battery (Refer to GROUP 54A – Battery –On-vehicle Service –Battery Test P.54A-5).

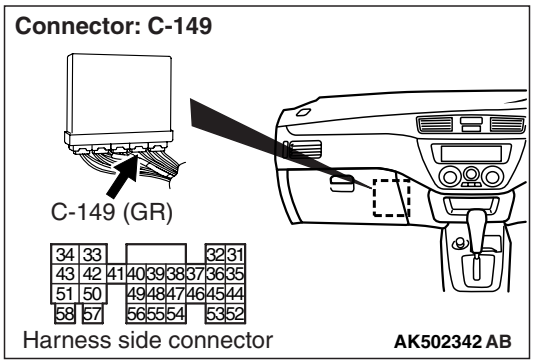
STEP 2. M.U.T.-II/III data list

- Item 18: Cranking signal

OK:
ON (Ignition switch: ST)
OFF (Ignition switch: ON)

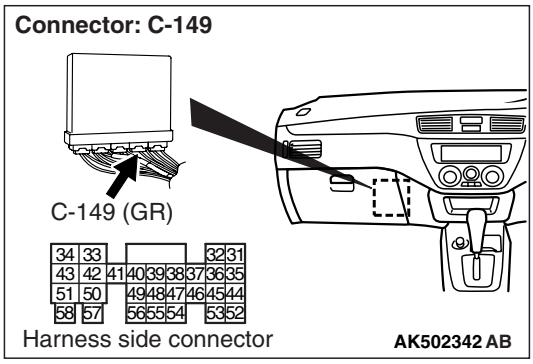
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 3 .

STEP 3. Connector check: C-149 engine-ECU connector



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

STEP 4. Perform voltage measurement at C-149 engine-ECU connector.

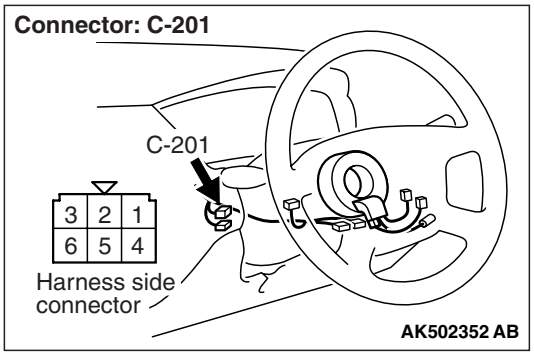


- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 51 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 5 .

STEP 5. Connector check: C-201 ignition switch connector



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

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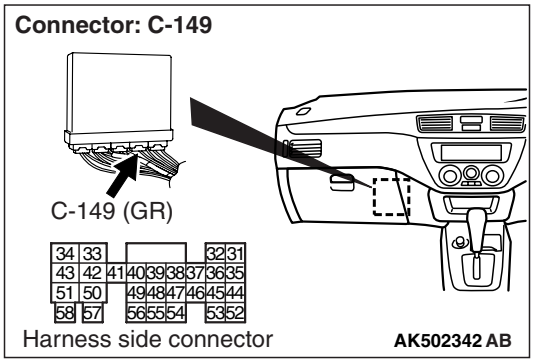
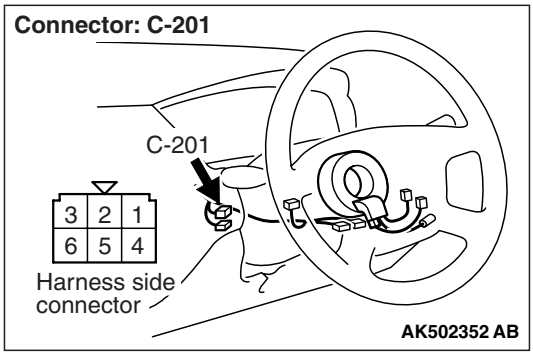
STEP 6. Check ignition switch.





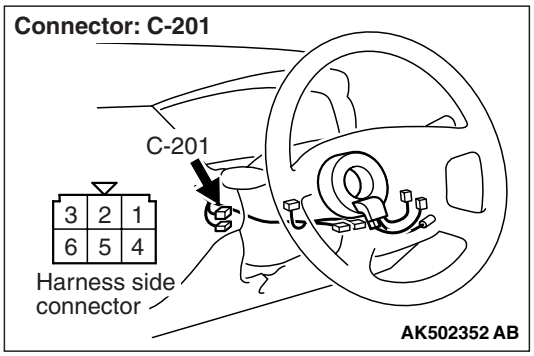
- Check ignition switch (Refer to GROUP 54A – Ignition Switch –Ignition Switch –Inspection P.54A-25).

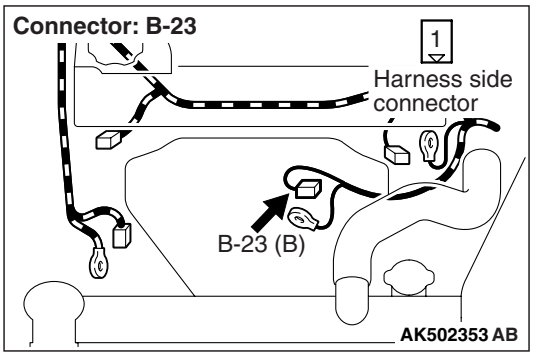
Q: Is the check result normal?

YES : Check intermediate connectors C-136 and B-18, and repair if necessary. If intermediate connector are normal, check and repair harness between C-149 (terminal No. 51) engine-ECU connector and C-201 (terminal No. 5) ignition switch connector.
- Check power supply line for open/short circuit.

NO : Replace the ignition switch.

STEP 7. Connector check: C-201 ignition switch connector and B-23 starter connector



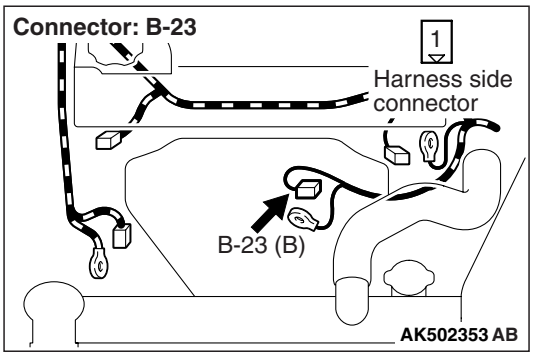


Q: Is the check result normal?

YES : Check intermediate connectors C-136 and B-18, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-201 (terminal No. 5) ignition switch connector and B-23 (terminal No. 1) starter connector.
- Check output line for short circuit.

NO : Repair or replace the connector.

STEP 8. Check connector: B-23 starter connector



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace the connector.

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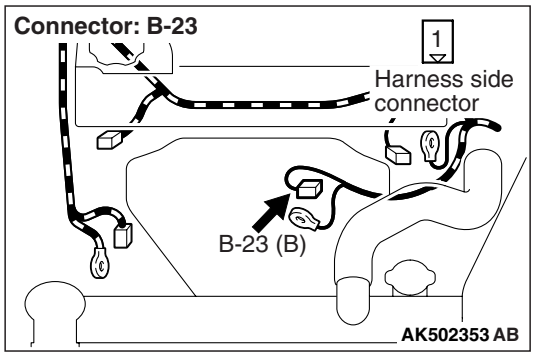
STEP 9. Perform voltage measurement at B-23 starter connector.

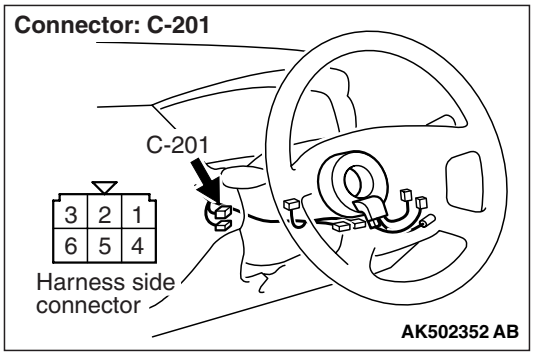


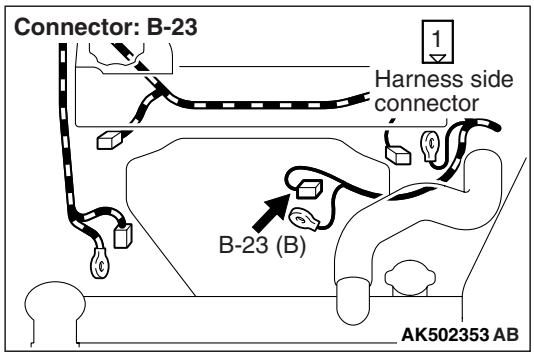
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 11 .
NO : Go to Step 10 .

STEP 10. Connector check: C-201 ignition switch connector

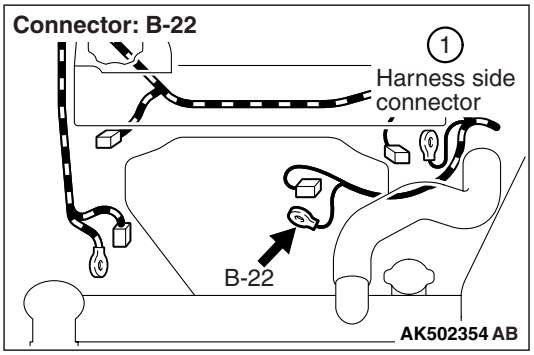




Q: Is the check result normal?
YES : Check intermediate connectors B-18 and C-136, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-201 (terminal No. 5) ignition switch connector and B-23 (terminal No. 1) starter connector.
- Check output line for open circuit and damage.

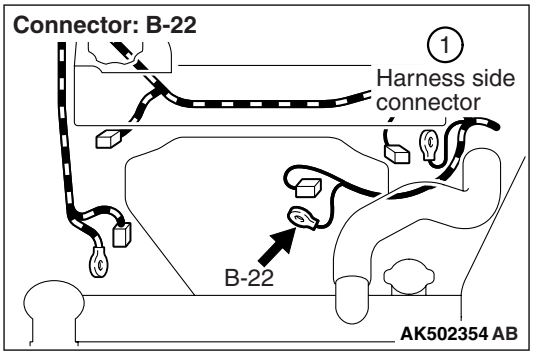
NO : Repair or replace the connector.

STEP 11. Connector check: B-22 starter connector



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

STEP 12. Perform voltage measurement at B-22 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-22 (terminal No. 1) starter connector and battery.
- Check power supply line for open/short circuit.

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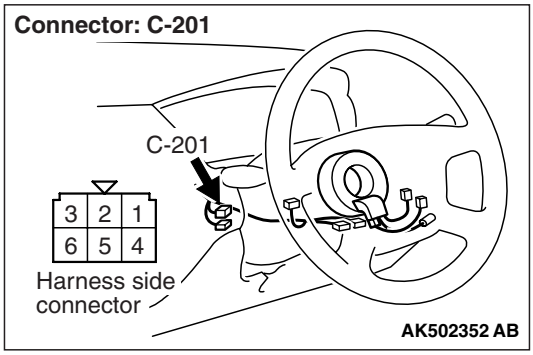
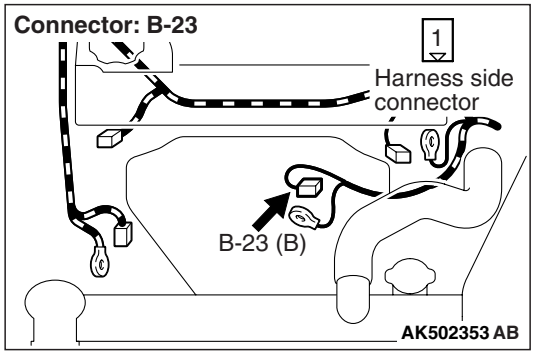
STEP 13. Check harness between C-201 (terminal No. 5) ignition switch connector and B-23 (terminal No. 1) starter connector.





NOTE: Before checking harness, check intermediate connectors B-18 and C-136, and repair if necessary.

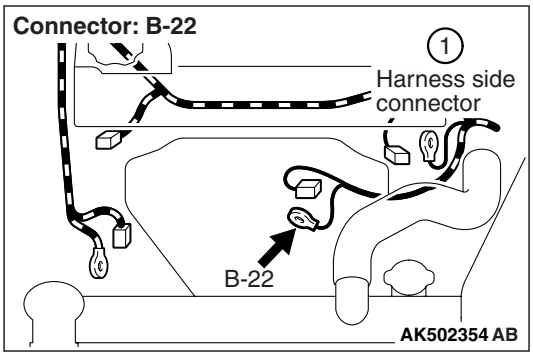
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair the damaged harness wire.

STEP 14. Check harness between B-22 (terminal No. 1) starter connector and battery.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Replace the starter.

NO : Repair the damaged harness wire.

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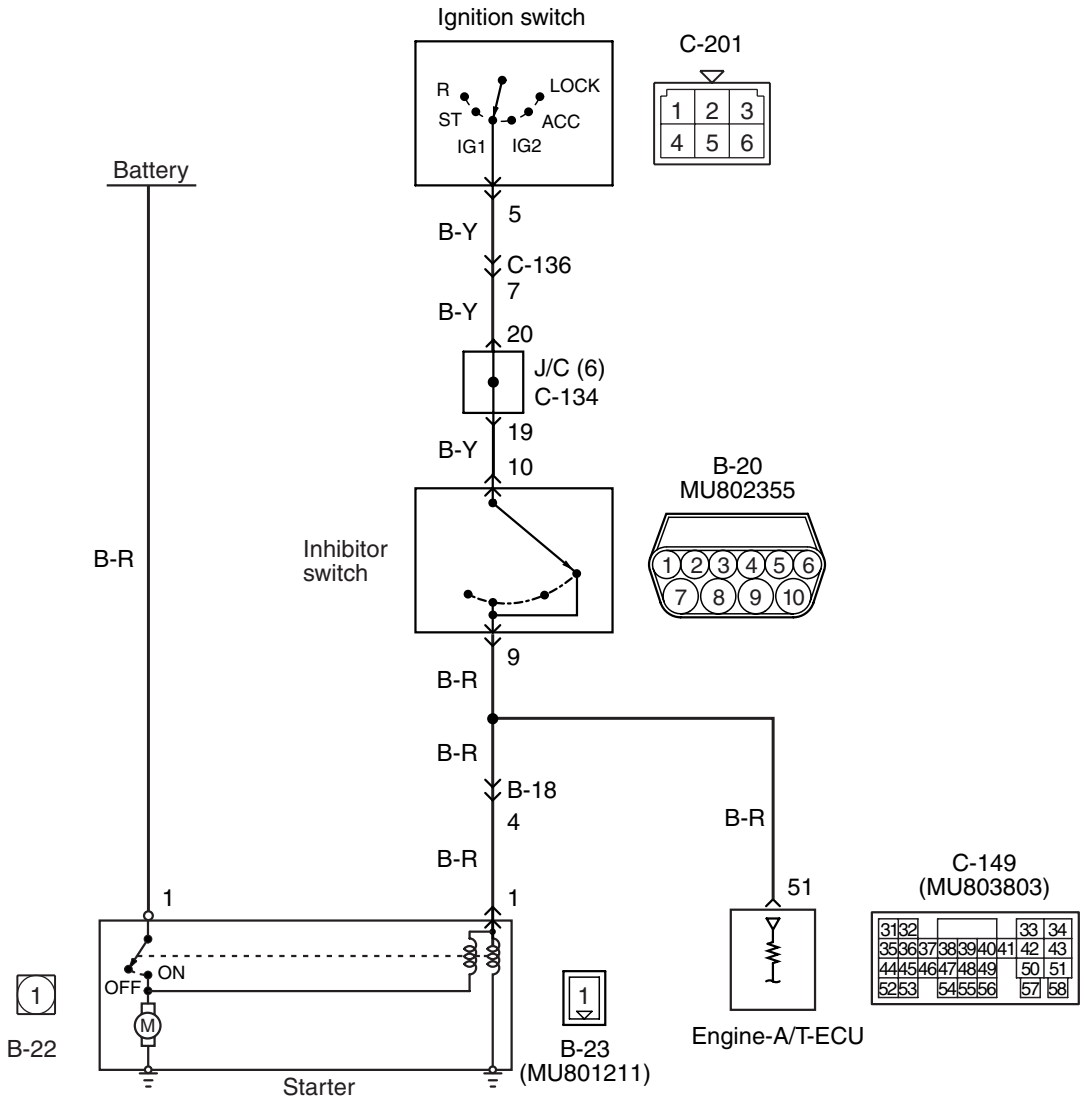
Inspection Procedure 6: Starting Impossible (No Initial Combustion) <A/T>

Stating impossible (no initial combustion) <A/T>



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

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COMMENT ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

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

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DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?
YES : Go to Step 2 .
NO : Check battery (Refer to GROUP 54A – Battery-On-vehicle Service –Battery Test P.54A-5).

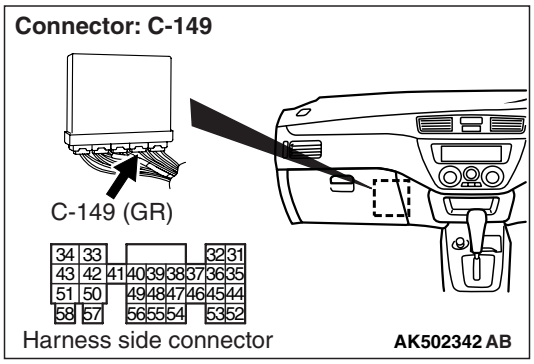
STEP 2. M.U.T.-II/III data list

- Item 18: Cranking signal

OK:
ON (Ignition switch: ST)
OFF (Ignition switch: ON)

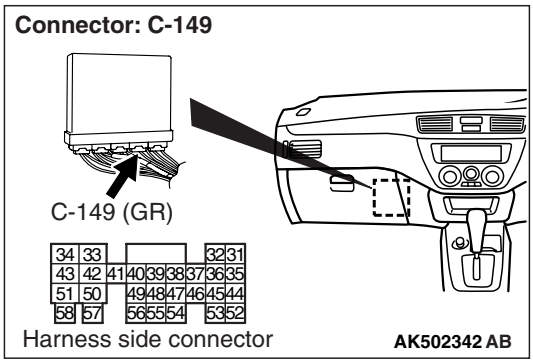
Q: Is the check result normal?
YES : Go to Step 11 .
NO : Go to Step 3 .

STEP 3. Connector check: C-149 engine-A/T-ECU connector



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

STEP 4. Perform voltage measurement at C-149 engine-A/T-ECU connector.

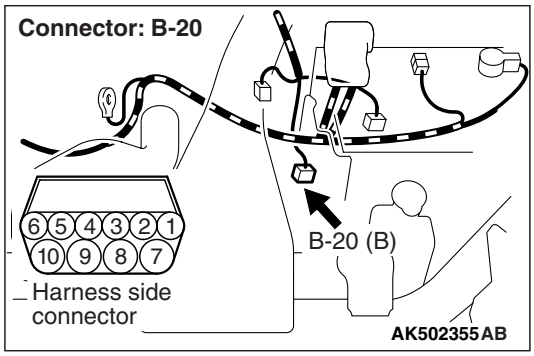


- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 51 and earth.

OK: System voltage

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

STEP 5. Connector check: B-20 inhibitor switch connector



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

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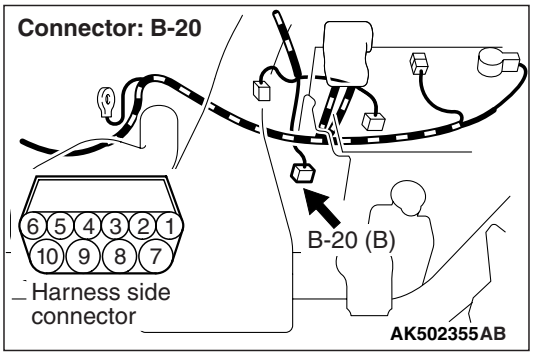
STEP 6. Perform voltage measurement at B-20 inhibitor switch connector

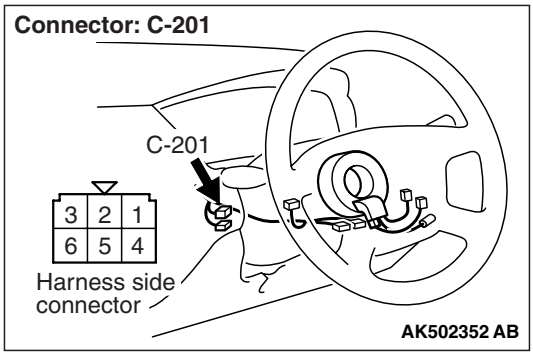


- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 10 and earth.

OK: System voltage

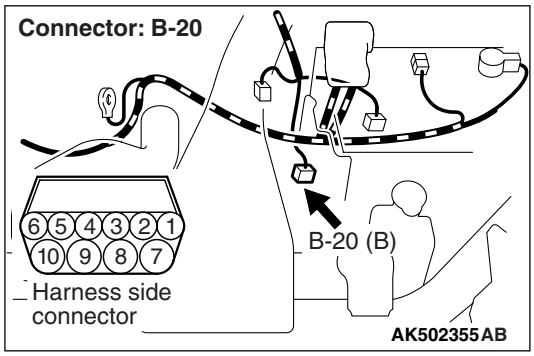
Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 7 .

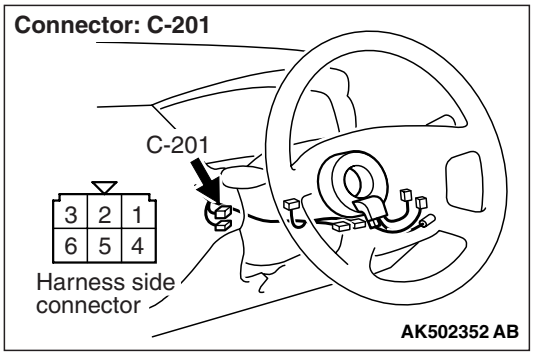
STEP 7. Connector check: C-201 ignition switch connector



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

STEP 8. Check ignition switch





- Check ignition switch (Refer to GROUP 54A – Ignition switch –Ignition Switch –Inspection P.54A-25).

Q: Is the check result normal?
YES : Check intermediate connectors C-134 and C-136, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-20 (terminal No. 10) inhibitor switch connector and C-201 (terminal No. 5) ignition switch connector.
  - Check power supply line for open/short circuit.

NO : Replace the ignition switch.

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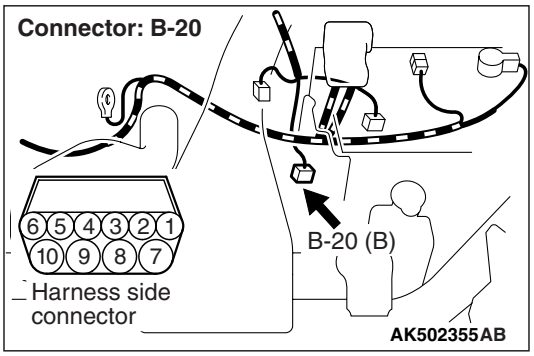
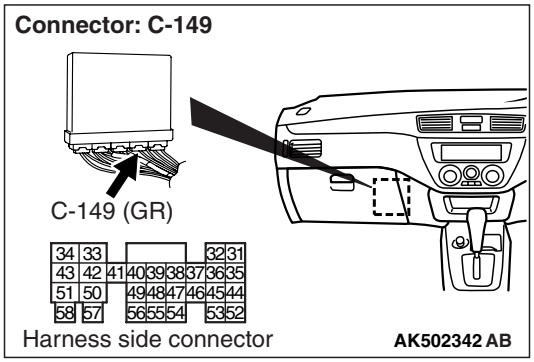
STEP 9. Check inhibitor switch.





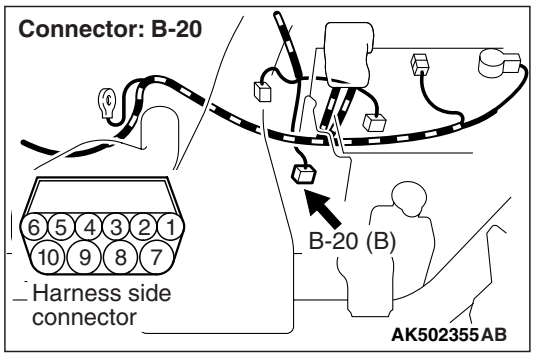
- Check ignition switch (Refer to GROUP 23A –On –vehicle Service –A/T Control Component Check –Inhibitor Switch Check P.23A-109).

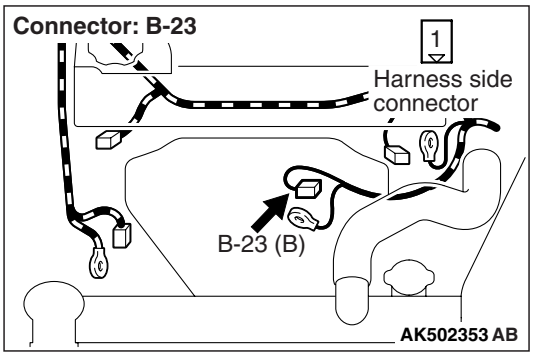
Q: Is the check result normal?

YES : Check and repair harness between B-20 (terminal No. 9) inhibitor switch connector and C-149 (terminal No. 51) engine-A/T-ECU connector.
- Check power supply line for open/short circuit.

NO : Replace the ignition switch.

STEP 10. Connector check: B-20 inhibitor switch connector and B-23 starter connector



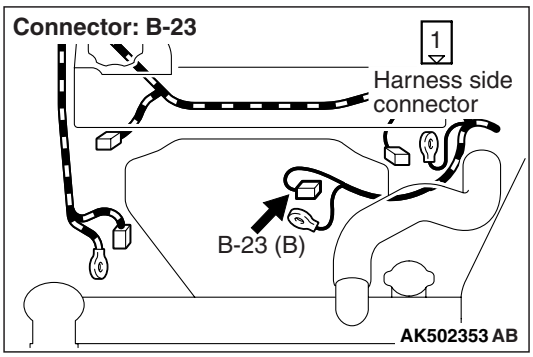


Q: Is the check result normal?

YES : Check intermediate connector B-18, and repair if necessary. If intermediate connector is normal, check and repair harness between B-20 (terminal No. 9) inhibitor switch connector and B-23 (terminal No. 1) starter connector.
- Check output line for short circuit.

NO : Repair or replace the connector.

STEP 11. Connector check: B-23 starter connector



Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace the connector.

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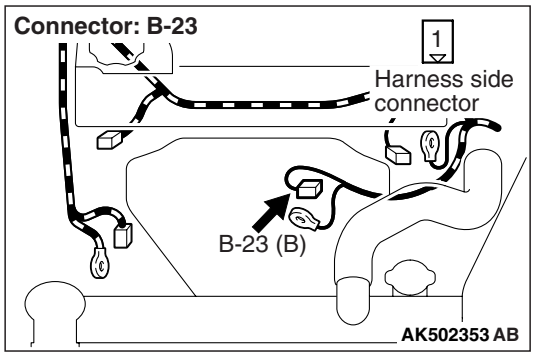
STEP 12. Perform voltage measurement at B-23 starter connector.

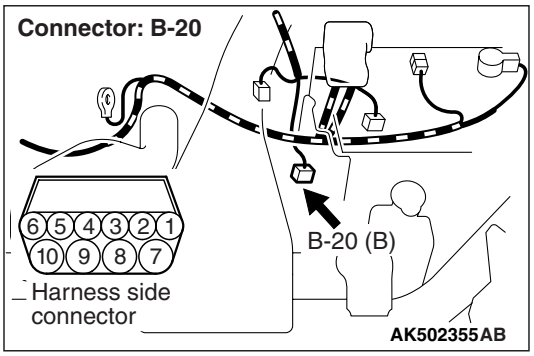


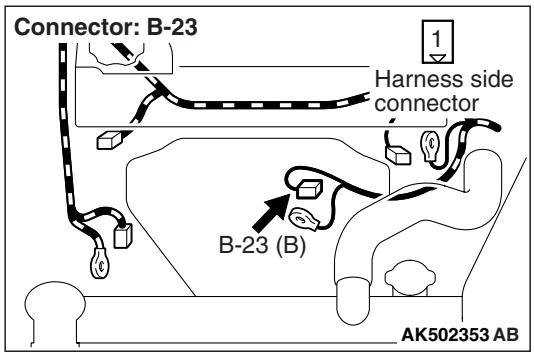
- Disconnect connector, and measure at the harness side.
- Ignition switch: ST
- Voltage between terminal No. 1 and earth.

OK: System voltage

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

STEP 13. Connector check: B-20 inhibitor switch connector

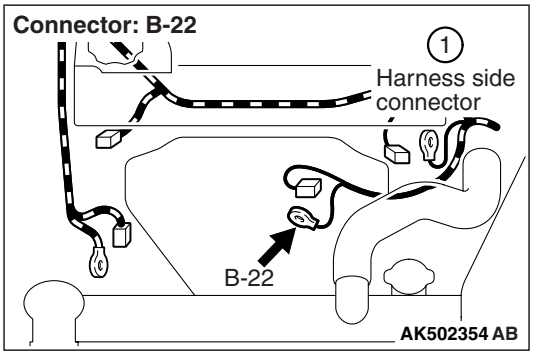




Q: Is the check result normal?
YES : Check intermediate connector B-18, and repair if necessary. If intermediate connector is normal, check and repair harness between B-20 (terminal No. 9) inhibitor switch connector and B-23 (terminal No. 1) starter connector.
- Check output line for open circuit and damage.

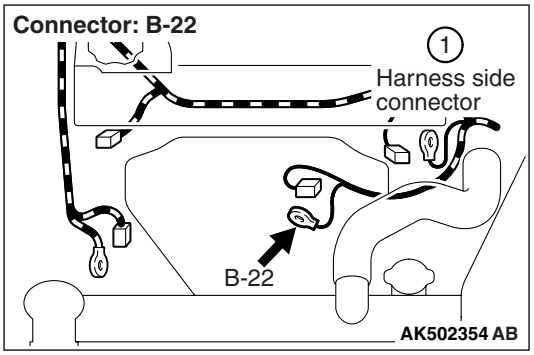
NO : Repair or replace the connector.

STEP 14. Connector check: B-22 starter connector



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

STEP 15. Perform voltage measurement at B-22 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-22 (terminal No. 1) starter connector and battery.
- Check power supply line for open/short circuit.

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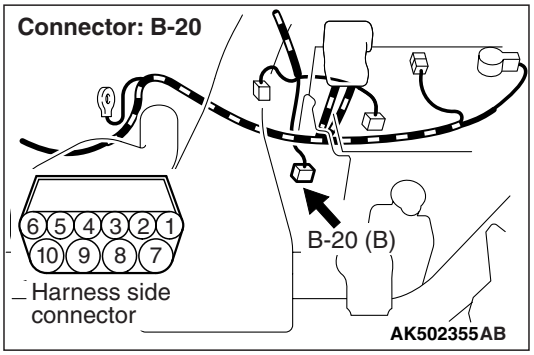
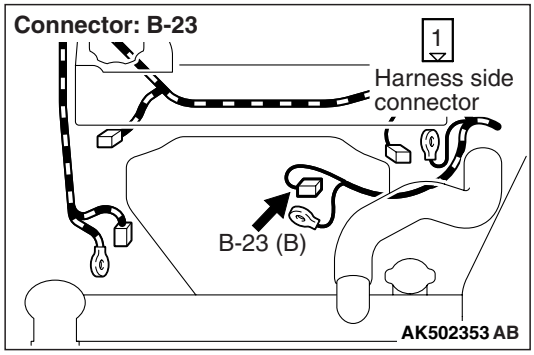
STEP 16. Check harness between B-20 (terminal No. 9) inhibitor switch connector and B-23 (terminal No. 1) starter connector.





NOTE: Before checking harness, check intermediate connector B-18 and repair if necessary.

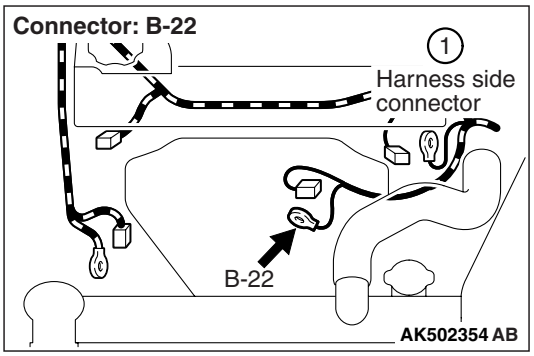
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair the damaged harness wire.

STEP 17. Check harness between B-22 (terminal No. 1) starter connector and battery.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Replace the starter.

NO : Repair the damaged harness wire.

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Inspection Procedure 7: Starting Impossible (Starter Operative but No Initial Combustion)

COMMENT ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

- Failed battery
- Timing belt broken
- Failed idle speed control
- Throttle valve fouled around
- Failed ignition system
- Failed fuel system
- Failed immobilizer system
- Failed inhibitor-switch <A/T>
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?

YES : Go to STEP 2 .

NO : Check battery (Refer to GROUP 54 –Battery –On-vehicle Service –Battery Test P.54A-5).

STEP 2. Check engine warning lamp for burnt out bulb.

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 24 P.13A-259).

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis codes (Refer to P.13A-19)

NO : Go to Step 4 .

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

- Item 07: Fuel pump

OK: Operating sound of fuel pump can be heard.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check fuel pump system (Refer to Inspection Procedure 25 P.13A-264)

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 the timing belt.

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

Q: Is the check result normal?

YES : Go to Step 7.

NO : Clean throttle body (throttle valve portion) (Refer to P.13A-320).

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

- Item 18: Cranking signal

OK:
ON (Ignition switch: ST)
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 <M/T>, Go to Step 9 <A/T> .

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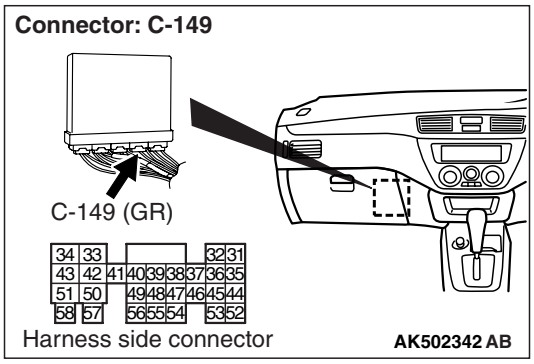
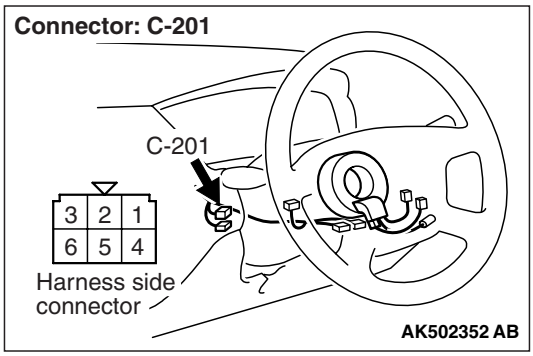
STEP 8. Connector check: C-149 engine-ECU connector





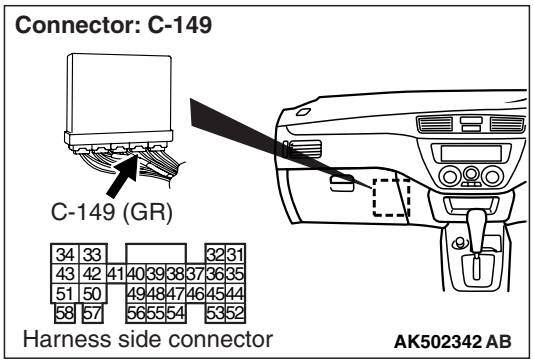
Q: Is the check result normal?

