

GROUP 13C

MULTIPOINT FUEL INJECTION (MPI) <4G69>

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GENERAL INFORMATION

M1131000101845

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 mix-

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

THROTTLE VALVE OPENING CONTROL

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

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 Motor Control

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

5. Alternator Output Current Control

Prevents alternator output current from increasing suddenly and idle speed from dropping at times such as when the headlamp are turned on.

6. Purge Control Solenoid Valve Control

(Refer to [P.17-60](#), GROUP 17 – Engine And Emission Control – Evaporative Emission Control System).

7. EGR Control Solenoid Valve Control

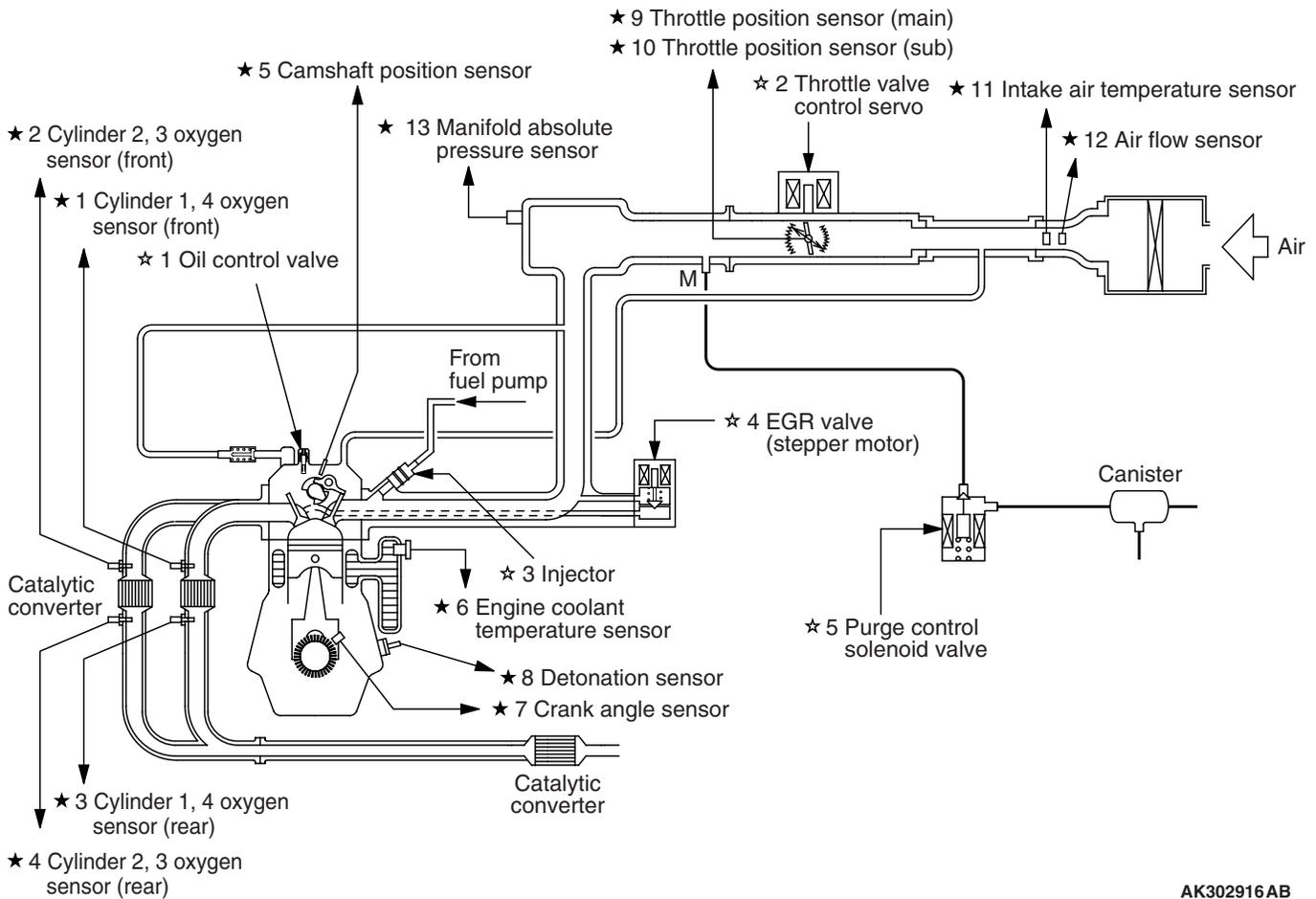
[Refer to [P.17-67](#), GROUP 17 – Engine And Emission Control – Exhaust Gas Recirculation (EGR) System].

GENERAL SPECIFICATIONS

Items		Specifications
Throttle body	Throttle bore mm	60
	Throttle position sensor	Hall element type
	Throttle valve control servo	DC motor type, having broshes
Engine-ECU <M/T>	Identification No.	E6T38984
Engine-A/T-ECU <A/T>	Identification No.	E6T44480
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	IDH322S
	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

<ul style="list-style-type: none"> ★ 1 Cylinder 1, 4 oxygen sensor (front) ★ 2 Cylinder 2, 3 oxygen sensor (front) ★ 3 Cylinder 1, 4 oxygen sensor (rear) ★ 4 Cylinder 2, 3 oxygen sensor (rear) ★ 5 Camshaft position sensor ★ 6 Engine coolant temperature sensor ★ 7 Crank angle sensor ★ 8 Detonation sensor ★ 9 Throttle position sensor (main) ★ 10 Throttle position sensor (sub) ★ 11 Intake air temperature sensor ★ 12 Air flow sensor ★ 13 Manifold absolute pressure sensor 	<ul style="list-style-type: none"> ● Power supply ● Ignition switch-IG ● Ignition switch-ST ● A/C switch ● A/C load signal ● A/C pressure sensor ● 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> 	<p>⇒ Engine-ECU <M/T> or Engine-A/T-ECU <A/T></p> <ul style="list-style-type: none"> ● Barometric pressure sensor 	<ul style="list-style-type: none"> ★ 1 Oil control valve ★ 2 Throttle valve control servo ★ 3 Injector ★ 4 EGR valve (Stepper motor) ★ 5 Purge control solenoid valve 	<ul style="list-style-type: none"> ● 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 ● Cylinder 1, 4 oxygen sensor (front) ● Cylinder 2, 3 oxygen sensor (front) ● Cylinder 1, 4 oxygen sensor (rear) ● Cylinder 2, 3 oxygen sensor (rear)
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SERVICE SPECIFICATIONS

M1131000300675

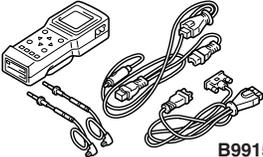
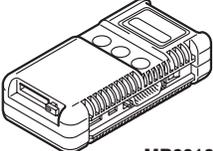
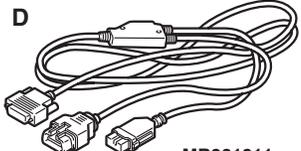
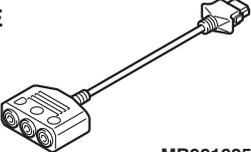
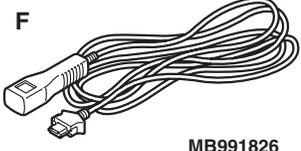
Items		Specifications
Intake air temperature sensor resistance kΩ	-20°C	13 – 17
	0°C	5.3 – 6.7
	20°C	2.3 – 3.0
	40°C	1.0 – 1.5
	60°C	0.56 – 0.76
	80°C	0.30 – 0.42
Engine coolant temperature sensor resistance kΩ	-20°C	14 – 17
	0°C	5.1 – 6.5
	20°C	2.1 – 2.7
	40°C	0.9 – 1.3
	60°C	0.48 – 0.68
	80°C	0.26 – 0.36
Oxygen sensor output voltage (at racing) V		0.6 – 1.0
Oxygen sensor heater resistance (at 20°C) Ω	front	4.5 – 8.0
	rear	11 – 18
Fuel pressure kPa		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 (at 20°C) Ω		6.9 – 7.9

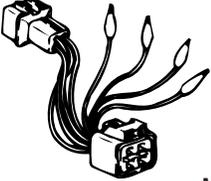
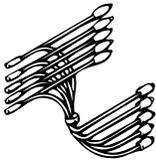
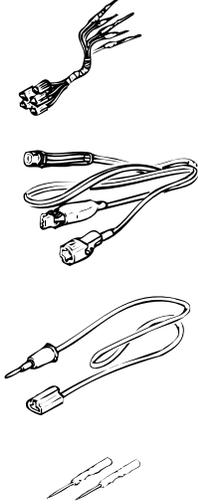
SEALANT

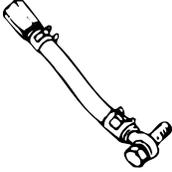
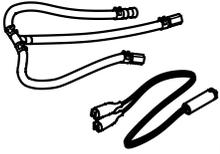
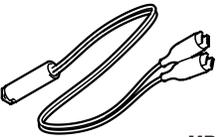
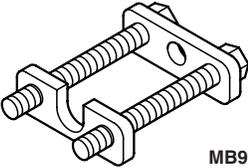
M1131000500419

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

SPECIAL TOOLS

Tool	Number	Name	Use
 <p>B991502</p>	MB991502	M.U.T.-II sub assembly	<ul style="list-style-type: none"> • Reading diagnosis code • MPI system inspection • Measurement of fuel pressure
<p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991825</p> <p>F</p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955</p> <p>A: MB991824</p> <p>B: MB991827</p> <p>C: MB991910</p> <p>D: MB991911</p> <p>E: MB991825</p> <p>F: MB991826</p>	<p>M.U.T.-III sub assembly</p> <p>A: Vehicle communication interface (V.C.I.)</p> <p>B: M.U.T.-III USB cable</p> <p>C: M.U.T.-III main harness A (Vehicles with CAN communication system)</p> <p>D: M.U.T.-III main harness B (Vehicles without CAN communication system)</p> <p>E: M.U.T.-III measurement adapter</p> <p>F: M.U.T.-III trigger harness</p>	<ul style="list-style-type: none"> • Reading diagnosis code • MPI system inspection • Measurement of fuel pressure
 <p>MB991348</p>	MB991348	Test harness set	<ul style="list-style-type: none"> • Measurement of voltage during troubleshooting

Tool	Number	Name	Use
	MB991709	Test harness	<ul style="list-style-type: none"> • Measurement of voltage during troubleshooting • Inspection using an oscilloscope
 <p align="right">MB991316</p>	MB991316	Test harness (4-pin, square)	<ul style="list-style-type: none"> • Measurement of voltage during Troubleshooting • Inspection of oxygen sensor (rear)
	MD998464	Test harness (4-pin, square)	<ul style="list-style-type: none"> • Measurement of voltage during Troubleshooting • Inspection of oxygen sensor (rear)
 <p align="right">MB991658</p>	MB991658	Test harness	<ul style="list-style-type: none"> • Measurement of voltage during Troubleshooting • Inspection using an oscilloscope • Inspection of data list
 <p align="right">MB991223</p>	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222	Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	<ul style="list-style-type: none"> • Check at the ECU terminals A: Connector pin contact inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection

Tool	Number	Name	Use
	MD998709	Adaptor hose	Measurement of fuel pressure
	MD998742	Hose adaptor	
 <p>MB991637</p>	MB991637	Fuel pressure gauge set	
 <p>MD998706</p>	MD998706	Injector test set	Checking the spray condition of injectors
 <p>MB991607</p>	MB991607	Injector test harness	
 <p>MD998741</p>	MD998741	Injector test adaptor	
 <p>MB991976</p>	MB991976	Injector test holder assembly	

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

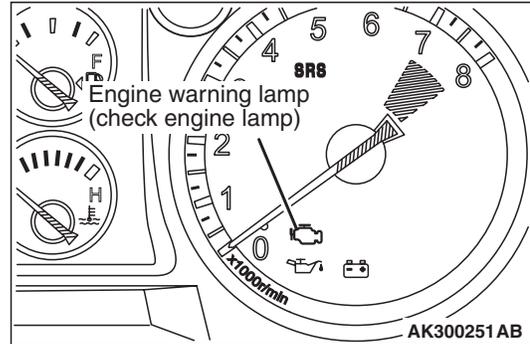
Refer to P.00-6, GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS FUNCTION

M1131150000568

M1131155500858

ENGINE WARNING LAMP (CHECK ENGINE LAMP)



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

ENGINE WARNING LAMP INSPECTION ITEMS

Code No.	Diagnosis item
–	Engine-ECU <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	Cylinder 1, 4 oxygen sensor (front) system
P0135	Cylinder 1, 4 oxygen sensor (front) heater system
P0136	Cylinder 1, 4 oxygen sensor (rear) system
P0141	Cylinder 1, 4 oxygen sensor (rear) heater system
P0150	Cylinder 2, 3 oxygen sensor (front) system
P0155	Cylinder 2, 3 oxygen sensor (front) heater system
P0156	Cylinder 2, 3 oxygen sensor (rear) system
P0161	Cylinder 2, 3 oxygen sensor (rear) heater system
P0170	Abnormal fuel system (cylinder 1, 4)
P0173	Abnormal fuel system (cylinder 2, 3)
P0201	No. 1 injector system
P0202	No. 2 injector system

Code No.	Diagnosis item
P0203	No. 3 injector system
P0204	No. 4 injector system
P0222*	Throttle position sensor (sub) circuit low input
P0223*	Throttle position sensor (sub) circuit high input
P0300*	Random/multiple cylinder misfire detected
P0301*	No. 1 cylinder misfire detected
P0302*	No. 2 cylinder misfire detected
P0303*	No. 3 cylinder misfire detected
P0304*	No. 4 cylinder misfire detected
P0325	Detonation sensor system
P0335	Crank angle sensor system
P0340	Camshaft position sensor system
P0403	Exhaust gas recirculation control system
P0421	Warm up catalyst malfunction (cylinder 1, 4)
P0431	Warm up catalyst malfunction (cylinder 2, 3)
P0443	Purge control solenoid valve system
P0500	Vehicle speed sensor system <M/T>
P0513	Immobilizer malfunction
P0551*	Power steering fluid pressure switch system
P0606*	Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction
P0622	Alternator FR terminal system
P0638*	Throttle valve control servo circuit range/performance problem
P0642*	Throttle position sensor power supply
P0657*	Throttle valve control servo relay circuit malfunction
P0705	Inhibitor switch system
P0710	A/T fluid temperature sensor system
P0715*	Input shaft speed sensor system
P0720*	Output shaft speed sensor system
P0740*	Torque converter clutch solenoid valve system
P0750*	Low-reverse solenoid valve system
P0755*	Underdrive solenoid valve system
P0760*	Second solenoid valve system
P0765*	Overdrive solenoid valve system
P1010	Oil control valve system
P1602*	Communication malfunction (between engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor and system LSI)
P1603*	Battery backup circuit malfunction
P1751*	A/T control relay system
P2100*	Throttle valve control servo circuit (open)
P2101*	Throttle valve control servo magneto malfunction

Code No.	Diagnosis item
P2102*	Throttle valve control servo circuit (shorted low)
P2103*	Throttle valve control servo circuit (shorted high)
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
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.

**METHOD OF READING AND ERASING
DIAGNOSIS CODES**

Refer to P.00-6, GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS USING DIAGNOSIS 2 CODES

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

NOTE: By turning the ignition switch to OFF, the ENGINE-ECU <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 (cylinder 1, 4)	%	
82	Short-term fuel compensation (cylinder 1, 4)	%	
83	Long-term fuel compensation (cylinder 2, 3)	%	
84	Short-term fuel compensation (cylinder 2, 3)	%	
88	Fuel control condition (cylinder 1, 4)	Open loop	OL
		Closed loop	CL
		Open loop owing to drive condition	OL-DRV.
		Open loop owing to system malfunction	OL-SYS.
		Closed loop based on one oxygen sensor	CL- H02S
89	Fuel control condition (cylinder 2, 3)	Open loop	OL
		Closed loop	CL
		Open loop owing to drive condition	OL-DRV.
		Open loop owing to system malfunction	OL-SYS.
		Closed loop based on one oxygen sensor	CL- H02S
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.

DRIVE CYCLE

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

⚠ CAUTION

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

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

DRIVE CYCLE PATTERN LIST

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

Procedure 1

Catalytic converter monitor	
Diagnosis code No.	P0421, P0431
Drive cycle pattern	<p>One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 16 minutes or more.</p> <p style="text-align: right;">AK301815AB</p>
Inspection condition	<ul style="list-style-type: none"> Atmospheric temperature: -10°C or more
Test procedure	<ol style="list-style-type: none"> Engine: start Accelerate until the vehicle speed is 90 km/h or more. Travel for 6 minutes or more while keeping the vehicle speed at 90 km/h or more. Decelerate until the vehicle speed is within 80 km/h or less. While traveling at 55 – 80 km/h for 10 minutes or more, fully close the throttle at least once in 2 minutes and decelerate for 10 seconds or more. <ul style="list-style-type: none"> Do not repeat deceleration too often. Vehicle speed may go below 55 km/h after the deceleration. Stopping and braking are permitted. (If stopped or drive at 55 km/h or less for more than 5 minutes the monitoring may be stopped. In this case please restart monitoring from the beginning.) After completing the above deceleration, bring the vehicle speed back to 55 – 80 km/h and keep it in the range until starting the deceleration again. <ul style="list-style-type: none"> Repeat the above deceleration at least 5 times. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position.

Procedure 2

Oxygen sensor (front) monitor	
Diagnosis code No.	P0130, P0150
Drive cycle pattern	<p>One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 16 minutes or more.</p> <p style="text-align: right;">AK301816AB</p>
Inspection conditions	<ul style="list-style-type: none"> • Engine coolant temperature: After engine warm up • Atmospheric temperature: -10°C or more
Test procedure	<ol style="list-style-type: none"> 1. Engine: start 2. Accelerate until the vehicle speed is 55 – 80 km/h. 3. While keeping the accelerator pedal opening degree constant, keep the vehicle speed at 55 – 80km/h and travel for 16 minutes or more. <ul style="list-style-type: none"> • Stopping and braking during this operation are permitted. 4. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position.

Procedure 3

Other monitor	
Diagnosis code No.	P0135, P0136, P0141, P0155, P0156, P0161, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0325, P0551, P0638
Drive cycle pattern	<p>One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 21 minutes or more.</p> <p style="text-align: right;">AK301817AB</p>
Inspection conditions	<ul style="list-style-type: none"> • Engine coolant temperature: After engine warm up • Atmospheric temperature: -10°C or more
Test procedure	<ol style="list-style-type: none"> 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, P0431
- Oxygen sensor: P0130, P0136, P0150, P0156
- Oxygen sensor heater: P0135, P0141, P0155, P0161

FAIL-SAFE FUNCTION REFERENCE TABLE

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

Malfunctioning item	Control contents during malfunction
Air flow sensor	Uses the throttle position sensor signal and engine speed signal (crankshaft position sensor signal) for basic injector drive time and basic ignition timing from the pre-set mapping.
Intake air temperature sensor	Controls as if the intake air temperature is 25°C.
Barometric pressure sensor	Controls as if the barometric pressure is 101 kPa.
Throttle position sensor (main)	<ul style="list-style-type: none"> • Controls the throttle valve position through the use of the throttle position sensor (sub) signal. • Renders the amount of accelerator pedal travel as being approximately one-half the normal opening angle. • Prohibits the operation of the engine speed feedback control. • Cuts off fuel when the engine speed exceeds 3,000 r/min. • Suppresses the engine output by stopping the electronically controlled throttle valve system if the throttle position sensor (sub) is also malfunctioning.
Throttle position sensor (sub)	<ul style="list-style-type: none"> • Controls the throttle valve position through the use of the throttle position sensor (main) signal. • Renders the amount of accelerator pedal travel as being approximately one-half the normal opening angle. • Cuts off fuel when the engine speed exceeds 3,000 r/min. • Suppresses the engine output by stopping the electronically controlled throttle valve system if the throttle position sensor (main) is also malfunctioning.
Accelerator pedal position sensor (main)	<ul style="list-style-type: none"> • Detects the amount of the accelerator pedal travel through the use of the accelerator pedal position sensor (sub) signal, but rendering it only as being approximately one-half the normal opening angle. • Cuts off fuel when the engine speed exceeds 3,000 r/min. • Suppresses the engine output by stopping the electronically controlled throttle valve system if the accelerator pedal position sensor (sub) is also malfunctioning.
Accelerator pedal position sensor (sub)	<ul style="list-style-type: none"> • Detects the amount of the accelerator pedal travel through the use of the accelerator pedal position sensor (main) signal, but rendering it only as being approximately one-half the normal opening angle. • Cuts off fuel when the engine speed exceeds 3,000 r/min. • Suppresses the engine output by stopping the electronically 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.