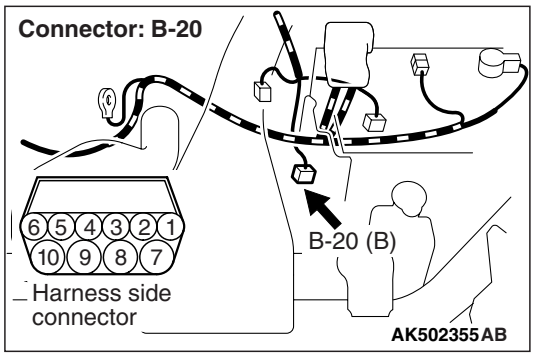
YES : Check intermediate connector C-136, and repair if necessary. If intermediate connector is normal, check and repair harness between C-201 (terminal No. 5) ignition switch connector and C-149 (terminal No. 51) engine-ECU connector.

- Check output line for open/short circuit.

NO : Repair or replace the connector.

STEP 9. Connector check: C-149 engine-A/T-ECU connector





Q: Is the check result normal?

YES : Check and repair harness between B-20 (terminal No. 9) inhibitor switch connector and C-149 (terminal No. 51) engine-A/T-ECU connector.

- Check output line for open/short circuit.

NO : Repair or replace the connector.

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

- Refer to Data List Reference Table P.13A-297.
  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-118).

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STEP 11. Check injector for operating sound.

- Check injector for operating sound (Refer to P.13A-330).

Q: Can operating sound be heard?

YES : Go to Step 12 .

NO : Check the injector system of the defective cylinder.

(Refer to Code No. P0201: No. 1 injector system P.13A-82.)

(Refer to Code No. P0202: No. 2 injector system P.13A-86.)

(Refer to Code No. P0203: No. 3 injector system P.13A-90.)

(Refer to Code No. P0204: No. 4 injector system P.13A-94.)

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 30)

STEP 13. Fuel pressure measurement.

- Fuel pressure measurement (Refer to P.13A-320).

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14. Replace the 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 : The check is end.

Inspection Procedure 8: Starting Impossible (Initial Combustion But No Complete Combustion), Improper Starting (Long Time to Start)

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by poor ignition, incorrect air-fuel ratio at cranking, improper fuel pressure or other faults.

PROBABLE CAUSE

- Failed battery
- Failed ignition system
- Failed fuel system
- Air-fuel ratio control
- Failed idle speed control system
- Failed intake system
- Failed exhaust gas cleaning system
- Throttle valve fouled around
- Timing belt not in place
- Compression pressure improper
- Failed engine-ECU <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 higher

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check battery (Refer to GROUP 54 –Battery –On-vehicle Service –Battery Test P.54A-5).

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis codes (Refer to P.13A-19).

NO : Go to Step 4 .

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 12: Air flow sensor
  b. Item 13: Intake air temperature sensor
  c. Item 21: Engine coolant temperature sensor
  d. Item 95: Manifold absolute pressure sensor

Q: Are the check results normal?
YES : Go to Step 5 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-19).

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 25: Barometric pressure sensor

Q: Are the check results normal?
YES : Go to Step 6 .
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-320).

STEP 7. M.U.T.-II/III actuator test

- Item 07: Fuel pump

  OK: Operating sound of fuel pump can be heard.

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Check fuel pump system (Refer to Inspection Procedure 25 P.13A-264).

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-330).

Q: Can operating sound be heard?
YES : Go to Step 10 .
NO : Check the injector system of the defective cylinder.
(Refer to Code No. P0201: No.1 Injector System P.13A-82).
(Refer to Code No. P0202: No.2 Injector System P.13A-86).
(Refer to Code No. P0203: No.3 Injector System P.13A-90).
(Refer to Code No. P0204: No.4 Injector System P.13A-94).

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 30 P.13A-284).

STEP 12. Check spray condition of injector.

- Check each injector for spray condition (Refer to P.13A-330).

Q: Is the check result normal?
YES : Go to Step 13 .
NO : Replace the injector.

STEP 13. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A –On-vehicle Service –Compression Pressure Check P.11A-15).

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.17-56].

Q: Is the check result normal?
YES : Go to Step 15 .
NO : Replace the EGR valve (stepper motor).

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STEP 15. Replace the 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 : The check is end.

Inspection Procedure 9: Unstable Idling (Rough Idling, Hunting), Improper Idling Speed (Too High or too Low), Engine Stalls during Idling (Die Out)

COMMENT ON TROUBLE SYMPTOM

- Probable causes can be widely found in ignition system, air-fuel ratio control system, idle speed control system, fuel system, etc. A sudden engine stall is possibly caused by poor connector contact.

PROBABLE CAUSE

- Failed ignition system
- Failed fuel system
- Failed air-fuel ratio control system
- Failed idle speed control system
- Failed intake/exhaust system
- Failed emission gas cleaning system
- Throttle valve body fouled
- Timing belt out of place
- Compression pressure improper
- Failed engine-ECU <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.-II/III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-19).

NO : Go to Step 3 .

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

- Refer to Data List Reference Table P.13A-297.
  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 77: Accelerator pedal position sensor (sub)
  f. Item 78: Accelerator pedal position sensor (main)
  g. Item 79: Throttle position sensor (main)
  h. Item 95: Manifold absolute 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-19).

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 5 .

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

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 27: Power steering fluid pressure switch

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Check power steering fluid pressure switch circuit (Refer to Code No. P0551 P.13A-147).

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

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-320).

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

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

STEP 8. Check injector for operating sound.

- Check injector for operating sound (Refer to P.13A-330).

Q: Can operating sound be heard?
YES : Go to Step 9 .
NO : Check the injector system of the defective cylinder.
(Refer to Code No. P0201: No. 1 Injector System P.13A-82).
(Refer to Code No. P0202: No. 2 Injector System P.13A-86).
(Refer to Code No. P0203: No. 3 Injector System P.13A-90).
(Refer to Code No. P0204: No. 4 Injector System P.13A-94).

STEP 9. Check timing marks of timing belt.

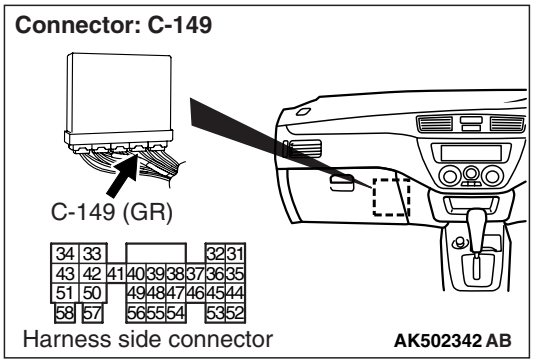
Q: Is the check result normal?
YES : Go to Step 10 .
NO : Align timing marks.

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 11: Oxygen sensor (front)
  b. Item 59: Oxygen sensor (rear)

Q: Is the check result normal?
YES : Go to Step 11 .
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-19).

STEP 11. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

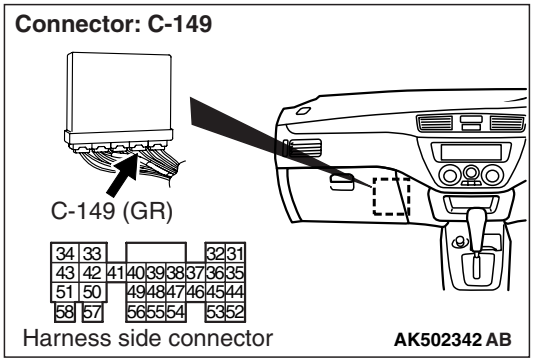


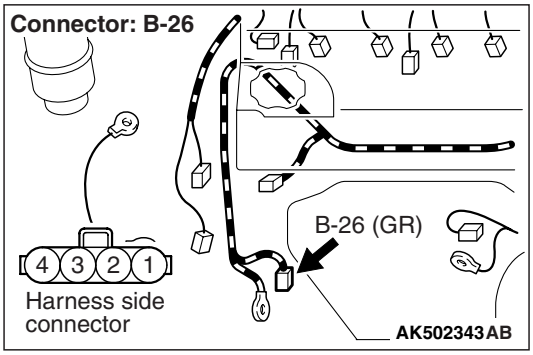
- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral <M/T> or P range <A/T>
- Radiator fan: Not operating
- Voltage between terminal No. 45 and earth.

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

Q: Is the check result normal?
YES : Go to Step 15 .
NO : Go to Step 12 .

STEP 12. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-26 alternator connector





Q: Is the check result normal?
YES : Go to Step 13 .
NO : Repair or replace the connector.

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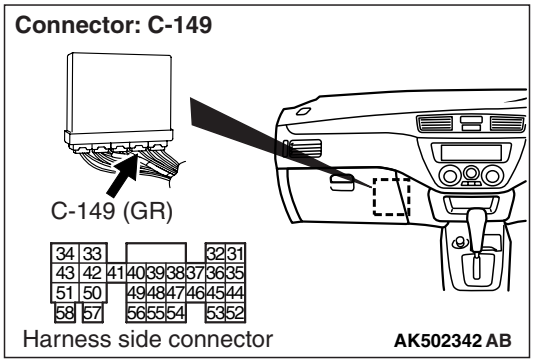
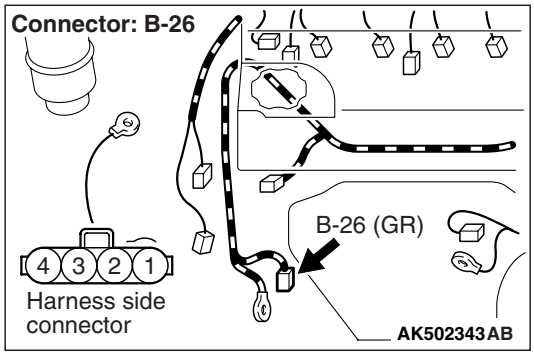
STEP 13. Check harness between C-149 (terminal No. 45) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-26 (terminal No. 1) alternator connector.





NOTE: Before checking harness, check intermediate connector B-18, and repair if necessary.

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

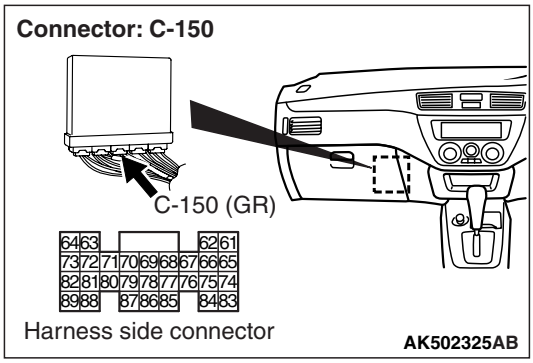
Q: Is the check result normal?
YES : Go to Step 14 .
NO : Repair the damaged harness wire.

STEP 14. Replace the alternator

- After alternator is replaced, re-check for trouble symptom.

Q: Does trouble symptom persist?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : The check is end.

STEP 15. Perform voltage measurement at C-150 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
- A/C switch: ON (A/C compressor ON)
- Voltage between terminal No. 78 and earth.

  OK:
  1 V or less (with outside air temperature sensor ambient temperature at 18° C or higher and A/C set for maximum air flow at minimum temperature)
  System voltage (with A/C set for minimum air flow at room temperature)

Q: Is the check result normal?
YES : Go to Step 16 .
NO : Check A/C load signal system (Refer to Inspection Procedure 29 P.13A-280).

STEP 16. Check ignition coil spark.

Q: Is the check result normal?
YES : Go to Step 17 .
NO : Check ignition circuit system (Refer to Inspection Procedure 30 P.13A-284).

STEP 17. Check injector for spray condition.

- Check each injector for spray condition (Refer to P.13A-330).

Q: Is the check result normal?
YES : Go to Step 18 .
NO : Replace the injector.

STEP 18. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A –On-vehicle Service –Compression Pressure Check P.11A-15).

Q: Is the check result normal?
YES : Go to Step 19 .
NO : Repair.

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STEP 19. 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.17-54).

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Replace the purge control solenoid valve.

STEP 20. 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.17-56].

Q: Is the check result normal?

YES : Go to Step 21 .

NO : Replace the EGR valve (stepper motor).

STEP 21. M.U.T.-II/III actuator test

- Item 07: Fuel pump

  OK: Operating sounds of fuel pump can be heard.

Q: Is the check result normal?

YES : Go to Step 22 .

NO : Check fuel pump system (Refer to inspection Procedure 25 P.13A-264).

STEP 22. Replace the 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 : The check is end.

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Inspection Procedure 10: The Engine Stalls when Starting the Car (Pass Out)

COMMENT ON TROUBLE SYMPTOM

- Engine stall on starting is possibly caused by misfire due to failed spark plug, improper air-fuel ratio at accelerator pedal depression or other faults.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

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

- Refer to Data List Reference Table P.13A-297.
  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-19).

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.17-56].

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Replace the EGR valve (stepper motor).

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

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

STEP 5. Check ignition coil spark.

Q: Is the check result normal?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Check ignition circuit system (Refer to Inspection Procedure 30 P.13A-284).

Inspection Procedure 11. The Engine Stalls when Decelerating

COMMENT ON TROUBLE SYMPTOM

- Engine stall on deceleration is possibly caused by insufficient air intake, improper air-fuel ratio due to failed exhaust gas recirculation system or other faults.

PROBABLE CAUSE

- Failed idle speed control system
- Failed ignition system
- Failed emission control system
- Throttle valve fouled
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

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

- Refer to Data List Reference Table P.13A-297.
  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-19).

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.17-56].

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Replace the 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-320).

STEP 5. Check ignition coil spark.

Q: Is the check result normal?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Check ignition circuit system (Refer to Inspection Procedure 30 P.13A-284).

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Inspection Procedure 12: Engine Does Not Revole Up

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed fuel system, throttle valve opening control system ignition system or other faults.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

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

- Refer to Data List Reference Table P.13A-297.
  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-19).

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 30 P.13A-284).

STEP 4. Fuel pressure measurement.

- Fuel pressure measurement P.13A-320).

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

Inspection Procedure 13: Hesitation, Sag, Poor Acceleration, Stumble, Surge

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition system, improper air-fuel ratio, throttle valve opening control system improper compression pressure or other faults.

PROBABLE CAUSE

- Failed air-fuel ratio control system
- Failed ignition system
- Failed fuel system
- Failed intake and exhaust system
- Failed emission control system
- Failed throttle valve opening control system
- Throttle valve fouled
- Improper compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

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STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to P.13A-330).

Q: Can operating sound be heard?

YES : Go to Step 3 .

NO : Check the injector system of the defective cylinder.
(Refer to Code No. P0201: No. 1 Injector System P.13A-82).
(Refer to Code No. P0202: No. 2 Injector System P.13A-86).
(Refer to Code No. P0203: No. 3 Injector System P.13A-90).
(Refer to Code No. P0204: No. 4 Injector System P.13A-94).

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

- Refer to Data List Reference Table P.13A-297.
  a. Idem 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)
  g. Item 95: Manifold absolute 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-19).

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 25: Barometric pressure sensor

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Replace the 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.17-54).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace the 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.17-56].

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Replace the EGR valve (stepper motor).

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 11: Oxygen sensor (front)
  b. Item 59: Oxygen sensor (rear)

Q: Are the check results normal?

YES : Go to Step 8 .

NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-19).

STEP 8. Check ignition coil spark.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Check ignition circuit system (Refer to Inspection Procedure 30 P.13A-284).

STEP 9. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Clean throttle body (throttle valve portion) (Refer to P.13A-320).

STEP 10. Measure fuel pressure.

- Measure fuel pressure (Refer to P.13A-320).

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. Check compression pressure.

- Check compression pressure (Refer to GROUP 11A –On-vehicle Service –Compression Pressure Check P.11A-15).

Q: Is the check result normal?

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

NO : Repair.

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Inspection Procedure 14. The Feeling of Impact or Vibration when Accelerating

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition leak with rise in spark plug-required voltage at acceleration, throttle valve opening control system.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-19).

NO : Go to Step 2 .

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

- Refer to Data List Reference Table P.13A-297.
  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-19).

STEP 3. Check ignition coil spark.

Q: Is the check result normal?

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

NO : Check ignition circuit system (Refer to Inspection Procedure 30 P.13A-284).

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Inspection Procedure 15: The Feeling of Impact or Vibration when Decelerating

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by insufficient air intake due to failed idle speed control system.

PROBABLE CAUSE

- Failed idle speed control system
- Throttle valve body fouled
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

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

- Refer to Data List Reference Table P.13A-297.
  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-19).

STEP 3. Check throttle body (throttle valve) contamination.

Q: Is the check result normal?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Clean throttle body (throttle valve portion) (Refer to P.13A-320).

Inspection Procedure 16: Knocking

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed detonation control, improper thermal value of spark plug or other faults.

PROBABLE CAUSE

- Defective detonation sensor
- Failed detonation control system
- Failed ignition system
- Defective spark plug
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

STEP 2. Check ignition coil spark.

Q: Is the check result normal?
YES : Check detonation sensor system (Refer to Code No. P0325 P.13A-115).
NO : Check ignition circuit system (Refer to Inspection Procedure 30 P.13A-284).

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Inspection Procedure 17: Ignition Timing Offset

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed crank angle sensor, failed camshaft position sensor, improper installed timing belt or other faults.

PROBABLE CAUSE

- Failed crank angle sensor
- Failed camshaft position sensor
- Improperly installed timing belt
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

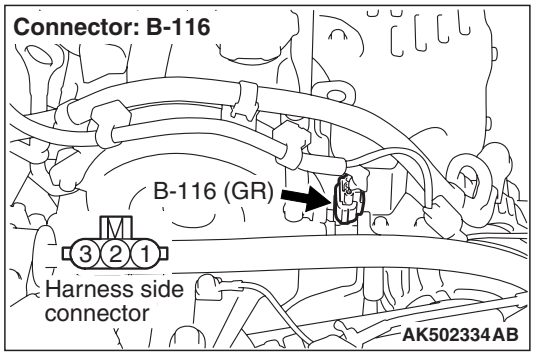
STEP 1. M.U.T.-II/III diagnosis code

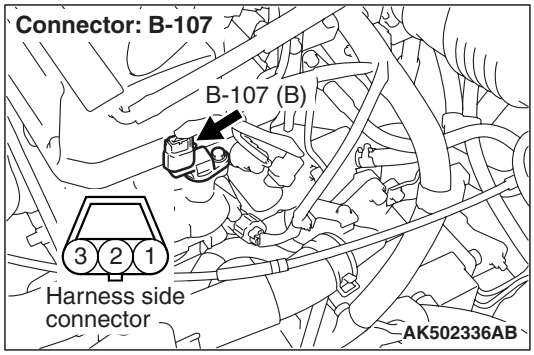
Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13A-19).

NO : Go to Step 2 .

STEP 2. Measure output waveforms of crank angle sensor and camshaft position sensor (Use oscilloscope).





Crank Angle Sensor

- Use special tool test harness (MB991658) to connect B-116 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-107 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-313) using an oscilloscope.

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Go to Step 4 .

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STEP 3. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

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 blead.

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Replace the crank shaft sensing blead.

STEP 7. Check camshaft position sensing cylinder.

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Replace the camshaft position sensing cylinder.

STEP 8. Replace the 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 : The check is end.

STEP 9. Replace the camshaft position sensor.
- After replacing the camshaft position sensor, re-check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

Inspection Procedure 18: 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-330).

Q: Does trouble symptom persist?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Replace the injector.

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Inspection Procedure 19: Odor, White Smoke, Black Smoke, and High-Concentration CO/HC during Idling

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by improper air-fuel ratio, deteriorated catalyst, failed ignition system, failed fuel system, failed compression pressure or other faults.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to P.13A-330).

Q: Can operating sound be heard?
YES : Go to Step 3 .
NO : Check the injector system of the defective cylinder.
(Refer to, Code No. P0201: No. 1 injector system P.13A-82).
(Refer to, Code No. P0202: No. 2 injector system P.13A-86).
(Refer to, Code No. P0203: No. 3 injector system P.13A-90).
(Refer to, Code No. P0204: No. 4 injector system P.13A-94).

STEP 3. Check ignition timing.

- Check ignition timing. (Refer to GROUP 11A – On-vehicle Service –Ignition Timing Check P.11A-12).

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Check for offset ignition timing (Refer to Inspection Procedure 17 P.13A-246).

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 12: Air flow sensor
  b. Item 13: Intake air temperature sensor
  c. Item 21: Engine coolant temperature sensor
  d. Item 95: Manifold absolute pressure sensor

Q: Are the check results normal?
YES : Go to Step 5 .
NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-19).

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

- Refer to Data List Reference Table P.13A-297.
  a. Item 25: Barometric pressure sensor

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

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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-320).

STEP 9. M.U.T.-II/III data list
- Refer to Data List Reference Table P.13A-297.
  a. Item 11: Oxygen sensor (front)
  b. Item 59: Oxygen sensor (rear)

Q: Are the check results normal?
YES : Go to Step 10 .
NO : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code P.13A-19).

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.17-54).

Q: Is the check result normal?
YES : Go to Step 11 .
NO : Replace the 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.17-56].

Q: Is the check result normal?
YES : Go to Step 12 .
NO : Replace the EGR valve (stepper motor).

STEP 12. Measure fuel pressure.
- Measure fuel pressure (Refer to P.13A-320).

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.17-52).

Q: Is the check result normal?
YES : Go to Step 14 .
NO : Replace the positive crankcase ventilation valve.

STEP 14. Check spark plug.

Q: Is the check result normal?
YES : Go to Step 15 .
NO : Replace the spark plug.

STEP 15. Check ignition coil itself.
- Check ignition coil itself (Refer to GROUP 16 –Ignition System –On-vehicle Service –Ignition Coil Check P.16-25).

Q: Is the check result normal?
YES : Go to Step 16 .
NO : Replace the ignition coil.

STEP 16. Check compression pressure.
- Check compression pressure (Refer to GROUP 11A –On-vehicle Service –Compression Pressure Check P.11A-15).

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-330).

Q: Does trouble symptom persist?
YES : Go to Step 18 .
NO : Replace the injector.

STEP 18. Replace the catalytic converter.
- After replacing the catalytic converter, re-check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : The check is end.

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Inspection Procedure 20: Battery Run Down

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed alternator, failed generation control circuit or other faults.

PROBABLE CAUSE

- Failed battery
- Alternator G terminal short-circuited
- Failed alternator
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage during cranking.

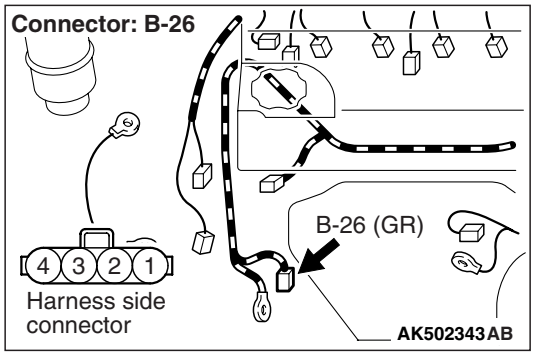
OK: 8 V or more

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 54A – Battery –On-vehicle Service –Battery Test P.54A-5).

STEP 2. Connector check: B-26 alternator connector

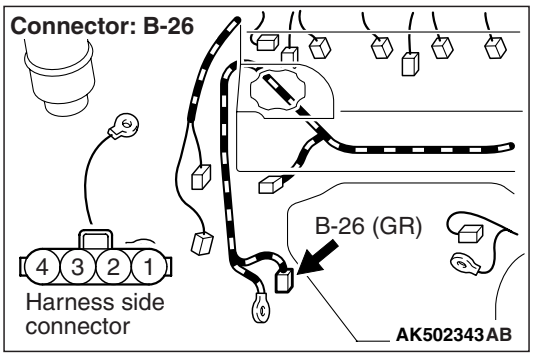


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Perform voltage measurement at B-26 alternator connector.



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

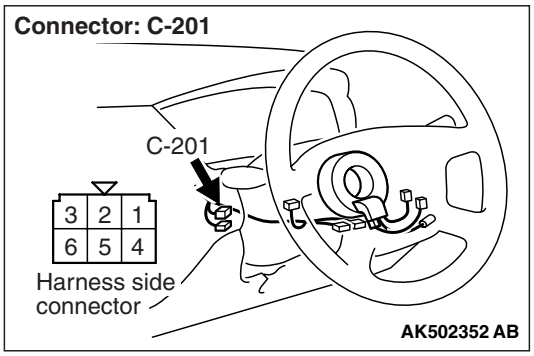
OK: System voltage

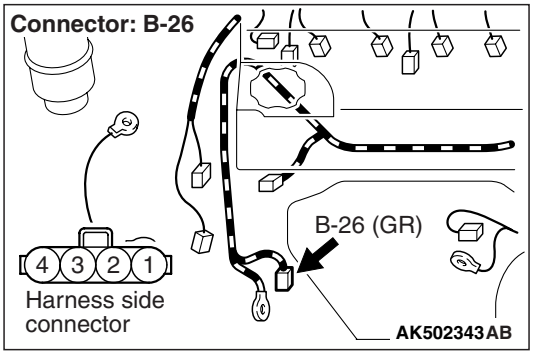
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: C-201 ignition switch connector





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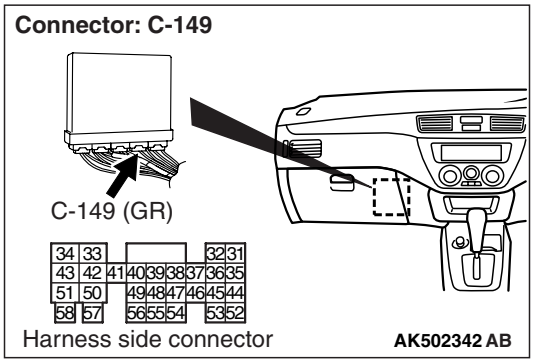
Q: Is the check result normal?

YES : Check intermediate connectors B-18, C-04, C-137, C-210 and C-212, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-26 (terminal No. 3) alternator connector and C-201 (terminal No. 2) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 5. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

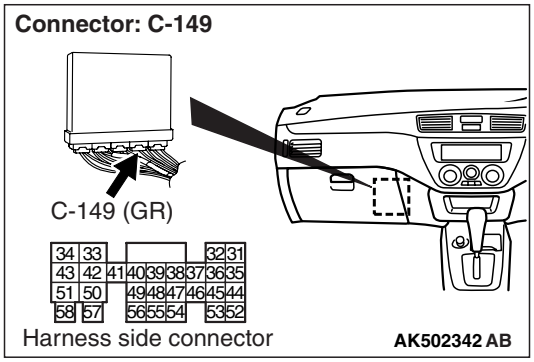


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace the connector.

STEP 6. Perform voltage measurement at C-149 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.

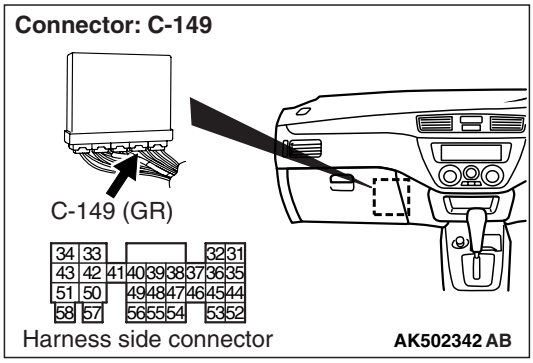
OK: System voltage

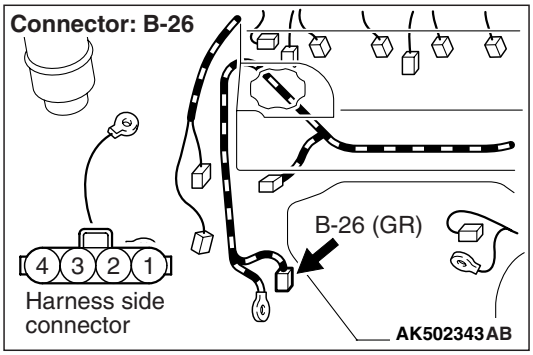
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Check harness between C-149 (terminal No. 45) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-26 (terminal No. 1) alternator connector.





- Check output line for open/short circuit.

Q: Is the check result normal?

YES : Replace the alternator.

NO : Repair the damaged harness wire.

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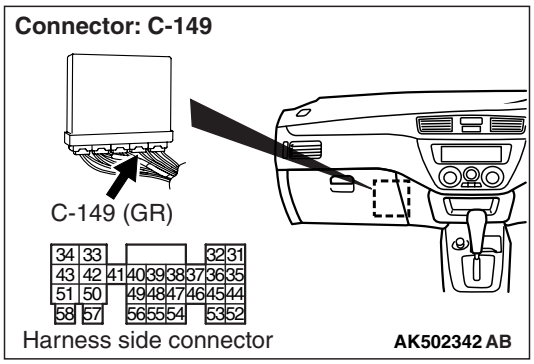
STEP 8. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- 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 the alternator.

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

Inspection Procedure 21: Overheating

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed engine cooling system, failed fan controller, failed engine coolant temperature sensor or other faults.

PROBABLE CAUSE

- Insufficient or deteriorated engine coolant
- Failed fan controller
- Failed engine coolant temperature sensor
- Failed thermostat
- Failed water pump
- Failed radiator core
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
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.14-21).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace or add engine coolant.

STEP 3. M.U.T.-II/III actuator test

- Item 21: Fan controller

  OK: Fan motor rotating

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Check fan control relay system (Refer to Inspection Procedure 26 P.13A-272).

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

- Item 21: Engine coolant temperature sensor

  OK:

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

  Engine hot state: At 80 –120° C

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check engine coolant temperature sensor system (Refer to Code No. P0115 P.13A-40).

STEP 5. Check thermostat.

- Check thermostat (Refer to GROUP 14 –Thermostat –Thermostat Inspection P.14-26).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace the thermostat.

STEP 6. Check water pump.

- Check water pump.

Q: Is the check result normal?

YES : Replace the radiator.

NO : Replace the water pump.

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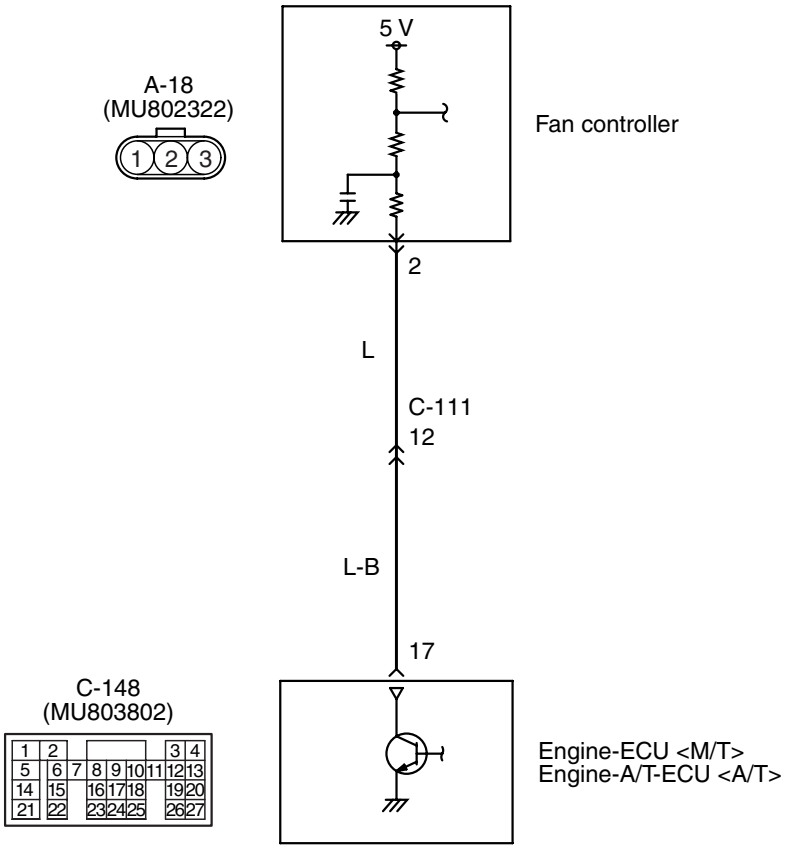
Inspection Procedure 22: Abnormal Rotation of Fan Motor

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 PU: Purple

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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 5 V).

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>

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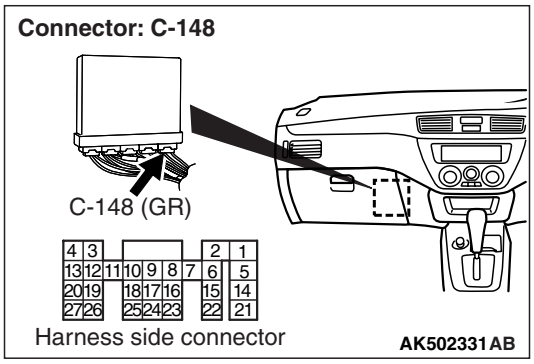
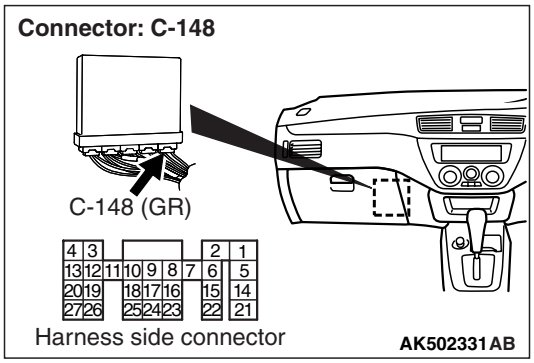
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-148 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 the connector.

STEP 2. Check at C-148 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.

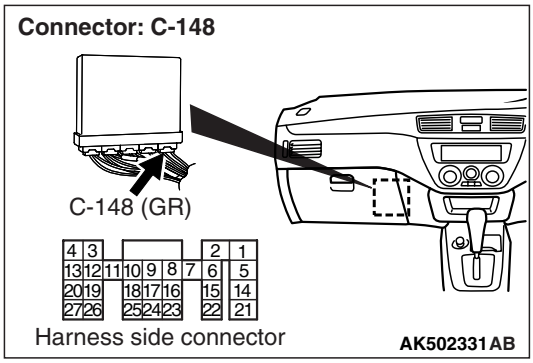
OK: Fan motor stops rotating.

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 the 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 –How to Cope with Intermittent Malfunctions P.00-13).

STEP 4. Perform voltage measurement at C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

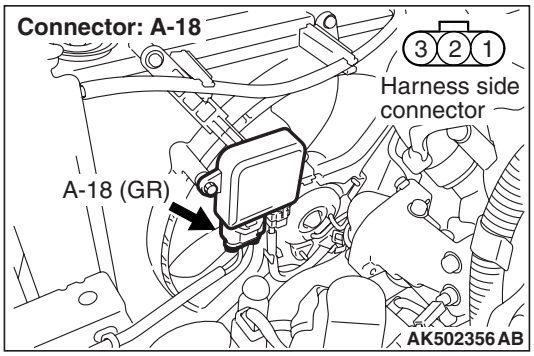


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 17 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Replace fan controller.
NO : Go to Step 5 .

STEP 5. Connector check: A-18 fan controller connector



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

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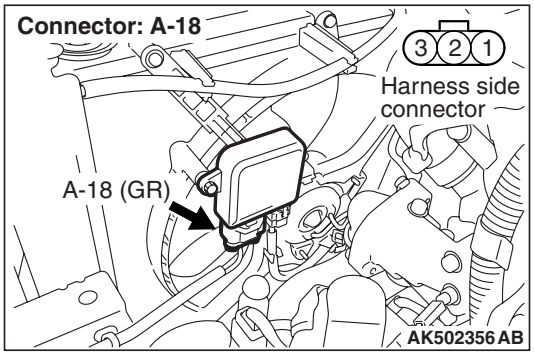
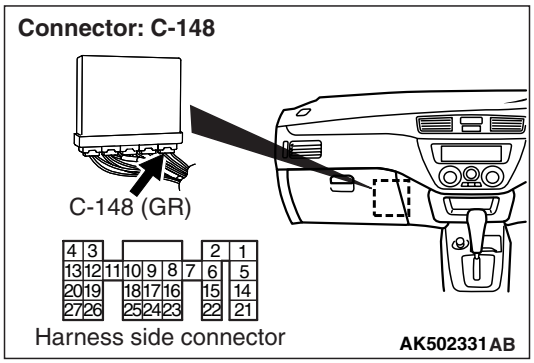
STEP 6. Check harness between A-18 (terminal No. 2) fan controller connector and C-148 (terminal No. 17) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





NOTE: Before checking harness, check intermediate connector C-111, and repair if necessary.

- Check output line for open circuit.

Q: Is the check result normal?

YES : Replace the fan controller.

NO : Repair the damaged harness wire.

Inspection Procedure 23: Poor A/C Performance

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by short /overcharged A/C refrigerant, failed A/C control system, failed fan control system or other faults.

PROBABLE CAUSE

- Short or overcharged A/C refrigerant
- Failed A/C compressor relay
- Failed fan controller
- Failed A/C-ECU
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?
YES : Inspection chart for diagnosis code (Refer to P.13A-19).
NO : Go to Step 2 .

STEP 2. A/C compressor magnet clutch operation check.

- Engine: Idling
- A/C set temperature:
  Maximum Cool when temperature in cabin is 25° C or more
  Maximum Hot when temperature in cabin is 25° C or less

OK:
Magnet clutch active (when A/C is ON)
Magnet clutch inactive (when A/C is OFF)

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Go to Step 3 .

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

- Item 28: A/C switch
  a. Engine: Idling
  b. A/C set temperature:
     Maximum Cool when temperature in cabin is 25° C or more
     Maximum Hot when temperature in cabin is 25° C or less

OK:
ON (when A/C is ON)
OFF (when A/C is OFF)

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Check A/C switch (Refer to Inspection Procedure 27 P.13A-278).

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

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

OK:
ON (when A/C is ON)
OFF (when A/C is OFF)

Q: Is the check result normal?
YES : Check A/C system (Refer to GROUP 55A – Troubleshooting check chart for trouble symptoms P.55A-5).
NO : Check A/C compressor relay (Refer to Inspection Procedure 28 P.13A-279).

STEP 5. Check charged amount of A/C refrigerant.

- Check charged amount of A/C refrigerant (Refer to GROUP 55A –On-vehicle Service –Charging And Discharging P.55A-43).

Q: Is the check result normal?
YES : Go to Step 6 .
NO : Adjust charged amount of A/C refrigerant.

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STEP 6. M.U.T.-II/III actuator test

- Item 21: Fan controller

  OK: Fan motor rotates.

Q: Is the check result normal?

YES : Check A/C load signal system (Refer to Inspection Procedure 29 P.13A-280).

NO : Check fan control relay system (Refer to Inspection Procedure 26 P.13A-272).

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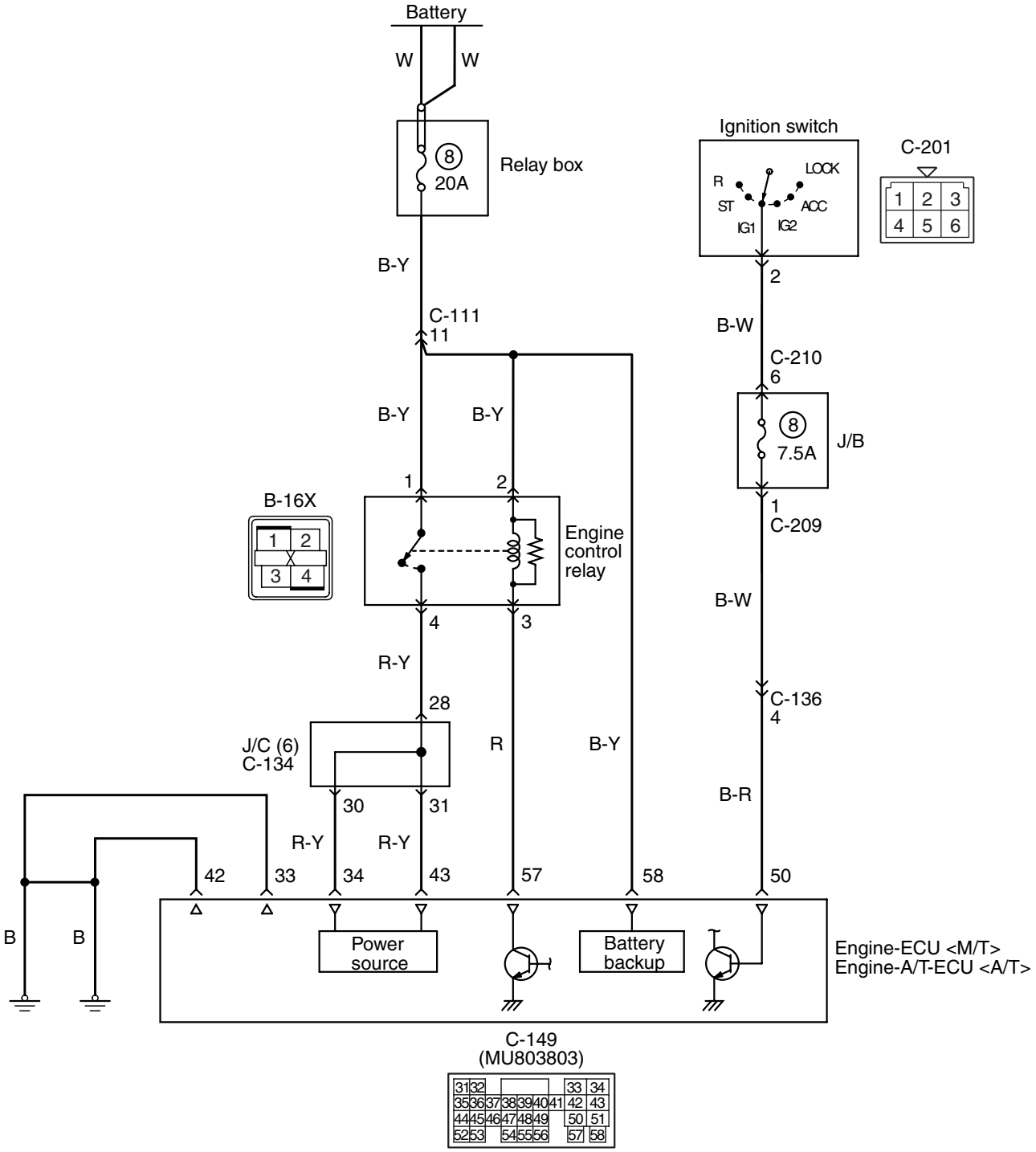
Inspection Procedure 24: Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Power Supply, Engine Control Relay, Ignition Switch-IG1 System

Power supply and ignition switch-IG circuit



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

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OPERATION

- The battery voltage is applied to the engine control relay (terminal No. 1 and 2).
- 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. 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 engine control relay in the ON position. Accordingly, the battery voltage is supplied to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, sensor and actuator.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage during cranking.

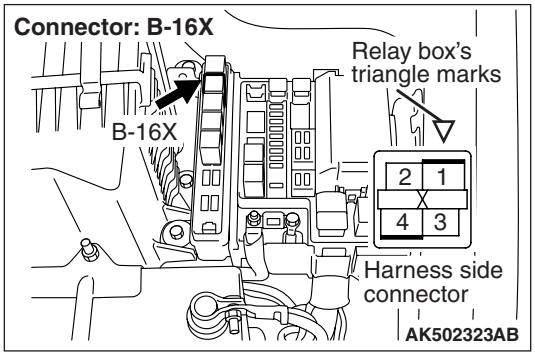
OK: 8 V or more

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 54A – Battery –On-vehicle Service –Battery test P.54A-5).

STEP 2. Connector check: B-16X engine control relay connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace the connector.

STEP 3. Check engine control relay.

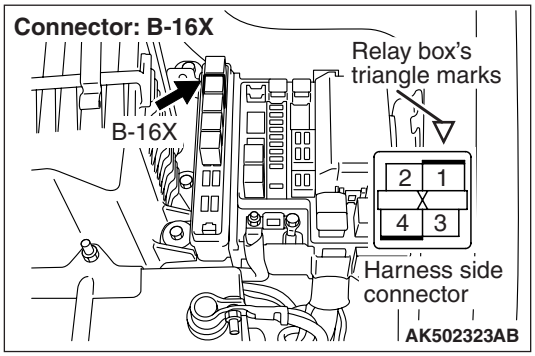
- Check engine control relay (Refer to P.13A-325).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace the engine control relay.

STEP 4. Perform voltage measurement at B-16X engine control relay connector.



- Remove relay, and measure at relay box side.
- Voltage between terminal No. 1 and earth, also between terminal No. 2 and earth.

OK: System voltage

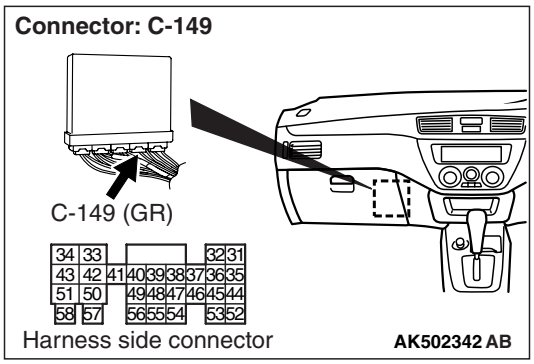
Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check intermediate connector C-111, and repair if necessary. If intermediate connector is normal, check and repair harness between B-16X (terminal No. 1 and terminal No. 2) engine control relay connector and battery.

- Check power supply line for open/short circuit.

STEP 5. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

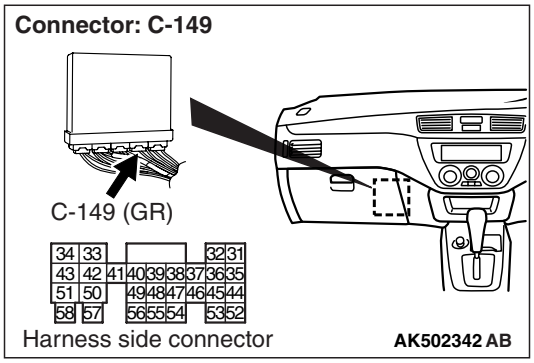


- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 34 and earth, also between terminal No. 43 and earth.

OK: System voltage

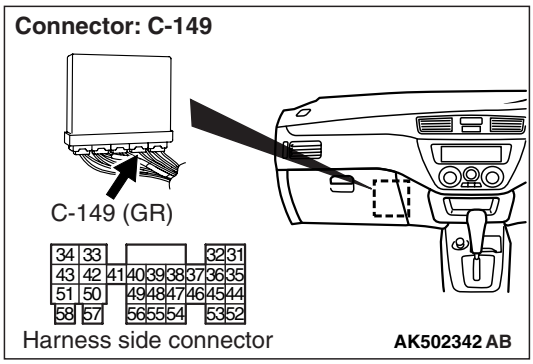
Q: Is the check result normal?
YES : Check and repair C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
NO : Go to Step 6 .

STEP 6. Connector check: C-149 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 the connector.

STEP 7. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

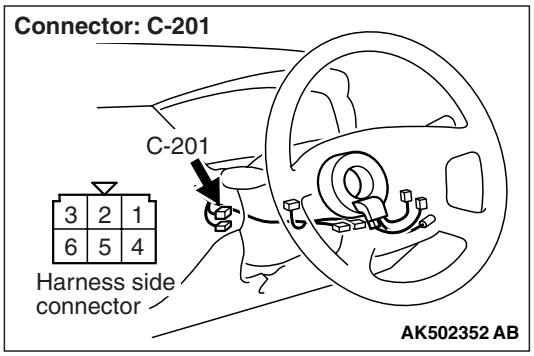


- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 50 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 10 .
NO : Go to Step 8 .

STEP 8. Connector check: C-201 ignition switch connector



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

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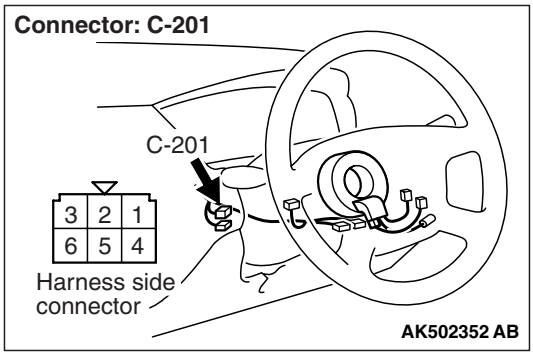
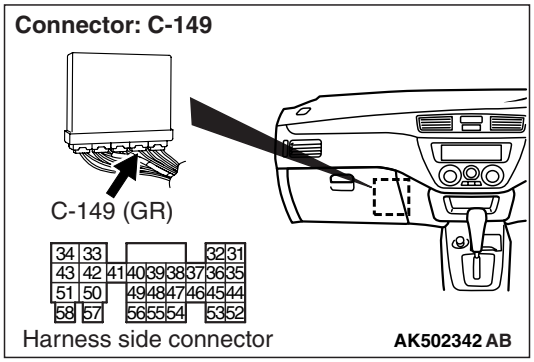
STEP 9. Check ignition switch.





- Check ignition switch (Refer to GROUP 54A – Ignition Switch –Ignition Switch –Inspection P.54A-25).

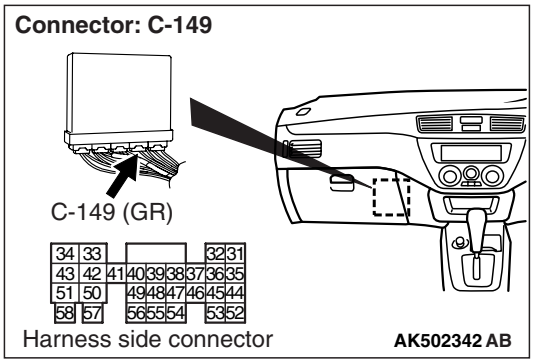
Q: Is the check result normal?

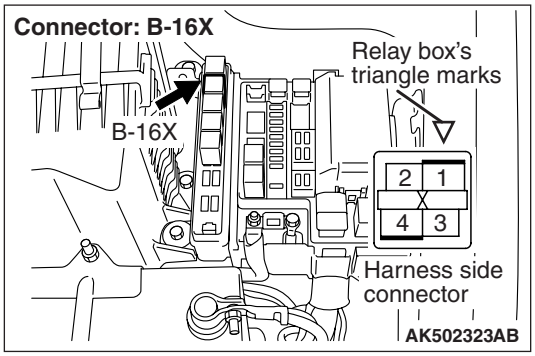
YES : Check intermediate connector C-136, C-209 and C-210, and repair if necessary. If intermediate connector is normal, check and repair harness between C-201 (terminal No. 2) ignition switch connector and C-149 (terminal No. 50) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

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

NO : Replace the ignition switch.

STEP 10. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: OFF
- Voltage between terminal No. 57 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Check and repair harness between B-16X (terminal No. 3) engine control relay connector and C-149 (terminal No. 57) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

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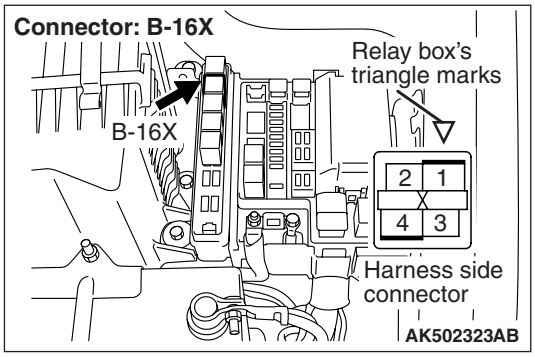
STEP 11. Check harness between B-16X (terminal No. 1 and No. 2) engine control relay connector and battery.

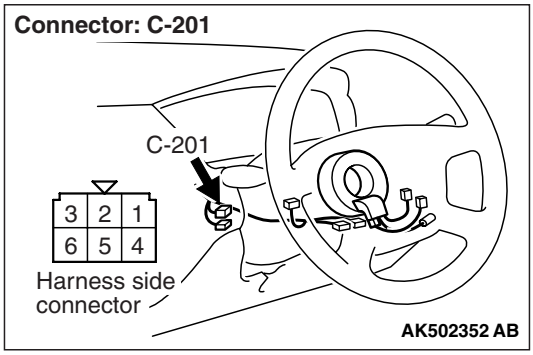


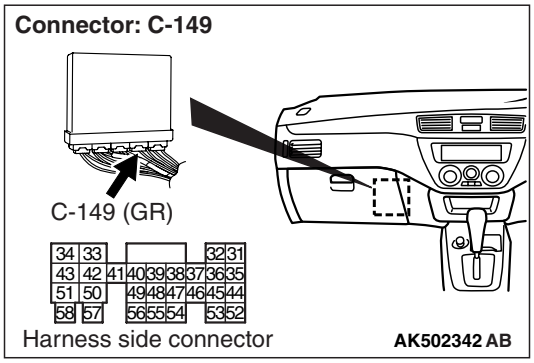
NOTE: Before checking harness, check intermediate connector C-111, and repair if necessary.

- Check power supply line for damage.

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

STEP 12. Check harness between C-201 (terminal No. 2) ignition switch connector and C-149 (terminal No. 50) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



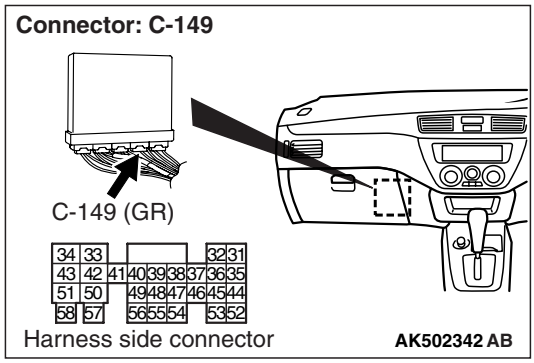


NOTE: Before checking harness, check intermediate connectors C-136, C-209 and C-210 and repair if necessary.

- Check output line for damage.

Q: Is the check result normal?
YES : Go to Step 13 .
NO : Repair the damaged harness wire.

STEP 13. Check harness between C-149 (terminal No. 33 and No. 42) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and body earth.



- Check earthing line for damage.

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

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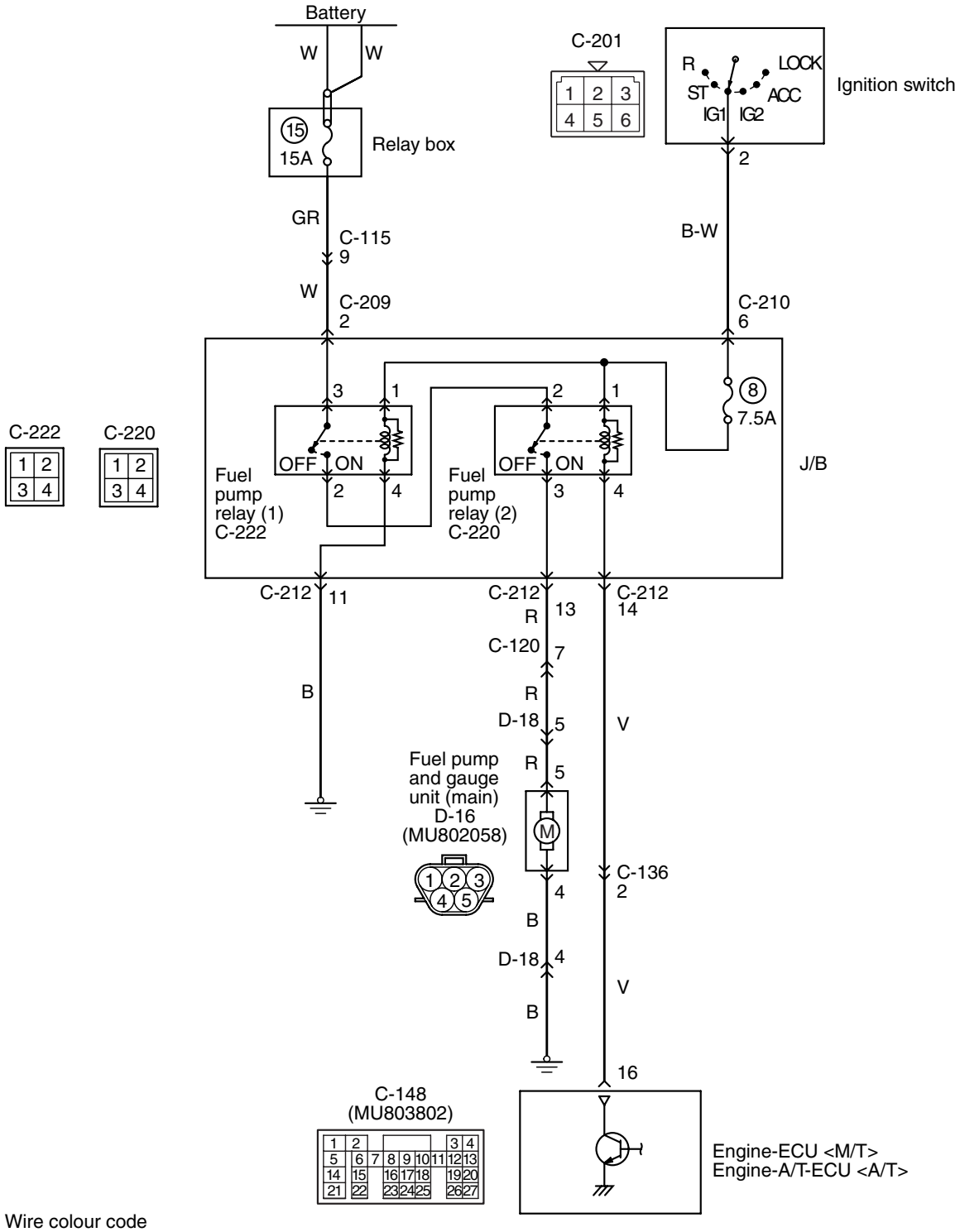
Inspection Procedure 25: Fuel Pump System

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 PU: Purple

AK502041 AB

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OPERATION

- The battery voltage is applied to the fuel pump relay (1) (terminal No. 1) form the ignition switch and is earthed to the vehicle body from the fuel pump relay (1) (terminal No. 4).
- The battery voltage is applied to the fuel pump relay (1) (terminal No. 3) and to the fuel pump relay (2) (terminal No. 2) from the fuel pump relay (1) (terminal No. 2).
- The battery voltage is applied to the fuel pump relay (2) (terminal No. 1) from the ignition switch. The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 16) makes the power transistor in the unit be in "ON" position and makes currents go on the fuel pump relay (2) coil, and that makes the relay be in "ON" position.
- When the fuel pump relay (2) is in "ON" position, the battery voltage is supplied to the fuel pump (low pressure) from the fuel pump relay (2) (terminal No. 3).

FUNCTION

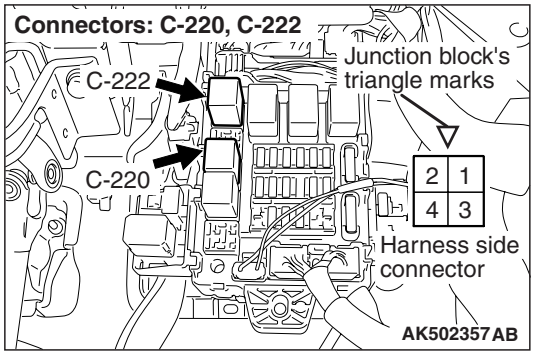
- When the ignition switch ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> places the fuel pump relay in the "ON" position. Accordingly, the battery voltage is supplied to the fuel pump.

PROBABLE CAUSE

- Failed fuel pump relay
- Failed fuel pump
- Open/short circuit in fuel pump drive circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-222 fuel pump relay (1) connector and C-220 fuel pump relay (2) connector



Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check fuel pump relay.

- Fuel pump relay, continuity check (Refer to P.13A-326).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the fuel pump relay.

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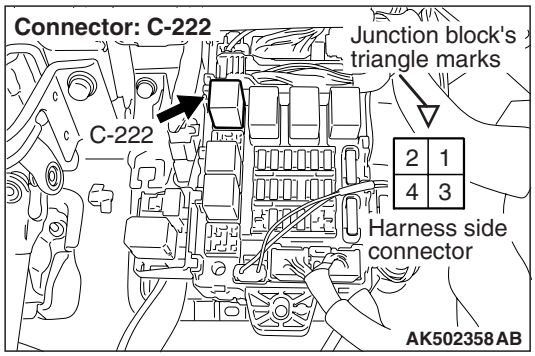
STEP 3. Perform resistance measurement at C-222 fuel pump relay (1) connector.



- Remove relay, and measure at junction block side.
- Resistance between terminal No. 4 and earth.

OK: 2 Ω or less

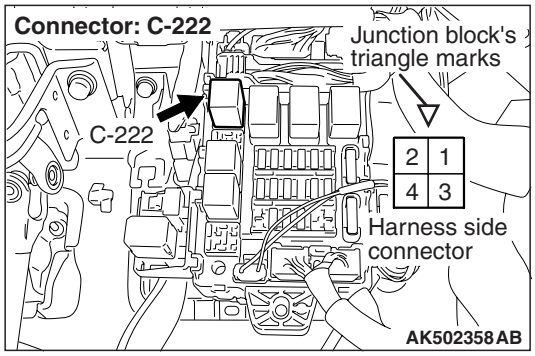
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check intermediate connector C-212, and repair if necessary. If intermediate connector is normal, check and repair harness between C-222 (terminal No. 4) fuel pump relay (1) connector and body earth.

- Check earthing line for open circuit and damage.

STEP 4. Perform voltage measurement at C-222 fuel pump relay (1) connector.



- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

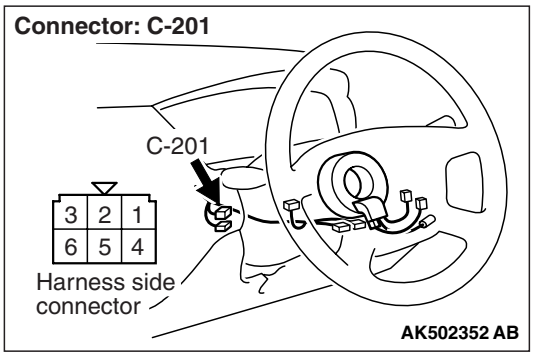
OK: System voltage

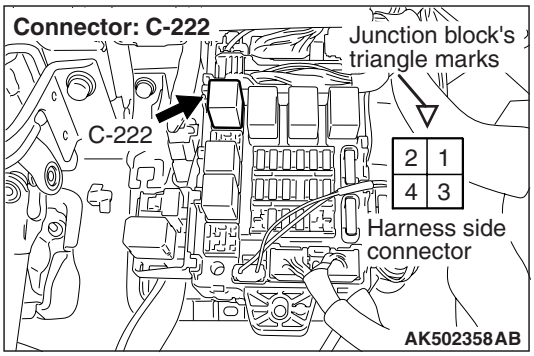
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: C-201 ignition switch connector





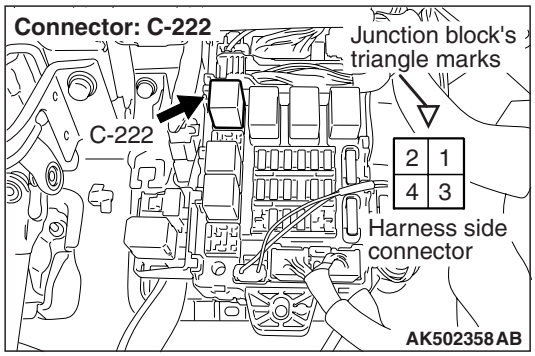
Q: Is the check result normal?

YES : Check intermediate connector C-210, and repair if necessary. If intermediate connector is normal, check and repair harness between C-222 (terminal No. 1) fuel pump relay (1) connector and C-201 (terminal No. 2) ignition switch connector.

- Check power supply line for open circuit and damage.

NO : Repair or replace the connector.

STEP 6. Perform voltage measurement at C-222 fuel pump relay (1) connector.



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

OK: System voltage

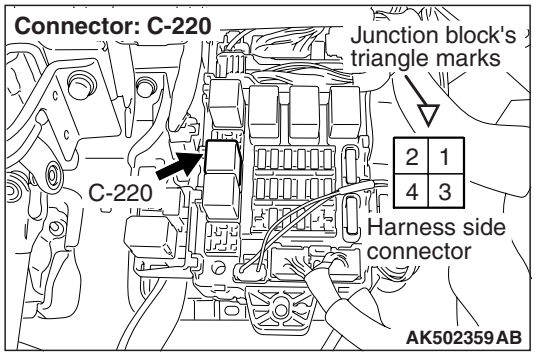
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Check intermediate connectors C-115 and C-209, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-222 (terminal No. 3) fuel pump relay (1) connector and battery.

- Check power supply line for open/short circuit.

STEP 7. Perform voltage measurement at C-220 fuel pump relay (2) connector.



- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

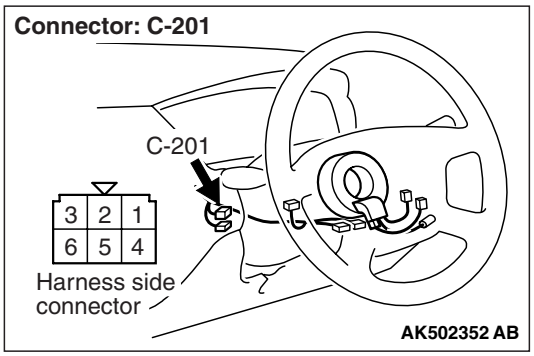
OK: System voltage

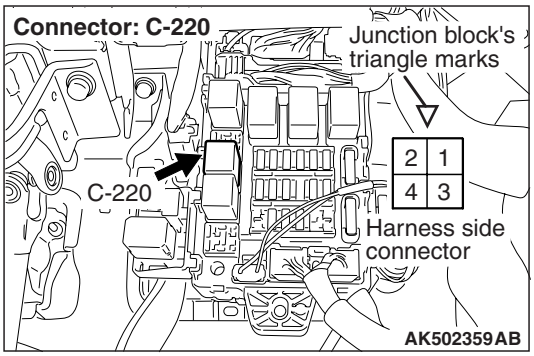
Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 8 .

STEP 8. Connector check: C-201 ignition switch connector





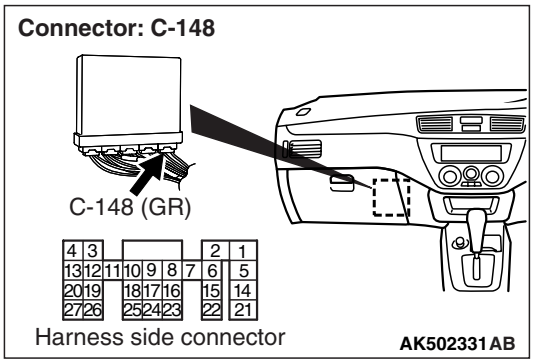
Q: Is the check result normal?

YES : Check intermediate connector C-210, and repair if necessary. If intermediate connector is normal, check and repair harness between C-201 (terminal No. 2) ignition switch connector and C-220 (terminal No. 1) fuel pump relay (2) connector.

- Check power supply line for open circuit.

NO : Repair or replace the connector.

STEP 9. Connector check: C-148 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 the connector.

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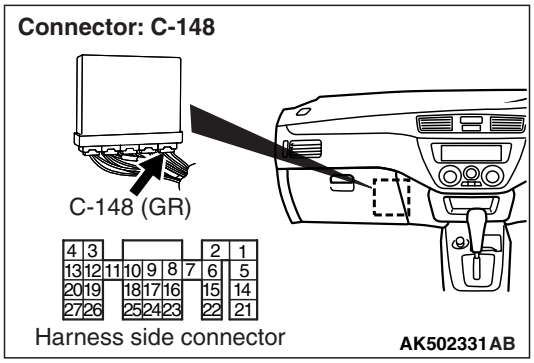
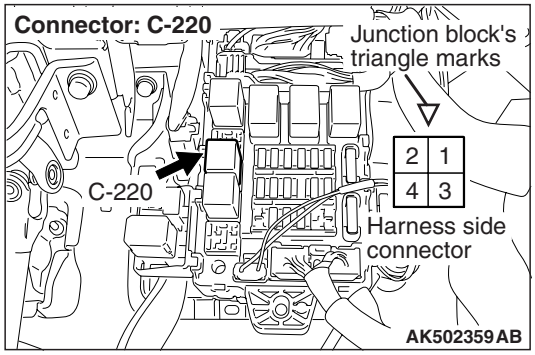
STEP 10. Perform voltage measurement at C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 16 and earth.

OK: System voltage

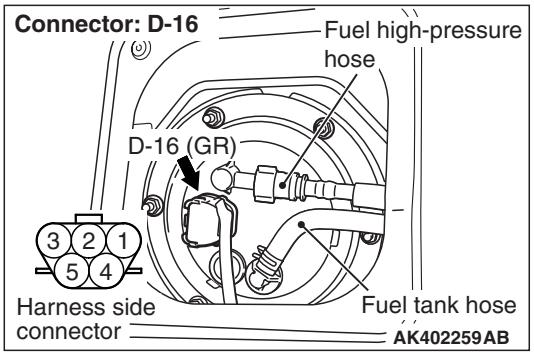
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Check intermediate connectors C-136 and C-212, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-220 (terminal No. 4) fuel pump relay (2) connector and C-148 (terminal No. 16) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

STEP 11. Connector check: D-16 fuel pump connector

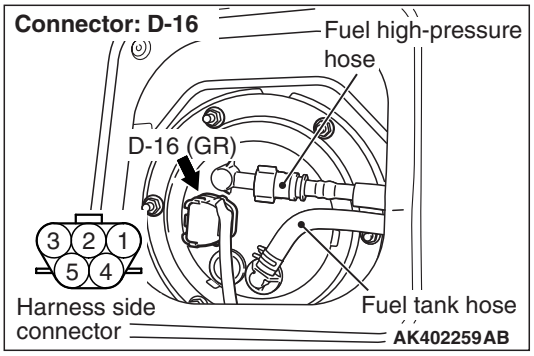


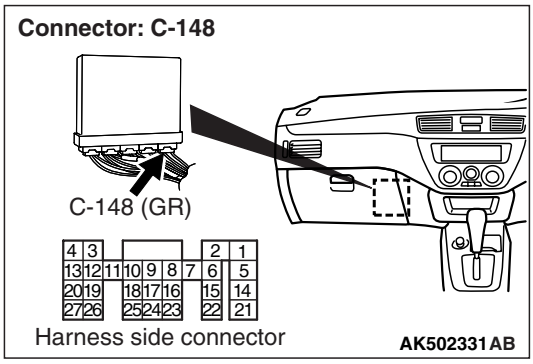
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace the connector.

STEP 12. Perform voltage measurement at D-16 fuel pump connector.





- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Using a jumper wire, connect C-148 (terminal No. 16) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and earth.
- Voltage between terminal No. 5 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Go to Step 13 .

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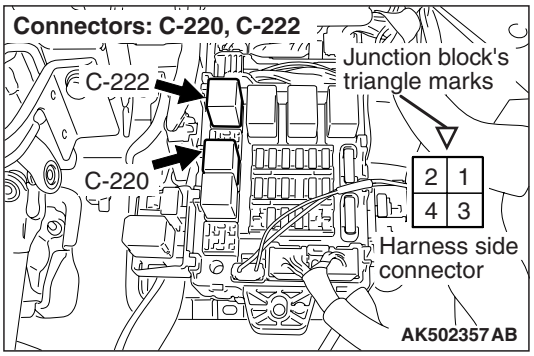
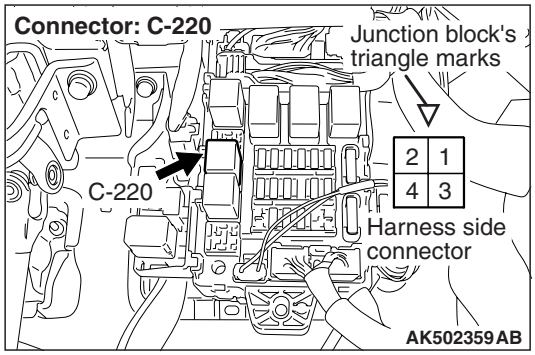
STEP 13. Check harness between C-222 (terminal No. 2) fuel pump relay (1) connector and C-220 (terminal No. 2) fuel pump relay (2) connector.