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

INSPECTION CHART FOR DIAGNOSIS CODE

M1131151001412

Code No.	Diagnosis item	Reference page
P0100	Air flow sensor system	P.13C-24
P0105	Manifold absolute pressure sensor system	P.13C-30
P0110	Intake air temperature sensor system	P.13C-40
P0115	Engine coolant temperature sensor system	P.13C-47
P0122*	Throttle position sensor (main) circuit low input	P.13C-54
P0123*	Throttle position sensor (main) circuit high input	P.13C-58
P0125*	Feedback system monitor	P.13C-61
P0130	Cylinder 1, 4 oxygen sensor (front) system	P.13C-67
P0135	Cylinder 1, 4 oxygen sensor (front) heater system	P.13C-73
P0136	Cylinder 1, 4 oxygen sensor (rear) system	P.13C-79
P0141	Cylinder 1, 4 oxygen sensor (rear) heater system	P.13C-86
P0150	Cylinder 2, 3 oxygen sensor (front) system	P.13C-93
P0155	Cylinder 2, 3 oxygen sensor (front) heater system	P.13C-100
P0156	Cylinder 2, 3 oxygen sensor (rear) system	P.13C-106
P0161	Cylinder 2, 3 oxygen sensor (rear) heater system	P.13C-113
P0170	Abnormal fuel system (cylinder 1, 4)	P.13C-119
P0173	Abnormal fuel system (cylinder 2, 3)	P.13C-122
P0201	No. 1 injector system	P.13C-126
P0202	No. 2 injector system	P.13C-131
P0203	No. 3 injector system	P.13C-136
P0204	No. 4 injector system	P.13C-141
P0222*	Throttle position sensor (sub) circuit low input	P.13C-146
P0223*	Throttle position sensor (sub) circuit high input	P.13C-150
P0300*	Random/multiple cylinder misfire detected	P.13C-153
P0301*	No. 1 cylinder misfire detected	P.13C-155
P0302*	No. 2 cylinder misfire detected	P.13C-158
P0303*	No. 3 cylinder misfire detected	P.13C-161
P0304*	No. 4 cylinder misfire detected	P.13C-164
P0325	Detonation sensor system	P.13C-167
P0335	Crank angle sensor system	P.13C-170
P0340	Camshaft position sensor system	P.13C-180
P0403	Exhaust gas recirculation control system	P.13C-189
P0421	Warm Up Catalyst Malfunction (cylinder 1, 4)	P.13C-194
P0431	Warm Up Catalyst Malfunction (cylinder 2, 3)	P.13C-195
P0443	Purge control solenoid valve system	P.13C-196
P0500	Vehicle speed sensor system <M/T>	P.13C-201

Code No.	Diagnosis item	Reference page	
P0513	Immobilizer malfunction	P.13C-204	
P0551*	Power steering fluid pressure switch system	P.13C-206	
P0606*	Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction	P.13C-211	
P0622	Alternator FR terminal system	P.13C-212	
P0638*	Throttle valve control servo circuit range/performance problem	P.13C-216	
P0642*	Throttle position sensor power supply	P.13C-219	
P0657*	Throttle valve control servo relay circuit malfunction	P.13C-220	
P0705	Inhibitor switch system	<ul style="list-style-type: none"> • A/T DTC No. 27 (Inhibitor switch system: open circuit) • A/T DTC No. 28 (Inhibitor switch system: short circuit) 	P.23A-50, P.23A-55
P0710	A/T fluid temperature sensor system	<ul style="list-style-type: none"> • A/T DTC No. 15 (A/T fluid temperature sensor system: open circuit) • A/T DTC No. 16 A/T (fluid temperature sensor system: short circuit) 	P.23A-19, P.23A-25
P0715*	Input shaft speed sensor system	<ul style="list-style-type: none"> • A/T DTC No. 22 (Input shaft speed sensor system) 	P.23A-28
P0720*	Output shaft speed sensor system	<ul style="list-style-type: none"> • A/T DTC No. 23 (Output shaft speed sensor system) 	P.23A-37
P0740*	Torque converter clutch solenoid valve system	<ul style="list-style-type: none"> • A/T DTC No. 36 (Torque converter clutch solenoid valve system) 	P.23A-73
P0750*	Low-reverse solenoid valve system	<ul style="list-style-type: none"> • A/T DTC No. 31 (Low-reverse solenoid valve system) 	P.23A-58
P0755*	Underdrive solenoid valve system	<ul style="list-style-type: none"> • A/T DTC No. 32 (Underdrive solenoid valve system) 	P.23A-62
P0760*	Second solenoid valve system	<ul style="list-style-type: none"> • A/T DTC No. 33 (Second solenoid valve system) 	P.23A-66
P0765*	Overdrive solenoid valve system	<ul style="list-style-type: none"> • A/T DTC No. 34 (Overdrive solenoid valve system) 	P.23A-69
P1010	Oil control valve circuit	P.13C-227	
P1602*	Communication malfunction (between engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor and system LSI)	P.13C-232	
P1603*	Battery backup circuit malfunction	P.13C-233	
P1751*	A/T control relay system	<ul style="list-style-type: none"> • A/T DTC No. 54 (A/T control relay system) 	P.23A-80
P2100*	Throttle valve control servo circuit (open)	P.13C-236	
P2101*	Throttle valve control servo magneto malfunction	P.13C-240	
P2102*	Throttle valve control servo circuit (shorted low)	P.13C-243	
P2103*	Throttle valve control servo circuit (shorted high)	P.13C-246	
P2121*	Accelerator pedal position sensor (main) circuit range/performance problem	P.13C-249	
P2122*	Accelerator pedal position sensor (main) circuit low input	P.13C-252	

Code No.	Diagnosis item	Reference page
P2123*	Accelerator pedal position sensor (main) circuit high input	P.13C-256
P2126*	Accelerator pedal position sensor (sub) circuit range/performance problem	P.13C-259
P2127*	Accelerator pedal position sensor (sub) circuit low input	P.13C-262
P2128*	Accelerator pedal position sensor (sub) circuit high input	P.13C-266
P2135*	Throttle position sensor (main and sub) range/performance problem	P.13C-269
P2138*	Accelerator pedal position sensor (main and sub) range/performance problem	P.13C-271
P2173*	Abnormal intake air amount	P.13C-277
P2226	Barometric pressure sensor system	P.13C-277

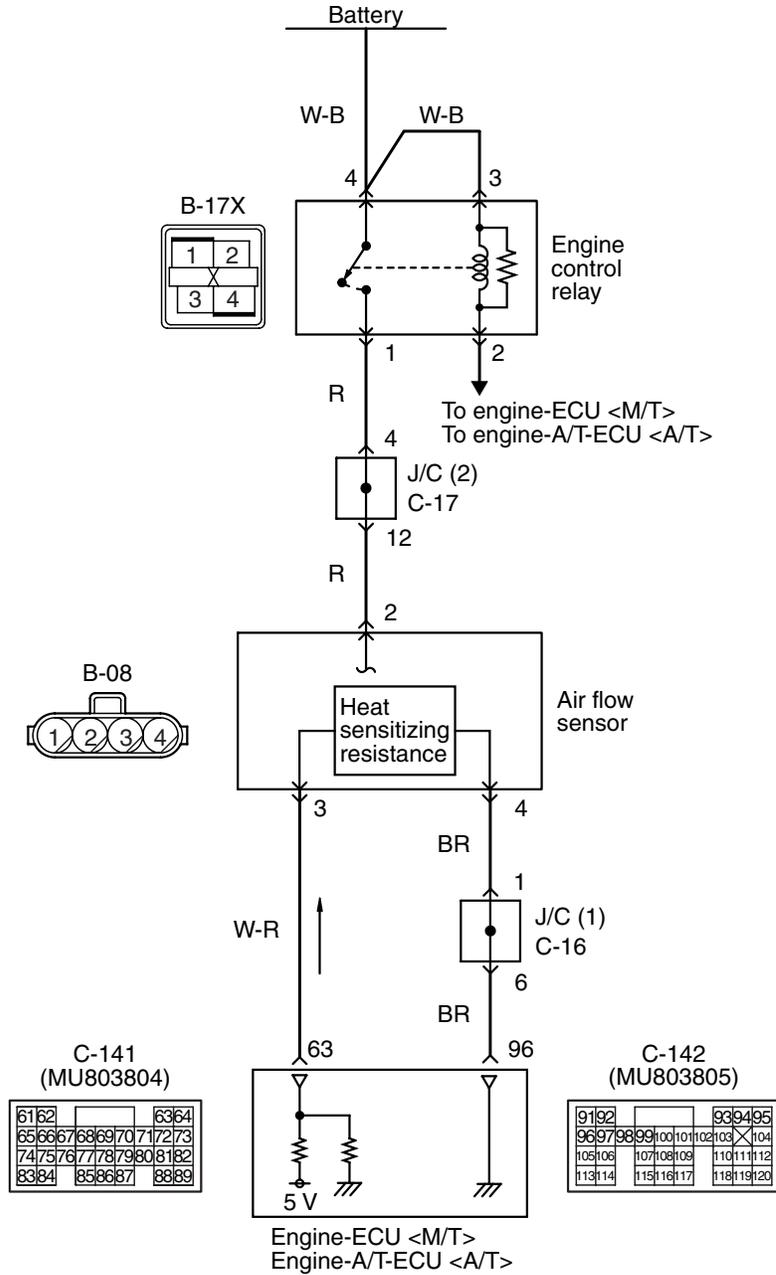
NOTE:

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

INSPECTION PROCEDURE FOR
DIAGNOSIS CODES

Code No. P0100: Air Flow Sensor System

Air flow sensor circuit



Wire colour code

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

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- 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

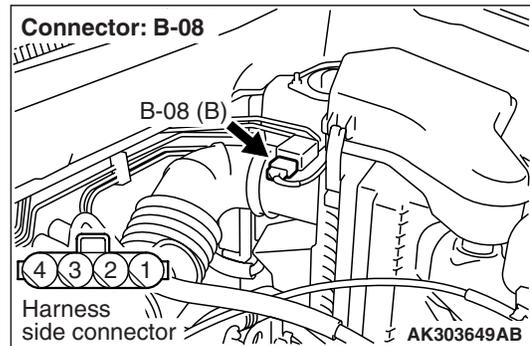
- Refer to Data list reference table [P.13C-402](#).
 - Item 12: Air flow sensor

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

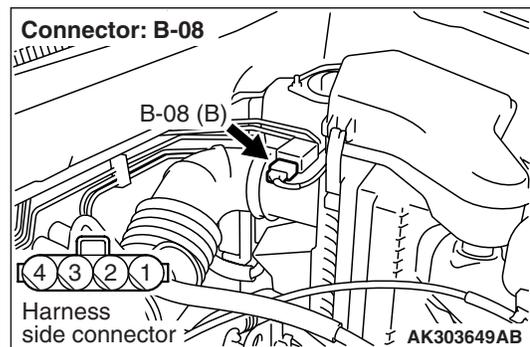


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

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



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

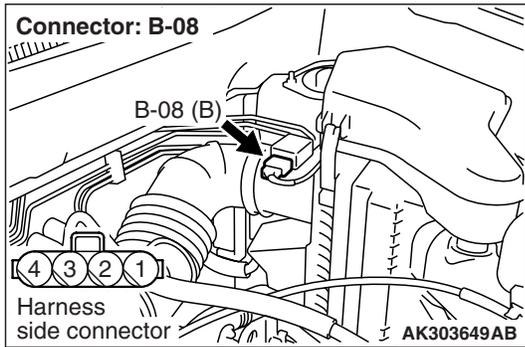
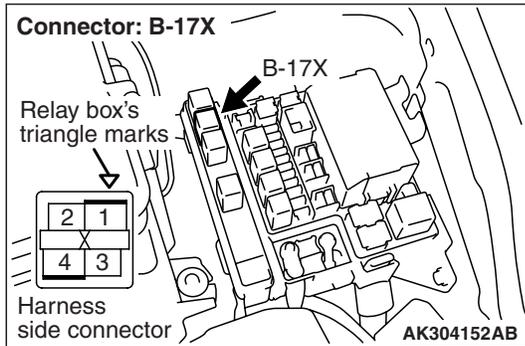
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

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



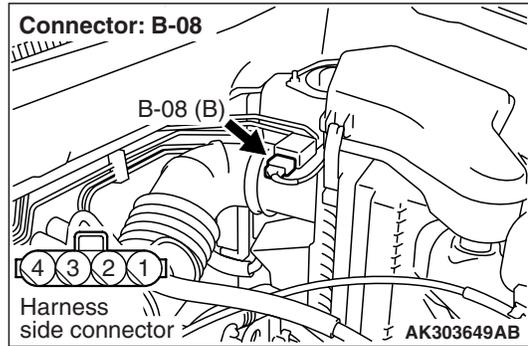
Q: Is the check result normal?

YES : Check intermediate connector C-17, and repair if necessary. If intermediate connector is normal, check and repair harness between B-08 (terminal No. 2) air flow sensor connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair.

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



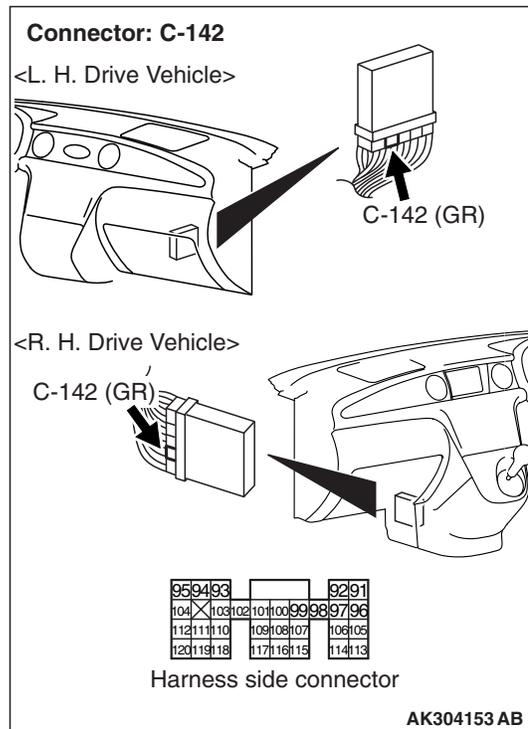
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 4 and earth.
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 6 .

STEP 6. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

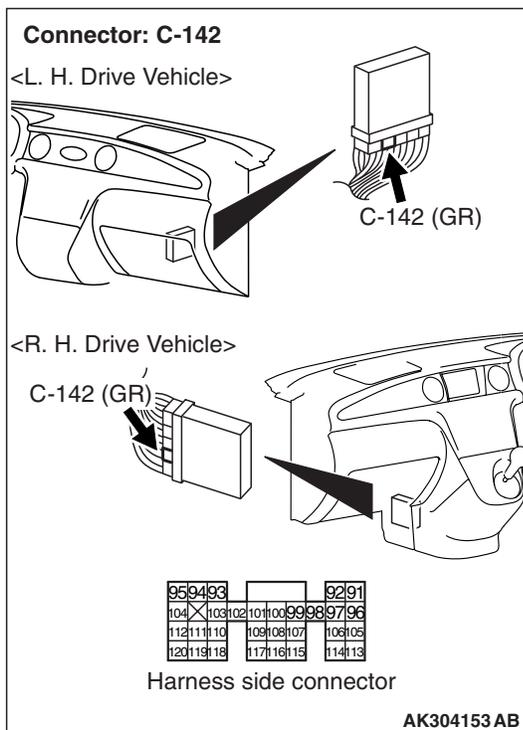
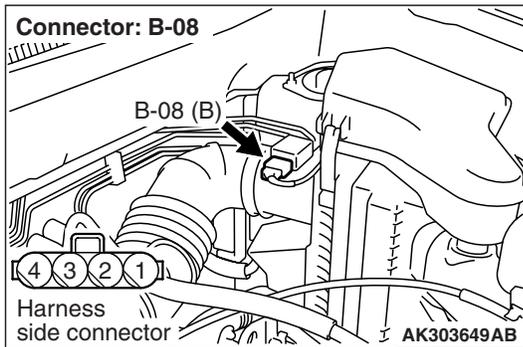


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Check harness between B-08 (terminal No. 4) air flow sensor connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

- Check earthing line for open circuit.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

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

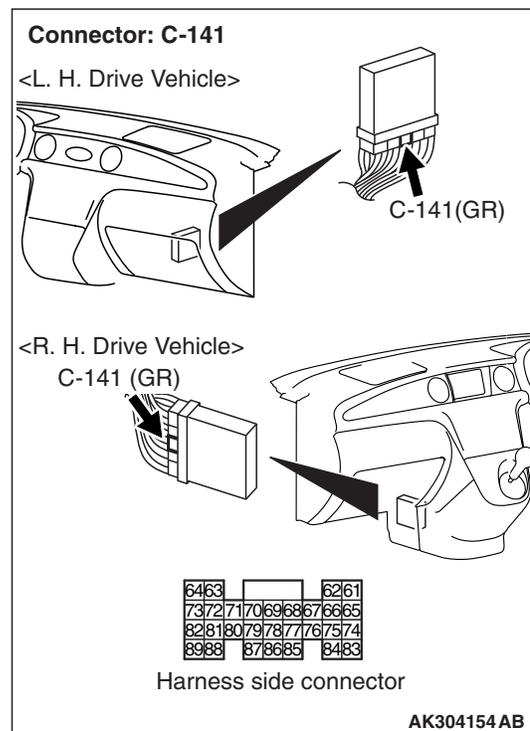
- Refer to Data List Reference Table P.13C-402.
 - Item 12: Air flow sensor

Q: Is the check result normal?