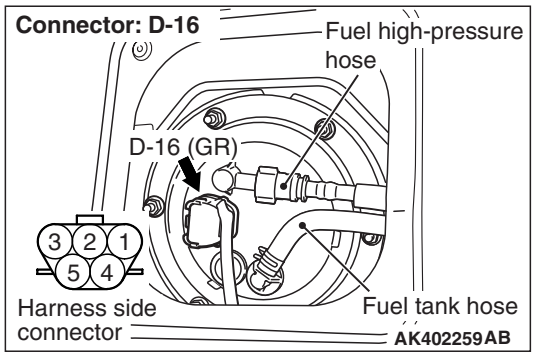


- Check power supply line for open/short circuit.

Q: Is the check result normal?
YES : Go to Step 14
NO : Repair the damaged harness wire.

STEP 14. Check harness between C-220 (terminal No. 3) fuel pump relay (2) connector and D-16 (terminal No. 5) fuel pump connector.



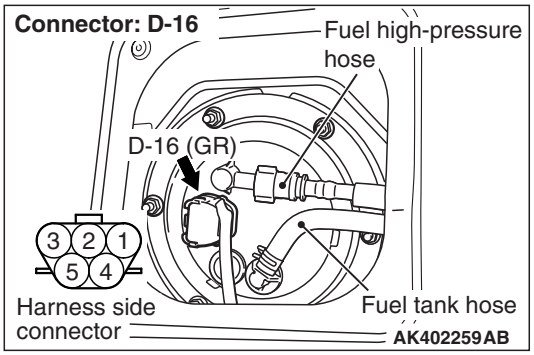


NOTE: Before checking harness, check intermediate connectors D-212 and D-18, and repair if necessary.

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

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

STEP 15. Perform resistance measurement at D-16 fuel pump connector.

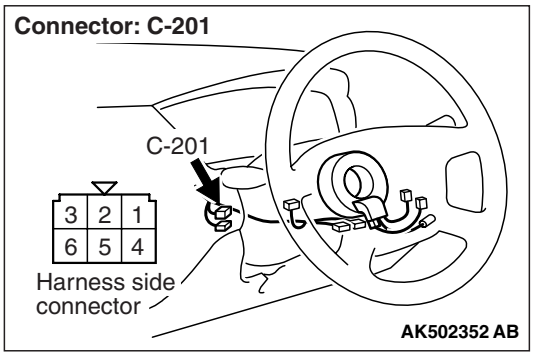


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 4 and earth.

OK: 2 Ω or less

Q: Is the check result normal?
YES : Go to Step 16 .
NO : Check intermediate connector D-18, and repair if necessary. If intermediate connector is normal, check and repair harness between D-16 (terminal No. 4) fuel pump connector and body earth.
- Check earthing line for open circuit and damage.

STEP 16. Connector check: C-201 ignition switch connector



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

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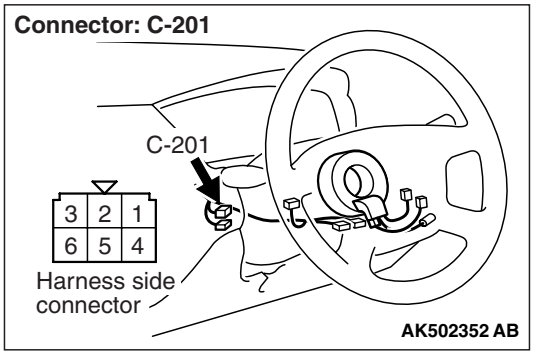
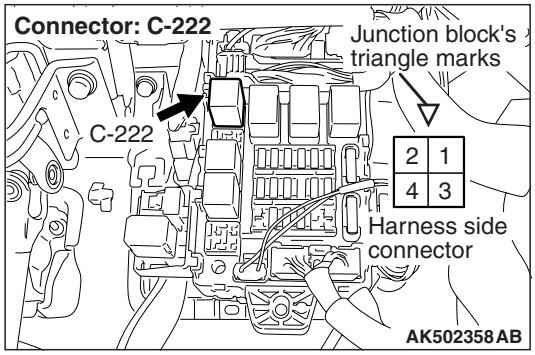
STEP 17. Check harness between C-201 (terminal No. 2) ignition switch connector and C-222 (terminal No. 1) fuel pump relay (1) connector.



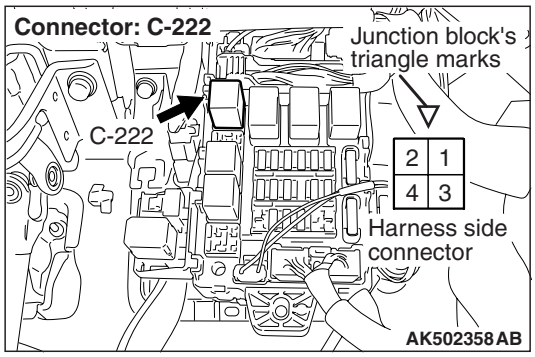


NOTE: Before checking harness, check intermediate connector C-210, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 18 .
NO : Repair the damaged harness wire.

STEP 18. Check harness between battery and C-222 (terminal No. 3) fuel pump relay (1) connector.

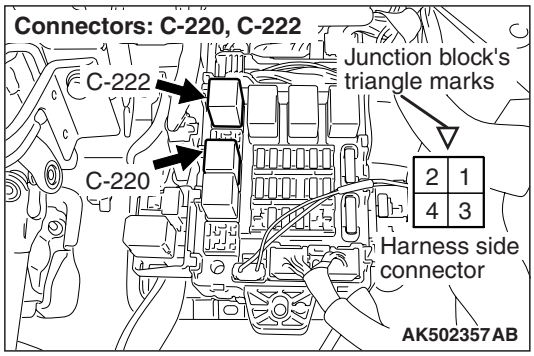


NOTE: Before checking harness, check intermediate connectors C-115 and C-209, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 19 .
NO : Repair the damaged harness wire.

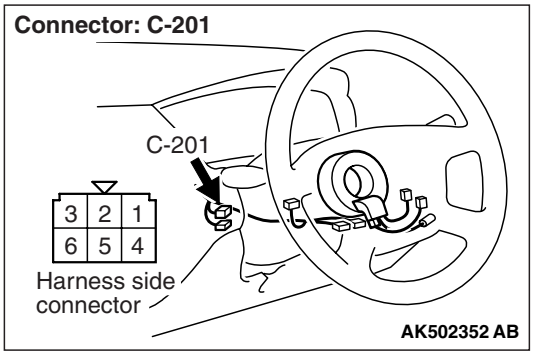
STEP 19. Check harness between C-222 (terminal No. 2) fuel pump relay (1) connector and C-220 (terminal No. 2) fuel pump relay (2) connector.

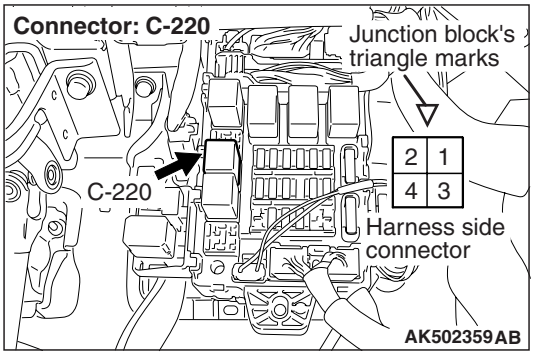


- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 20 .
NO : Repair the damaged harness wire.

STEP 20. Check harness between C-201 (terminal No. 2) ignition switch connector and C-220 (terminal No. 1) fuel pump relay (2) connector.





- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 21 .
NO : Repair the damaged harness wire.

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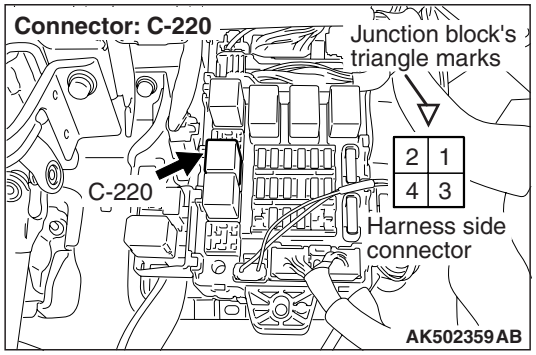
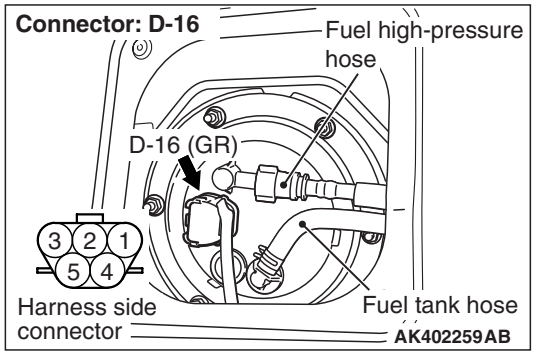
STEP 21. Check harness between C-220 (terminal No. 3) fuel pump relay (2) connector and D-16 (terminal No. 5) fuel pump connector.





NOTE: Before checking harness, check intermediate connectors D-18 and C-212, and repair if necessary.

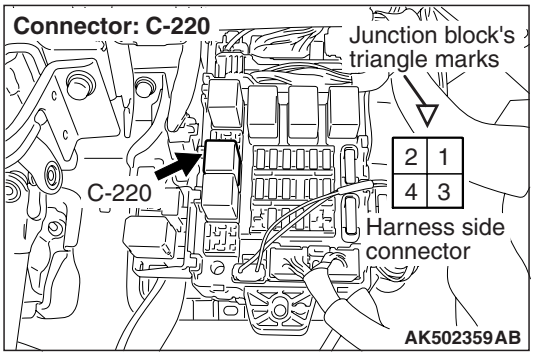
- Check earthing line for damage.

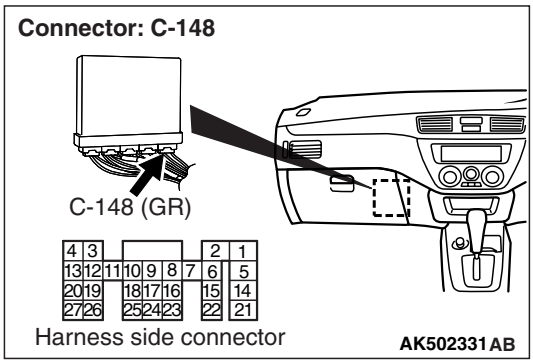
Q: Is the check result normal?

YES : Replace the fuel pump.

NO : Repair the damaged harness wire.

STEP 22. Check harness between C-220 (terminal No. 4) fuel pump relay (2) connector and C-148 (terminal No. 16) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





NOTE: Before checking harness, check intermediate connectors C-136 and C-212, and repair if necessary.

- Check output line for damage.

Q: Is the check result normal?

YES : Replace the fuel pump

NO : Repair the damaged harness wire.

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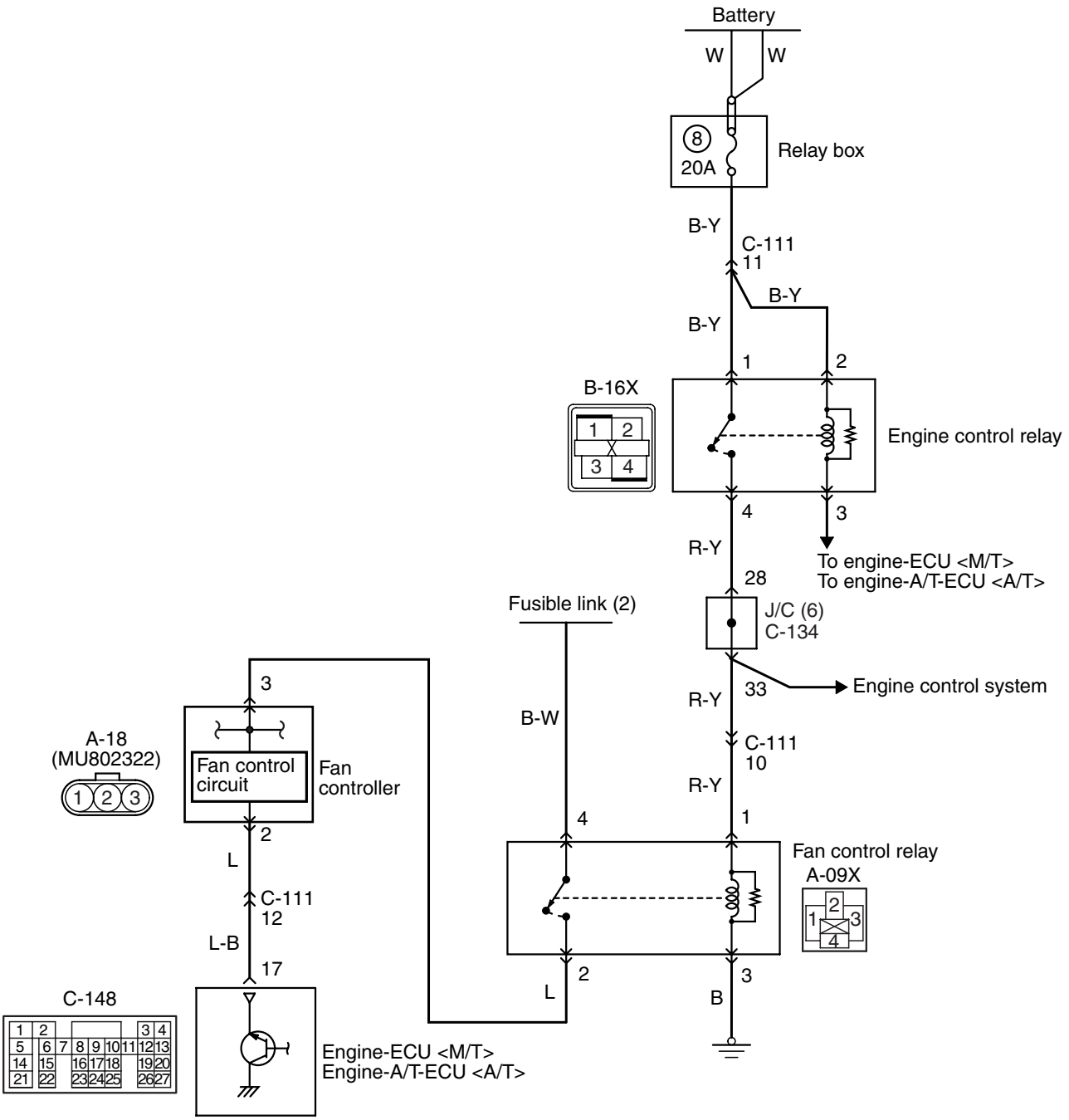
Inspection Procedure 26: Fan Control Relay System

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 PU: Purple

AK502042AB

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OPERATION

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

FUNCTION

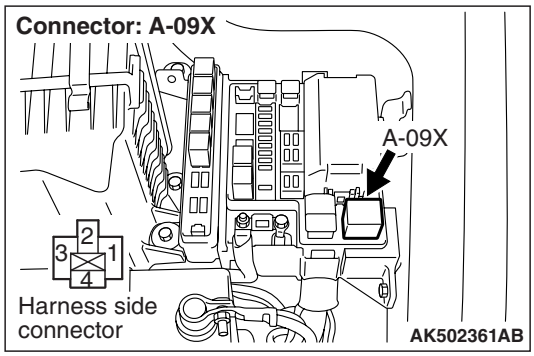
- When the engine control relay is in "ON" position, the fan control relay is also simultaneously placed in "ON" position. Accordingly, the battery voltage is supplied to the fan controller.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-09X fan control relay connector



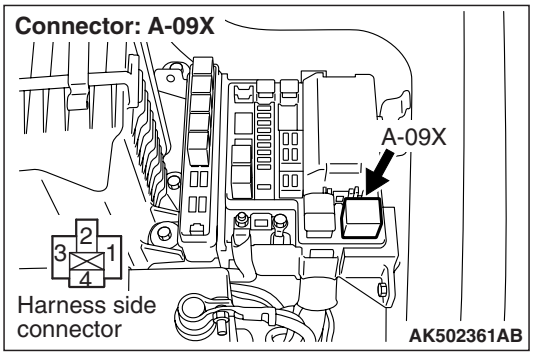
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check fan control relay.

- Check fan control relay (Refer to GROUP 14 –On– vehicle Service –Fan Control Relay Continuity Check P.14-23).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the fan control relay.

STEP 3. Perform resistance measurement at A-09X fan control relay connector.

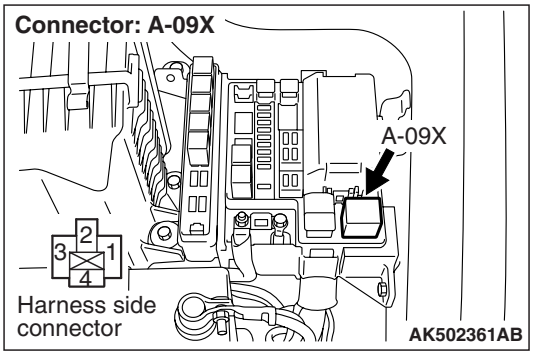


- Remove relay and measure at relay box side.
- Resistance between terminal No. 3 and earth.

OK: 2 Ω or less

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Check and repair harness between A-09X (terminal No. 3) fan control relay connector and body earth.
- Check earthing line for open circuit and damage.

STEP 4. Perform voltage measurement at A-09X fan control relay connector.



- Remove relay and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 6 .
NO : Go to Step 5 .

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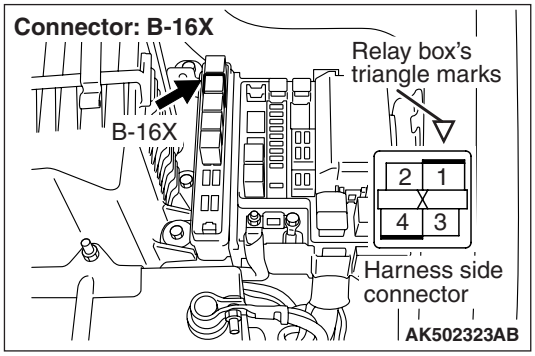
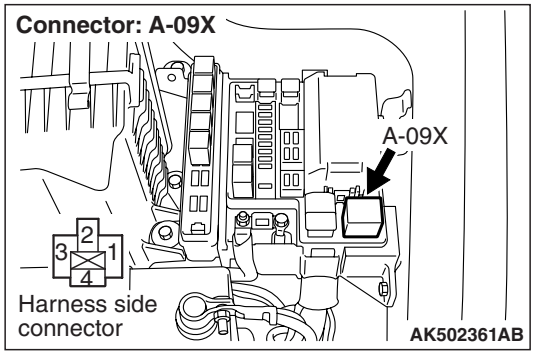
STEP 5. Connector check: B-16X engine control relay connector





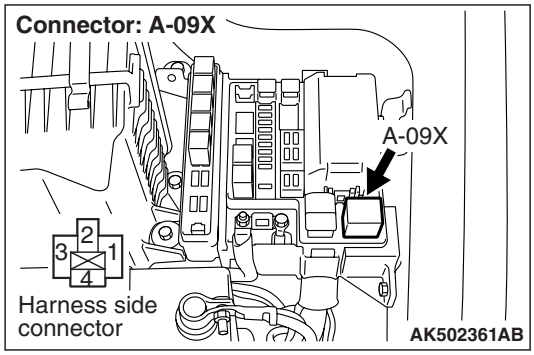
Q: Is the check result normal?

YES : Check intermediate connectors C-111 and C-134, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-16X (terminal No. 4) engine control relay connector and A-09X (terminal No. 1) fan control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 6. Perform voltage measurement at A-09X fan control relay connector.



- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth

OK: System voltage

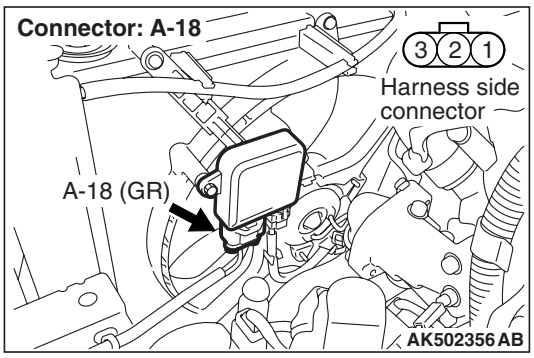
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Check and repair harness between battery and A-09X (terminal No. 4) fan control relay connector.

- Check power supply line for open/short circuit.

STEP 7. Connector check: A-18 fan controller connector

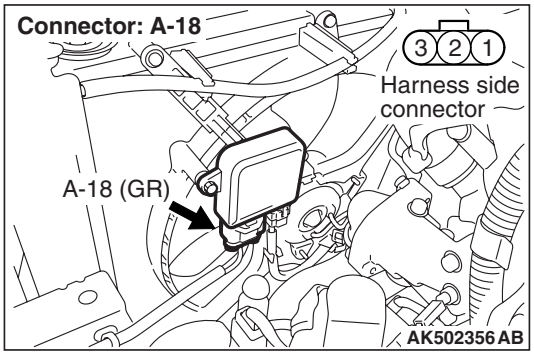


Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace the connector.

STEP 8. Perform voltage measurement at A-18 fan controller connector.



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

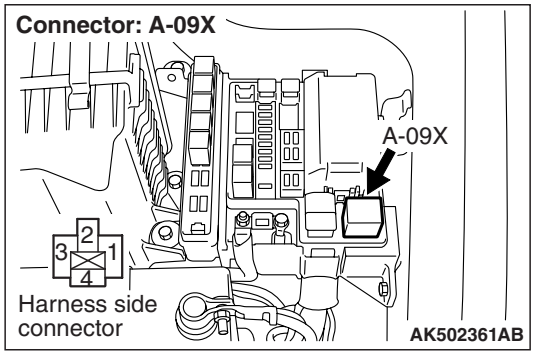
OK: System voltage

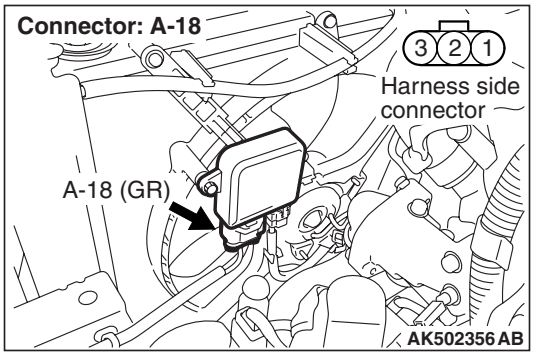
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 9 .

STEP 9. Check harness between A-09X (terminal No. 2) fan control relay connector and A-18 (terminal No. 3) fan controller connector.

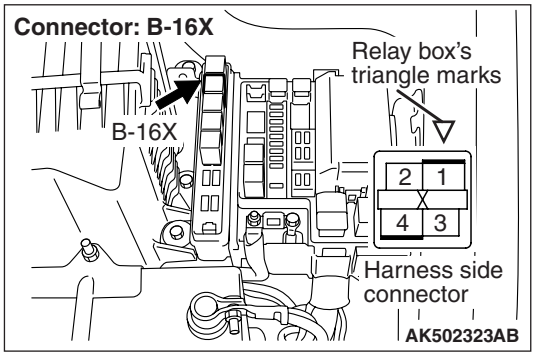




- Check output line for open/short circuit.

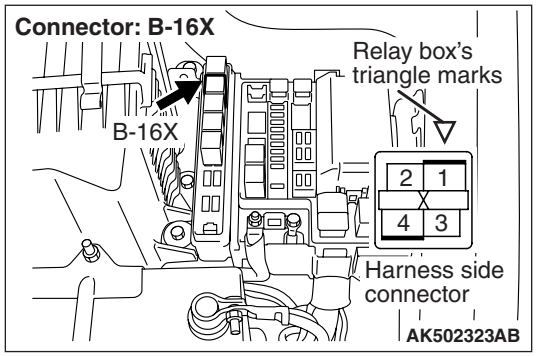
Q: Is the check result normal?
YES : Go to Step 10 .
NO : Repair the damaged harness wire.

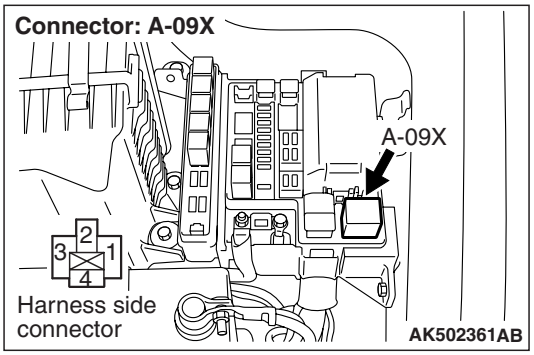
STEP 10. Connector check: B-16X engine control relay connector



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

STEP 11. Check harness between B-16X (terminal No. 4) engine control relay connector and A-09X (terminal No. 1) fan control relay connector.





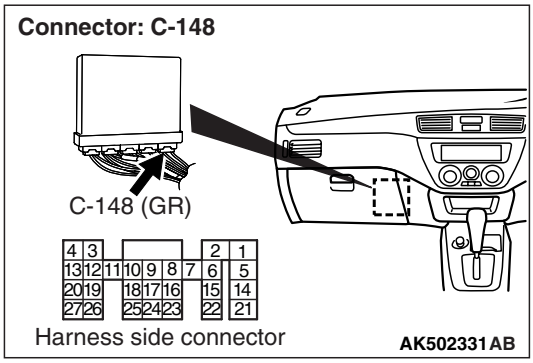
NOTE: Before checking harness, check intermediate connectors C-111 and C-134, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?
YES : Check and repair harness between A-09X (terminal No. 3) fan control relay connector and body earth.
- Check earthing line for damage.

NO : Repair the damaged harness wire.

STEP 12. Connector check: C-148 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 the connector.

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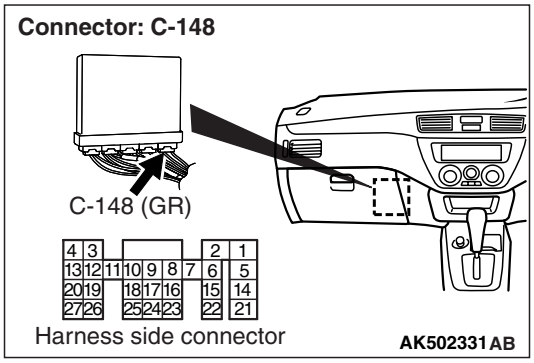
STEP 13. Fan motor drive test.



- Disconnect C-148 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 .

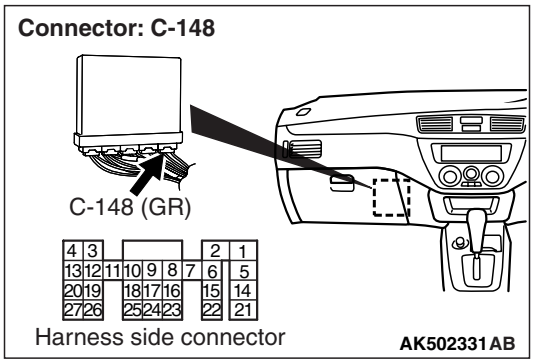
STEP 14. M.U.T.-II/III actuator test

- Item 21: Fan controller

OK: Fan motor rotates.

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).
NO : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 15. Perform voltage measurement at C-148 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

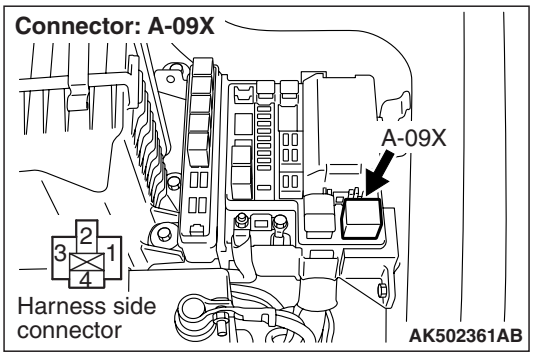


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 17 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 16 .
NO : Go to Step 18 .

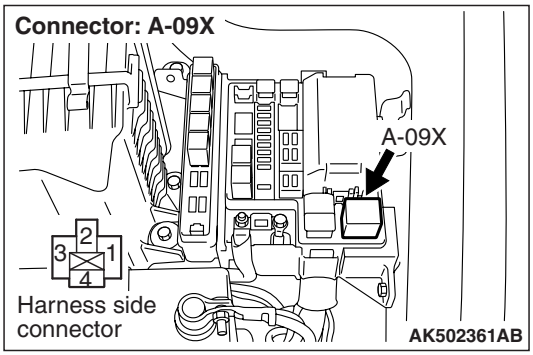
STEP 16. Check harness between A-09X (terminal No. 1) fan control relay connector and battery.

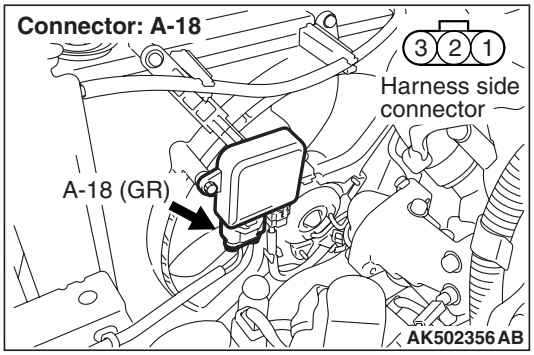


- Check power supply line for damage.

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

STEP 17. Check harness between A-09X (terminal No. 2) fan control relay connector and A-18 (terminal No. 3) fan controller connector.





- Check output line for damage.

Q: Is the check result normal?
YES : Replace the fan motor and fan controller.
NO : Repair the damaged harness wire.

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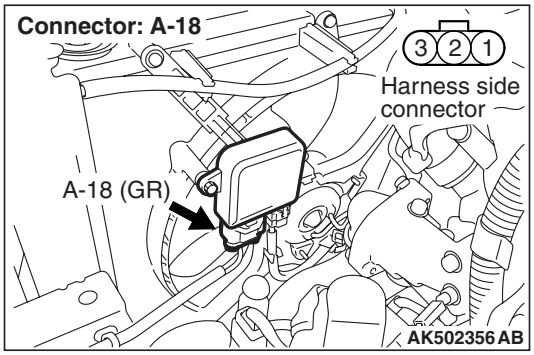
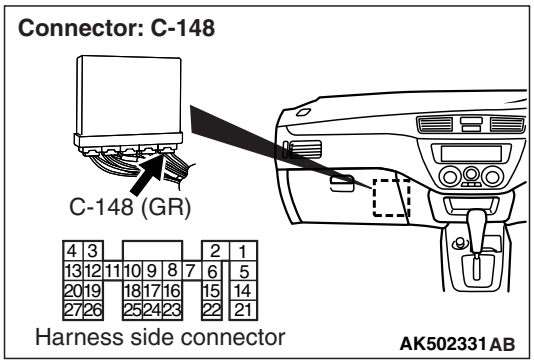
STEP 18. Check harness between A-18 (terminal No. 2) fan controller connector and C-148 (terminal No. 17) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





NOTE: Before checking harness, check intermediate connector C-111, and repair if necessary.

- Check output line for short circuit.

Q: Is the check result normal?

YES : Replace the fan motor and fan controller.

NO : Repair the damaged harness wire.

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Inspection Procedure 27: A/C Switch System

OPERATION

- The battery voltage is applied to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 69) from the A/C-ECU.

FUNCTION

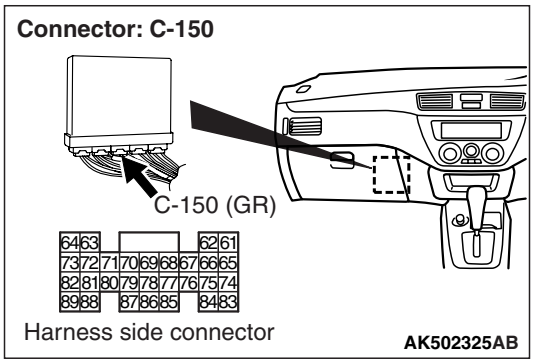
- When the A/C switch is in "ON" position, A/C switch ON signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> from the A/C-ECU. In response to the signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the A/C compressor relay.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-150 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector

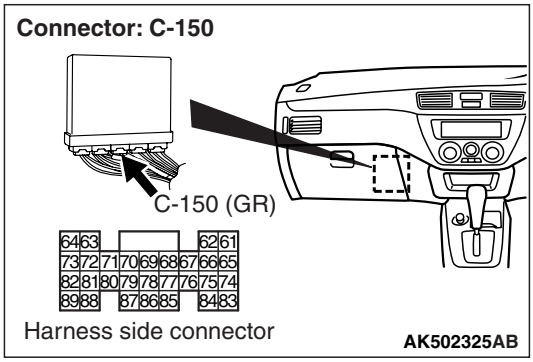


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Perform voltage measurement at C-150 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 69 and earth.

OK:

System voltage (when the A/C is ON)
0.5 V or less (when the A/C is OFF)

Q: Is the check result normal?

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

NO : Check air conditioner (Refer to GROUP 55A –Troubleshooting –Check Chart for Trouble Symptom P.55A-5).

Inspection Procedure 28: A/C Compressor Relay System

OPERATION

- The battery voltage is applied to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 8) from the A/C compressor relay.
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 8) makes the power transistor in the unit be in "ON" position and makes currents go on the A/C compressor relay coil, and that makes the relay be in "ON" position.

FUNCTION

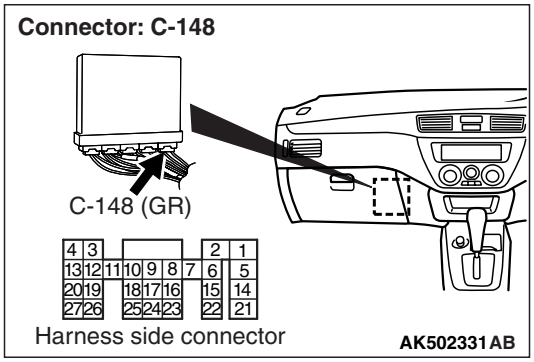
- When the A/C switch "ON" signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> places the A/C compressor relay in the "ON" position. Accordingly, the battery voltage supplied to the A/C compressor operates the magnet clutch.

PROBABLE CAUSE

- Failed A/C compressor relay
- Failed A/C system compressor magnet clutch
- Open/short circuit in A/C circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-148 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector

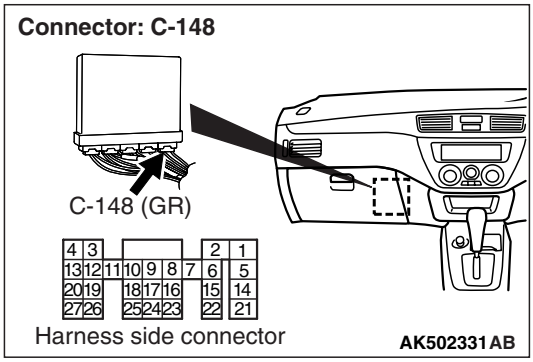


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace the connector.

STEP 2. Perform voltage measurement at C-148 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 8 and earth.

  OK:

  System voltage

- Using a jumper wire, connect terminal No. 8 to earth.

  OK:

  A/C compressor relay should turn "ON"

Q: Is the check result normal?

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

NO : Check air conditioner (Refer to GROUP 55A –Troubleshooting –Check Chart for Trouble Symptom P.55A-5).

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Inspection Procedure 29: A/C Load Signal System

OPERATION

- The A/C load signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 78) from the A/C-ECU (terminal No. 2). <Manual A/C> or (terminal No. 32) <Auto A/C>

FUNCTION

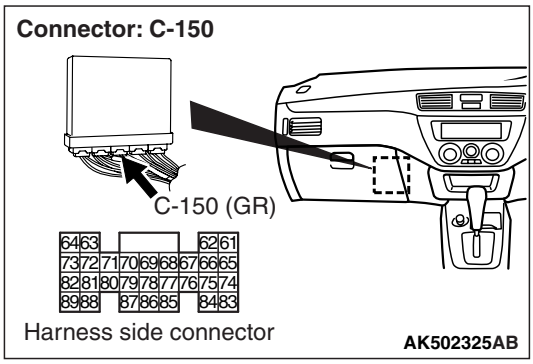
- The magnitude of the A/C compressor load is detected and input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>. The engine-ECU <M/T> or engine-A/T-ECU <A/T> provides A/C idle up control according to the A/C compressor load condition.

PROBABLE CAUSE

- Failed A/C-ECU
- Open/short circuit in A/C load signal circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Perform voltage measurement at C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T>.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Engine: Idling
- A/C switch: ON (A/C compressor in driven state)
- Voltage between terminal No. 78 and earth

OK:

1 V or less (when the temperate around the atmospheric air temperature sensor is 18° C or more, and the A/C is set to the lowest temperature and the maximum air flow rate)

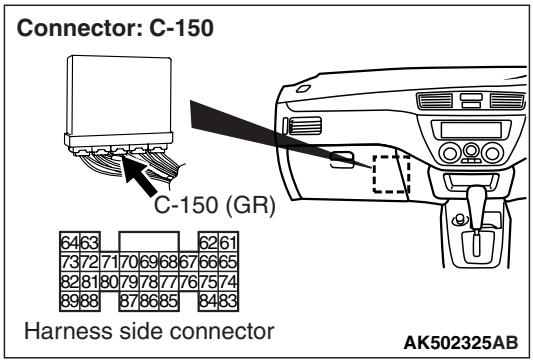
System voltage (when the A/C is set to the temperature in the cabin and the minimum air flow rate)

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Go to Step 4 .

STEP 2. Connector check: C-150 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 the connector.

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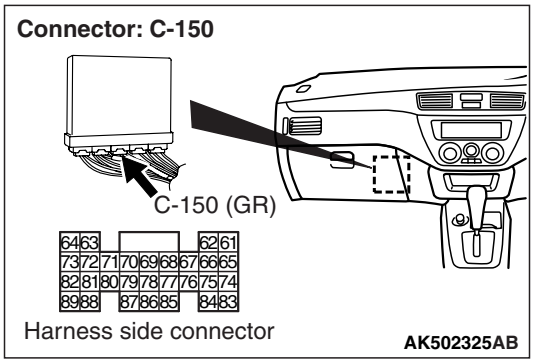
STEP 3. Check the trouble symptoms.

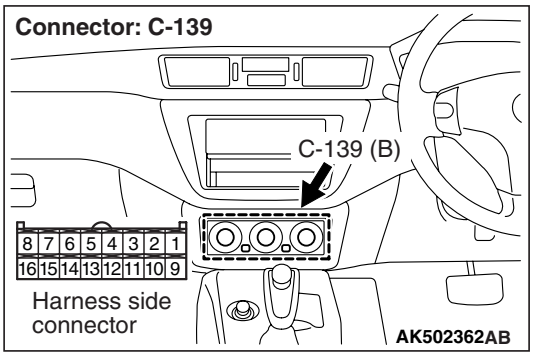
Q: Does trouble symptom persist?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 –How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13).

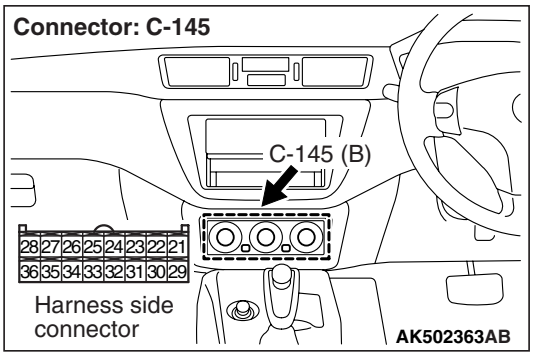
STEP 4. Connector check: C-150 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 5. Perform voltage measurement at C-139 A/C-ECU <Manual A/C> connector or C-145 A/C-ECU <Auto A/C> connector.





- Measure A/C-ECU terminal voltage.
- Engine: Idling
- A/C set temperature:
  Maximum Cool when temperature in cabin is 25° C or more
  Maximum Hot when temperature in cabin is 25° C or less
- Voltage between terminal No. 2 and earth <Manual A/C>
- Voltage between terminal No. 32 and earth <Auto A/C>

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 6 .

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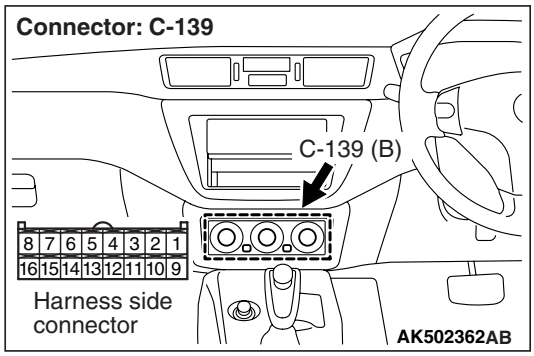
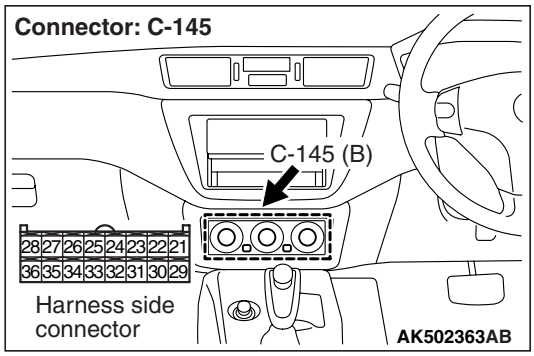
STEP 6. Connector Check: C-139 A/C-ECU <Manual A/C> connector or C-145 A/C-ECU <Auto A/C> connector



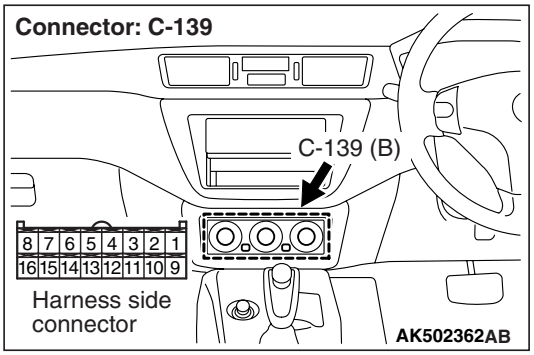


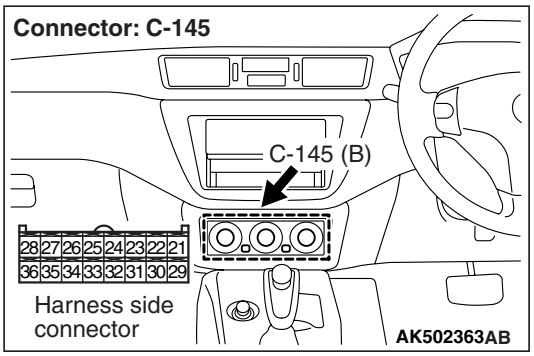
Q: Is the check result normal?

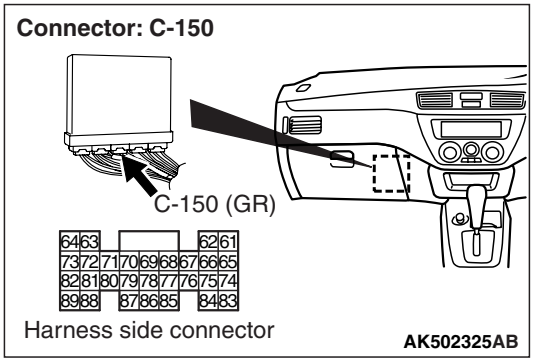
YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between C-139 (terminal No. 2) or C-145 (terminal No. 32) A/C-ECU connector and C-150 (terminal No. 78) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.







NOTE: Before checking harness, check intermediate connector C-135, and repair if necessary.

- Check output line for short circuit.

Q: Is the check result normal?

YES : Check A/C system (Refer to GROUP 55A – Troubleshooting –Check Chart for Trouble Symptoms P.55A-5).

NO : Repair the damaged harness wire.

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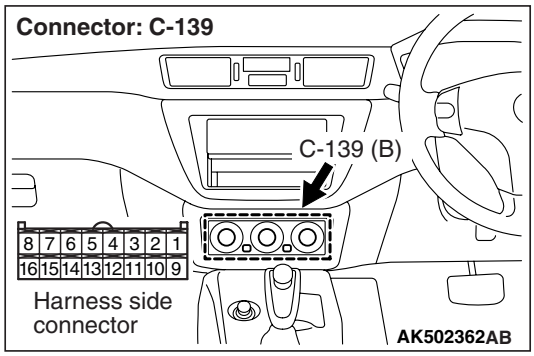
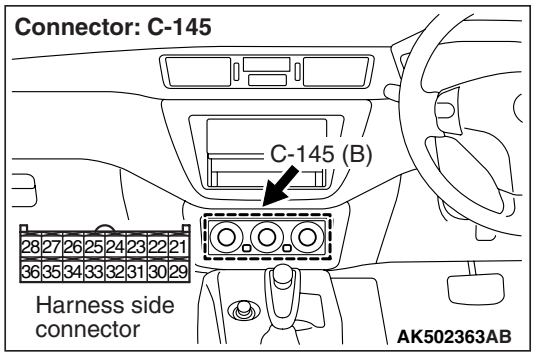
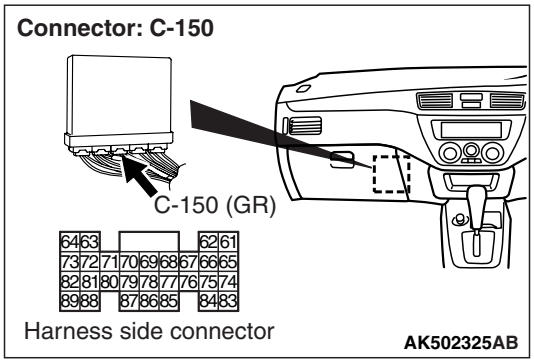
STEP 8. Connector check : C-139 A/C-ECU connector <Manual A/C> or C-145 A/C-ECU connector <Auto A/C>







Q: Is the check result normal?

YES : Check intermediate connector C-135, and repair if necessary. If intermediate connector is normal, check and repair harness between C-139 (terminal No. 2) or C-145 (terminal No. 32) A/C-ECU connector and C-150 (terminal No. 78) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair or replace the connector.

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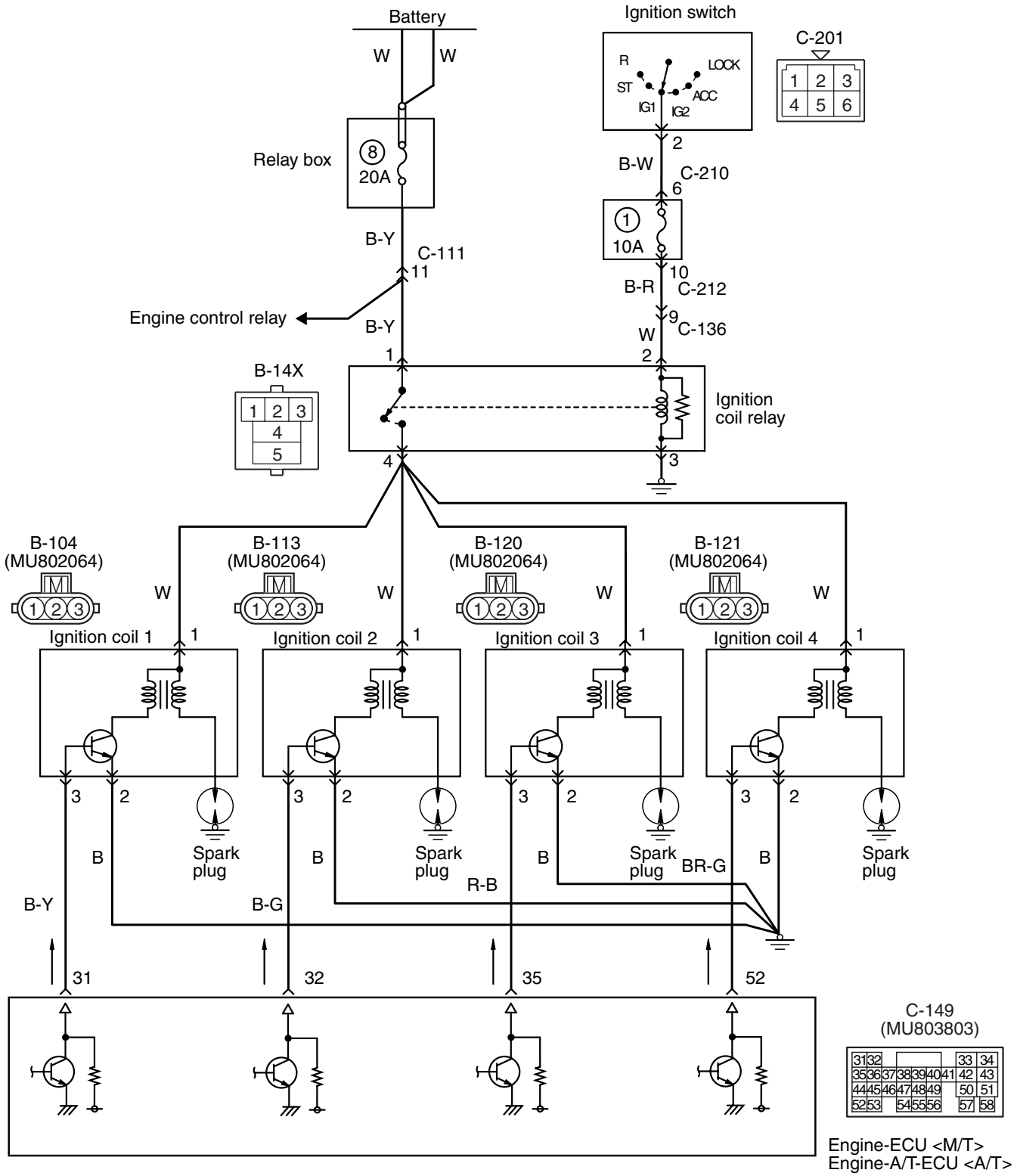
Inspection Procedure 30: Ignition Circuit System

Ignition circuit



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

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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

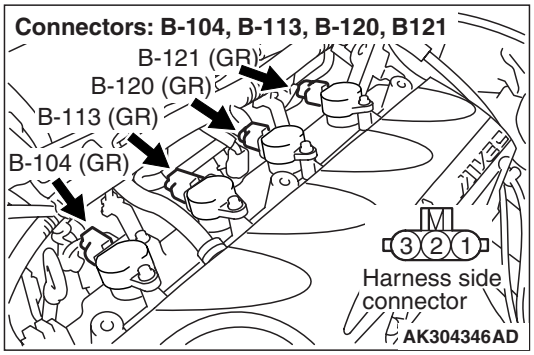
- Failed ignition coil
- Failed spark plug
- Failed spark plug cable
- Open/short circuit in ignition primary circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Check spark plug.

Q: Is the check result normal?
YES : Go to Step 2 .
NO : Replace the spark plug.

STEP 2. Connector check: B-104, B-113, B-120 and B-121 ignition coil connectors



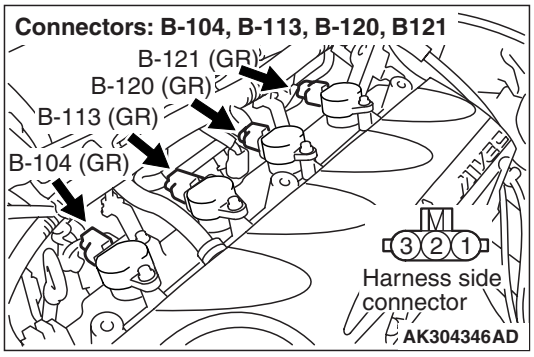
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Repair or replace the connector.

STEP 3. Check ignition coil itself.

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service –Ignition coil check P.16-25).

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Replace the ignition coil.

STEP 4. Perform voltage measurement at B-104, B-113, B-120 and B-121 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 11 .
NO : Go to Step 5 .

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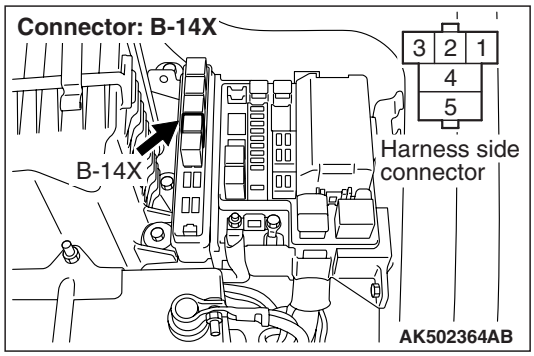
STEP 5. Connector check: B-14X ignition coil relay connector



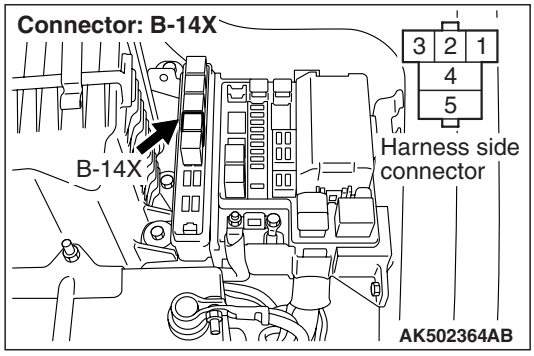
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair or replace the connector.

STEP 6. Check ignition coil relay.

- Check ignition coil relay (Refer to GROUP 16 – Ignition System –On-vehicle Service P.16-26).

Q: Is the check result normal?
YES : Go to Step 7 .
NO : Replace the ignition coil relay.

STEP 7. Perform voltage measurement at B-14X ignition coil relay connector.

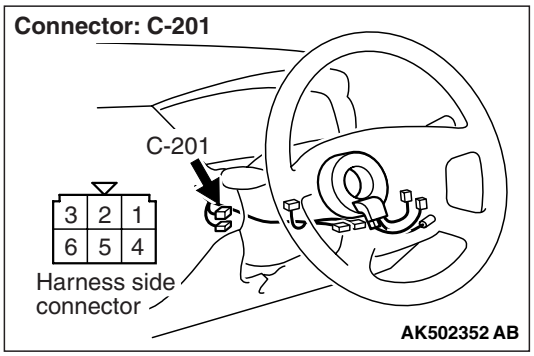


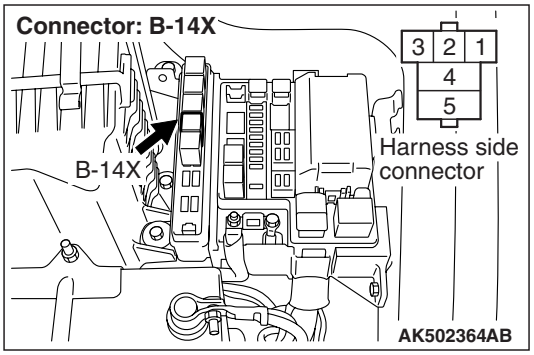
- Remove relay, and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 8 .

STEP 8. Connector check: C-201 ignition switch connector

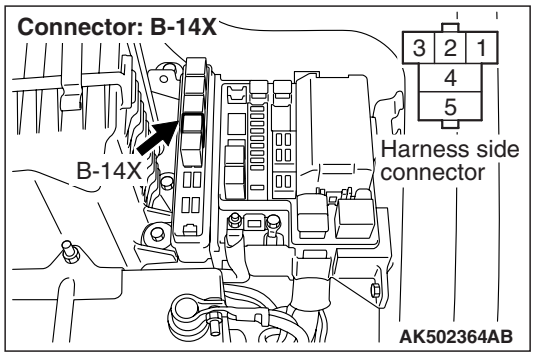




Q: Is the check result normal?
YES : Check intermediate connectors C-136, C-210 and C-212, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-201 (terminal No. 2) ignition switch connector and B-14X (terminal No. 2) ignition coil relay connector.
- Check power supply line for open/short circuit.

NO : Repair or replace the connector.

STEP 9. Perform resistance measurement at B-14X connector.



- Remove relay, and measure at relay box side.
- Resistance between terminal No. 3 and earth.

OK: 2 Ω or less

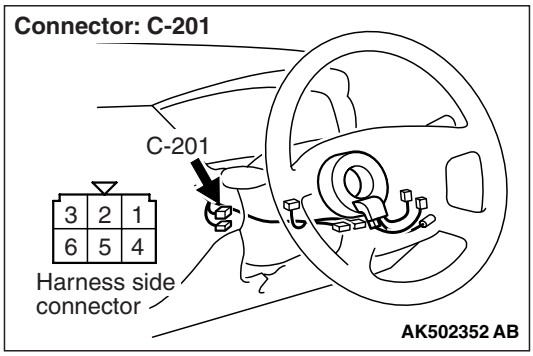
Q: Is the check result normal?

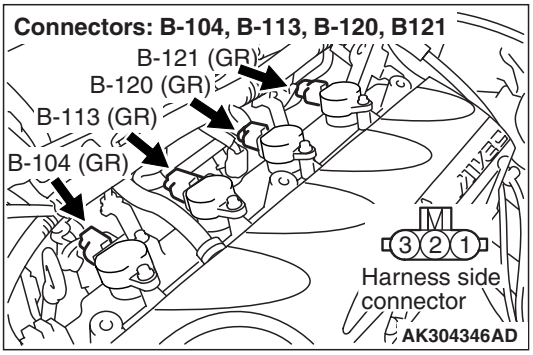
YES : Go to Step 10 .

NO : Check and repair harness between B-14X (terminal No. 3) ignition coil relay connector and body earth.

- Check earthing line for open circuit and damage.

STEP 10. Perform voltage measurement at B-14X at ignition coil relay connector.





- Remove relay, and measure at relay box side.
- Voltage between terminal No. 1 and earth.

Q: Is the check result normal?

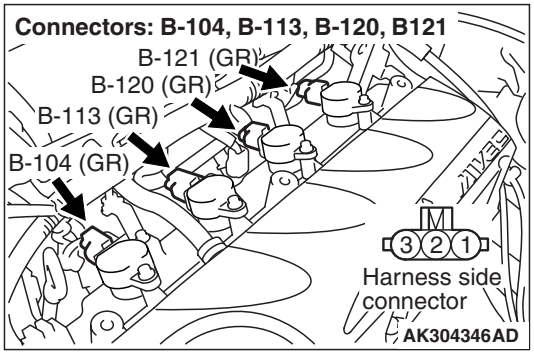
YES : Check and repair harness between ignition coil relay connector and ignition coil connector.

a. Check and repair harness between B-14X (terminal No. 4) ignition coil relay connector and B-104 (terminal No. 1) No. 1 ignition coil connector
b. Check and repair harness between B-14X (terminal No. 4) ignition coil relay connector and B-113 (terminal No. 1) No. 2 ignition coil connector
c. Check and repair harness between B-14X (terminal No. 2) ignition coil relay connector and B-120 (terminal No. 1) No. 3 ignition coil connector
d. Check and repair harness between B-14X (terminal No. 2) ignition coil relay connector and B-121 (terminal No. 1) No. 4 ignition coil connector
   - Check power supply line for open/short circuit.

NO : Check intermediate connectors C-111, and repair if necessary. If intermediate connector is normal, check and repair harness between B-14X (terminal No. 1) ignition coil relay connector and battery.

- Check power supply line for open/short circuit.

STEP 11. Perform voltage measurement at B-104, B-113, B-120 and B-121 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 17 .

NO : Go to Step 12 .

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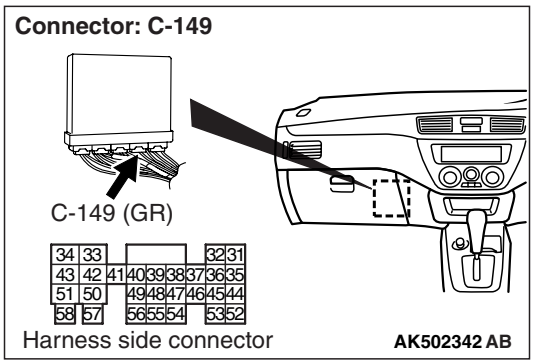
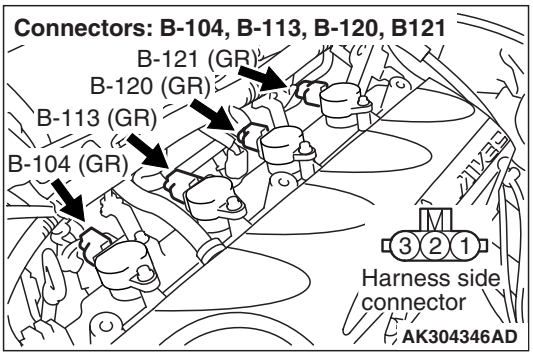
STEP 12. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Disconnect B-104, B-113, B-120 and B-121 ignition coil connectors.
- Engine: Cranking
  a. Voltage between terminal No. 31 and earth (No. 1 Ignition coil).
  b. Voltage between terminal No. 32 and earth (No. 2 Ignition coil).
  c. Voltage between terminal No. 35 and earth (No. 3 Ignition coil).
  d. Voltage between terminal No. 52 and earth (No. 4 Ignition coil).

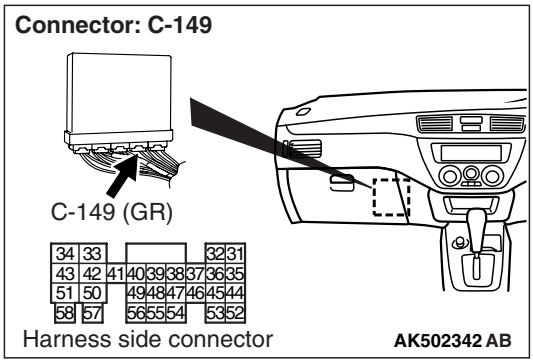
  OK: 0.5 – 4.0 V

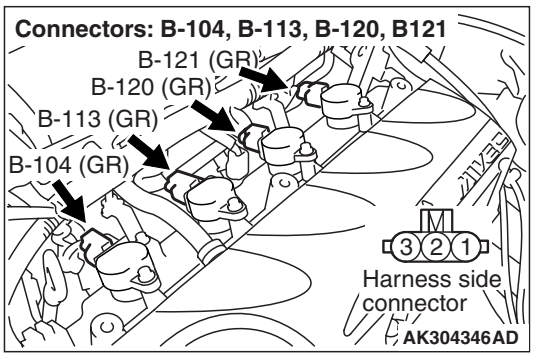
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 14 .

STEP 13. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





Q: Is the check result normal?

YES : Check and repair harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
  a. Check and repair harness between B-104 (terminal No. 3) No. 1 ignition coil connector and C-149 (terminal No. 31) engine-ECU <M/T> or connector engine-A/T-ECU <A/T> connector.
  b. Check and repair harness between B-113 (terminal No. 3) No. 2 ignition coil connector and C-149 (terminal No. 32) engine-ECU <M/T> or connector engine-A/T-ECU <A/T> connector.
  c. Check and repair harness between B-120 (terminal No. 3) No. 3 ignition coil connector and C-149 (terminal No. 35) engine-ECU <M/T> or connector engine-A/T-ECU <A/T> connector.
  d. Check and repair harness between B-121 (terminal No. 3) No. 4 ignition coil connector and C-149 (terminal No. 52) engine-ECU <M/T> or connector engine-A/T-ECU <A/T> connector.
     - Check output line for open circuit.

NO : Repair or replace the connector.

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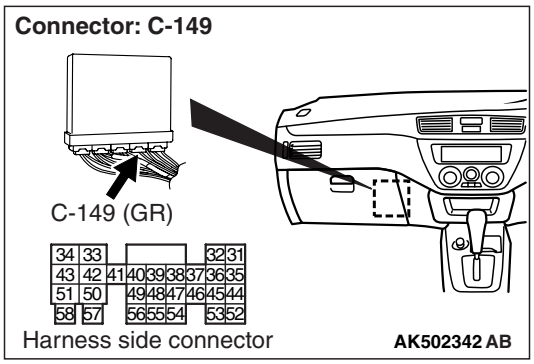
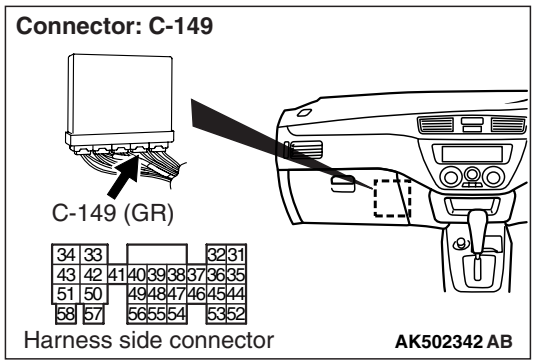
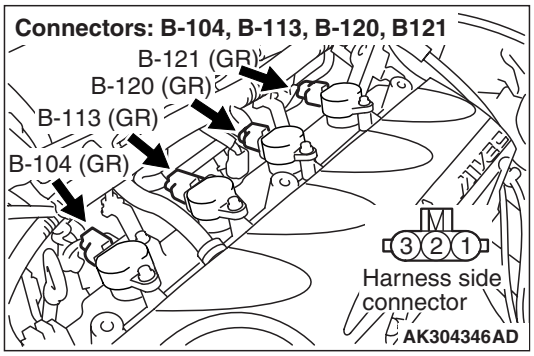
STEP 14. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 15. Check harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





a. Check and repair harness between B-104 (terminal No. 3) No. 1 ignition coil connector and C-149 (terminal No. 31) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
b. Check and repair harness between B-113 (terminal No. 3) No. 2 ignition coil connector and C-149 (terminal No. 32) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
c. Check and repair harness between B-120 (terminal No. 3) No. 3 ignition coil connector and C-149 (terminal No. 35) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
d. Check and repair harness between B-121 (terminal No. 3) No. 4 ignition coil connector and C-149 (terminal No. 52) 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 16 .
NO : Repair the damaged harness wire.

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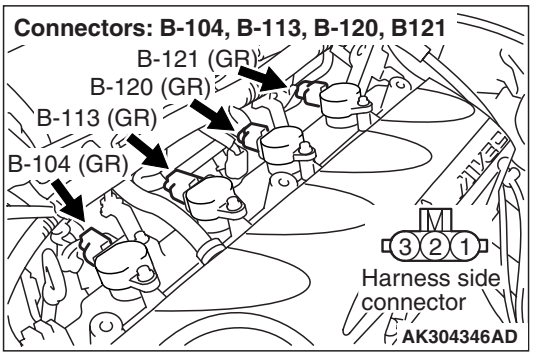
STEP 16. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace the 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 –How to Cope with Intermittent Malfunctions P.00-13).

STEP 17. Perform resistance measurement at B-104, B-113, B-120 and B-121 ignition coil connectors.

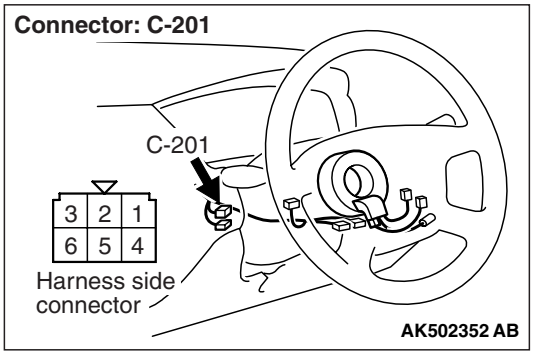


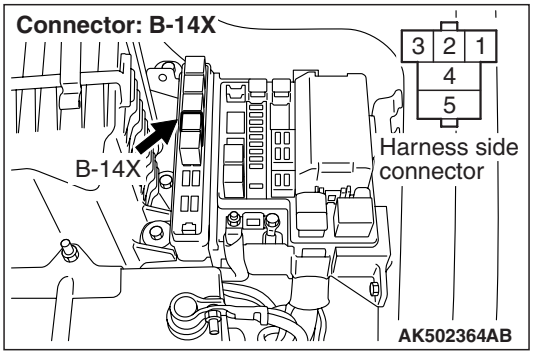
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.

OK: 2 Ω or less

Q: Is the check result normal?
YES : Go to Step 18 .
NO : Check and repair harness between ignition coil connector and body earth
a. Check and repair harness between B-104 (terminal No. 2) No. 1 ignition coil connector and body earth
b. Check and repair harness between B-113 (terminal No. 2) No. 2 ignition coil connector and body earth
c. Check and repair harness between B-120 (terminal No. 2) No. 3 ignition coil connector and body earth
d. Check and repair harness between B-121 (terminal No. 2) No. 4 ignition coil connector and body earth
- Check earthing line for open circuit and damage.

STEP 18. Check harness between C-201 (terminal No. 2) ignition switch connector and B-14X (terminal No. 2) connector.

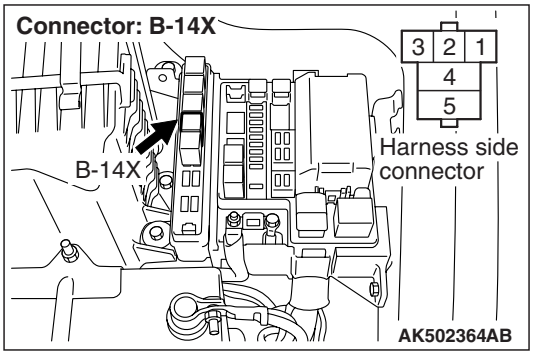




NOTE: Before checking harness, check intermediate connectors C-136, C-210 and C-212, and repair if necessary.
- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 19 .
NO : Repair the damaged harness wire.

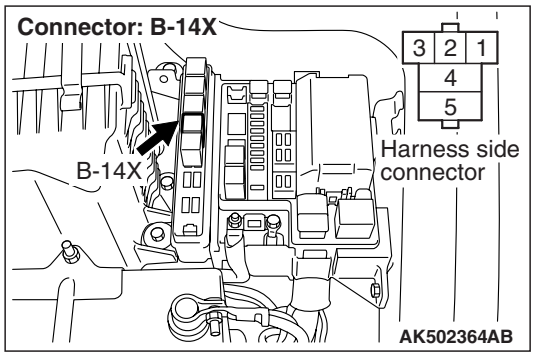
STEP 19. Check harness between battery and B-14X (terminal No. 1) ignition coil relay connector.

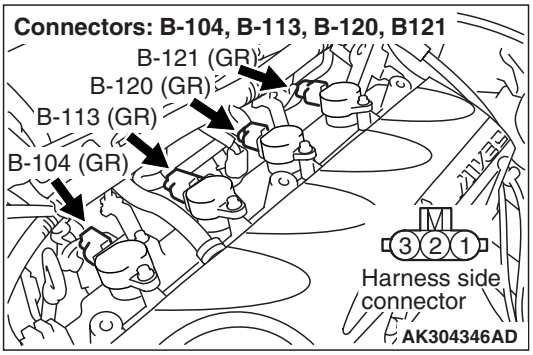


NOTE: Before checking harness, check intermediate connector C-111 and repair if necessary.
- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 20 .
NO : Repair the damaged harness wire.