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

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

STEP 9. Connector check: C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

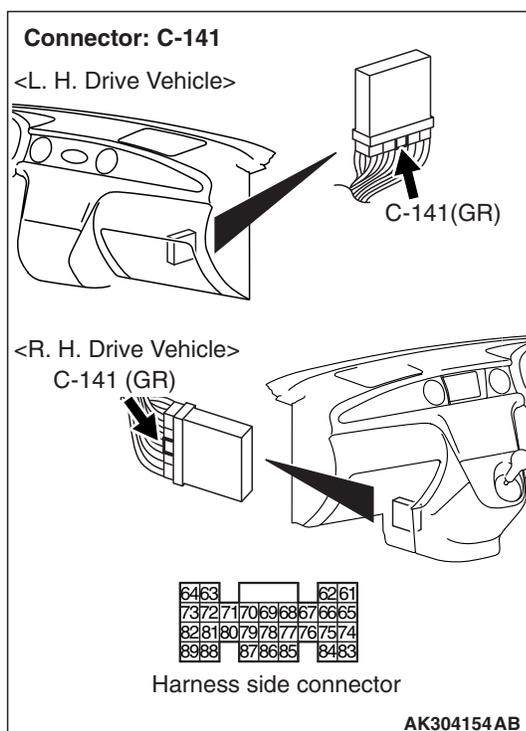
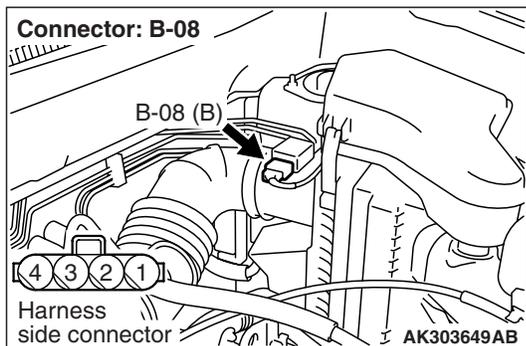


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

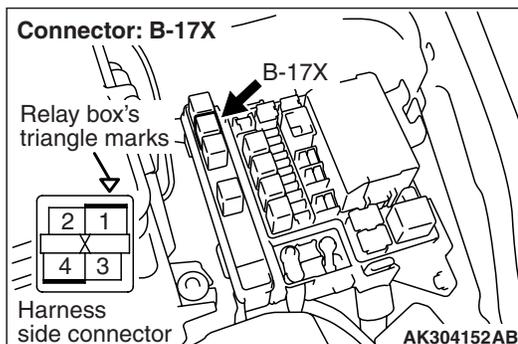
STEP 10. Check harness between B-08 (terminal No. 3) air flow sensor connector and C-141 (terminal No. 63) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

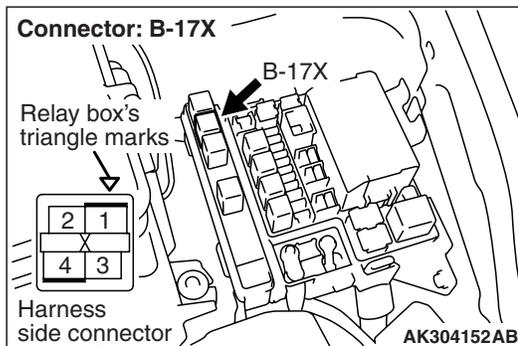
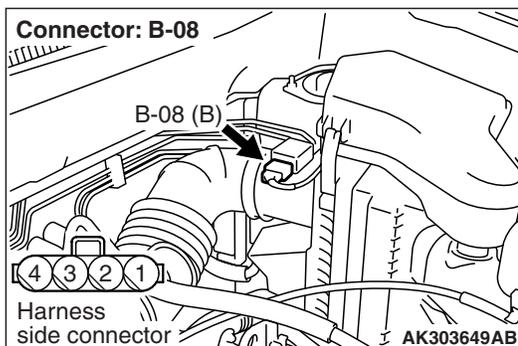
Q: Is the check result normal?
YES : Go to Step 11 .
NO : Repair.

STEP 11. Connector check: B-17X engine control relay connector



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

STEP 12. Check harness between B-08 (terminal No. 2) air flow sensor connector and B-17X (terminal No. 1) engine control relay connector.



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

- Check power supply line for damage.

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

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

- Refer to Data List Reference Table [P.13C-402](#).
 - a. Item 12: Air flow sensor

Q: Is the check result normal?

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

NO : Go to Step 14 .

STEP 14. Replace air flow sensor.

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

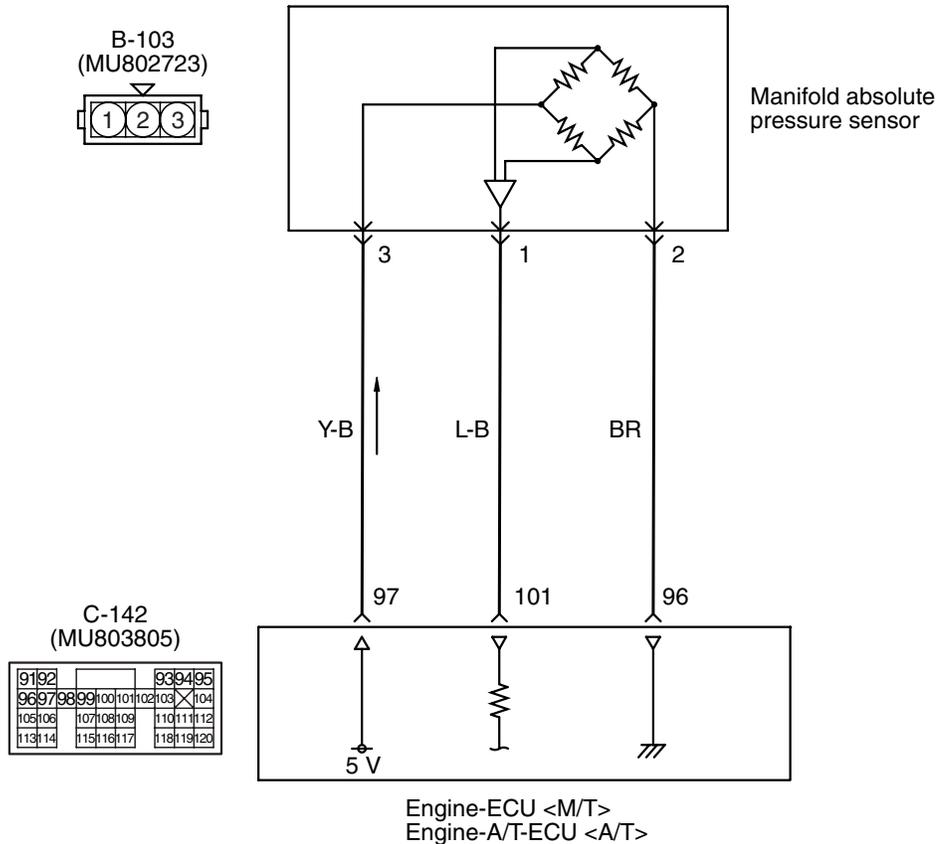
Q: Is the check result normal?

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

NO : Check end.

Code No. P0105: 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

AK304119AB

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.

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 4.5V or more (barometric pressure above 114 kPa or equivalent) for 4 seconds.

Or

- The sensor output voltage is 0.2 V or less (barometric pressure below 53 kPa or equivalent) for 4 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

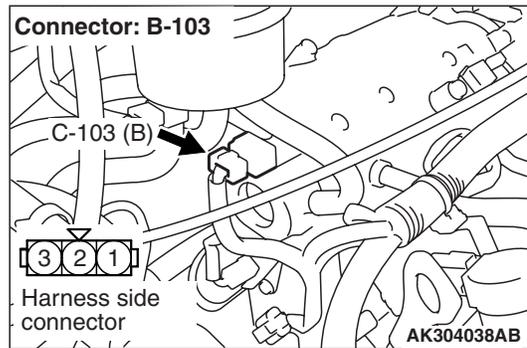
- Refer to Data List Reference Table [P.13C-402](#).
 - Item 95: Manifold absolute pressure sensor

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-103 Manifold absolute pressure sensor connector

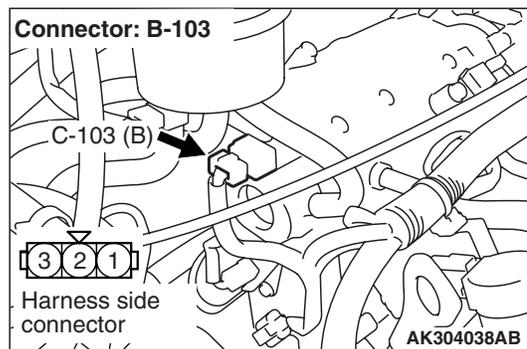


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Perform voltage measurement at B-103 manifold absolute pressure sensor connector.



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

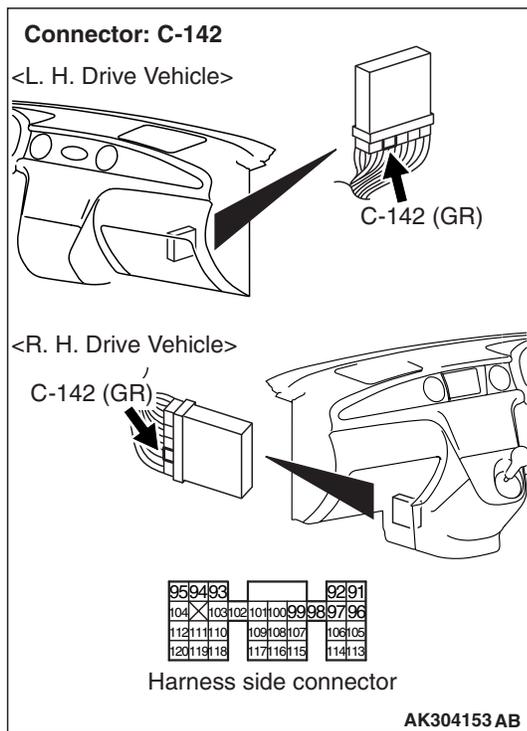
OK: 4.9 – 5.1 V

Q: Is the check result normal?

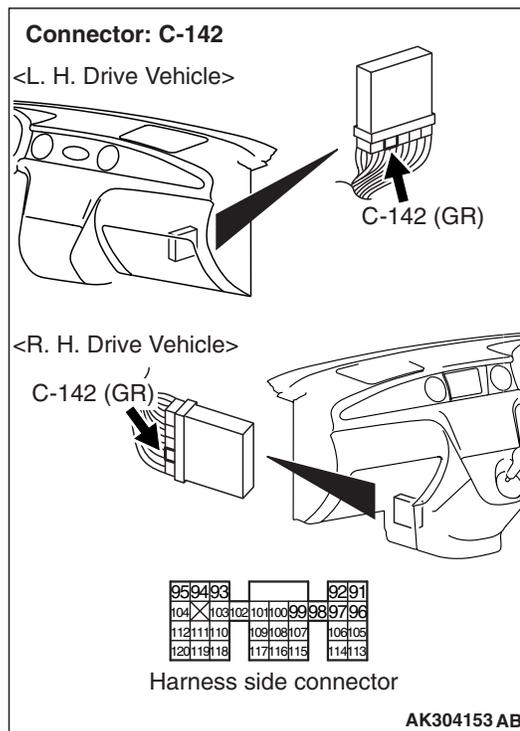
YES : Go to Step 9 .

NO : Go to Step 4 .

STEP 4. Perform voltage measurement at C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 5. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



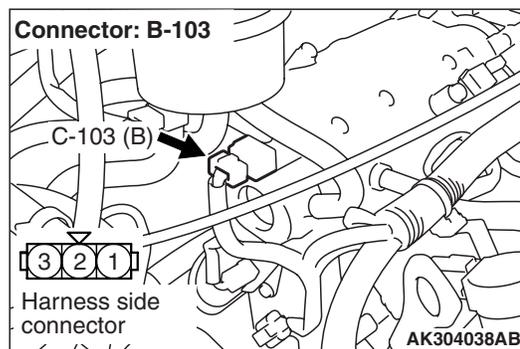
- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 97 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .



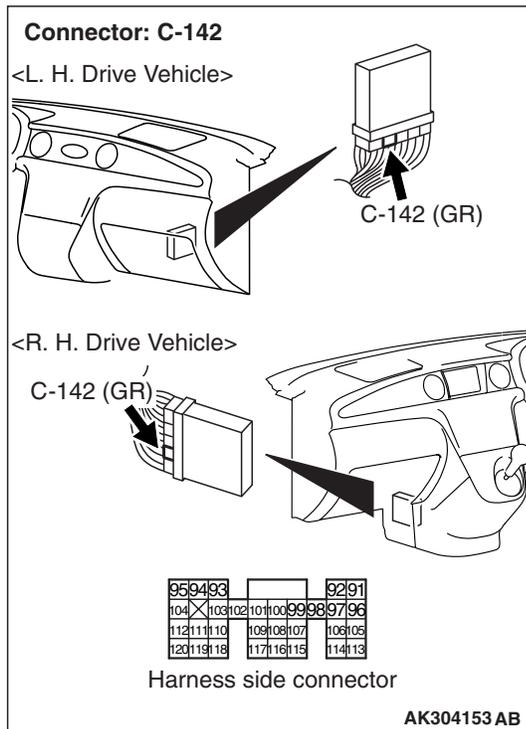
Q: Is the check result normal?

YES : Check and repair harness between B-103 (terminal No. 3) manifold absolute pressure sensor connector and C-142 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check power supply line for open circuit.

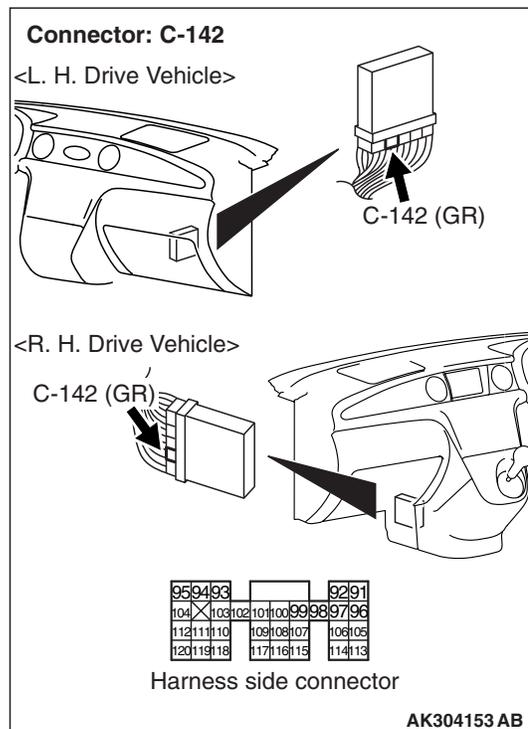
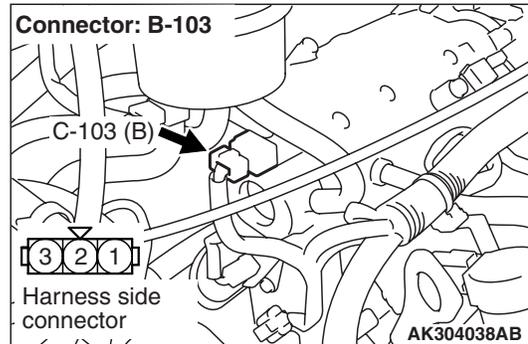
NO : Repair.

STEP 6. Connector check: C-142 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.

STEP 7. Check harness between B-103 (terminal No. 3) manifold absolute pressure sensor connector and C-142 (terminal No. 97) 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 8 .
NO : Repair.

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

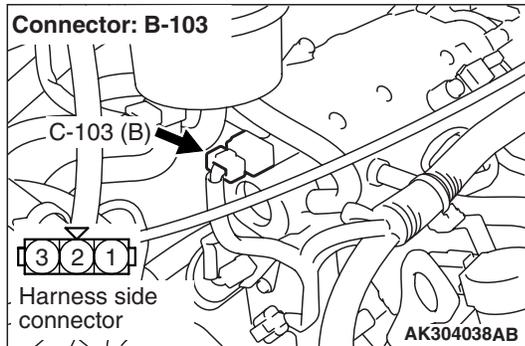
- Refer to Data List Reference Table P.13C-402.
 - a. Item No. 95: Manifold absolute pressure sensor

Q: Is the check result normal?

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

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

STEP 9. Perform resistance measurement at B-103 manifold absolute pressure sensor connector.



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

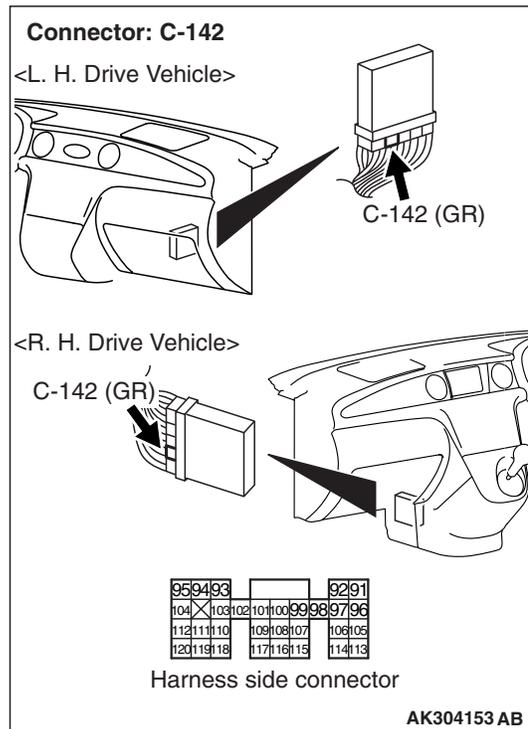
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 10 .

STEP 10. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

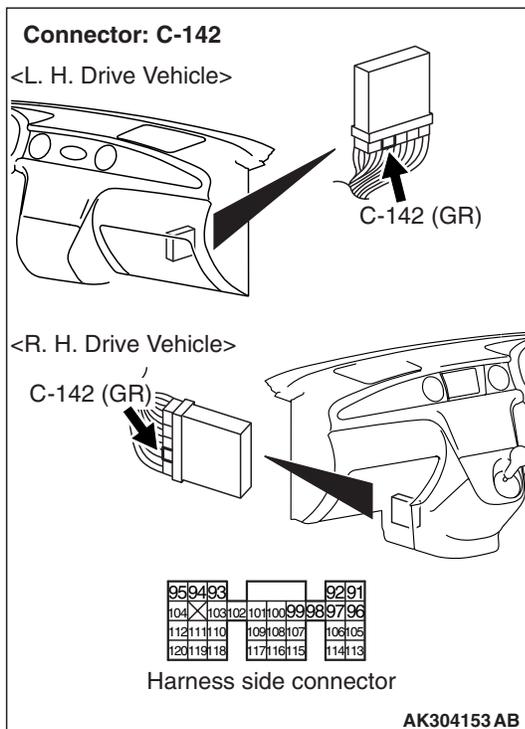
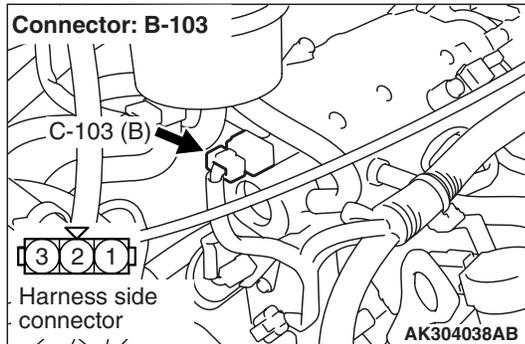


Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

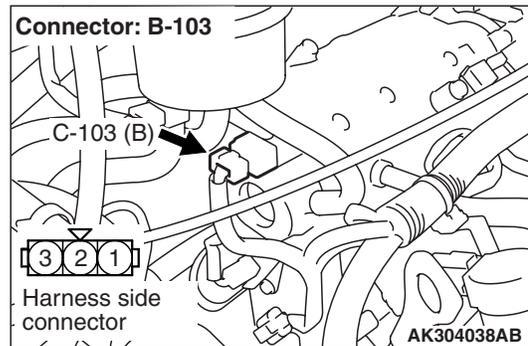
STEP 11. Check harness between B-103 (terminal No. 2) manifold absolute pressure sensor connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open circuit and damage.

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

STEP 12. Perform voltage measurement at B-103 manifold absolute pressure sensor connector.