STEP 20. Check harness between ignition coil relay connector and ignition coil connector.

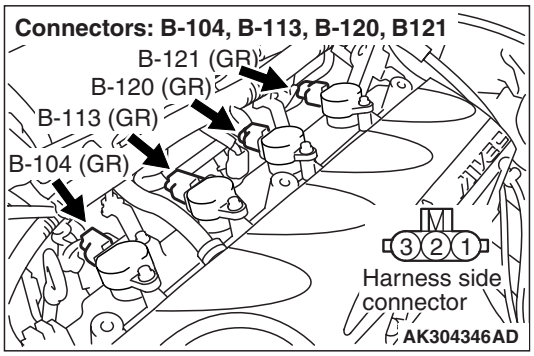


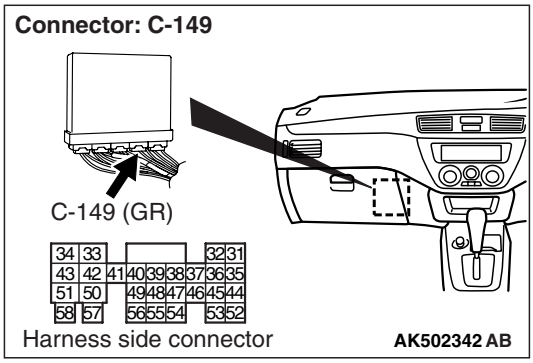


a. Check and repair harness between B-14X (terminal No. 4) ignition coil relay connector and B-104 (terminal No. 1) No. 1 ignition coil connector.
b. Check and repair harness between B-14X (terminal No. 4) ignition coil relay connector and B-113 (terminal No. 1) No. 2 ignition coil connector.
c. Check and repair harness between B-14X (terminal No. 4) ignition coil relay connector and B-120 (terminal No. 1) No. 3 ignition coil connector.
d. Check and repair harness between B-14X (terminal No. 4) ignition coil relay connector and B-121 (terminal No. 1) No. 4 ignition coil connector.
- Check power supply line for damage.

Q: Is the check result normal?
YES : Go to Step 21 .
NO : Repair the damaged harness wire.

STEP 21. Check harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





a. Check and repair harness between B-104 (terminal No. 3) No. 1 ignition coil connector and C-149 (terminal No. 31) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
b. Check and repair harness between B-113 (terminal No. 3) No. 2 ignition coil connector and C-149 (terminal No. 32) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
c. Check and repair harness between B-120 (terminal No. 3) No. 3 ignition coil connector and C-149 (terminal No. 35) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
d. Check and repair harness between B-121 (terminal No. 3) No. 4 ignition coil connector and C-149 (terminal No. 52) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
   - Check output line for damage.

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

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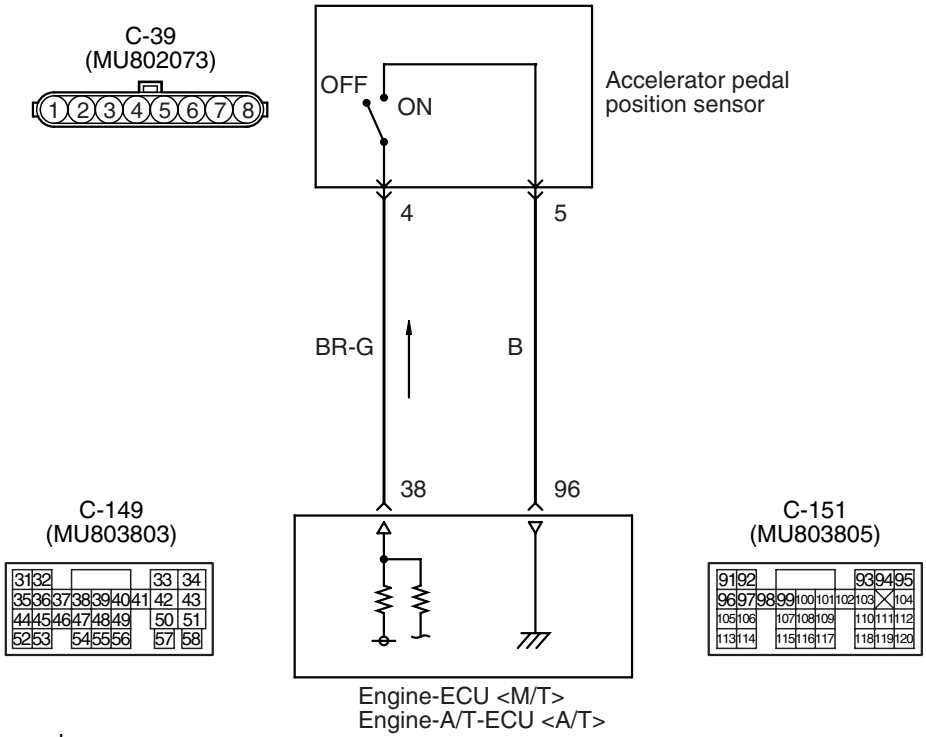
Inspection Procedure 31: Accelerator Pedal Position Switch Circuit System

Accelerator pedal position 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 PU: Purple

AK304332AF

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position switch output terminal (terminal No. 4) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 38).
- 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 switch (terminal No. 5).

COMMENT ON TROUBLE SYMPTOM

- Accelerator pedal position switch turns OFF when amount of travel of the accelerator pedal exceeds the prescribed value.
- Engine-ECU <M/T> or engine-A/T-ECU <A/T> uses the signal that is input by the accelerator pedal position switch for determining the abnormal characteristics of the accelerator pedal position sensor (sub).

PROBABLE CAUSE

- Failed accelerator pedal position switch.
- Open/short circuit in accelerator pedal position switch circuit or loose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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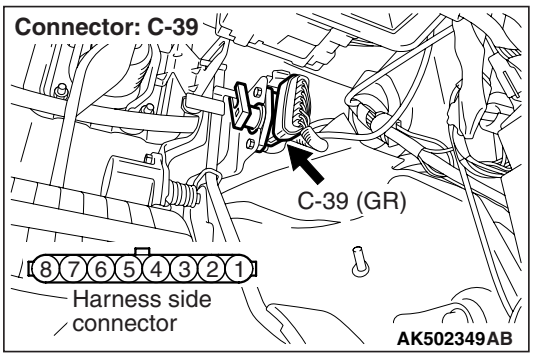
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-39 accelerator pedal position sensor connector



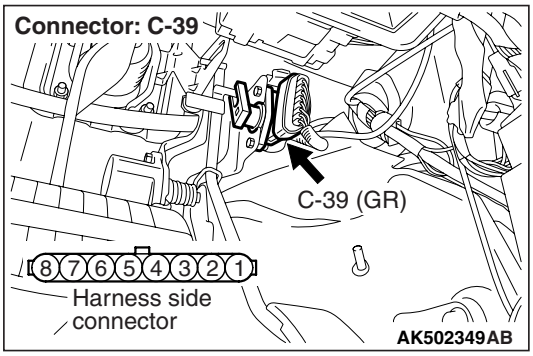
Q: Is the check result normal?
YES : Go to Step 2 .
NO : Repair or replace the connector.

STEP 2. Check accelerator pedal position switch itself

- Check accelerator pedal position switch itself (Refer to P.13A-328).

Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the accelerator pedal position sensor.

STEP 3. Perform voltage measurement at C-39 accelerator pedal position sensor connector.

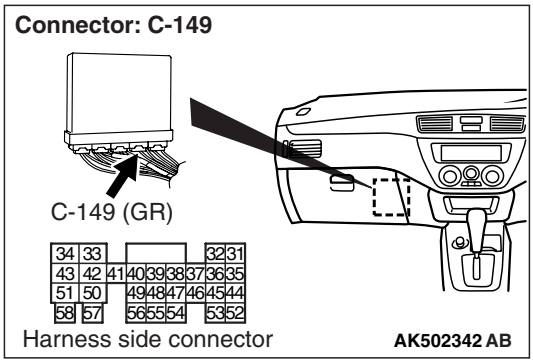


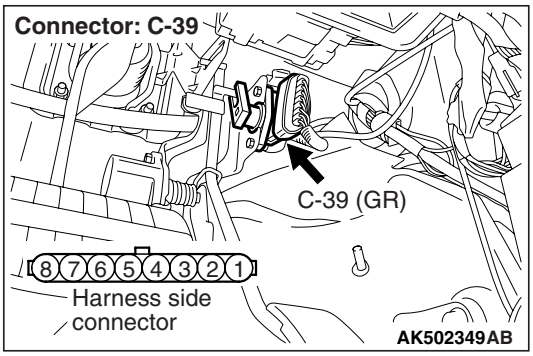
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 4 .

STEP 4. Perform voltage measurement at C-149 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 C-39 accelerator pedal position sensor
- Ignition switch: ON
- Voltage between terminal No. 38 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 5 .
NO : Go to Step 6 .

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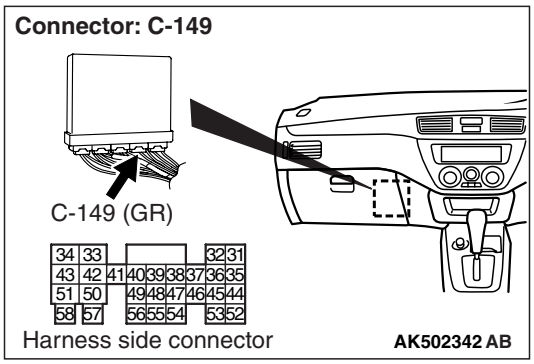
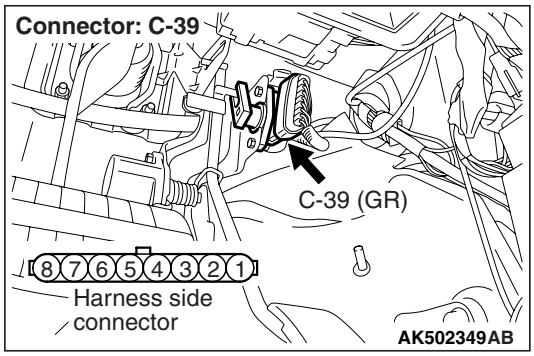
STEP 5. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





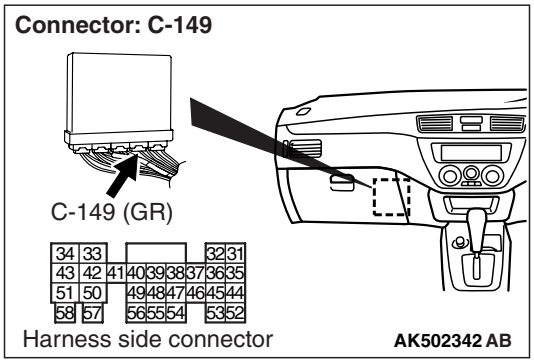
Q: Is the check result normal?

YES : Check and repair harness between C-39 (terminal No. 4) accelerator pedal position sensor connector and C-149 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair or replace the connector.

STEP 6. Connector check: C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

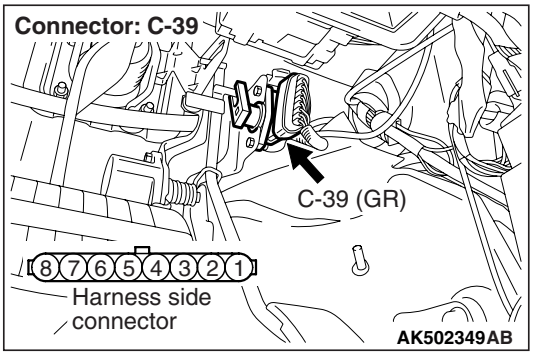


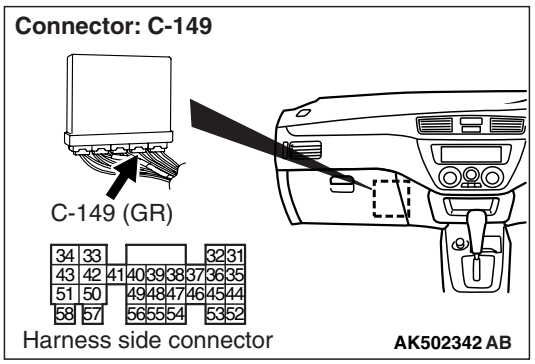
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace the connector.

STEP 7. Check harness between C-39 (terminal No. 4) accelerator pedal position sensor connector and C-149 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





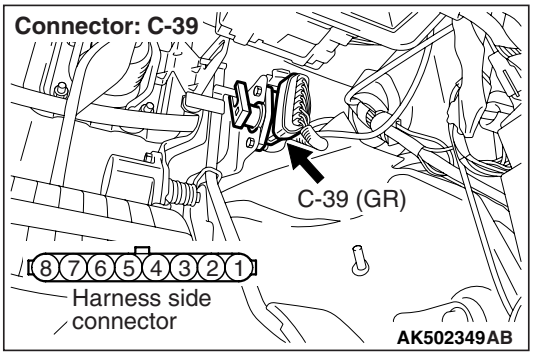
- Check output line for short circuit.

Q: Is the check result normal?

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

NO : Repair the damaged harness wire.

STEP 8. Perform resistance measurement at C-39 accelerator pedal position sensor connector.



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

OK: 2 Ω or less

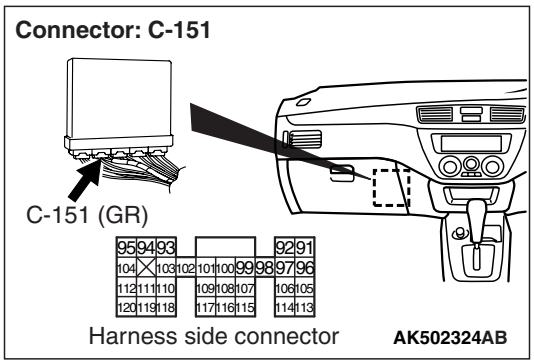
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 9 .

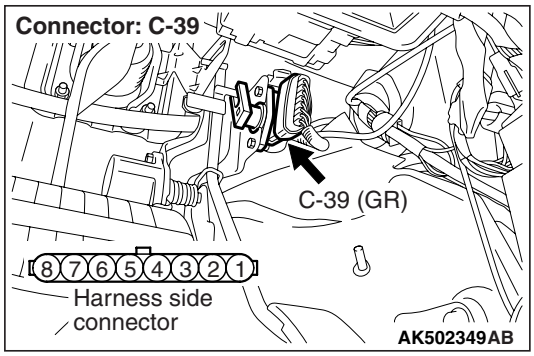
STEP 9. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

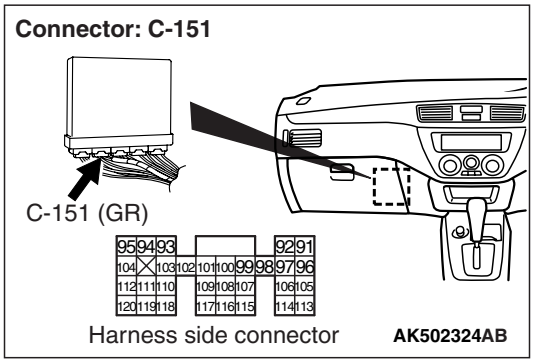
Q: Is the check result normal?



YES : Go to Step 10 .
NO : Repair or replace the connector.

STEP 10. Check harness between C-39 (terminal No. 5) accelerator pedal position sensor connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

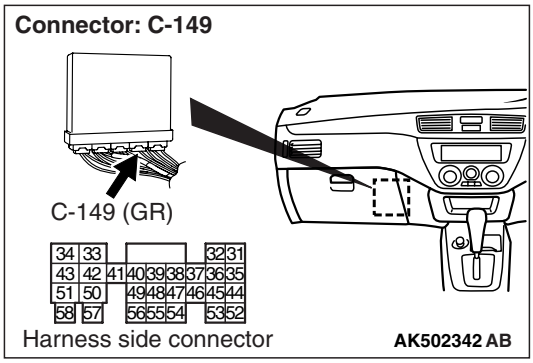




- Check earthing line for open circuit and damage.

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

STEP 11. Perform voltage measurement at C-149 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

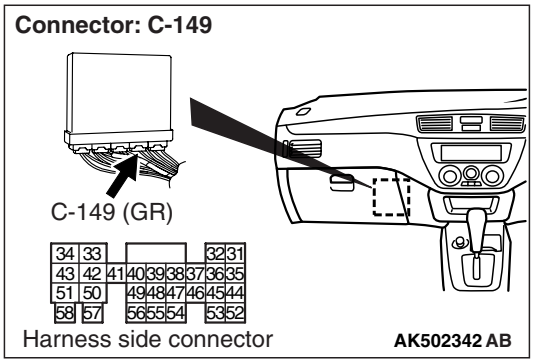


- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 38 and earth.

OK:
0 – 1 V (Release the accelerator pedal)
4 V or more (Depress the accelerator pedal)

Q: Is the check result normal?
YES : Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Go to Step 12 .

STEP 12. Connector check: C-149 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 the connector.

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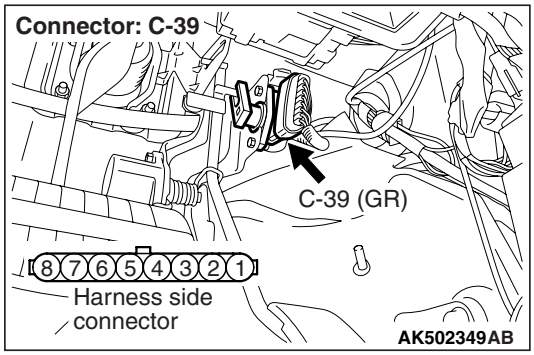
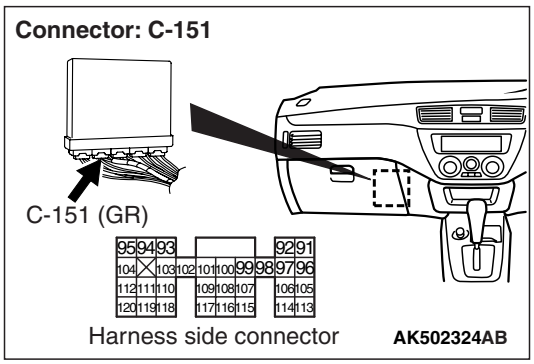
STEP 13. Check harness between C-39 (terminal No. 4) accelerator pedal position sensor connector and C-151 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.





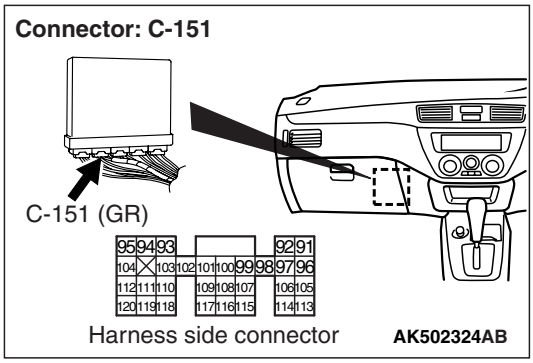
- Check output line for damage.

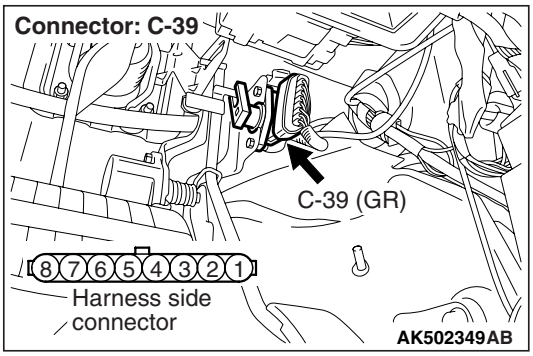
Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair the damaged harness wire.

STEP 14. Connector check: C-151 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector





Q: Is the check result normal?

YES : Check harness between C-39 (terminal No. 5) accelerator pedal position sensor connector and C-151 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for damage.

NO : Repair or replace the connector.

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DATA LIST REFERENCE TABLE

M1131152002140

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
11	Oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	200 mV or less	Code No. P0130	P.13A-57
			At excessive acceleration	600 – 1,000 mV		
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU <M/T> or engine-A/T-ECU <A/T>.	Idle operation	400 mV or less ⇔ 600 – 1,000 mV (altered)		
			2,500 r/min			
12	Air flow sensor *1	• 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 – 6.0 g/s	–	–
			2,500 r/min	7.0 – 17.0 g/s		
			Acceleration	According to acceleration, frequency is amplified.		
13	Intake air temperature sensor	Ignition switch: "ON" or engine running	Intake air temperature: – 20° C	– 20° C	Code No. P0110	P.13A-34
			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		

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
14	Throttle position sensor (sub) *4	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and the connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. • Ignition switch: ON	Fully close the throttle valve with your finger	2,200 – 2,800 mV	Code No. P0222, P0223	P.13A-98 P.13A-102
			Fully open the throttle valve with your finger	4,000 mV or more		
16	Power supply voltage	Ignition switch: "ON"		System voltage	Procedure No. 24	P.13A-259
18	Cranking signal (ignition switch-ST)	Ignition switch: "ON"	Engine: Stopped	OFF	Procedure No. 24	P.13A-259
			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-40
			Coolant temperature: 0° C	0° C		
			Coolant temperature: 20° C	20° C		
			Coolant temperature: 40° C	40° C		
			Coolant temperature: 80° C	80° C		

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
22	Crank angle sensor	• Engine: Cranking • Tachometer: Connected	Compare engine speed on tachometer with the value displayed on M.U.T.-II/III	Matched	Code No. P0335	P.13A-118
		Engine: Idle operation	Coolant temperature: -20° C	1,300 – 1,500 r/min		
			Coolant temperature: 0° C	1,300 – 1,500 r/min		
			Coolant temperature: 20° C	1,300 – 1,500 r/min		
			Coolant temperature: 40° C	1,160 – 1,360 r/min		
			Coolant temperature: 80° C	650 – 850 r/min		
25	Barometric pressure sensor	Ignition switch: "ON"	Altitude: 0m	101 kPa	Code No. P2226	P.13A-203
			Altitude: 600m	95 kPa		
			Altitude: 1,200m	88 kPa		
			Altitude: 1,800m	81 kPa		
26	Accelerator pedal position switch	Ignition switch: "ON"	Release the accelerator pedal	ON	Procedure No. 31	P.13A-292
			Depress the accelerator pedal	OFF		
27	Power steering fluid pressure switch	Engine: Idle operation	Steering wheel: Not operated	OFF	Code No. P0551	P.13A-147
			Steering wheel: Operated	ON		
28	A/C switch	Engine: Idle	AC switch: OFF	OFF	Procedure No. 27	P.13A-278
			AC switch: ON — A/C compressor is not driven	OFF		
			AC switch: ON — A/C compressor is driven	ON		
37	Volumetric efficiency	• Engine coolant temperature: 85 – 95° C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral <M/T>, "P" range <A/T>	Idle operation	12 – 32%	–	–
			2,500 r/min	10 – 30%		
			Excessive acceleration	According to acceleration, volumetric efficiency is increased.		

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
41	Injectors *2	Engine: Cranking	Coolant temperature: 0° C (all cylinders in simultaneous injecting operation)	50.4 – 75.6 ms	–	–
			Coolant temperature: 20° C	27.8 – 41.8 ms		
			Coolant temperature: 80° C	8.5 – 12.7 ms		
	Injectors*3	• Engine coolant temperature: 80 – 95° C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral <M/T>, "P" range <A/T>	Idle operation	2.4 – 3.6 ms		
			2,500 r/min	2.2 – 3.4 ms		
			Excessive acceleration	Increased		
44	Ignition advance	• Engine: After warm-up • Install timing light (for use to measure actual ignition timing)	Idle operation	2 – 18° BTDC	Procedure No. 30	P.13A-284
			2,500 r/min	22 – 42° BTDC		
49	A/C relay	Engine: After warm-up, idle operation after warm-up	A/C switch: OFF	OFF	Procedure No. 28	P.13A-279
			A/C switch: ON — A/C compressor is not driven	OFF		
			A/C switch: ON — A/C compressor is driven	ON		
59	Oxygen Sensor (rear)	Engine: After warm-up	At excessive acceleration	0 mV or less ⇔ 600 – 1,000 mV (altered)	Code No. P0136	P.13A-67
68	EGR valve	• Engine coolant temperature: 85 – 95° C • Lights and all accessories: "OFF" • Transmission: Neutral <M/T>, "P" range <A/T>	Idling	0 – 6 STEP	Code No. P0403	P.13A-133
			2,500 r/min	0 – 6 STEP		

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
77	Accelerator pedal position sensor (sub)	Ignition switch: ON	Release the accelerator pedal	735 – 1,335 mV	Code No. P2126, P2127, P2128	P.13A-186 P.13A-189 P.13A-193
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	4,000 mV or more		
78	Accelerator pedal position sensor (main)	Ignition switch: ON	Release the accelerator pedal	885 – 1,185 mV	Code No. P2121, P2122, P2123	P.13A-177 P.13A-180 P.13A-184
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	4,000 mV or more		
79	Throttle position sensor (main)	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. • Ignition switch: ON	Fully close the throttle valve with your finger	300 – 700 mV	Code No. P0122, P0123	P.13A-46 P.13A-50
			Fully open the throttle valve with your finger	4,000 mV or more		
		No load		530 – 630 mV		
		• Shift lever: "N" → "D" <A/ T>		560 – 660 mV		

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
95	Manifold absolute pressure sensor	Ignition switch: ON	Altitude: 0 m	101 kPa	Code No. P0105	P.13A-27
			Altitude: 600 m	95 kPa		
			Altitude: 1,200 m	88 kPa		
			Altitude: 1,800 m	81 kPa		
		• Engine coolant temperature: 85 – 95° C • Lights and all accessories: "OFF" • Transmission: Neutral <M/T>, "P" range <A/ T>	Idle operation	26 – 40 kPa		
			When engine is suddenly raced	Increased		
9A	Throttle position sensor (main) mid opening learning value	Ignition switch: ON		600 – 1,200 mV	Code No. P0122, P0123	P.13A-46 P.13A-50
12 *5	Air flow sensor	• 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 – 6.0 g/s	–	–
			2,500 r/min	7.0 – 17.0 g/s		
			Acceleration	According to acceleration, frequency is amplified.		
13 *5	Intake air temperature sensor	Ignition switch: "ON" or engine running	Intake air temperature: – 20° C	-20° C	Code No. P0110	P.13A-34
			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		

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
21 *5	Engine coolant temperature sensor	Ignition switch: "ON" or engine running	Coolant temperature: – 20° C	– 20° C	Code No. P0115	P.13A-40
			Coolant temperature: 0° C	0° C		
			Coolant temperature: 20° C	20° C		
			Coolant temperature: 40° C	40° C		
			Coolant temperature: 80° C	80° C		
22 *5	Crank angle sensor	• Engine: Cranking • Tachometer: Connected	Compare engine speed on tachometer with the value displayed on M.U.T.-II/III	Matched	–	–
		Engine: Idle operation	Coolant temperature: – 20° C	1,300 – 1,500 r/min		
			Coolant temperature: 0° C	1,300 – 1,500 r/min		
			Coolant temperature: 20° C	1,300 – 1,500 r/min		
			Coolant temperature: 40° C	1,160 – 1,360 r/min		
			Coolant temperature: 80° C	650 – 850 r/min		
24 *5	Vehicle speed sensor	Drive 40 km/h		Approximately 40 km/h	–	–
44 *5	Ignition advance	• Engine: After warm-up • Install timing light (for use to measure actual ignition timing)	Idle operation	2 – 18 deg	–	–
			2,500 r/min	25 – 45 deg		
81 *5	Long-term fuel compensation	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		–12.5 to 12.5%	Code No. P0170	P.13A-79
82 *5	Shot-term fuel compensation	Engine: After warm-up, 2,500 r/min without any load (during closed loop)		–25 to 25%	Code No. P0170	P.13A-79
87 *5	Calculation losd value	Engine: After warm-up	Idle operation	12 – 32%	–	–
			2,500 r/min	10 – 30%		
88 *5	Fuel control condition	Engine: After warm-up	2,500 r/min	Closed loop	–	–
			Acceleration	Open loop-drive condition		

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Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
8A *5	Throttle position sensor (main) *4	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and then connect terminal numbers No. 3, and No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. • Ignition switch: ON	Fully close the throttle valve with your finger	0 – 5%	Code No. P0122, P0123	P.13A-46 P.13A-50
			Fully open the throttle valve with your finger	88% or more		
A1 *5	Oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	0.2 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0130	P.13A-57
		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 ⇔ 0.6 – 1 V (altered)		
			2,500 r/min			
A2 *5	Oxygen sensor (rear)	Engine: After warm-up	At excessive acceleration	0 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0136	P.13A-67
A9 *5	Engine warning lamp distance	Running distance in the engine warning lamp on			–	–

⚠ CAUTION

When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward

*NOTE: *1: On the new vehicle (mileage: 500 km or less), air flow sensor output frequency may be higher by approx. 10%.*

*NOTE: *2: Injector drive time ranges shown are when power voltage is 11 V and the cranking speed is 250 r/min. or less.*

*NOTE: *3: On the new vehicle (mileage: 500 km or less), injector drive time may be longer by approx. 10%.*

*NOTE: *4: After the inspection has been completed, disconnect the throttle actuator control motor connector, and then use the M.U.T.-II/III to delete the diagnosis code that was recorded during the inspection.*

*NOTE: *5: When service data in check mode is selected, the data is not displayed.*

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ACTUATOR TEST REFERENCE TABLE

M1131152501346

Item No.	Inspection item	Drive content	Inspection conditions		Normal condition	Code No. /Inspection procedure No.	Reference page
01	Injector	Cut off No. 1 injector	Engine: After warm-up, idle operation (Cut off injectors sequentially to check for a cylinder that does not change engine in idle status.		Engine is changed (becomes unstable or stalled)	Code No. P0201	P.13A-82
02		Cut off No. 2 injector				Code No. P0202	P.13A-86
03		Cut off No. 3 injector				Code No. P0203	P.13A-90
04		Cut off No. 4 injector				Code No. P0204	P.13A-94
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. 25	P.13A-264
08	Purge control solenoid valve	Switch solenoid valve from OFF to ON	Ignition switch: "OFF"		When the valve is actuated, operating noise is audible	Code No. P0443	P.13A-139
17	Basic ignition timing	Switch engine-ECU <M/T> or engine-A/T-ECU <A/T> to ignition timing adjusting mode	• Engine: Idle operation • Install timing light		5° BTDC	–	–
21	Fan controller	Actuate fan motor	• Ignition switch: "ON" • A/C switch: ON		Fan motor is rotated	Procedure No. 22	P.13A-254
22	Oil control valve	Oil control valve turns from OFF the ON	Engine: Warming up, 2,000 r/min		Engine speed is changed	Code No. P1021	P.13A-165
34	Throttle valve control servo	Stop the throttle valve control servo	Ignition switch: "ON"		Throttle valve is open	Code No. P2100, P2102	P.13A-172 P.13A-175

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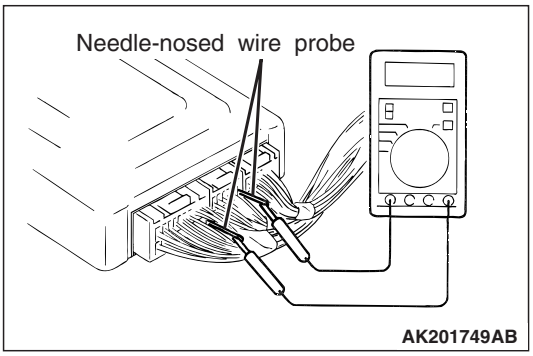
CHECK AT THE ECU TERMINALS

M1131153500755

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.

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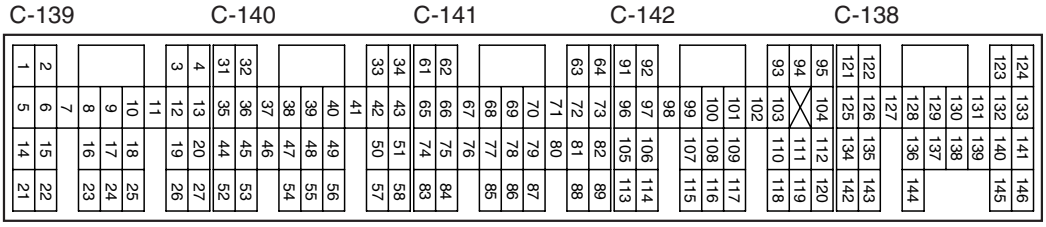
Engine-ECU <M/T> or engine-A/T-ECU <A/T> Connector Terminal Arrangement

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



AK303309AB

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)		
7	Engine warning lamp	Ignition switch: "LOCK" (OFF) → "ON"	1 V or less → System voltage (After several seconds have elapsed)
8	A/C relay	• Engine: Idle speed • A/C switch: OFF → ON (A/C compressor is operating)	System voltage → 1 V or less
10	Oxygen sensor heater (front)	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	Ignition switch: ON	System voltage
		Engine: Idle speed	1 V or less
17	Fan controller	Radiator and condenser fan is not operating	0 – 0.3 V*
		Radiator and condenser fan is operating	0.7 V* or more
18	Oxygen sensor heater (rear)	Engine: Idling after warming up	1 V or less
		Engine: Racing	System voltage
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
31	Ignition coil – No. 1	Engine r/min: 3,000 r/min	0.3 – 3.0 V*
32	Ignition coil – No. 2		
35	Ignition coil – No. 3		
52	Ignition coil – No. 4		

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Terminal No.	Check item	Check condition (Engine condition)		Normal condition
34	Power supply	Ignition switch: "ON"		System voltage
43				
38	Accelerator pedal position switch	Ignition switch: "ON"	Release the accelerator pedal	0 – 1 V
			Depress the accelerator pedal	4 V or more
45	Alternator G terminal	• Engine: Warm, idle (radiator fan: OFF) • Headlamp: OFF → ON • Stop lamp: OFF → ON • Rear defogger switch: OFF → ON		Voltage increases
47	Power steering fluid pressure switch	Engine: Idling after warming up	When steering wheel is Stationary	System voltage
			When steering wheel is turned	1 V or less
50	Ignition switch –IG	Ignition switch: "ON"		System voltage
51	Ignition switch –ST	Engine: Cranking		8 V or more
57	Engine control relay (Power supply)	Ignition switch: "LOCK" (OFF)		System voltage
		Ignition switch: "ON"		1 V or less
58	Backup power supply	Ignition switch: "LOCK" (OFF)		System voltage
63	Air flow sensor	Engine: Gradually increase the speed.		Voltage increase in response to revving
69	A/C switch	Engine: Idle speed	Turn the A/C switch OFF	0.5 V or less
			Turn the A/C switch ON (A/C compressor is operating)	System voltage
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
78	A/C load signal	Refer to GROUP 55 –Troubleshooting (Inspection at the Automatic compressor – ECU Terminal)		
79 <M/T>	Vehicle speed sensor	• Ignition switch: "ON" • Move the vehicle forword slowly		0 ⇔ 5 V Changes repeatedly
86	Alternator FR terminal	• Engine: Warm, idle (radiator fan: OFF) • Headlamp: OFF → ON • Stop lamp: OFF → ON • Rear defogger switch: OFF → ON		Voltage decreases
87	Tachometer signal	Engine: 3,000 r/min		0.3 – 3.0 V
92	Power supply voltage applied to accelerator pedal position sensor	Ignition switch: "ON"		4.5 – 5.5 V

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Terminal No.	Check item	Check condition (Engine condition)		Normal condition
95	Oil control valve	Ignition switch: "ON"		System voltage
		Engine: warming up, 4,000 r/min		4.0 – 10 V*
97	Sensor impressed voltage	Ignition switch: "ON"		4.9 – 5.1 V
98	Engine coolant temperature sensor	Ignition switch: "ON"	When engine coolant temperature is –20° C	3.9 – 4.5 V
			When engine coolant temperature is 0° C	3.2 – 3.8 V
			When engine coolant temperature is 20° C	2.3 – 2.9 V
			When engine coolant temperature is 40° C	1.3 – 1.9 V
			When engine coolant temperature is 60° C	0.7 – 1.3 V
			When engine coolant temperature is 80° C	0.3 – 0.9 V
99	Intake air temperature sensor	Ignition switch: "ON"	When intake air temperature is –20° C	3.8 – 4.4 V
			When intake air temperature is 0° C	3.2 – 3.8 V
			When intake air temperature is 20° C	2.3 – 2.9 V
			When intake air temperature is 40° C	1.5 – 2.1 V
			When intake air temperature is 60° C	0.8 – 1.4 V
			When intake air temperature is 80° C	0.4 – 1.0 V
101	Manifold absolute pressure sensor	Engine: idling		0.8 – 2.4 V
		• Engine: idling • Revving (momentary wide open throttle)		Rises from 0.8 – 2.4 V suddenly
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	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)		0 ⇔ 0.8 V (Changes repeatedly)

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Terminal No.	Check item	Check condition (Engine condition)		Normal condition
113	Throttle position sensor (sub)	• 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
115	Throttle position sensor (main)	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool (MB991658). • Ignition switch: "ON"	Fully close the throttle valve with your finger	0.3 – 0.7 V
			Fully open the throttle valve with your finger	4.0 V or more
116	Oxygen sensor (rear)	Engine: Idling after warmed up (Check using a digital type voltmeter)		0 ⇔ 0.6 V (Changes repeatedly)
132	Power supply voltage applied to throttle valve control servo	Ignition switch: "ON"		System voltage
133	Throttle valve control servo (+)	• Ignition switch: "ON" • Accelerator pedal: fully opened → fully closed		Decreases slightly (approximately 2 V) from battery voltage.
141	Throttle valve control servo (-)	• 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).*

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CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to "LOCK" (OFF) position.
2. Disconnect the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU <M/T> or engine-A/T-ECU <A/T> harness-side connector while referring to the check chart.

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

⚠ CAUTION

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

4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and the repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

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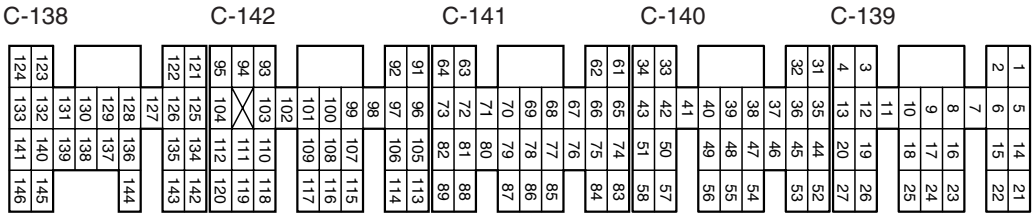
Engine-ECU <M/T> or engine-A/T-ECU <A/T> Harness Side Connector Terminal Arrangement

Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Harness Side Connector



AK303310AB

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)	
23 – 34	Purge control solenoid valve	30 – 34 Ω (At 20° C)
24 – 34	Oxygen sensor heater (rear)	11 – 18 Ω (at 20° C)
25 – 34	Oxygen sensor heater (front)	4.5 – 8.0 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)

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Terminal No.	Inspection item	Normal condition (Check condition)
96 – 99	Intake air temperature sensor	13 – 17 kΩ (When intake air temperature is – 20° C)
		5.3 – 6.7 kΩ (When intake air temperature is 0° C)
		2.3 – 3.0 kΩ (When intake air temperature is 20° C)
		1.0 – 1.5 kΩ (When intake air temperature is 40° C)
		0.56 – 0.76 kΩ (When intake air temperature is 60° C)
		0.30 – 0.45 kΩ (When intake air temperature is 80° C)
133 – 141	Throttle actuator control motor	0.3 – 80 Ω (at 20° C)

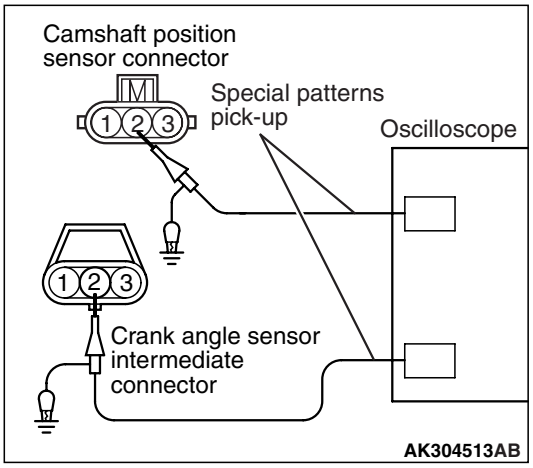
INSPECTION PROCEDURE USING OSCILLOSCOPE

M1131154501494

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

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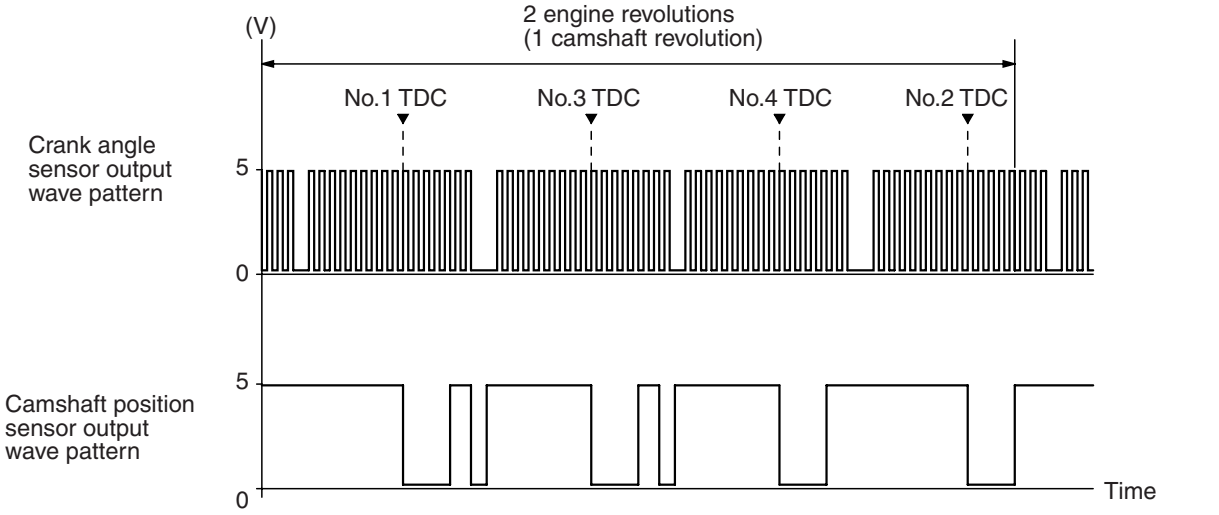
Standard Wave Pattern



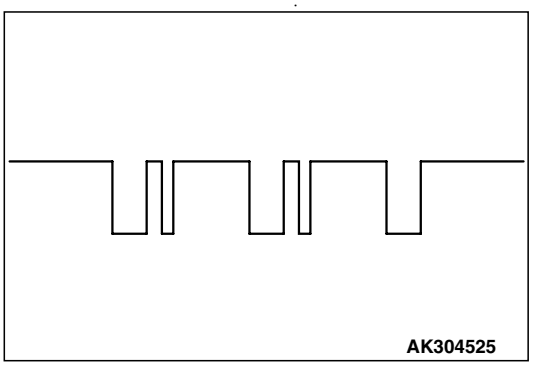
TDC: Top dead centre

AK304514 AB

Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.

Examples of Abnormal Wave Patterns



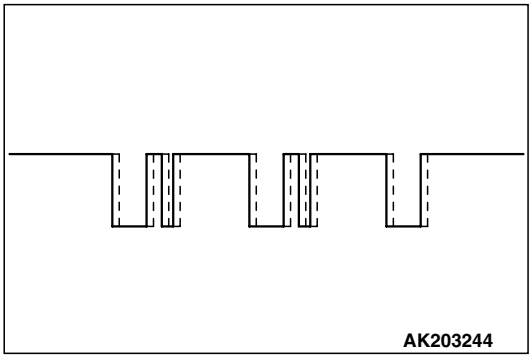
Example 1

Cause of problem

Sensor interface malfunction

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.



Example 2

Cause of problem

Loose timing belt

Abnormality in sensor disk

Wave pattern characteristics

Wave pattern is displaced to the left or right.

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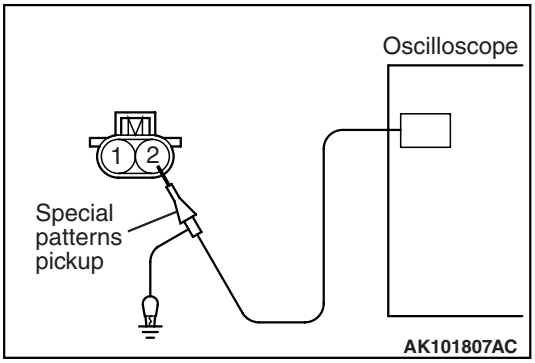
INJECTOR

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)

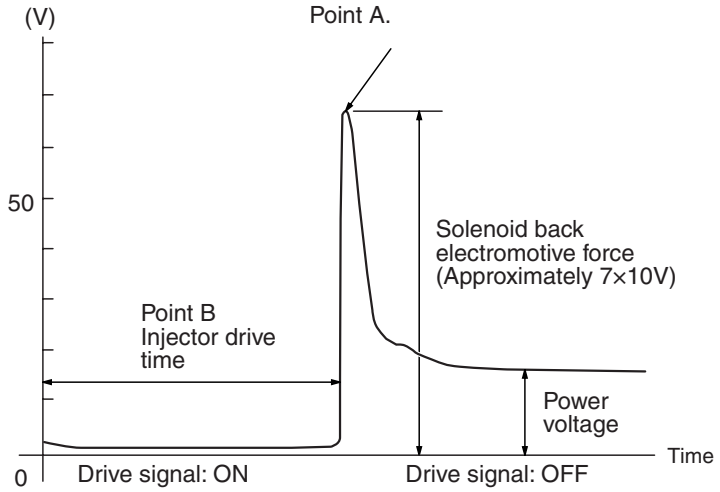
1. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 1 (When checking the No. 1 cylinder).
2. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 5 (When checking the No. 2 cylinder).
3. Connect 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



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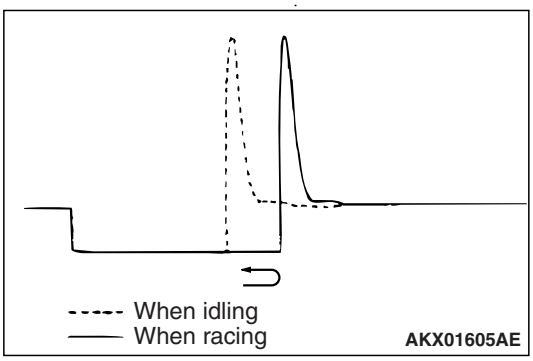
Wave Pattern Observation Points

Point A: Height of solenoid back electromotive force

Contrast with standard wave pattern	Probable cause
Solenoid coil back electromotive force is low or doesn't appear at all.	Short in the injector solenoid

Point B: Injector drive time



The injector drive time will be synchronized with the M.U.T.-II tester display.

- When the engine is suddenly raced, the drive time will be greatly extended at first, but the drive time will soon match the engine speed.

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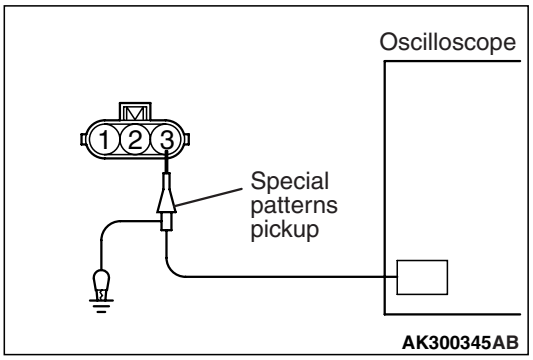
IGNITION COIL AND POWER TRANSISTOR

Measurement Method



1. Disconnect the ignition coil connector, and connect the special tool Test harness (MB991658) in between (All terminals should be connected).
2. Connect the oscilloscope special patterns pickup to terminal No. 3 of each ignition coil connector in turn.

Alternate Method (Test harness not available)

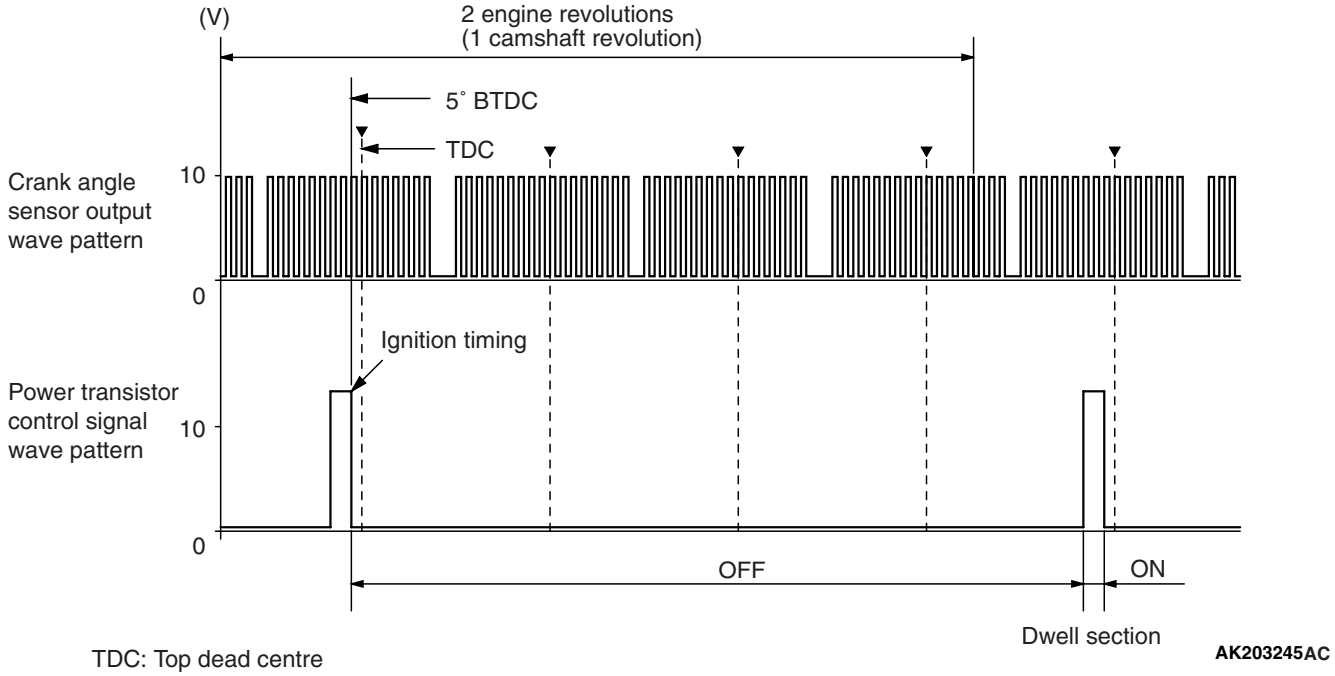
1. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 31. (When checking the number 1 cylinder.)
2. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 32. (When checking the number 2 cylinder.)
3. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 35. (When checking the number 3 cylinder.)
4. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 52. (When checking the number 4 cylinder.)

Standard Wave Pattern

Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine	Approximately. 1,200 r/min

Standard wave pattern



TDC: Top dead centre

Wave Pattern Observation Points

Point: When the engine speed increases, verify that the power transistor control signal (ignition timing) advances.

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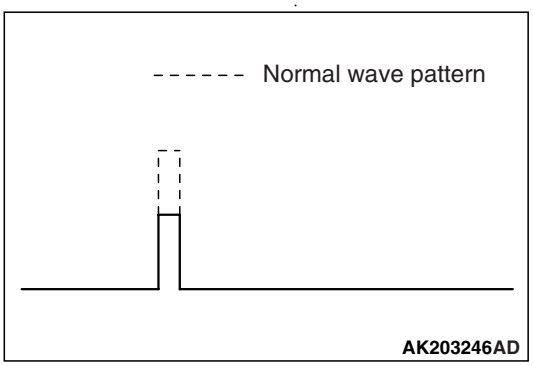
Examples of Abnormal Wave Patterns



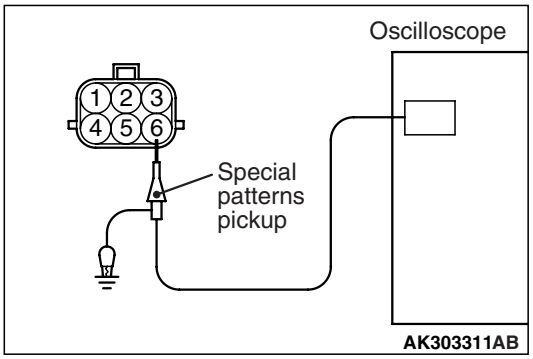
Example
Wave pattern during engine cranking

Cause of problem
Open-circuit in ignition primary circuit

Wave pattern characteristics
Top-right part of the build-up section cannot be seen, and voltage value is approximately 2 V too low.

EGR VALVE (STEPPER MOTOR)

Measurement Method



1. Disconnect the EGR valve connector, and connect the special tool test harness (MB991658) in between.
2. Connect the oscilloscope probe to the EGR valve-side connector terminal 1, terminal 3, terminal 4 and terminal 6 respectively.

Alternate Method (Test Harness not Available)

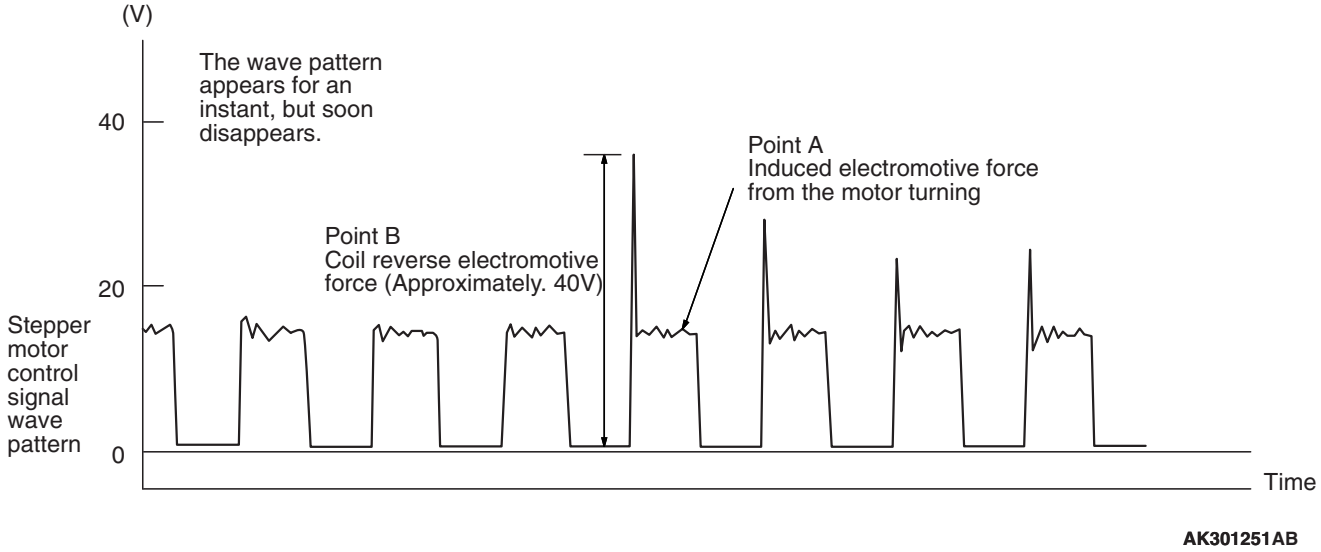
1. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 3, connection terminal No. 12, connection terminal No. 19, and connection terminal No. 26 respectively.

Standard Wave Pattern

Observation condition

Function	Special patterns
Pattern height	High
Pattern selector	Display
Engine	Ignition switch: OFF → ON

Standard wave pattern



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Wave pattern Observation Points

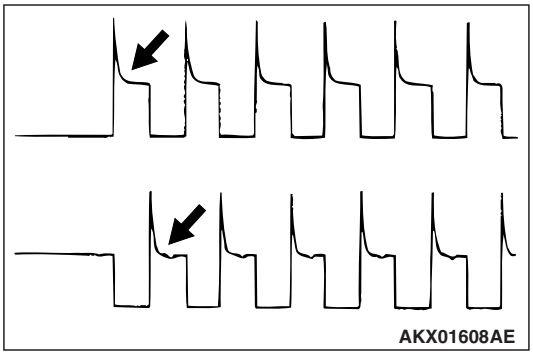
Check that the standard wave pattern appears when the EGR control servo is operating.
Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

Contrast with standard wave pattern	Probable cause
Induced electromotive force does not appear or is extremely small.	Motor is malfunctioning

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

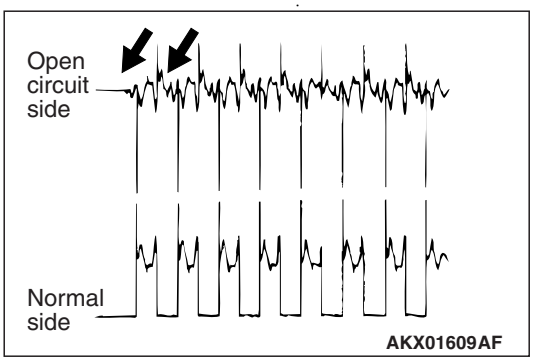
Examples of Abnormal Wave Patterns



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.

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ON-VEHICLE SERVICE

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001001001

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.

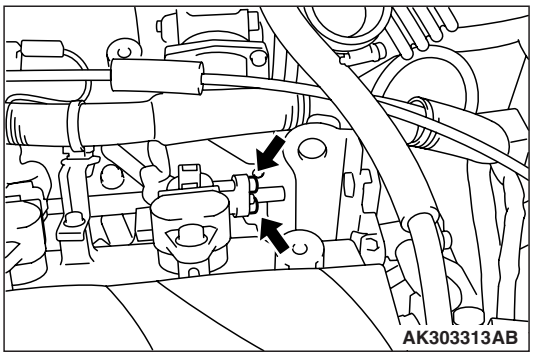
FUEL PRESSURE TEST

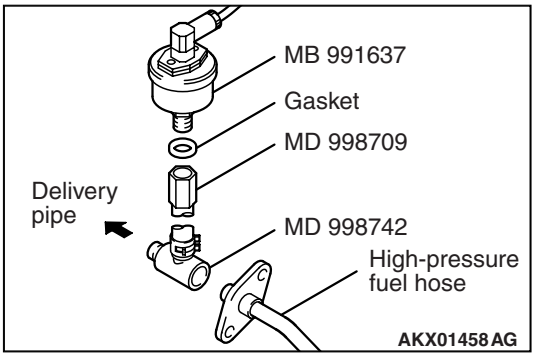
M1131001901297

1. Release residual pressure from the fuel pipe line to prevent fuel gush out (Refer to P.13A-323).

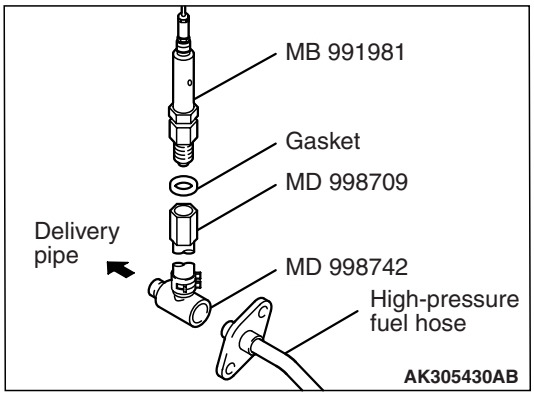
⚠ CAUTION

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



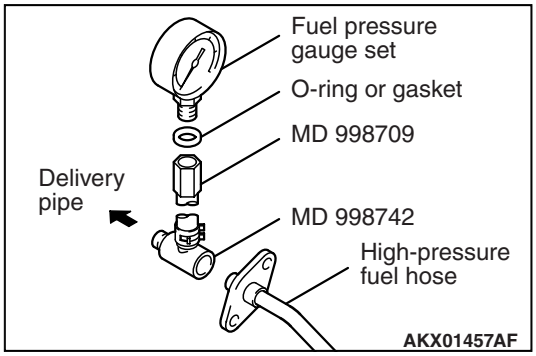


2. Disconnect the high-pressure fuel hose at the delivery pipe side.
3. Assemble the fuel pressure measurement tools as follows.



<When using the fuel pressure gauge set (special tool)>

a. Remove the union joint and bolt from the special tool Adaptor hose (MD998709) and attach the special tool Hose adaptor (MD998742) to the adaptor hose.
b. Via a gasket, install the special tool Fuel pressure gauge set (MB991637 or MB991981) into the special tool that has already assembled as described in (a) above.



<When using the fuel pressure gauge>

a. Remove the union joint and bolt from special tool Adaptor hose (MD998709) and attach the special tool Hose adaptor (MD998742) to the adaptor hose.
b. Via a suitable O-ring or gasket, install the fuel pressure gauge to the special tool that has already assembled as described in (a) above.

4. Install the assembled fuel pressure measurement tools between the fuel rail and fuel high-pressure hose.

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⚠ CAUTION

To prevent damage to the M.U.T.-II/III, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting the M.U.T.-II/III.

5. Connect the M.U.T.-II/III to the diagnosis connector.
6. Turn the ignition switch to "ON" position (But do not start the engine).
7. Select "Item No. 07" from the M.U.T.-II/III Actuator test to drive the fuel pump. Check that there are no fuel leaks from any parts.
8. Finish the actuator test or turn the ignition switch to "LOCK" (OFF) position.
9. Start the engine and run at idle.
10. Measure fuel pressure while the engine is running at idle.

    Standard value: Approximately. 324 kPa at curb idle

11. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
12. If any of fuel pressure measured in steps 10 to 11 is out of specification, troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
• Fuel pressure too low • Fuel pressure drops after racing	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

13. 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

14. Release residual pressure from the fuel pipe line (Refer to P.13A-323).

⚠ 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.

15. Remove the fuel pressure gauge and special tool from the delivery pipe.
16. 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.
17. Fit the fuel high pressure hose over the delivery pipe and tighten the bolt to specified toque.

    Tightening torque: 5.0 ±1.0 N· m

18. Check for any fuel leaks by following the procedure in step 7.
19. Disconnect the M.U.T.-II/III.

ACCELERATOR PEDAL POSITION SWITCH AND ACCELERATOR PEDAL POSITION SENSOR (APS) ADJUSTMENT

M1131053400104

⚠ CAUTION

1. **The accelerator pedal position sensor should not be moved unnecessarily; it has been precisely adjusted by the manufacture.**
2. **If the adjustment is disturbed for any reason, readjust as follows.**

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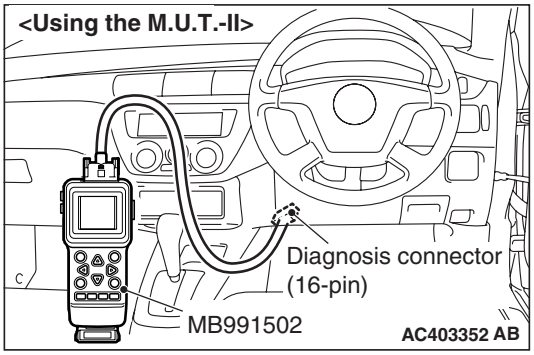
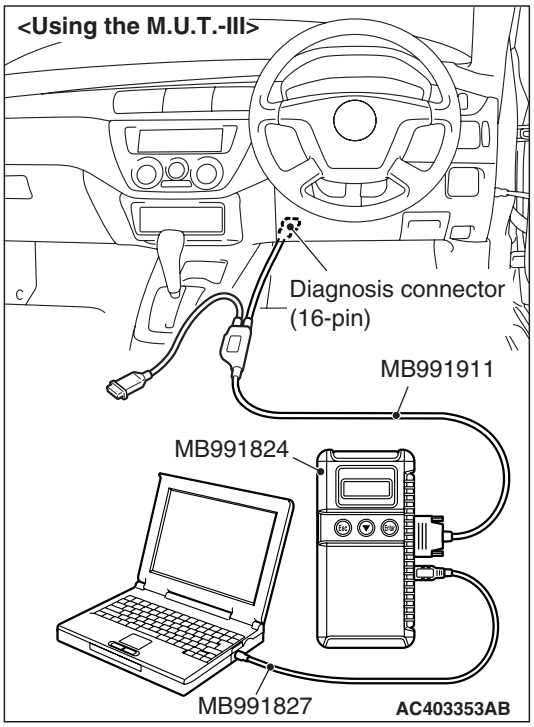
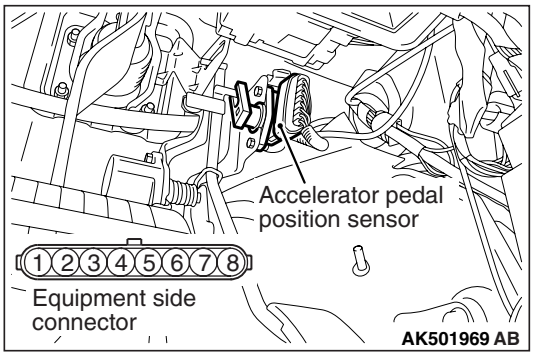
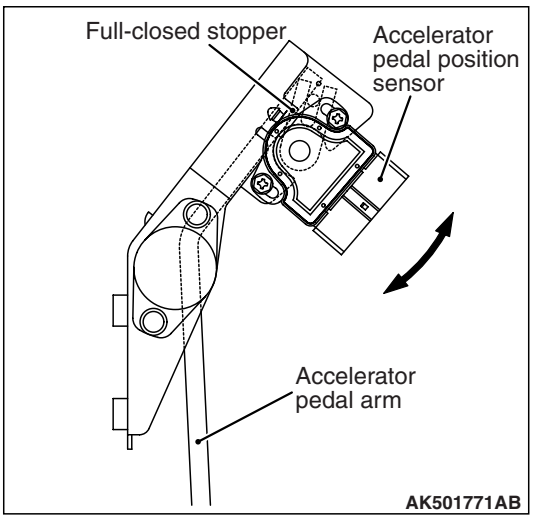




1. Connect the M.U.T.-II/III to the diagnosis connector.





2. Remove the accelerator pedal position sensor (main and sub) assembly mounting bolts, and then insert a thickness gauge with a thickness of 0.60 mm in between the accelerator lever and the fully-closed stopper (i.e. into area "A" shown in Fig).
3. Turn the ignition switch to the "ON" position (without starting the engine).
4. Loosen the accelerator pedal position sensor mounting bolt, and then turn the accelerator pedal position sensor anti-clockwise as far as it will go.
5. Check that the accelerator pedal position switch turns on at this time.
6. Turn the accelerator pedal position sensor clockwise until the point is found where the accelerator pedal position switch turns off. Securely tighten the accelerator pedal position sensor mounting bolt at this point.
7. Check that the accelerator pedal position sensor (main) output at this time is within the standard value range.

   Standard value: 0.985 – 1.085 V
8. Turn the ignition switch to the "LOCK" (OFF) position.
9. Remove the thickness gauge and then install the accelerator pedal position sensor assembly.
10. Remove the M.U.T.-II/III.

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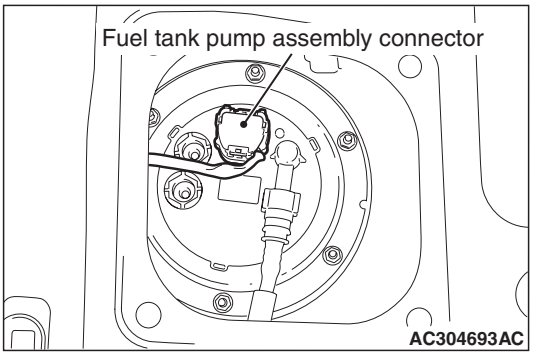
FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE PRESSURIZED FUEL LINES)

M1131000901216

⚠ WARNING

When removing the fuel pipe, etc., release fuel pressure to prevent fuel spray.

1. Remove the rear seat cushion (Refer to GROUP 52A –Rear Seat P.52A-25).
2. Remove the service hole cover mounting screws and remove the service hole cover.



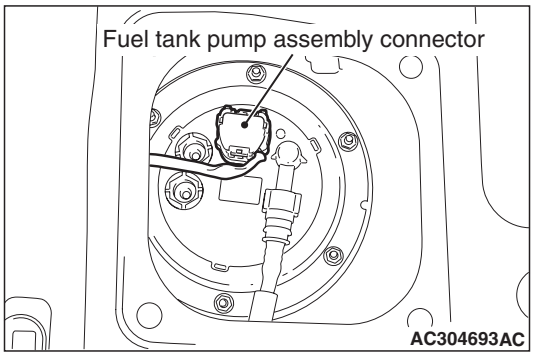
3. Disconnect the fuel tank pump assembly connector.
4. Crank the engine for at least two seconds.
5. If the engine is not started, turn the ignition switch to the "LOCK" (OFF) position.
6. If the engine is started, turn the ignition switch to the "LOCK" (OFF) position after the engine stopped.
7. Connect the fuel tank pump assembly connector.
8. Tighten the service hole cover mounting screws and install the service hole cover.
9. Install the rear seat cushion. (Refer to GROUP 52A –Rear Seat P.52A-25).

FUEL PUMP OPERATION CHECK

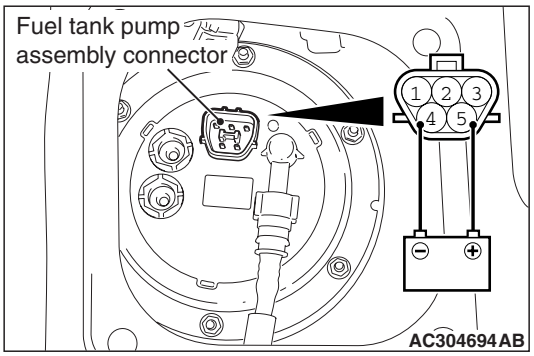
M1131002001316

1. Remove the fuel tank cap.

   NOTE: As the fuel tank pump is an in-tank type, the fuel tank pump sound is hard to hear. Then check the sound from the tank inlet.
2. Check the operating of the fuel tank pump by M.U.T.-II/III to force-drive the fuel tank pump.
3. If the fuel tank pump will not operate, check by using the following procedure. If normal, check the fuel tank pump drive circuit.
   (1) Turn the ignition switch to the "LOCK" (OFF) position.
   (2) Remove the rear seat cushion (Refer to GROUP 52A –Rear Seat P.52A-25).
   (3) Remove the service hole cover mounting screws and remove the service hole cover.



   (4) Disconnect the fuel tank pump assembly connector.



   (5) When the fuel tank pump drive connector (Fuel tank pump and gauge assembly side) is attached directly to the battery, check if the sound of the fuel tank pump operation can be heard. If no operating sound is heard, replace the fuel tank pump (Refer to GROUP 13B – Fuel Tank Pump Assembly Disassembly and Reassembly P.13B-6).

   NOTE: As the fuel tank pump is an in-tank type, the fuel tank pump sound is hard to hear. Then check the sound from the tank inlet.

   (6) Check for fuel pressure by pinching the fuel high pressure hose with fingertips.
   (7) Connect the fuel tank pump assembly connector.
   (8) Tighten the service hole cover mounting screws and install the service hole cover.
   (9) Install the rear seat cushion. (Refer to GROUP 52A –Rear Seat P.52A-25).
4. Install the fuel tank cap.