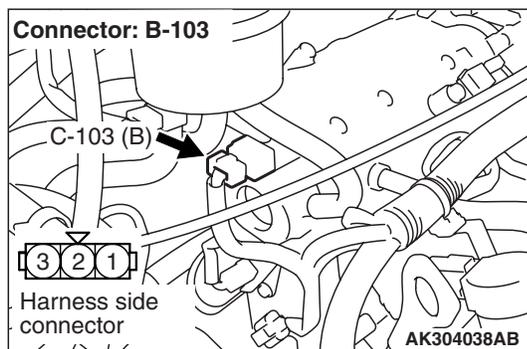
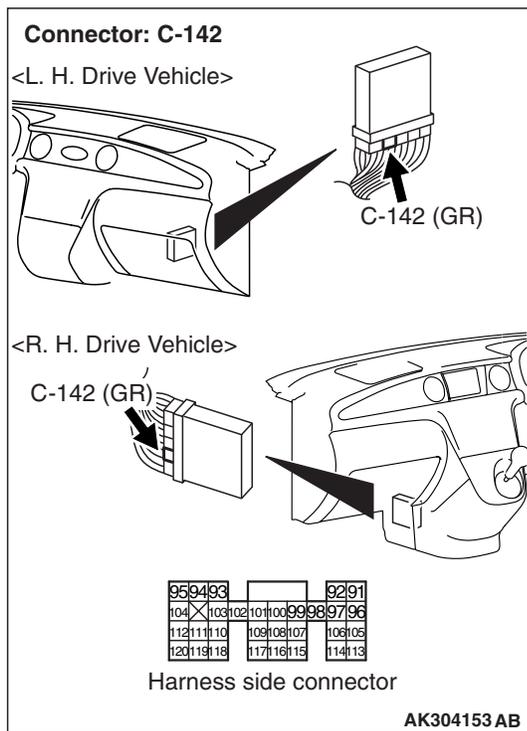


- Use special tool test harness (MB991348) to connect connector and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

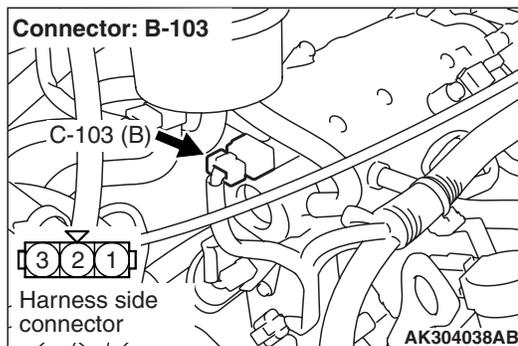
OK: 4.9 – 5.1 V

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

STEP 13. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 14. Perform voltage measurement at B-103 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?

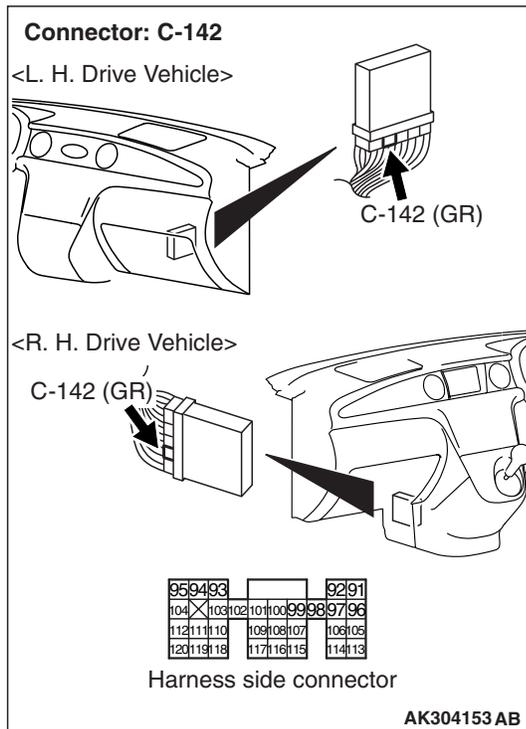
- YES :** Go to Step 17 .
- NO :** Go to Step 15 .

Q: Is the check result normal?

- YES :** Check and repair harness between B-103 (terminal No. 3) manifold absolute pressure sensor connector and C-142 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check power supply line for damage.

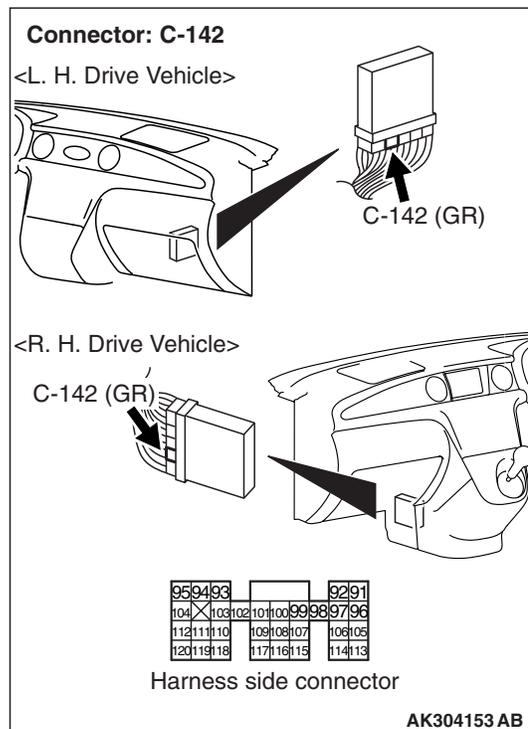
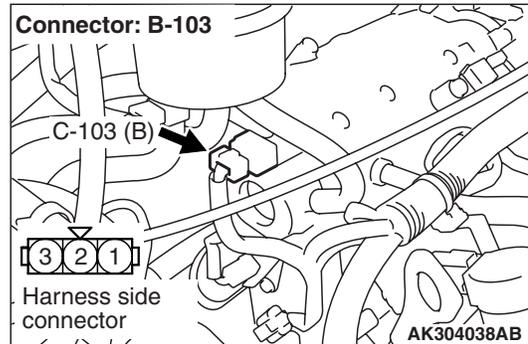
NO : Repair.

STEP 15. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



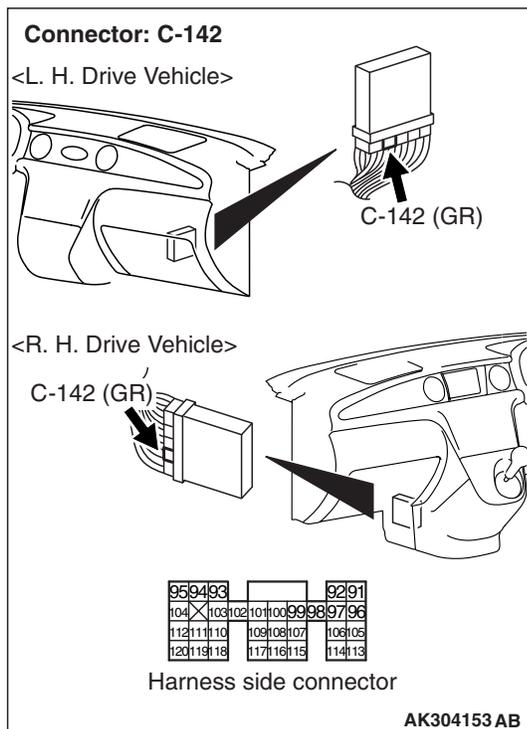
Q: Is the check result normal?
YES : Go to Step 16 .
NO : Repair.

STEP 16. Check harness between B-103 (terminal No. 1) manifold absolute pressure sensor connector and C-142 (terminal No. 101) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

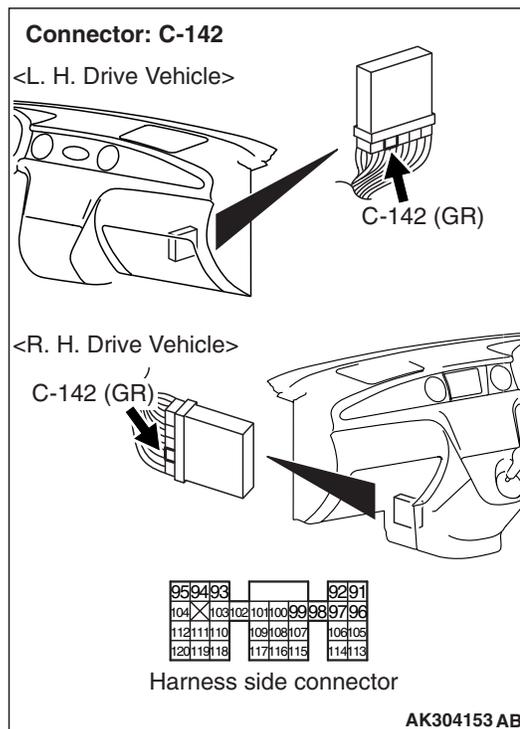


- Check output line for short circuit and damage.
- Q: Is the check result normal?**
YES : Replace manifold absolute pressure sensor.
NO : Repair.

STEP 17. Perform voltage measurement at C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 18. Connector check: C-142 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

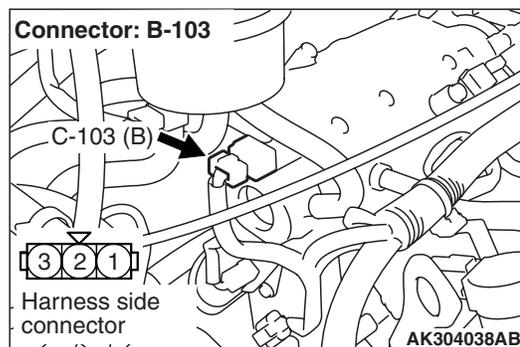
Altitude 1,200m: 3.2 – 3.8 V

Altitude 1,800m: 2.9 – 3.5 V

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Go to Step 18 .



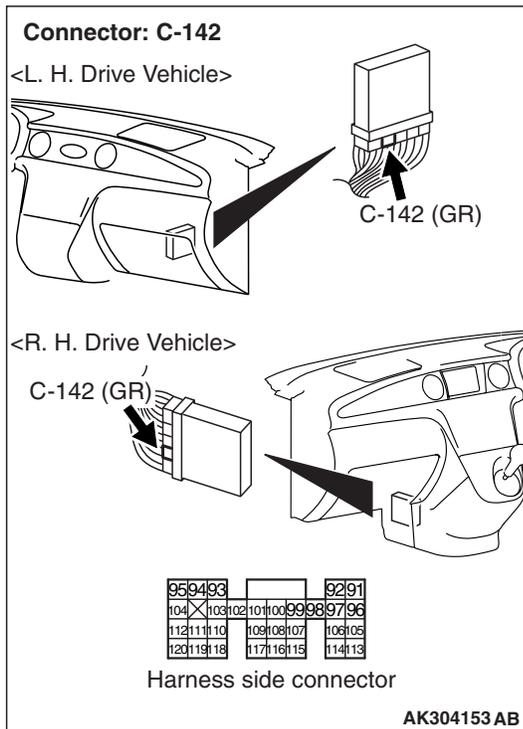
Q: Is the check result normal?

YES : Check and repair check harness between B-103 (terminal No. 1) manifold absolute pressure sensor connector and C-142 (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.

**STEP 19. Connector check: C-142 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



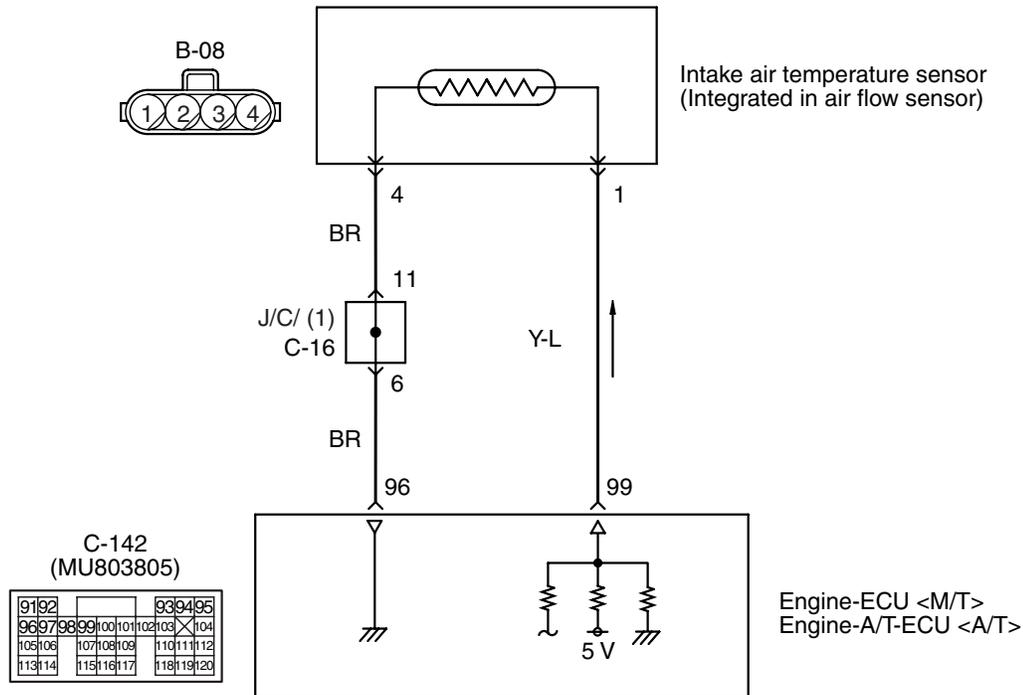
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

Code No. P0110: Intake Air Temperature Sensor System

Intake air temperature sensor circuit



AK401168AB

OPERATION

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

FUNCTION

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

- The intake air temperature sensor is a kind of resistor, which has characteristics to reduce its resistance as the intake air temperature rises. Therefore, the sensor output voltage varies with the intake air temperature, and becomes lower as the intake air temperature rises.

TROUBLE JUDGMENT**Check Conditions**

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

Judgment Criteria

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

Or

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

- Item 13: Intake air temperature sensor

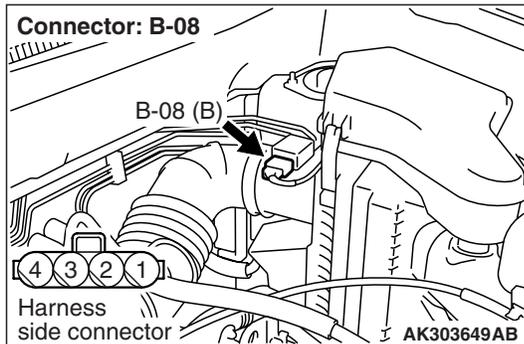
OK: At ambient temperature (atmospheric temperature) or equivalent.

Q: Is the check result normal?

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

NO : Go to Step 2 .

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check intake air temperature sensor itself.

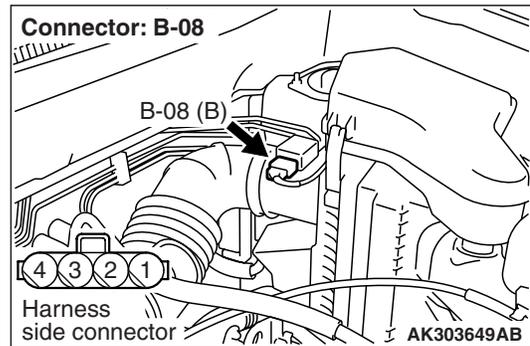
- Check intake air temperature sensor itself (Refer to P.13C-430).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace air flow sensor.

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



- Disconnect connector, and measure at harness side.

- Resistance between terminal No. 4 and earth.

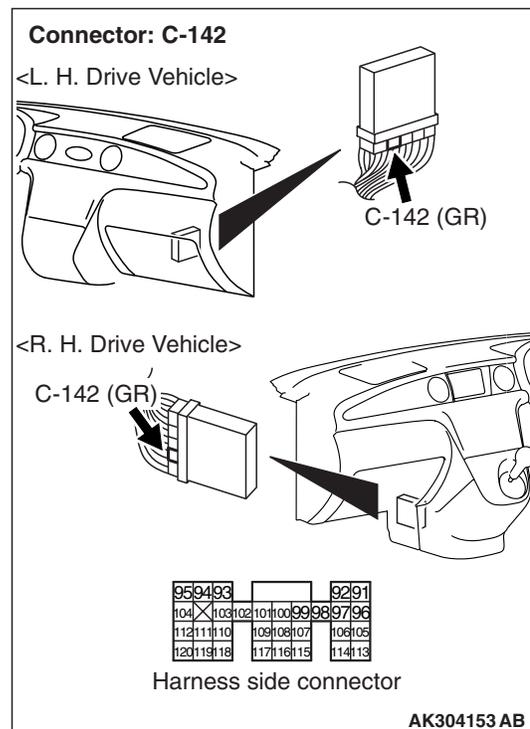
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 5 .

STEP 5. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

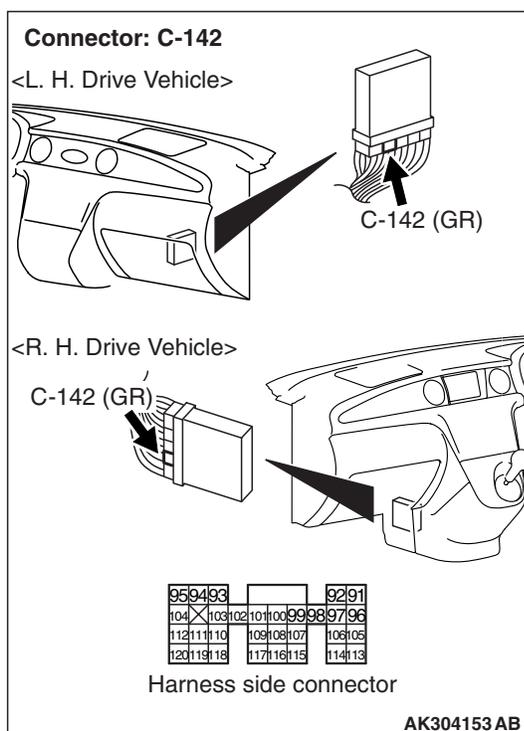
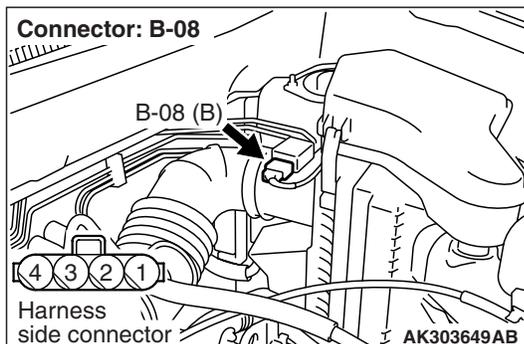


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-08 (terminal No. 4) air flow sensor connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

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

- Item No. 13: Intake air temperature sensor

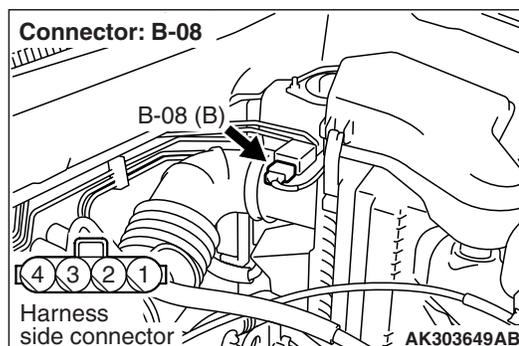
OK: At ambient temperature (atmospheric temperature) or equivalent.

Q: Is the check result normal?

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

NO : Replace 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.