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COMPONENT LOCATION

M1131002101595

Name	Symbol	Name	Symbol
Accelerator pedal position sensor (with accelerator pedal position switch)	T	Engine warning lamp (check engine lamp)	Q
A/C compressor relay	I	Fuel pump relay (1) and (2)	U
A/C switch	P	Ignition coil	L
Air flow sensor (with intake air temperature sensor)	G	Inhibitor switch <A/T>	O
Camshaft position sensor	N	Injector	B
Crank angle sensor	K	Manifold absolute pressure sensor	A
Detonation sensor	C	Oil control valve	F
Diagnosis connector	S	Oxygen sensor (front)	M
EGR valve	D	Oxygen sensor (rear)	V
Electronic-controlled throttle valve (Throttle position sensor and throttle valve control servo)	E	Power steering fluid pressure switch	J
Engine-ECU <M/T> or engine-A/T-ECU <A/T> (with barometric pressure sensor)	R	Purge control solenoid valve	A
Engine control relay	I	Throttle valve control servo relay	I
Engine coolant temperature sensor	N	Vehicle speed sensor <M/T>	H

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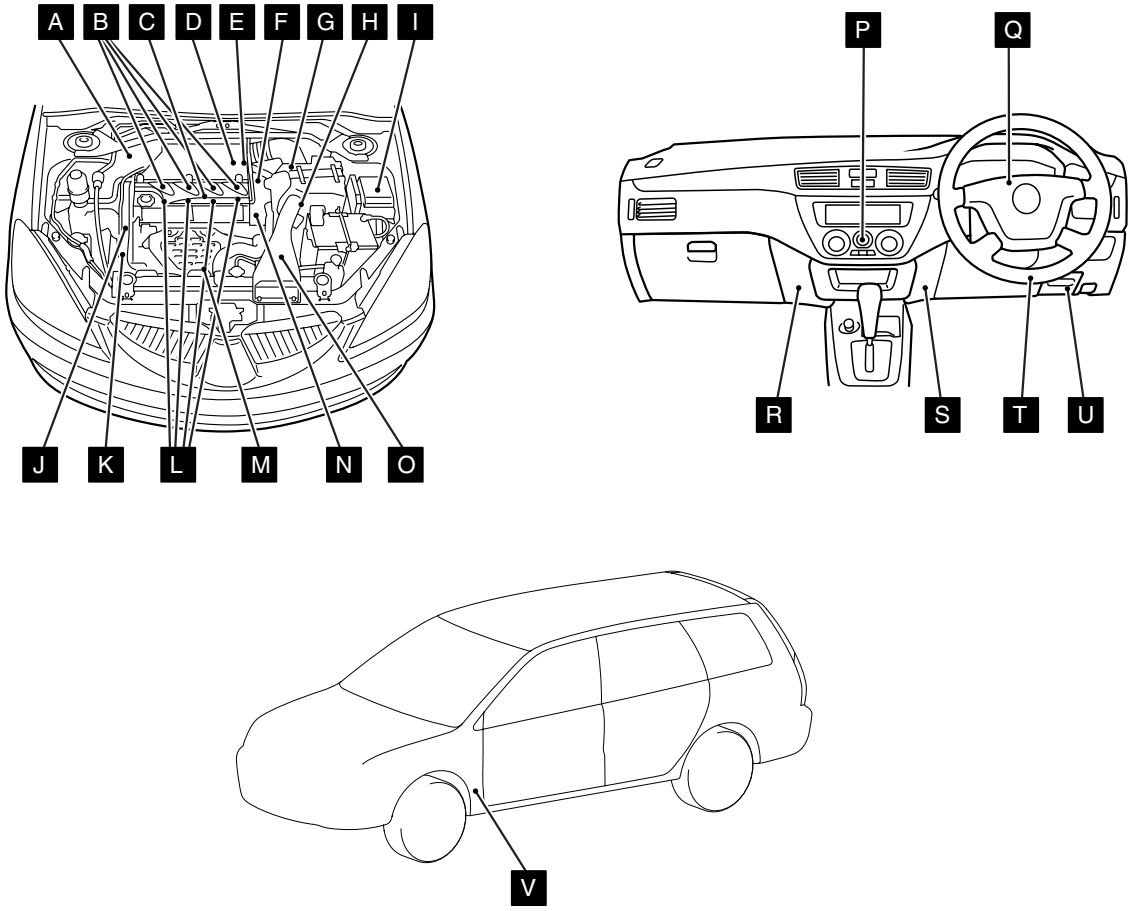

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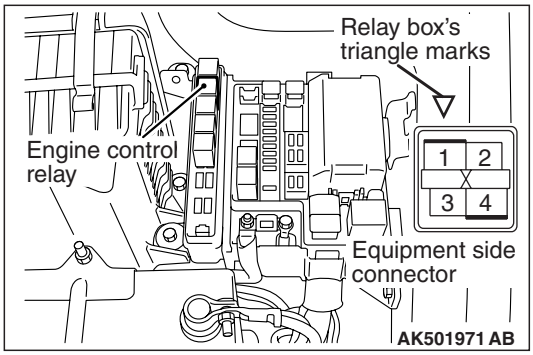
ENGINE CONTROL RELAY CONTINUITY CHECK

M1131050000765



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. 2 and negative (–) terminal of battery to terminal No. 3.)	Continuity

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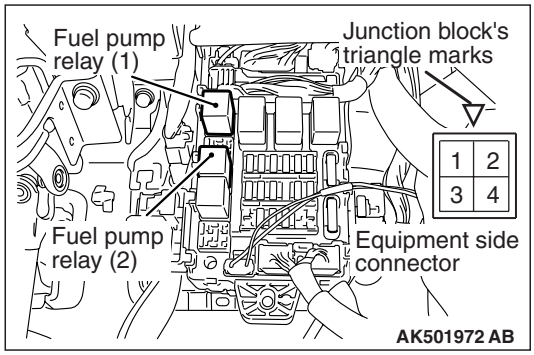
FUEL PUMP RELAY CONTINUITY CHECK

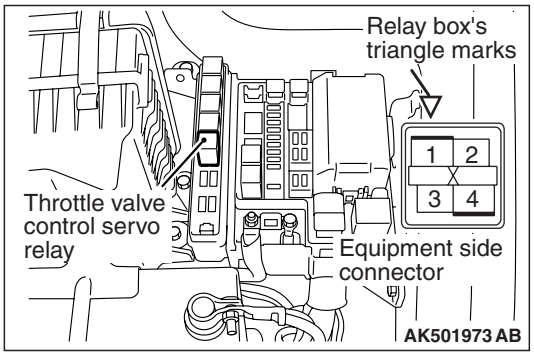
M1131033000784



Tester Connection Terminal	Battery Voltage	Normal State
1 – 4	No Voltage	Continuity
2 – 3	No Voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 1 and negative (–) terminal of battery to terminal No. 4.)	Continuity

THROTTLE VALVE CONTROL SERVO RELAY CONTINUITY CHECK

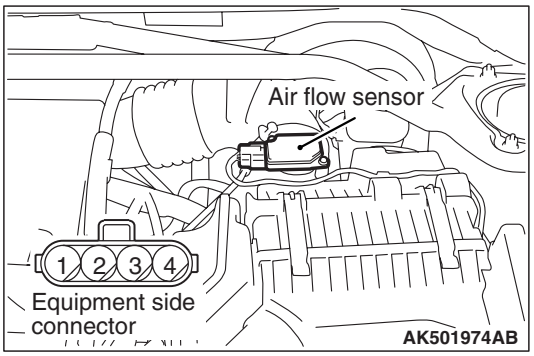
M1131053500208



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

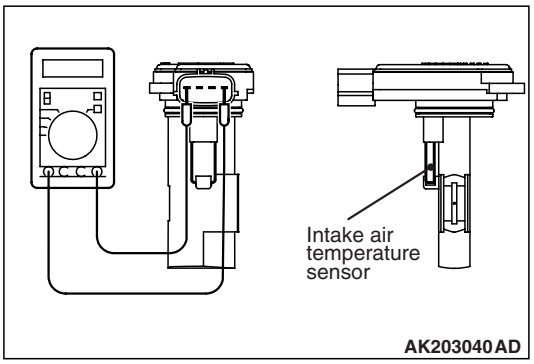
INTAKE AIR TEMPERATURE SENSOR CHECK

M1131002801129



1. Disconnect the air flow sensor connector.
2. Measure resistance between terminals No. 1 and No. 4.

   Standard value:
   13 – 17 kΩ (at –20° C)
   5.3 – 6.7 kΩ (at 0° C)
   2.3 – 3.0 kΩ (at 20° C)
   1.0 – 1.5 kΩ (at 40° C)
   0.56 – 0.76 kΩ (at 60° C)
   0.30 – 0.45 kΩ (at 80° C)
3. Remove the air flow sensor



4. Measure resistance while heating the sensor using a hair drier.

   Normal condition:

Temperature (° C)	Resistance (kΩ)
Higher	Smaller

5. If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.
6. Install the air flow sensor and tighten it to the specified torque.

   Tightening torque: 1.8 ± 0.6 N· m

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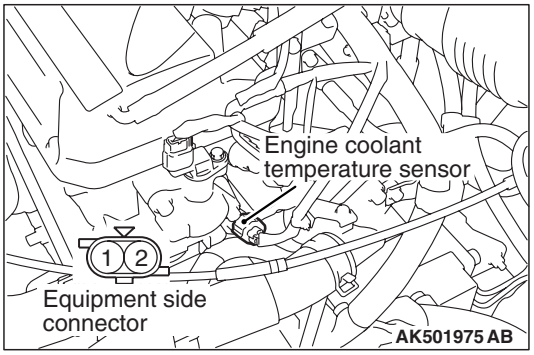
ENGINE COOLANT TEMPERATURE SENSOR CHECK

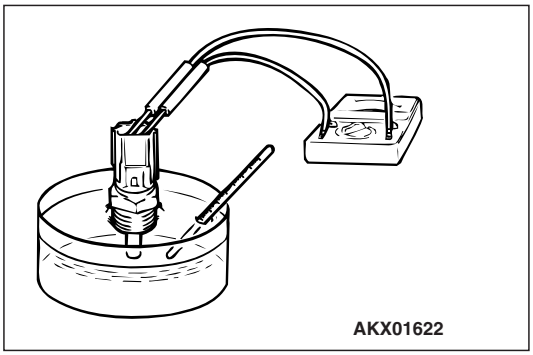
M1131003101071

⚠ CAUTION

Be careful not to touch the connector (resin section) with the tool when removing and installing.



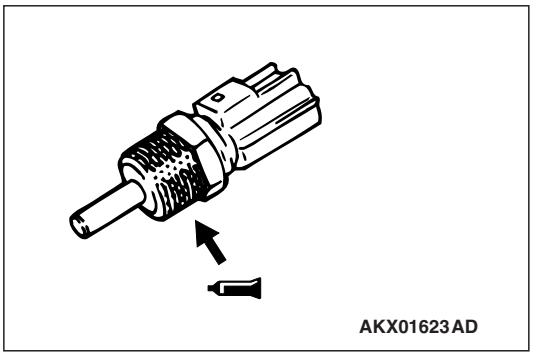
1. Remove the engine coolant temperature sensor.



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.

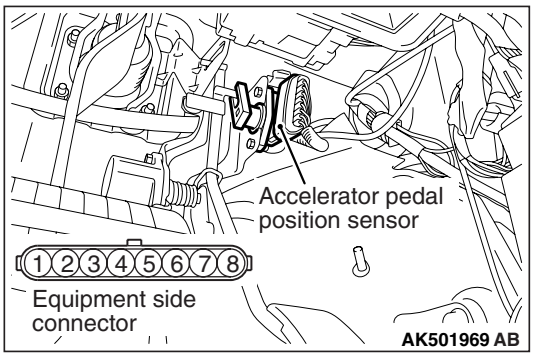
   Specified sealant:
   3M NUT Locking Part No. 4171 or equivalent

5. Install the engine coolant temperature sensor and tighten it to the specified torque.

   Tightening torque: 29 ±10 N· m

ACCELERATOR PEDAL POSITION SENSOR CHECK

M1131003400217



1. Disconnect the accelerator pedal position sensor connector.
2. Measure resistance between terminal No. 2 (main power supply) and No. 1 (main earth) as well as between terminal No. 8 (sub power supply) and terminal No. 7 (sub earth) of the sensor connector.

   Standard value: 3.5 – 6.5 kΩ

3. Measure resistance between terminal No. 2 (main power supply) and No. 3 (main output) as well as between terminal No. 8 (sub power supply) and No. 6 (sub output) of the sensor connector.

Normal condition:

Depress the accelerator pedal slowly.	Resistance value changes in accordance with the accelerator pedal depression smoothly.

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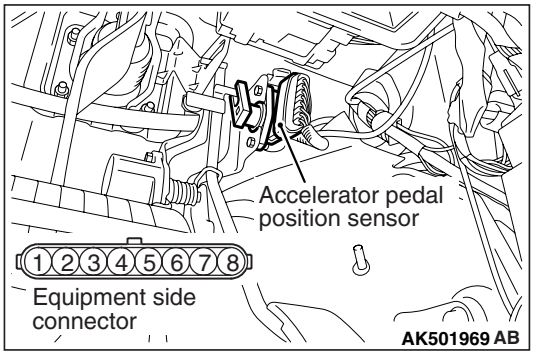
4. If not within the standard value, or resistance value does not change smoothly, replace the accelerator pedal position sensor.

   NOTE: After replacement, adjust the accelerator pedal position sensor. (Refer to P.13A-321.)

ACCELERATOR PEDAL POSITION SWITCH CHECK

M1131052500120



1. Disconnect the accelerator pedal position sensor connector.
2. Check continuity between terminal No. 4 (accelerator pedal position switch) and No. 5 (earth) of the connector.

Normal condition:

Accelerator pedal	Continuity
Depressed	No continuity
Released	Continuity (0 Ω)

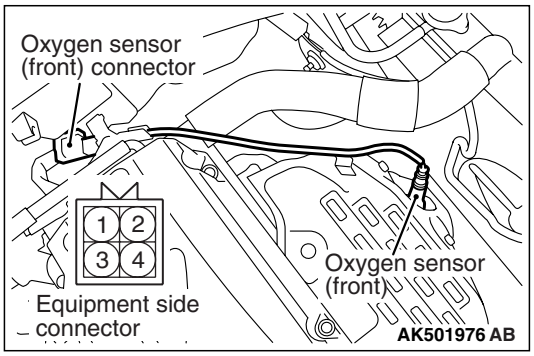
3. If defective, replace the accelerator pedal position sensor.

   NOTE: After replacement, adjust the accelerator pedal position sensor. (Refer to P.13A-321.)

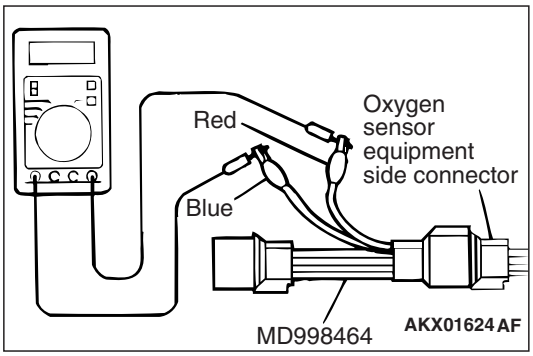
OXYGEN SENSOR CHECK

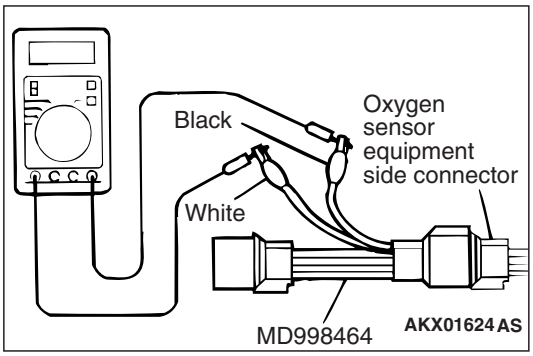
M1131005001445

OXYGEN SENSOR (FRONT)



1. Disconnect the oxygen sensor connector and connect the special tool Test harness (MD998464) to the connector on the oxygen sensor side.





2. Make sure that there is continuity (4.5 – 8.0 Ω at 20°) between terminal No. 1 (red clip of special tool) and No. 3 (blue clip of special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80° C or higher.
5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.
6. Connect a digital voltage meter between terminal No. 2 (black clip of special tool) and No. 4 (white clip of special tool).
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

   Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air-fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V.

⚠ CAUTION

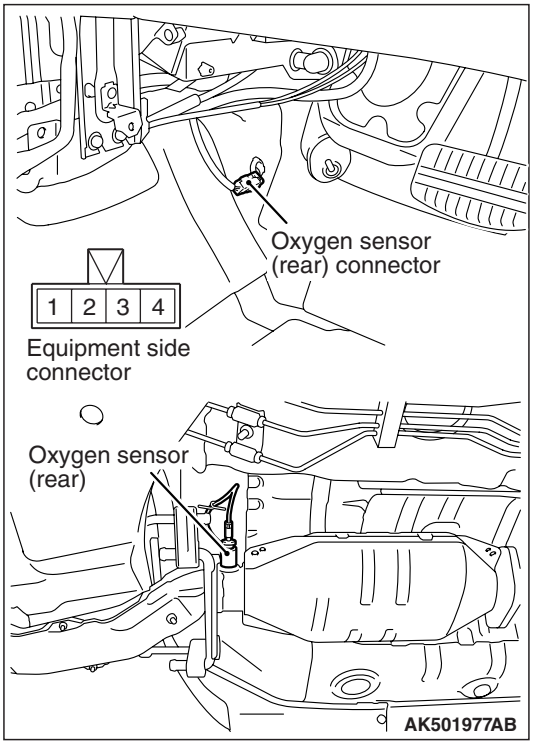
- **Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.**
- **Be careful the heater is broken when voltage of beyond 8V is applied to the oxygen sensor heater.**

NOTE: If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 1 (red clip of special tool) and the terminal No. 3 (blue clip of special tool) of the oxygen sensor with a (+) terminal and (–) terminal of 8 V power supply respectively, then check again.

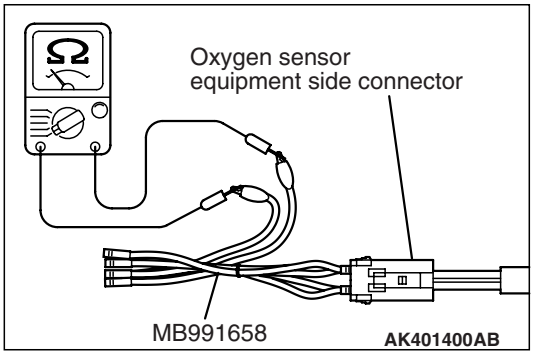
8. If the sensor is defective, replace the oxygen sensor.

   NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 –Exhaust Manifold. *P.15-7*.

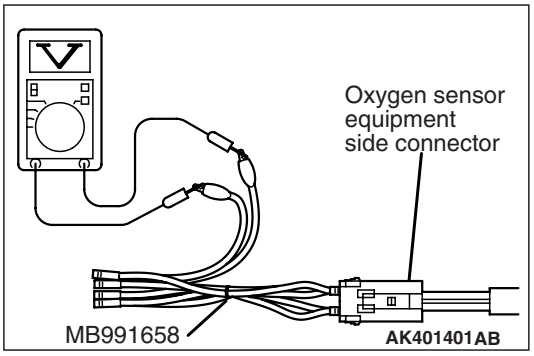
OXYGEN SENSOR (REAR)



1. Disconnect the oxygen sensor connector and connect the special tool Test harness (MB991658) to the connector on the oxygen sensor side.



2. Make sure that there is continuity (11 – 18 Ω at 20° C) between terminal No.1 and No. 2 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80° C or higher.
5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.



6. Connect a digital voltage meter between terminal No. 3 and No. 4.
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air-fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V.

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⚠ 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 and the terminal No. 2 of the oxygen sensor with a (+) terminal and (−) terminal of 12 V power supply respectively, then check again.

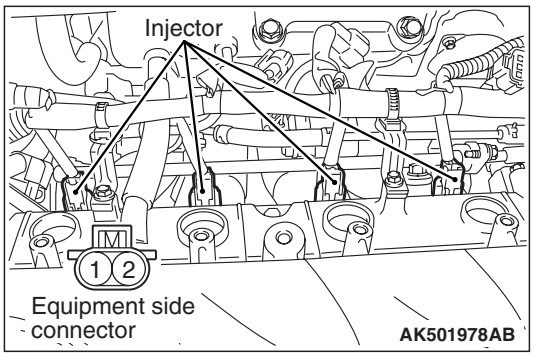
8. If the sensor is defective, replace the oxygen sensor.

   NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 − Exhaust Pipe and Main Muffler P.15-8.

INJECTOR CHECK

M1131005201278

CHECK THE OPERATION SOUND



1. Use a stethoscope to listen to the operation sound (clicking) of the injectors while the engine is idling or cranking.

⚠ CAUTION

Beware that the operation sounds of other injectors can be heard even if the injector that is being inspected might not be operating.

2. Verify that the operation sound increases with the engine speed.

   NOTE: If the operating sound cannot be heard, inspect the injector actuation circuit.

MEASUREMENT OF RESISTANCE BETWEEN TERMINALS

1. Disconnect the injector connector.
2. Measure the resistance between terminals.

   Standard value: 10.5 – 13.5 Ω (at 20° C)

3. Connect the injector connector.

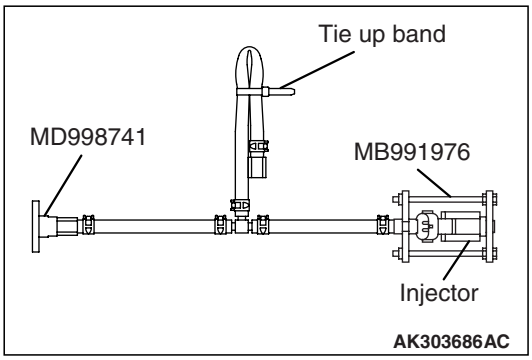
CHECK THE INJECTION CONDITION

1. Carry out the procedure to prevent flow of the fuel (Refer to P.13A-323).

⚠ 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 (MB992076) 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 (MB992076) of the special tool to the fuel high-pressure hose.
6. Connect the M.U.T.-II/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.-II/III actuator test and drive the fuel pump.

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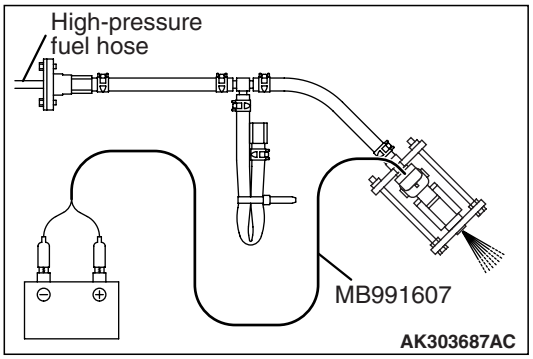


9. Connect Injector Test Harness (MB991607) of the special tool between the injector and battery, and then actuate the injector.
10. Check the fuel spray condition. The condition can be considered satisfactory unless it is extremely poor.
11. Stop actuating the injector. Check leakage from the injector nozzle. Turn the ignition switch to "LOCK OFF" position and then disconnect M.U.T.-II/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.

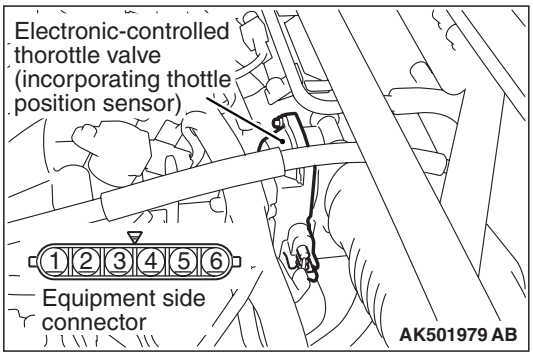
THROTTLE VALVE CONTROL SERVO CHECK

M1130532400082

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 electronically controlled throttle valve connector.
2. Measure the resistance between terminals No. 1 and No. 2 at the throttle valve control servo connector.

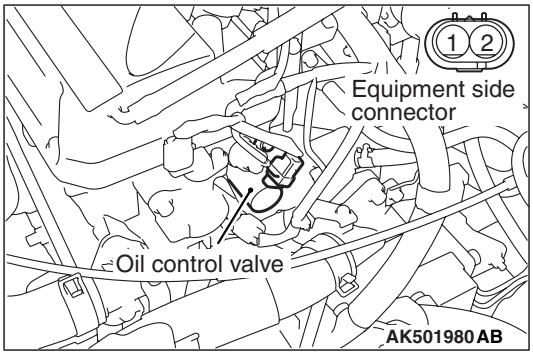
   Standard value: 0.3 – 80 Ω (at 20° C)

3. If resistance is outside the standard value, replace the throttle body assembly.

OIL CONTROL VALVE CHECK

M1131053200337

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.

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INJECTOR

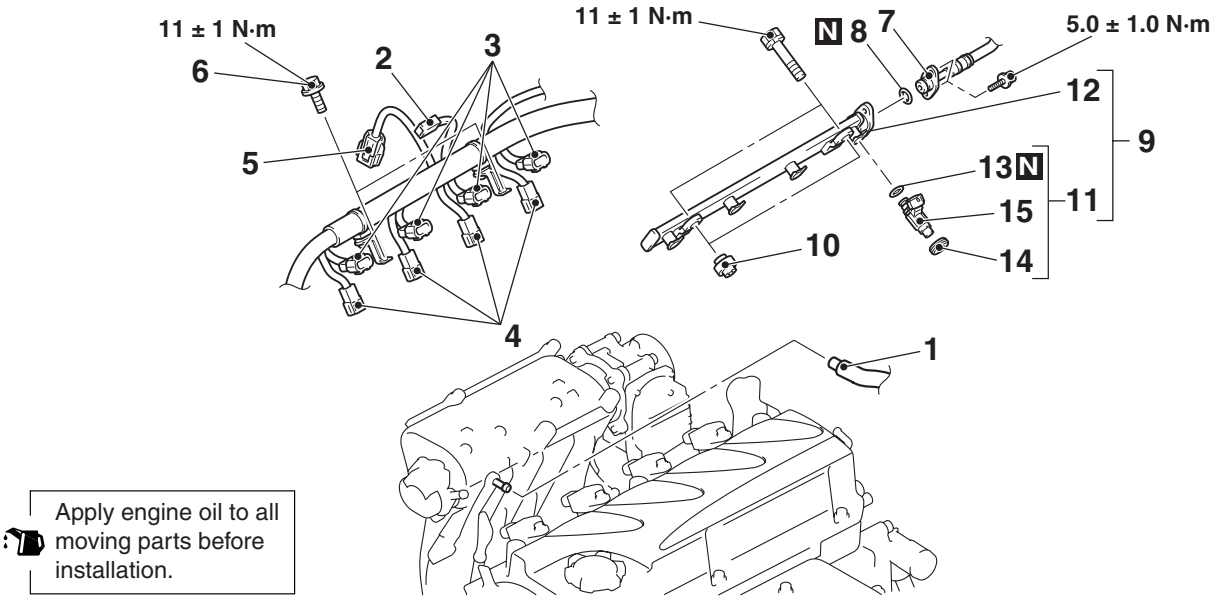
REMOVAL AND INSTALLATION

M1131007101545

⚠ CAUTION

When the fuel injector replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service –Initialisation Procedure for Learning Value in MPI Engine P.00-19).

Pre-removal Operation	Post-installation Operation
• Fuel Discharge Prevention (Refer to P.13A-323). • Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-3).	• Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-3). • Fuel Leakage Inspection.



AC304160AC

Removal steps

1. PCV hose connection
2. Capacitor connector
3. Ignition coil connector
4. Injector connector
5. EGR valve connector
6. Rocker cover bracket installation bolts
7. >>A<< Fuel high-pressure hose connection
8. O-ring
9. <<A>> Fuel delivery pipe and fuel injector assembly
10. Insulators
11. >>A<< Fuel injector assembly
12. Fuel delivery pipe
13. O-ring
14. Insulators
15. Fuel injectors

REMOVAL SERVICE POINT

<<A>> FUEL DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY REMOVAL

⚠ CAUTION

Do not drop the injector.

Remove the fuel delivery pipe with the fuel injector assembly attached to it.

INSTALLATION SERVICE POINT

>>A<< FUEL INJECTOR ASSEMBLY/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.

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3. If it does not turn smoothly, the O-ring may be trapped, remove the item, re-install it into the fuel delivery pipe and check again.
4. Tighten the fuel high-pressure hose to the specified torque.

   Tightening torque: 5.0 ±1.0 N· m

THROTTLE BODY ASSEMBLY

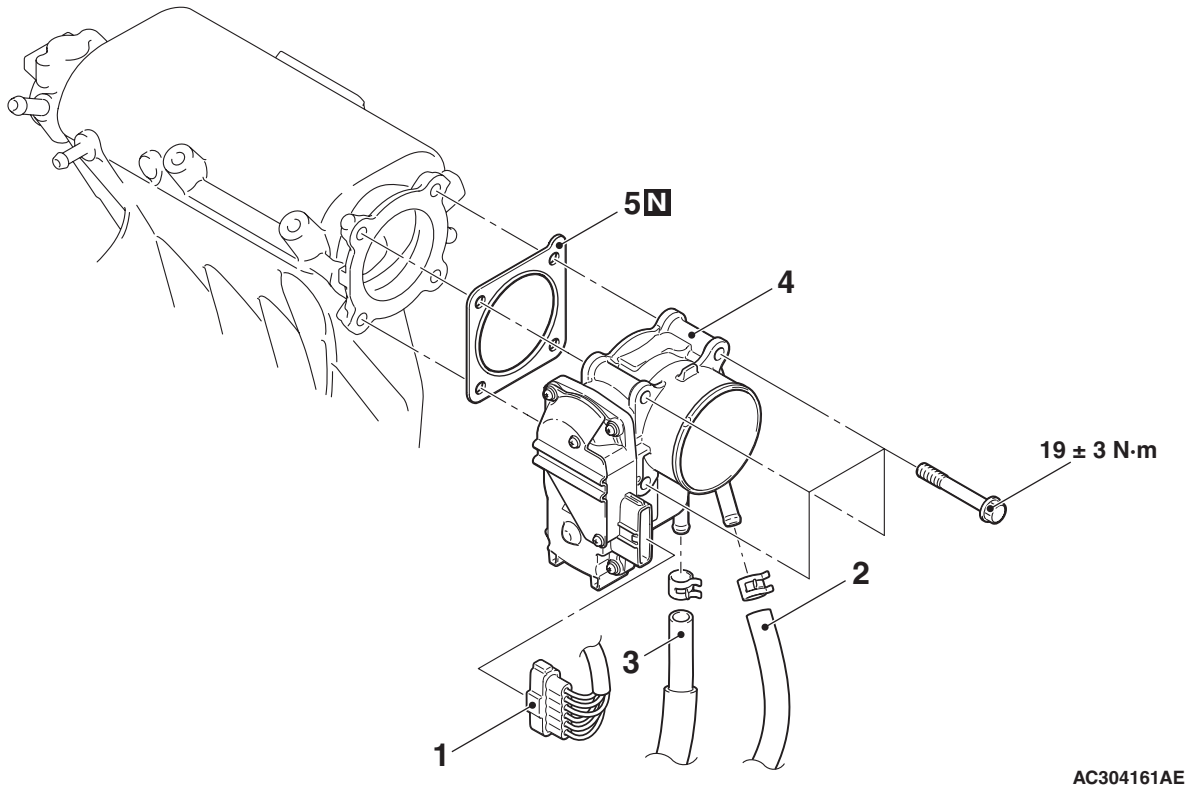
REMOVAL AND INSTALLATION

M1131007701417

⚠ CAUTION

- **When the throttle body assembly replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service –Initialisation Procedure for Learning Value in MPI Engine P.00-19).**
- **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	Post-installation Operation
• Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service –Engine Coolant Replacement P.14-21). • Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-3).	• 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.14-21).



Removal steps

>>B<< • Initialisation procedure (installation only)
1. Throttle position sensor connector
2. Water return hose connection

Removal steps (Continued)

3. Water feed hose connection
4. Throttle body assembly

>>A<< 5. Throttle body gasket

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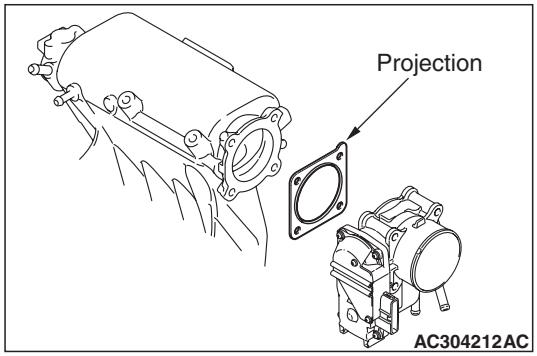
INSTALLATION SERVICE POINTS

>>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<< INITIALISATION PROCEDURE

Turn the ignition switch "ON" position then "LOCK" (OFF) position, and keep it "LOCK" (OFF) position for at least 10 seconds.

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ENGINE-ECU AND ENGINE-A/T-ECU

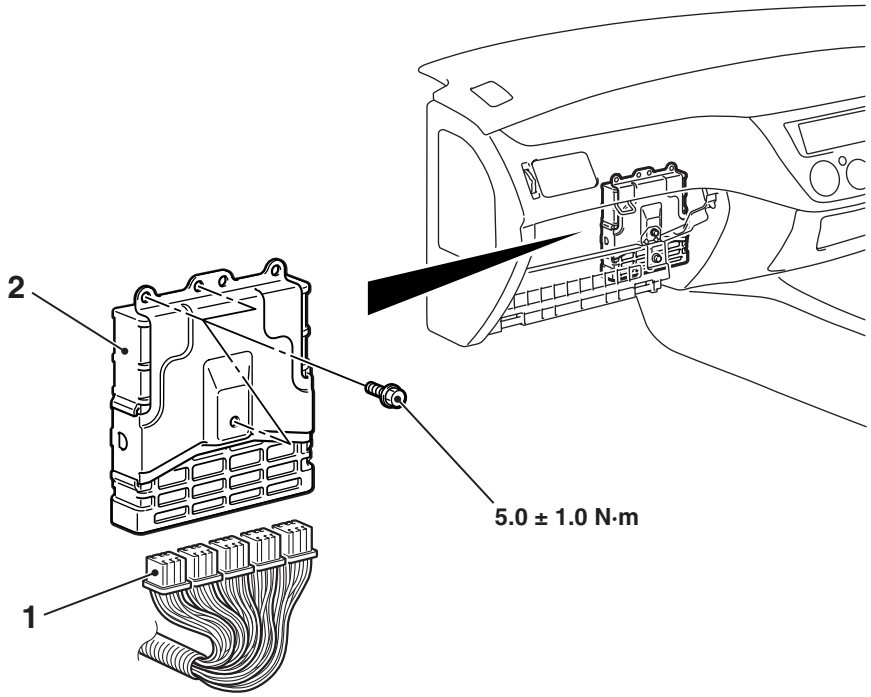
REMOVAL AND INSTALLATION

M1131022500172

⚠ CAUTION

When the engine-ECU <M/T> or the engine-A/T-ECU <A/T> replacement is performed, always refer to GROUP 54A, Troubleshooting –Encrypted Code Registration Criteria Table P.54A-9.

Pre-removal and Post-installation Operation
Globe Box and Harness Cover Removal and Installation (Refer to GROUP 52A –Instrument Panel Assembly P.52A-2).



AC505162 AB

REMOVAL STEPS

1. Engine-ECU connector <M/T> or Engine-A/T-ECU connector <A/T>
2. Engine-ECU <M/T> or Engine-A/T-ECU <A/T>