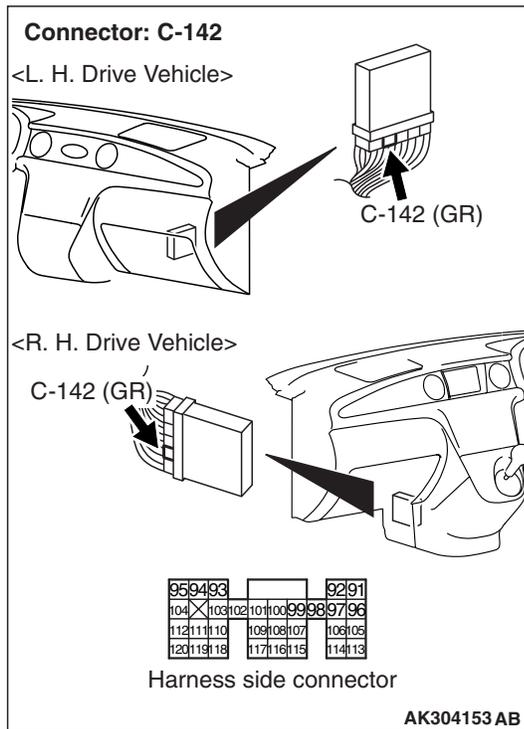
OK: 4.5 – 4.9 V

Q: Is the check result normal?

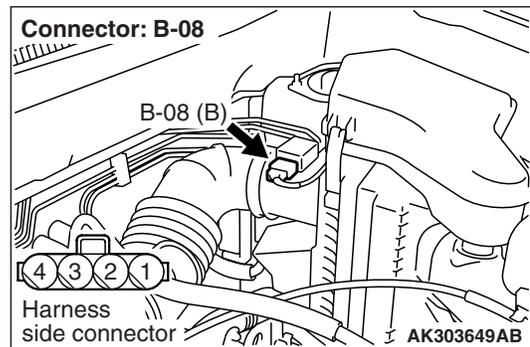
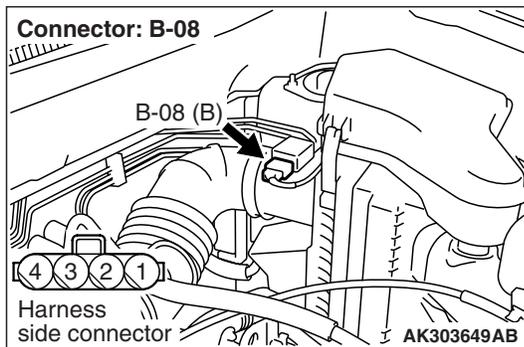
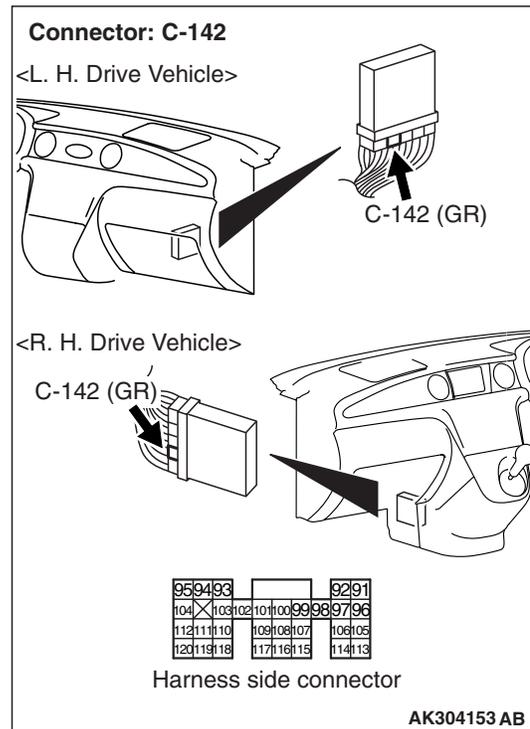
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

NO : Go to Step 9 .

STEP 9. Perform voltage measurement at C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 10. Connector check: C-142 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 .

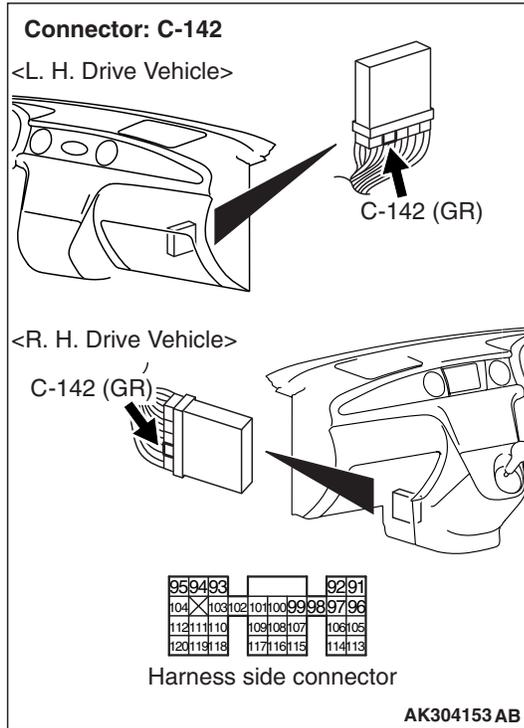
Q: Is the check result normal?

YES : Check and repair harness between B-08 (terminal No. 1) air flow sensor connector and C-142 (terminal No. 99) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

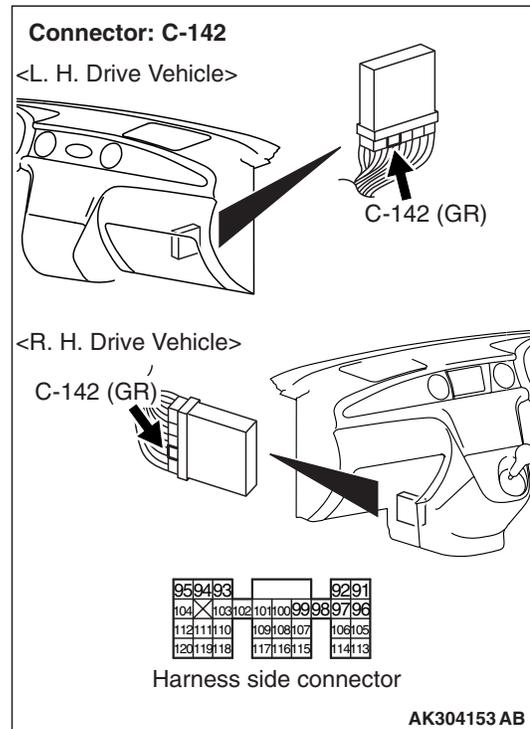
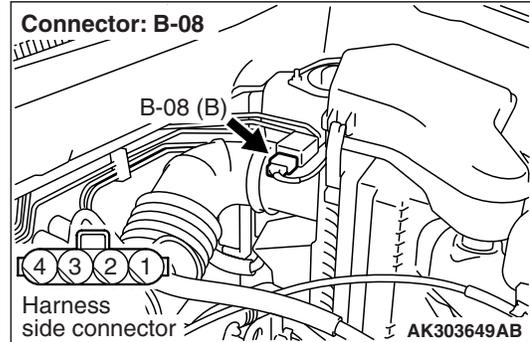
STEP 11. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

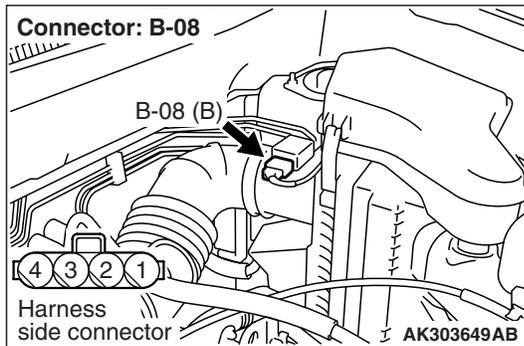
STEP 12. Check harness between B-08 (terminal No. 1) air flow sensor connector and C-142 (terminal No. 99) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for short circuit.



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

STEP 13. Perform voltage measurement at B-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

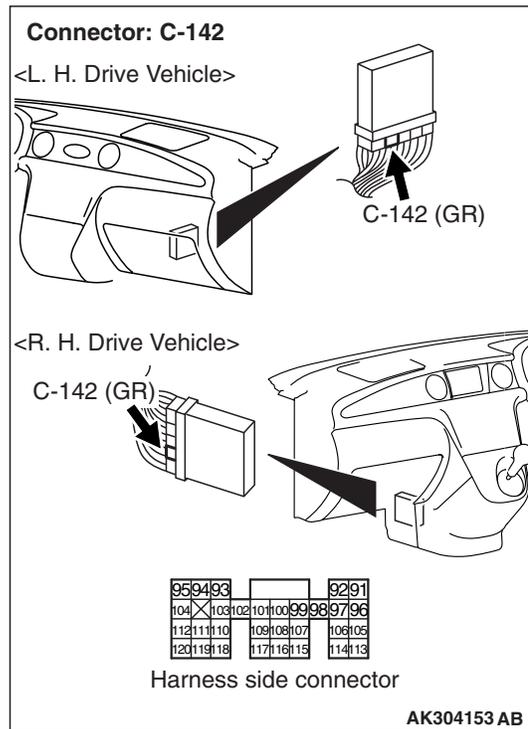
Ambient temperature at 80°C: 0.4 – 1.0 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 14 .

STEP 14. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

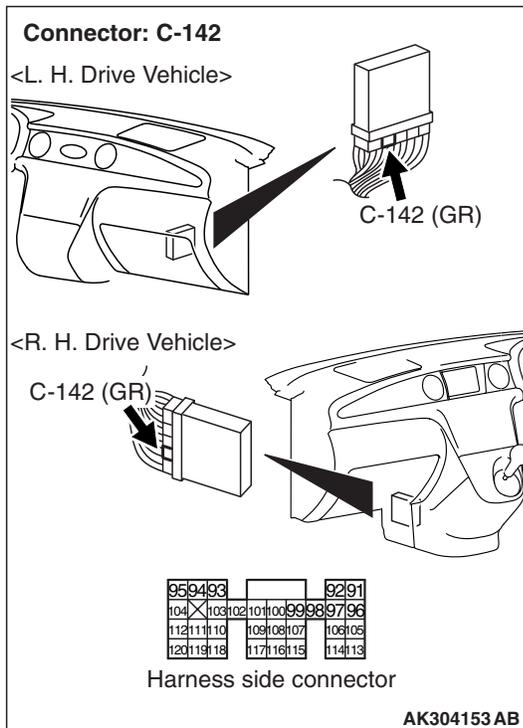
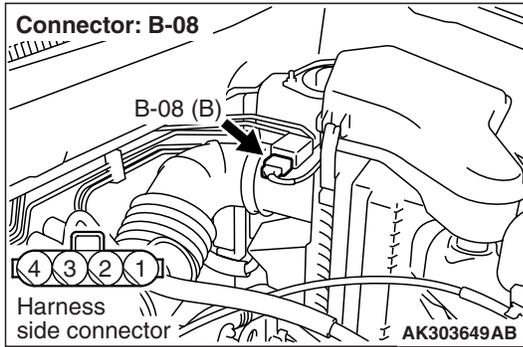


Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

STEP 15. Check harness between B-08 (terminal No. 1) air flow sensor connector and C-142 (terminal No. 99) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for damage.

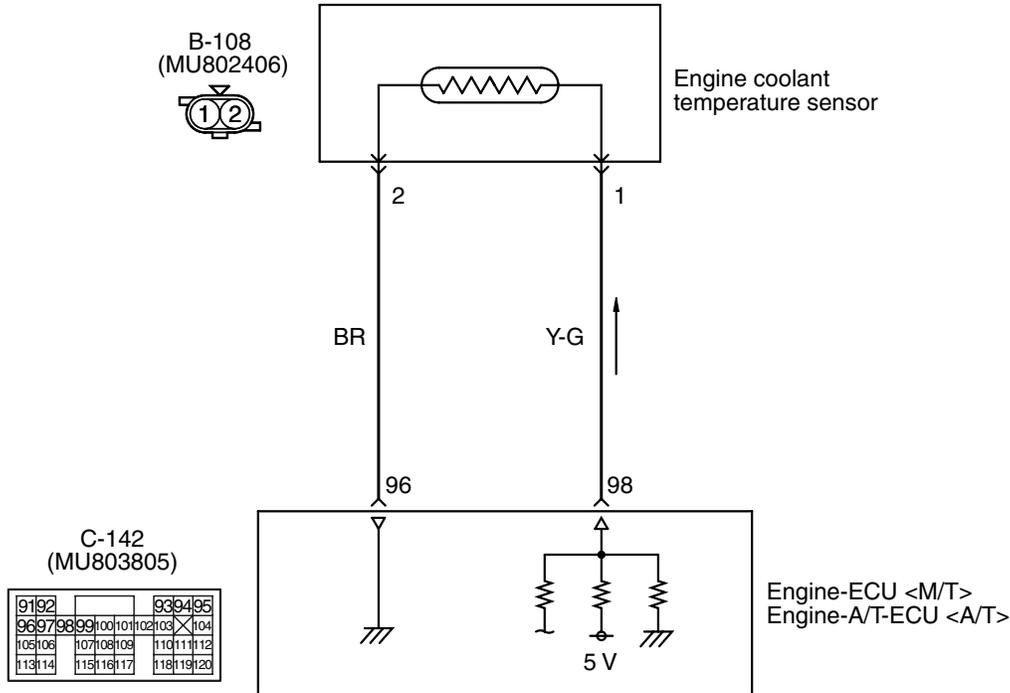
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

Code No. P0115: Engine Coolant Temperature Sensor System

Engine coolant temperature sensor circuit



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

AK304121AB

OPERATION

- A power voltage of 5 V is applied to the engine coolant temperature sensor output terminal (terminal No. 1) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 98).
- The power voltage is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96) from the engine coolant temperature sensor (terminal No. 2).

FUNCTION

- The engine coolant temperature sensor converts the engine coolant temperature into a voltage signal, and inputs the voltage to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- In response to the signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the fuel injection amount and the fast idle speed when the engine is cold state.

- The engine coolant temperature sensor is a kind of resistor, which has characteristics to reduce its resistance as the engine coolant temperature rises. Therefore, the sensor output voltage varies with the engine coolant temperature, and becomes lower as the engine coolant temperature rises.

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

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

Or

- The sensor output voltage is 0.1V or less (water temperature of above 140°C or equivalent) for 4 seconds.

Check Conditions

- After the engine has started up.

Judgment Criteria

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

PROBABLE CAUSE

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

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

- Item 21: Engine coolant temperature sensor

OK:

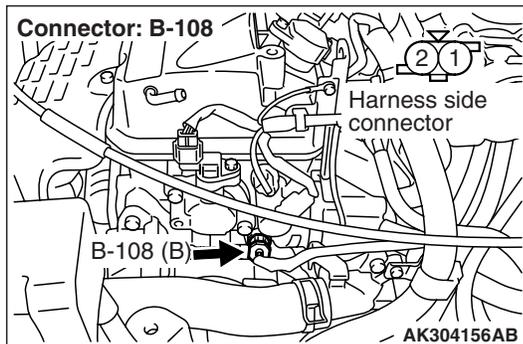
Engine cold state: At ambient temperature (atmospheric temperature) or equivalent.

Engine hot state: At 80 – 120°C

Q: Is the check result normal?

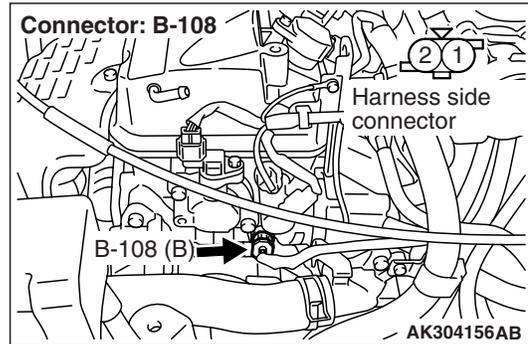
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

NO : Go to Step 2 .

STEP 2. Connector check: B-108 engine coolant temperature sensor connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair.

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

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

OK:

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

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

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

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

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

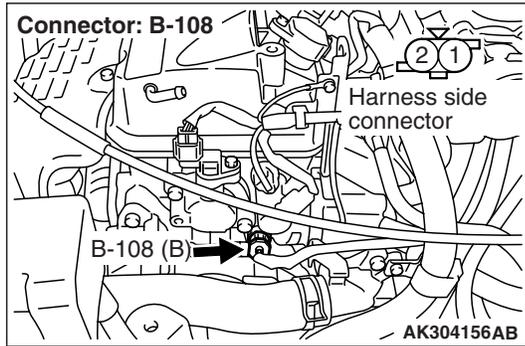
Engine coolant temperature at 80°C: 0.26 – 0.36 kΩ

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace engine coolant temperature sensor.

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



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

OK: Continuity (2 Ω or less)

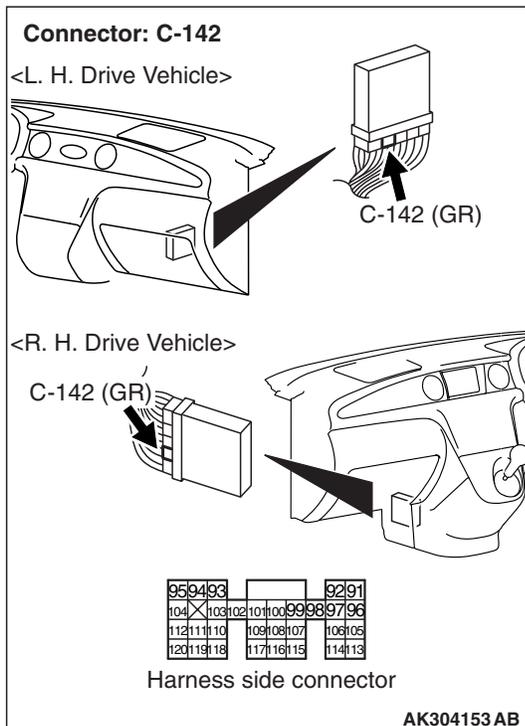
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 5 .

STEP 5. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

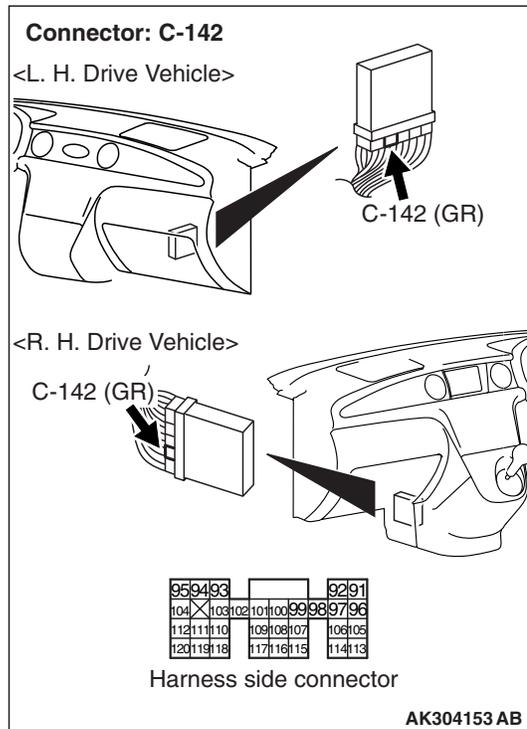
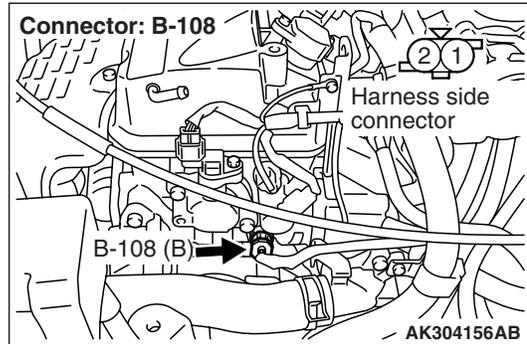
Q: Is the check result normal?



YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-108 (terminal No. 2) engine coolant temperature sensor connector and C-142 (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.

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.

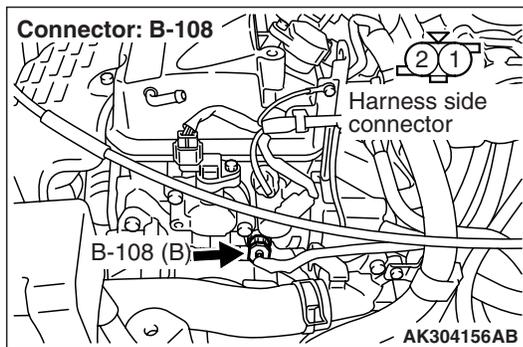
Engine hot state: At 80 – 120 °C

Q: Is the check result normal?

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

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

STEP 8. Perform voltage measurement at B-108 engine coolant temperature sensor connector.



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

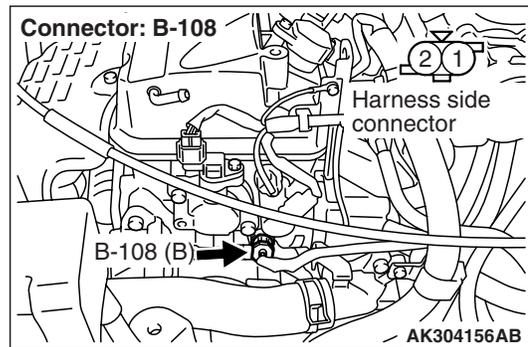
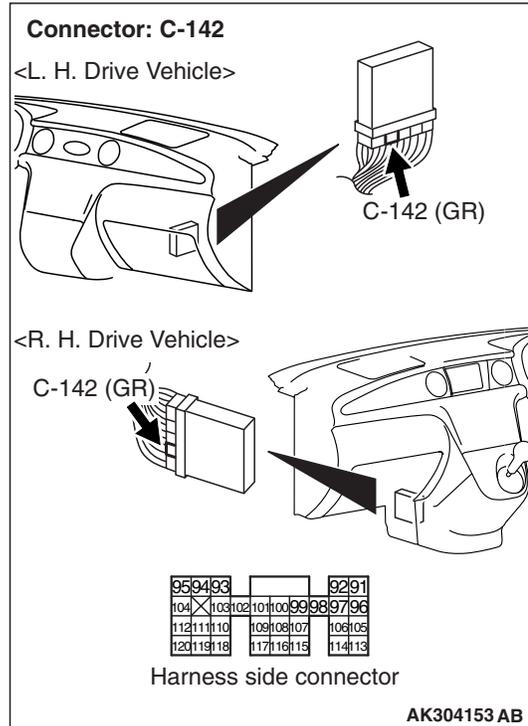
OK: 4.5 – 4.9 V

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 9 .

STEP 9. Perform voltage measurement at C-142 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-108 engine coolant temperature sensor.
- Ignition switch: ON
- Voltage between terminal No. 98 and earth.

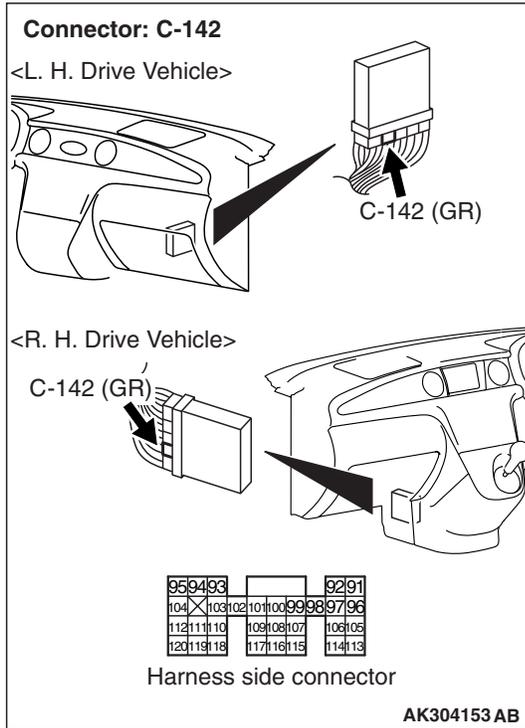
OK: 4.5 – 4.9 V

Q: Is the check result normal?

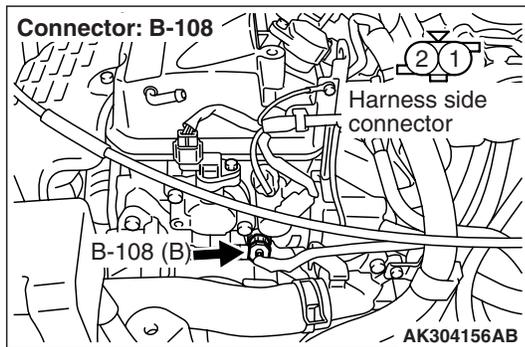
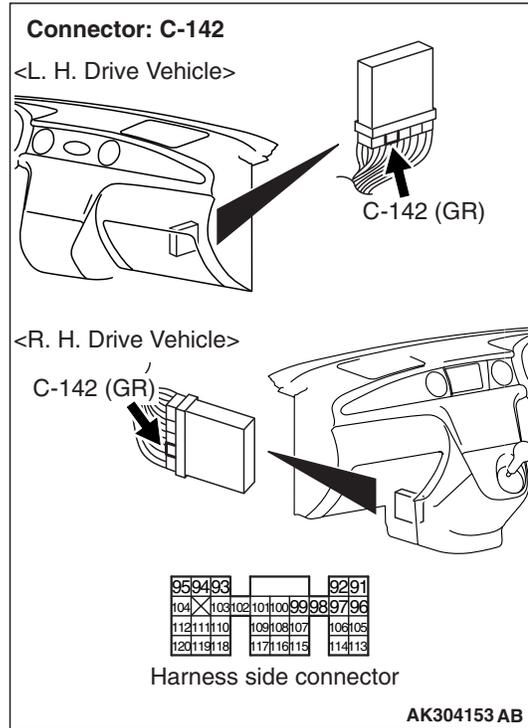
YES : Go to Step 10 .

NO : Go to Step 11 .

STEP 10. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 11. Connector check: C-142 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.

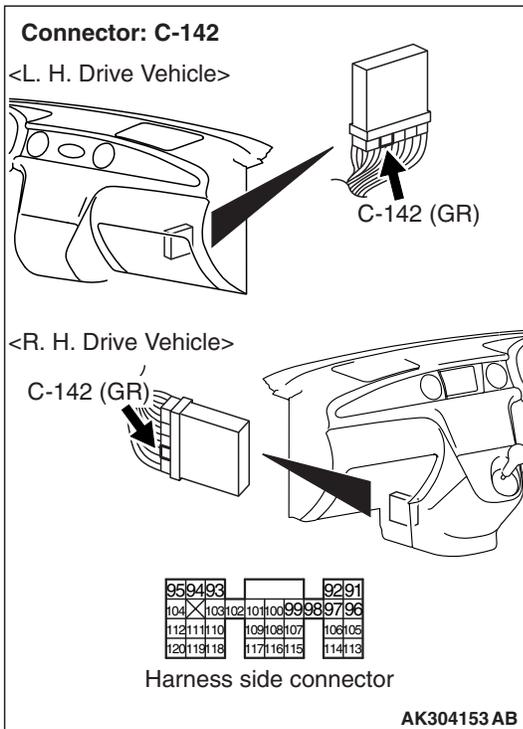
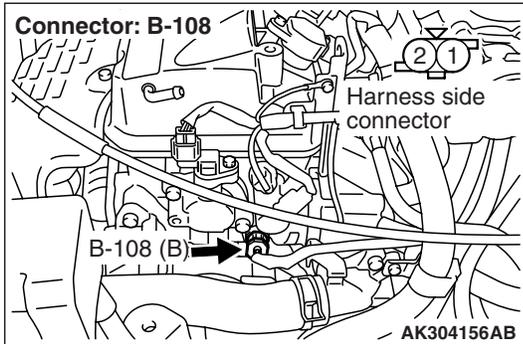
Q: Is the check result normal?

YES : Check and repair harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-142 (terminal No. 98) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

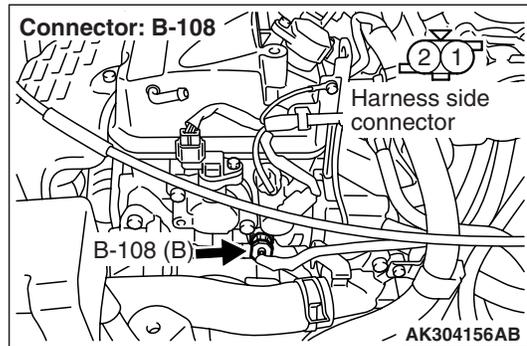
STEP 12. Check harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-142 (terminal No. 98) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



- Check output line for short circuit.

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

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



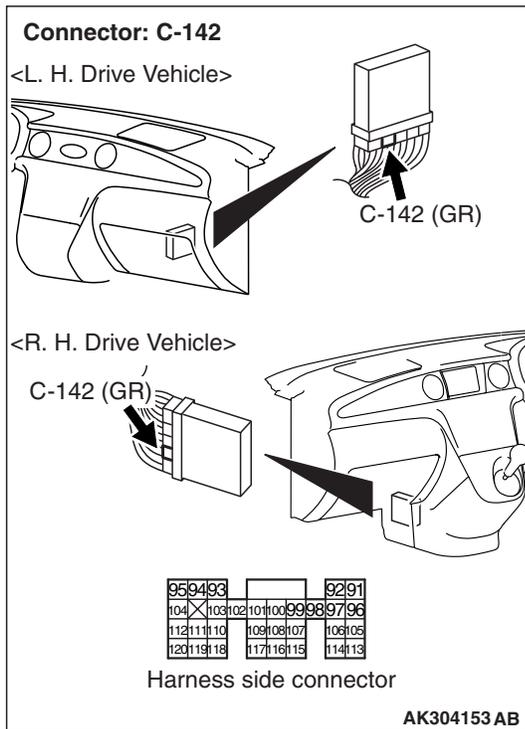
- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK:

- Engine coolant temperature at -20°C: 3.9 – 4.5 V**
- Engine coolant temperature at 0°C: 3.2 – 3.8 V**
- Engine coolant temperature at 20°C: 2.3 – 2.9 V**
- Engine coolant temperature at 40°C: 1.3 – 1.9 V**
- Engine coolant temperature at 60°C: 0.7 – 1.3 V**
- Engine coolant temperature at 80°C: 0.3 – 0.9 V**

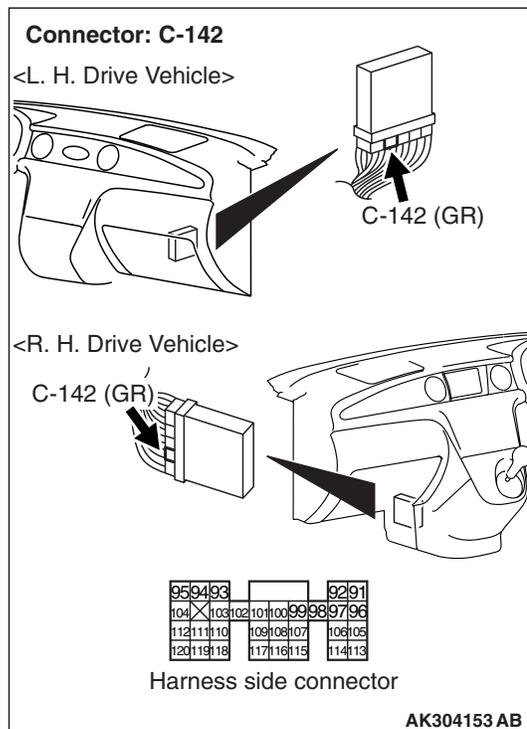
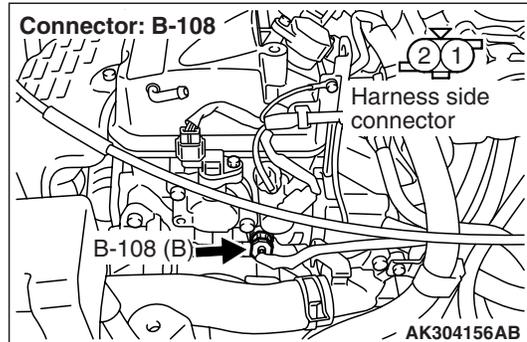
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 14 .

STEP 14. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 15. Check harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-142 (terminal No. 98) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

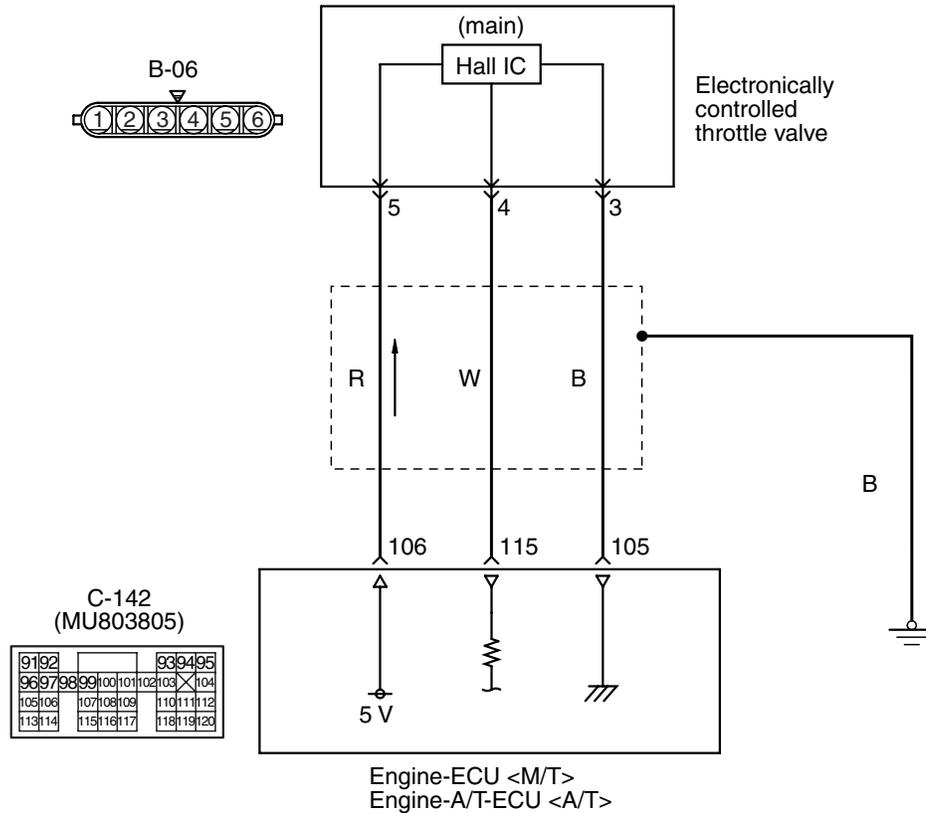


- Check output line for damage.

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

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

Throttle position sensor (main) circuit



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

AK304122AB

OPERATION

- A power voltage of 5 V is applied to the electronically 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 electronically 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 electronically controlled throttle valve output terminal (terminal No. 4).

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

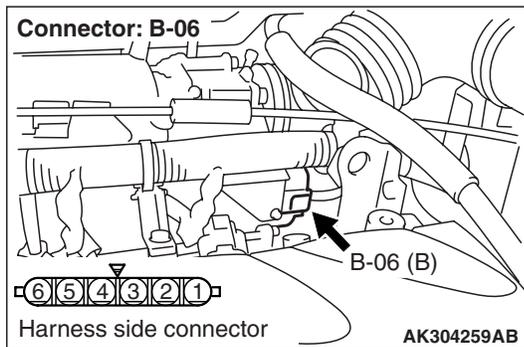
- Refer to Data List Reference Table P.13C-402.
 - Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

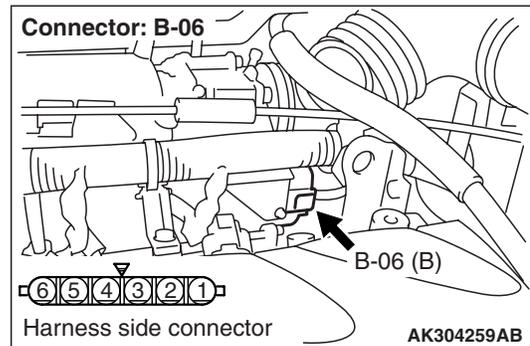


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

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



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

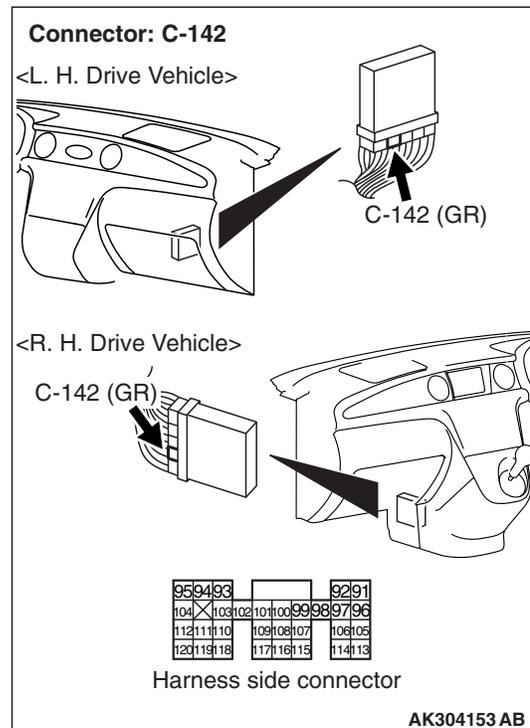
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

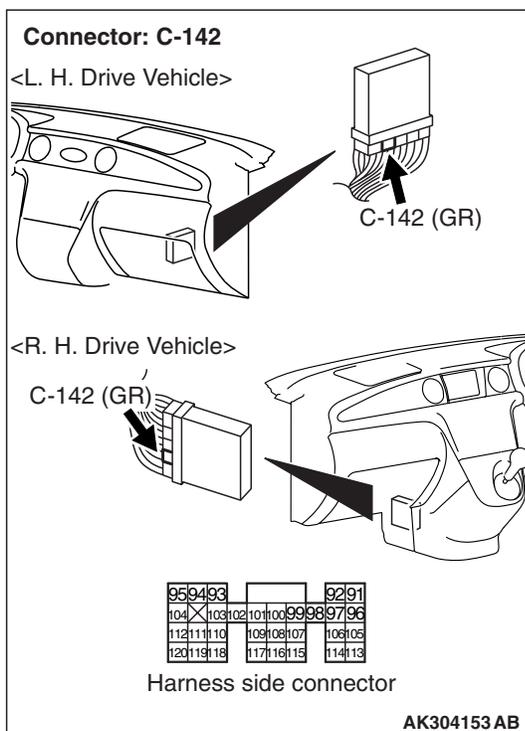
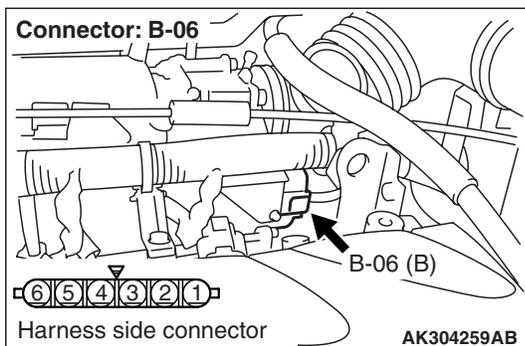


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check harness between B-06 (terminal No. 5) electronically controlled throttle valve connector and C-142 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for open/short circuit.

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

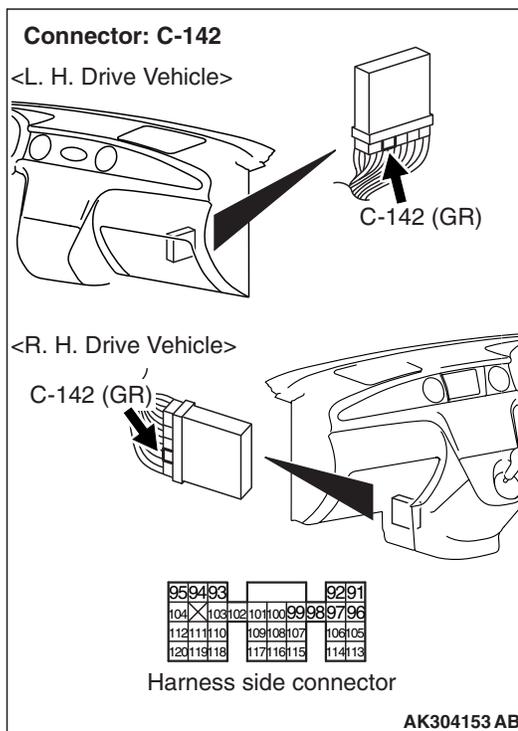
STEP 6. M.U.T.-II/III data list

- Refer to Data List Reference Table P.13C-402.
 - a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

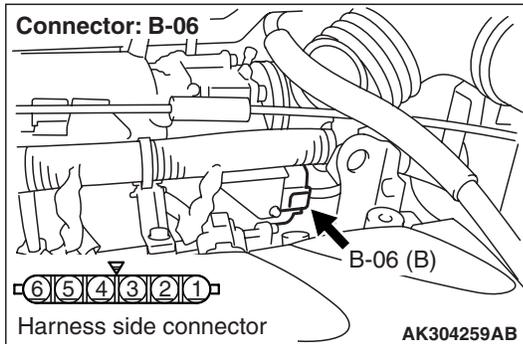
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

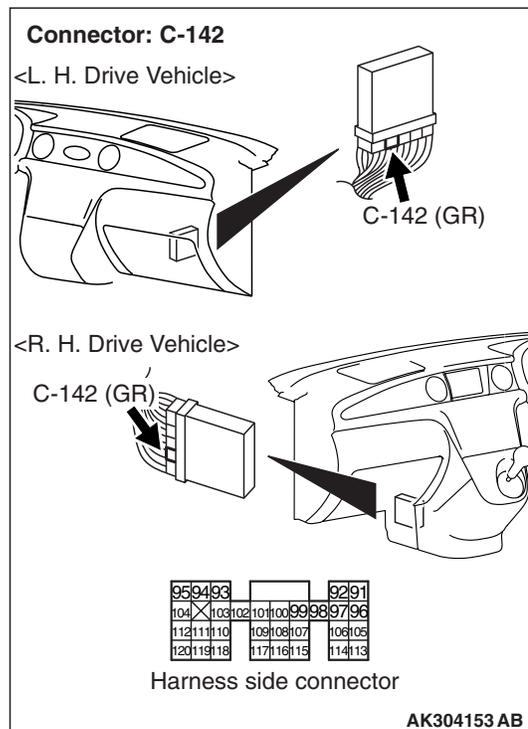
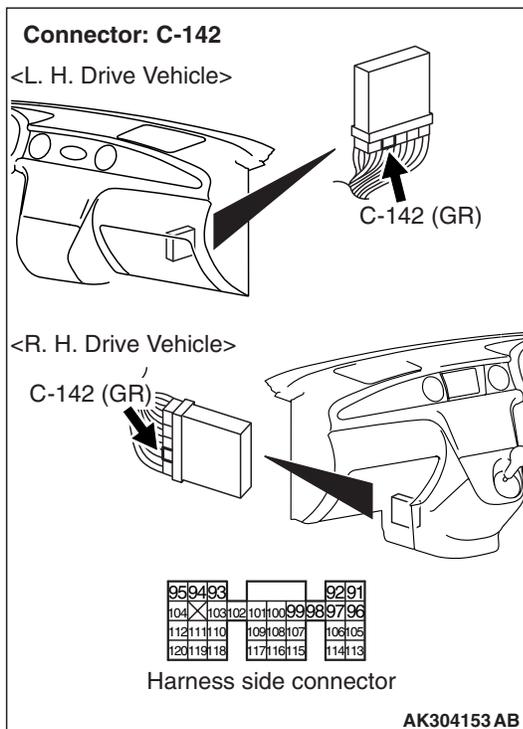
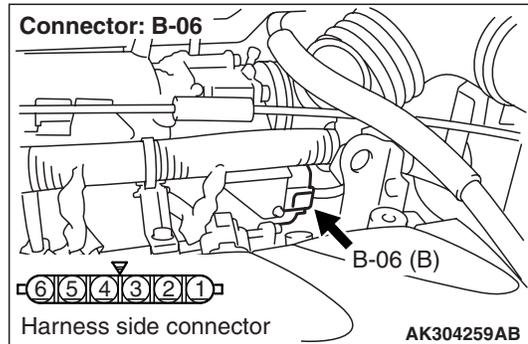


Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair.

STEP 8. Check harness between B-06 (terminal No. 5) electronically controlled throttle valve connector and C-142 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 9. Check harness between B-06 (terminal No. 4) electronically controlled throttle valve connector and C-142 (terminal No. 115) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for damage.

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

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

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

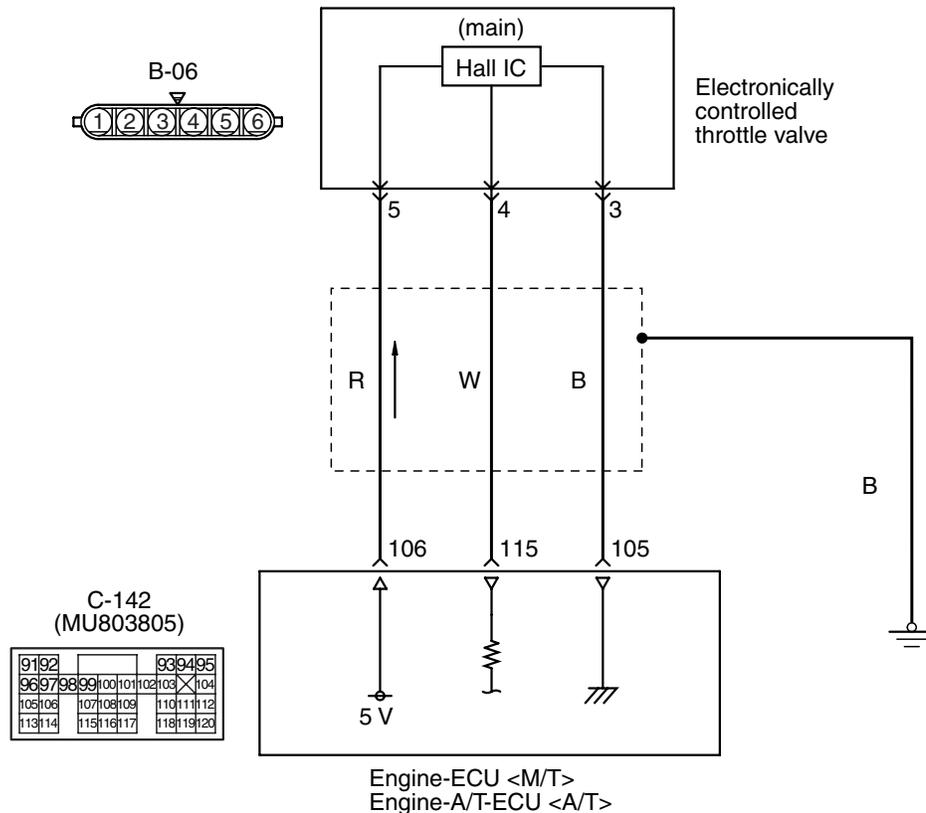
STEP 10. Replace the electronically controlled throttle valve

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

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

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

Throttle position sensor (main) circuit



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

AK304122AB

OPERATION

- A power voltage of 5 V is applied to the electronically 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 electronically 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 electronically controlled throttle valve output terminal (terminal No. 4).

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

- Ignition switch is in "ON" position.

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

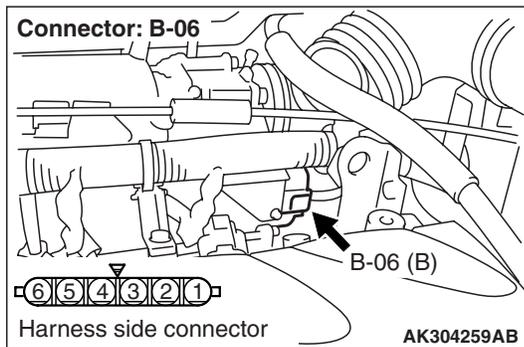
- Refer to Data List Reference Table P.13C-402.
 - Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

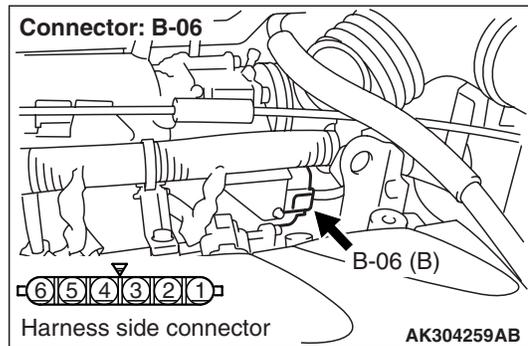


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

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



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

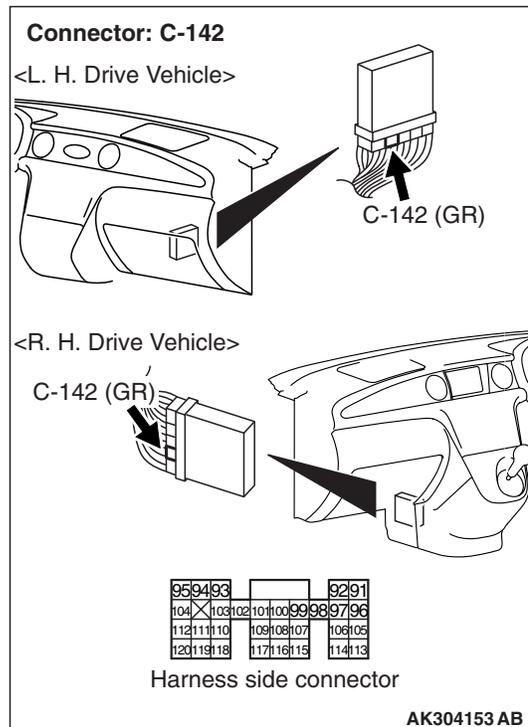
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

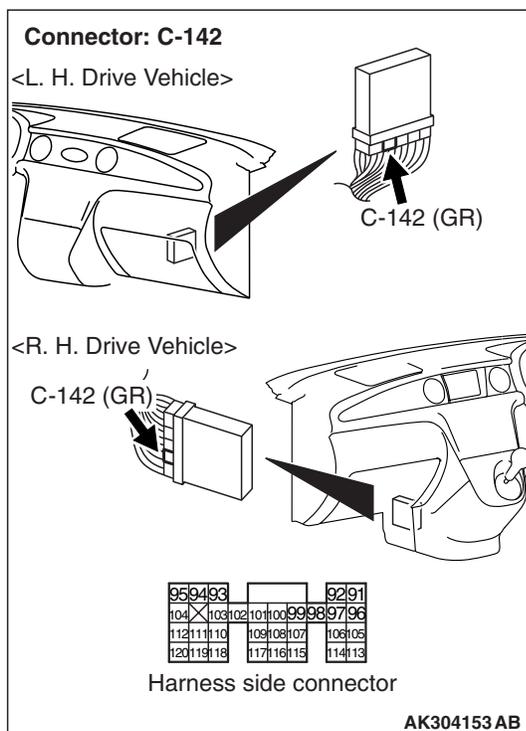
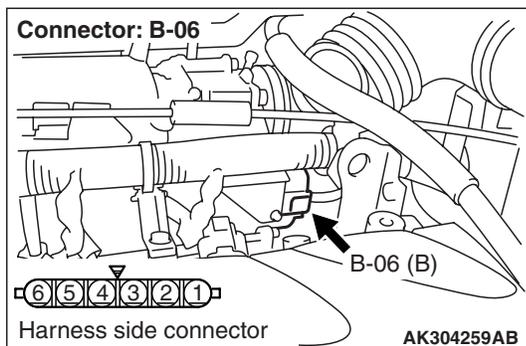


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check harness between B-06 (terminal No. 3) electronically controlled throttle valve connector and C-142 (terminal No. 105) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

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

- Refer to Data List Reference Table [P.13C-402](#).
 - a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

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

STEP 7. Replace the electronically controlled throttle valve

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

Q: Is the check result normal?

YES : Check end.

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

Code No. P0125: Feedback System Monitor

OPERATION

- Refer to Code No. P0201 No. 1 Injector System [P.13C-126](#).
- Refer to Code No. P0202 No. 2 Injector System [P.13C-131](#).
- Refer to Code No. P0203 No. 3 Injector System [P.13C-136](#).
- Refer to Code No. P0204 No. 4 Injector System [P.13C-141](#).
- Refer to Code No. P0130 Cylinder 1, 4 Oxygen Sensor (Front) Circuit [P.13C-67](#).
- Refer to P0150 Cylinder 2, 3 Oxygen Sensor (Front) Circuit [P.13C-93](#).

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 82°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 or P0173 output?

YES : Inspection chart for diagnosis code (Refer to [P.13C-21](#)).

NO : Go to Step 2 .

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

- Refer to Data List Reference Table [P.13C-402](#).
 - a. Item 12: Air flow sensor
 - b. Item 21: Engine coolant temperature sensor
 - c. Item 59: Cylinder 1, 4 oxygen sensor (front)
 - d. Item 69: Cylinder 2, 3 oxygen sensor (rear)
 - e. 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.13C-21](#)).

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

- Refer to Data List Reference Table [P.13C-402](#).
 - a. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 4 .

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

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

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

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

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

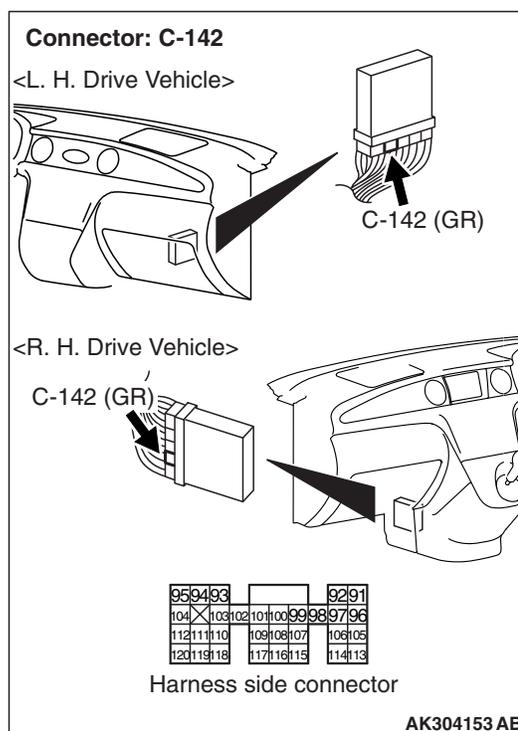
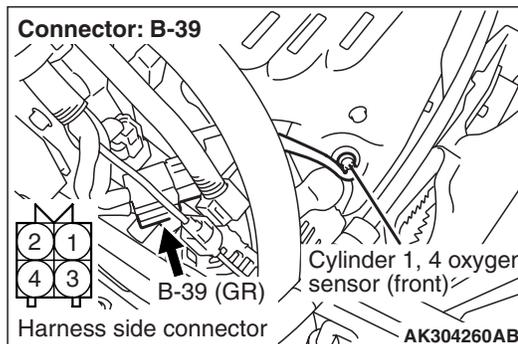
STEP 6. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13C-425](#)).

STEP 7. Connector check: B-39 cylinder 1, 4 oxygen sensor (front) connector, C-142 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.

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

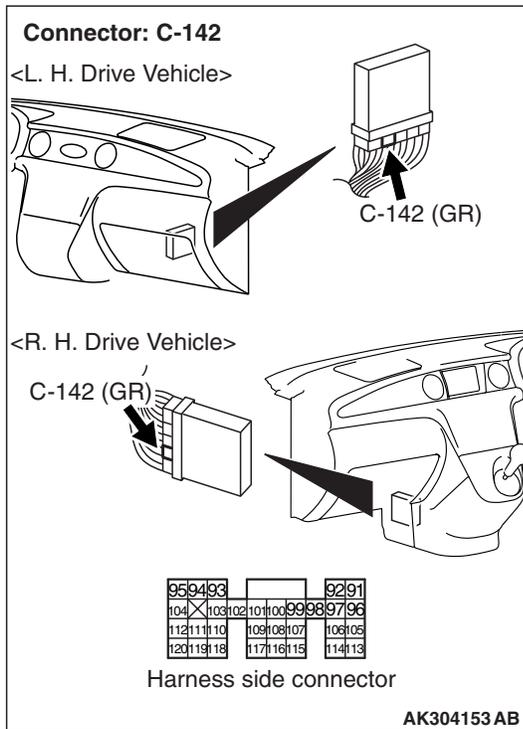
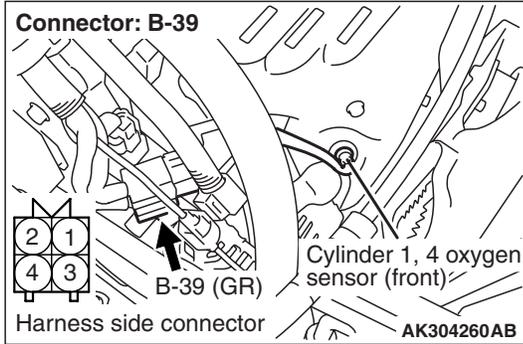
- Check cylinder 1, 4 oxygen sensor (front) itself (Refer to [P.13C-432](#)).

Q: Is the check result normal?

YES : Go to Step 9 .

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

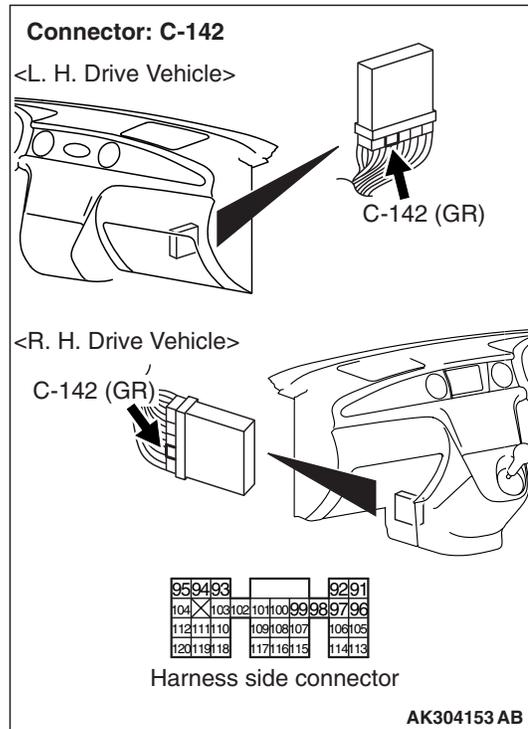
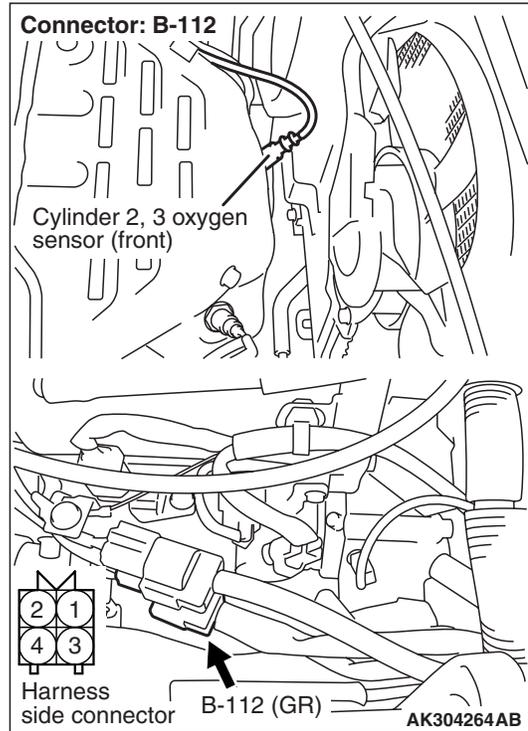
STEP 9. Check harness between B-39 (terminal No. 4) cylinder 1, 4 oxygen sensor (front) connector and C-142 (terminal No. 109) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for damage.

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

STEP 10. Connector check: B-112 cylinder 2, 3 oxygen sensor (front) connector, C-142 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.

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

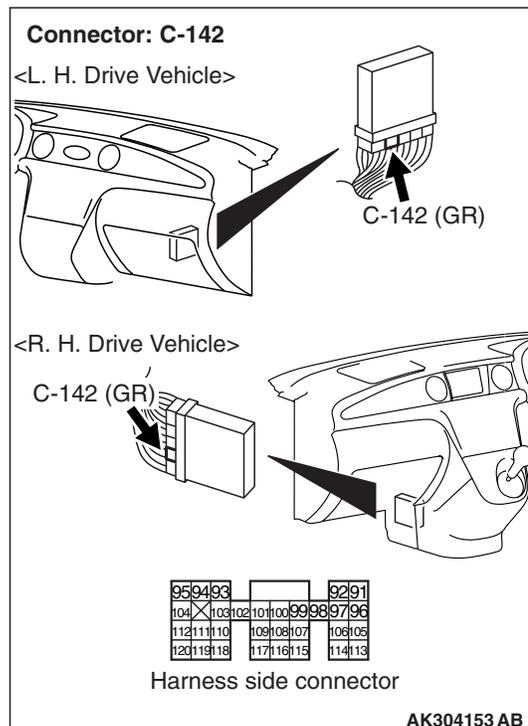
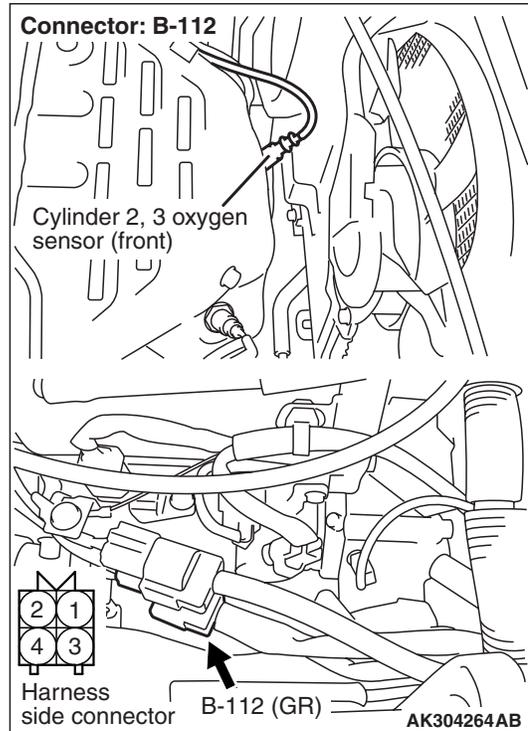
- Check cylinder 2, 3 oxygen sensor (front) itself (Refer to P.13C-432).

Q: Is the check result normal?

YES : Go to Step 12 .

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

STEP 12. Check harness between B-112 (terminal No. 4) cylinder 2, 3 oxygen sensor (front) connector and C-142 (terminal No. 108) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



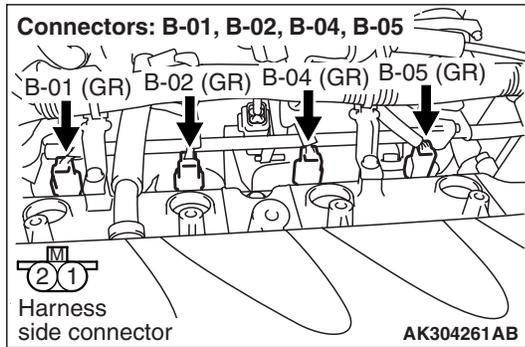
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

STEP 13. Connector check: Injector connector



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

Q: Is the check result normal?

- YES :** Go to Step 14 .
NO : Repair.

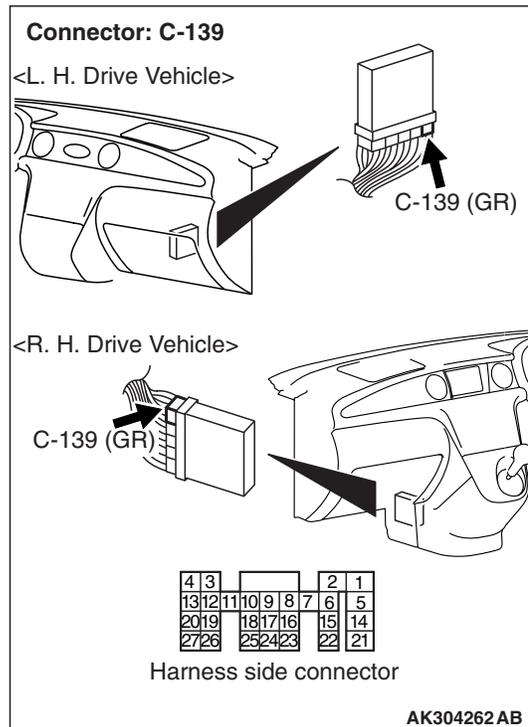
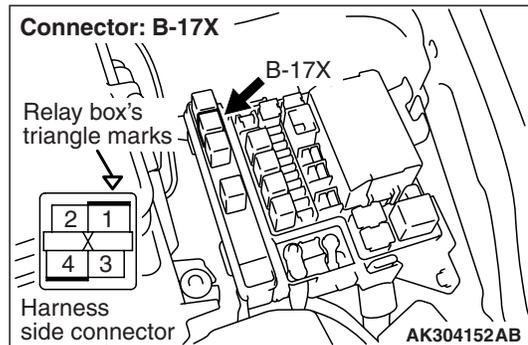
STEP 14. Check injector itself.

- Check Injector itself (Refer to [P.13C-435](#)).

Q: Is the check result normal?

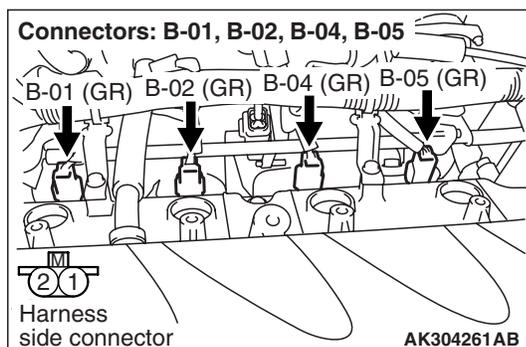
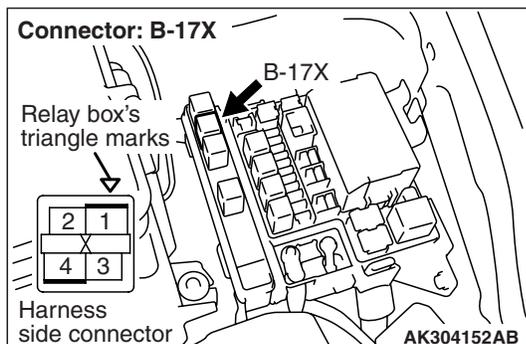
- YES :** Go to Step 15 .
NO : Replace injector.

STEP 15. Connector check: B-17X engine control relay connector and C-139 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.

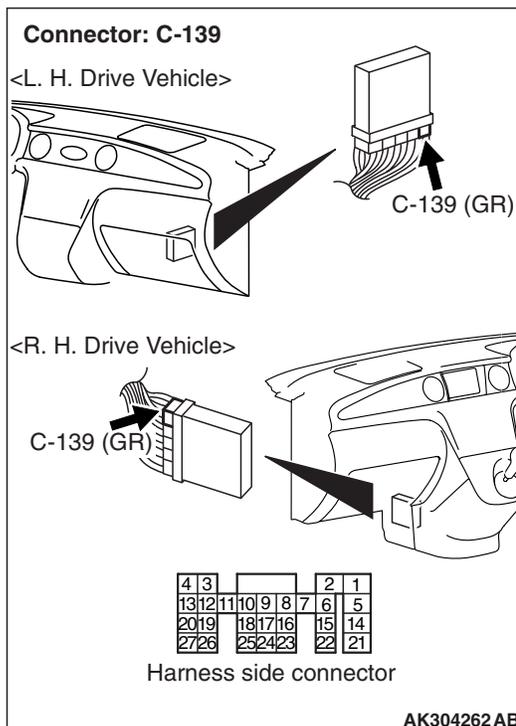
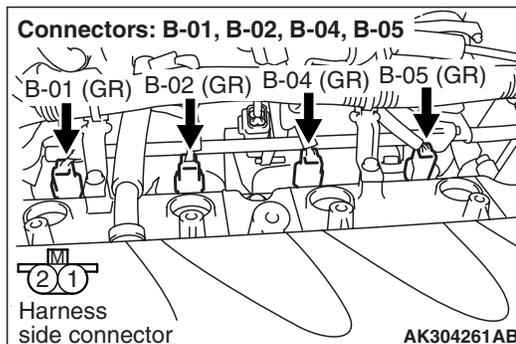
STEP 16. Check harness between B-17X engine control relay connector and injector connector.

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

Q: Are the check results normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Check harness between injector connector and C-134 engine-ECU connector.

- Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-139 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-139 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-139 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-139 (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 18 .

NO : Repair.

STEP 18. Fuel pressure measurement.

- Fuel pressure measurement (Refer to P.13C-425).

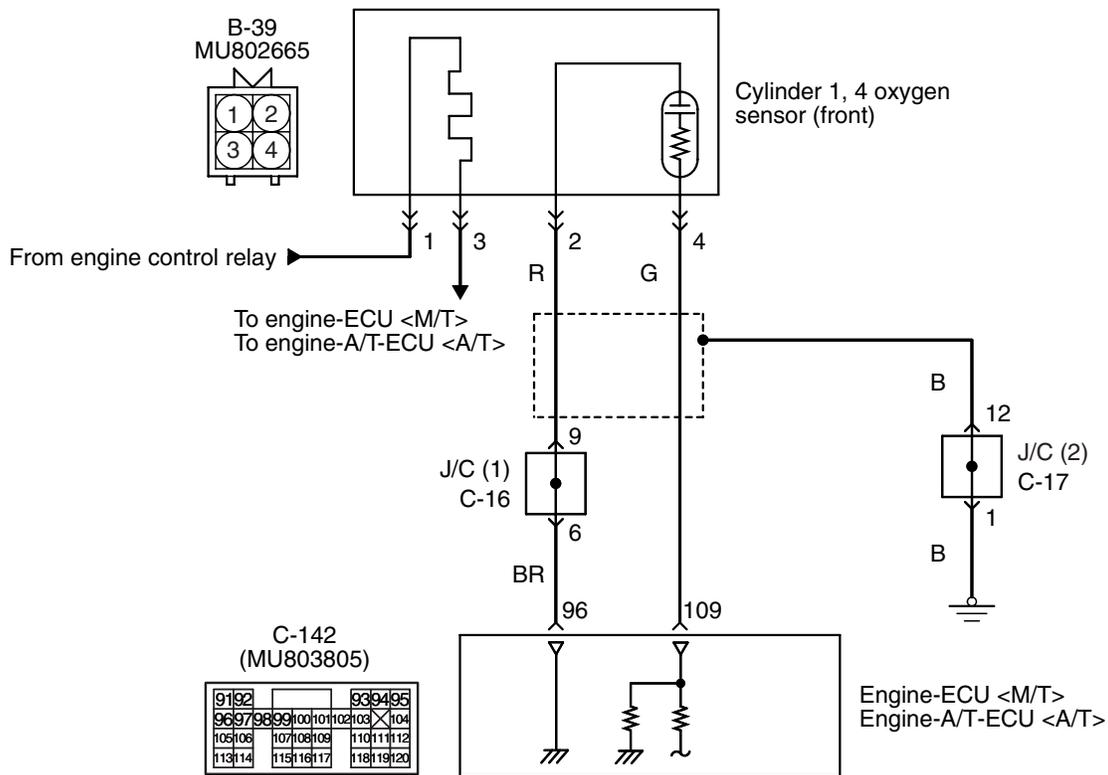
Q: Is the check result normal?

YES : Repair.

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

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

Cylinder 1, 4 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

AK401169AB

OPERATION

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

FUNCTION

- The cylinder 1, 4 oxygen sensor (front) converts the concentration of oxygen in the exhaust emission into a voltage and inputs the signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the cylinder 1, 4 oxygen sensor (front) outputs a voltage of about 1 V. When it is leaner than the theoretical air-fuel ratio, it outputs a voltage of about 0 V.
- In response to the signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the fuel injection amount so that the air-fuel ratio can be equivalent to the theoretical air-fuel ratio.

TROUBLE JUDGMENT**Check Conditions**

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

Judgment Criteria

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

Check Conditions

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

Judgment Criteria

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

PROBABLE CAUSE

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

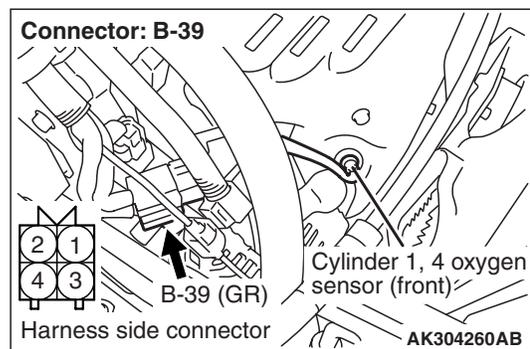
DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-II/III data list**

- Refer to Data List Reference Table P.13C-402.
 - Item 11: Cylinder 1, 4 oxygen sensor (front)

Q: Is the check result normal?

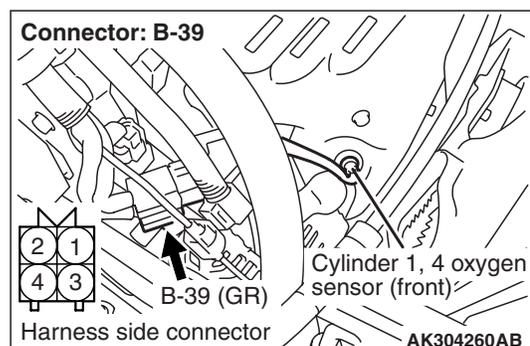
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

NO : Go to Step 2 .

STEP 2. Connector check: B-39 cylinder 1, 4 oxygen sensor (front) connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair.

STEP 3. Perform resistance measurement at B-39 cylinder 1, 4 oxygen sensor (front) connector.

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

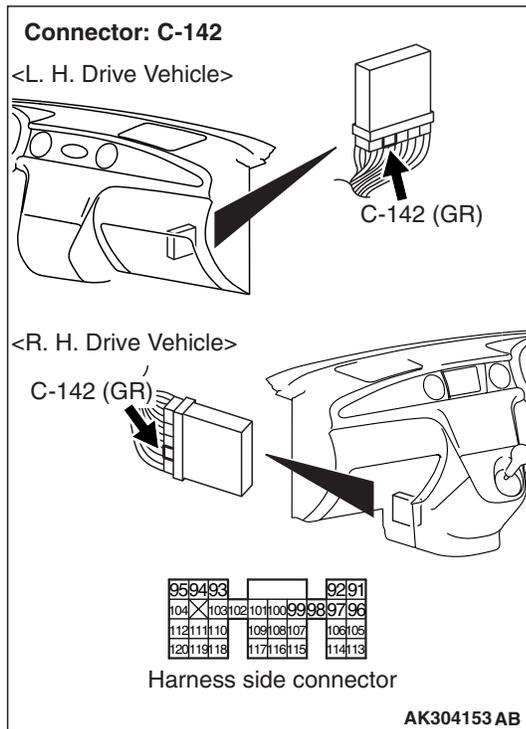
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

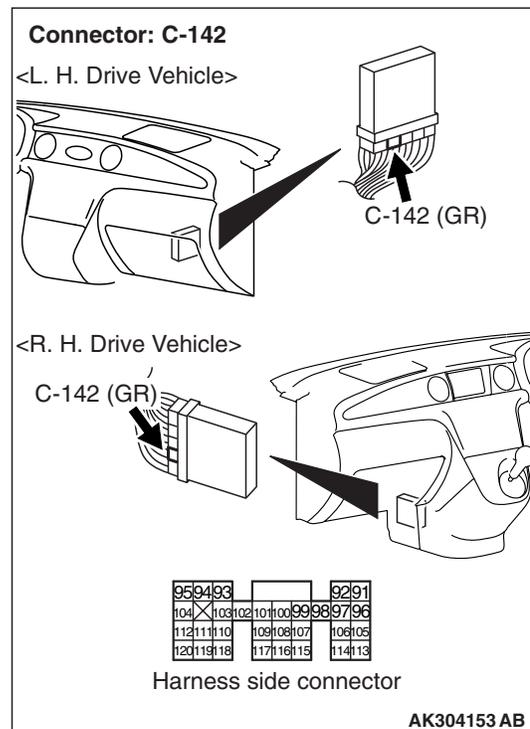
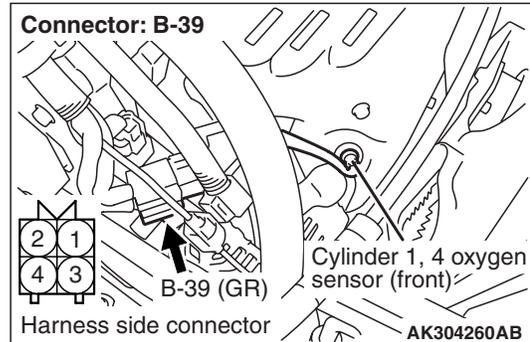
NO : Go to Step 4 .

STEP 4. Connector check: C-142 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.

STEP 5. Check harness between B-39 (terminal No. 2) cylinder 1, 4 oxygen sensor (front) connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Repair.

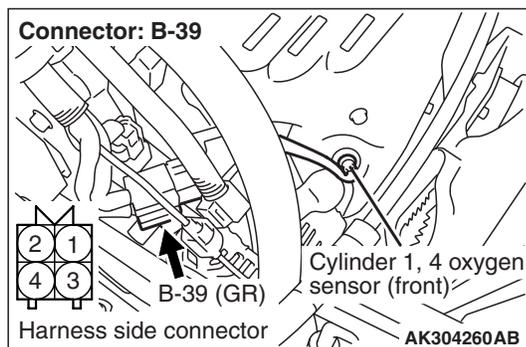
STEP 6. M.U.T.-II/III data list

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 11: Cylinder 1, 4 oxygen sensor (front)

Q: Is the check result normal?

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

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

STEP 7. Perform voltage measurement at B-39 cylinder 1, 4 oxygen sensor (front) connector.

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

OK:

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

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 .

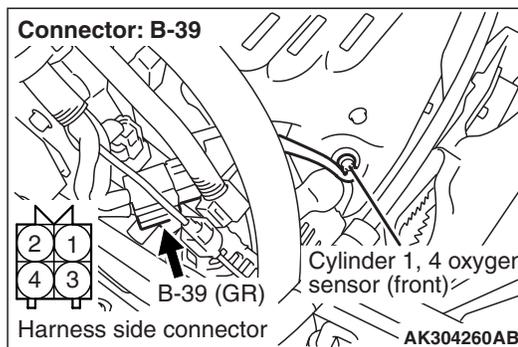
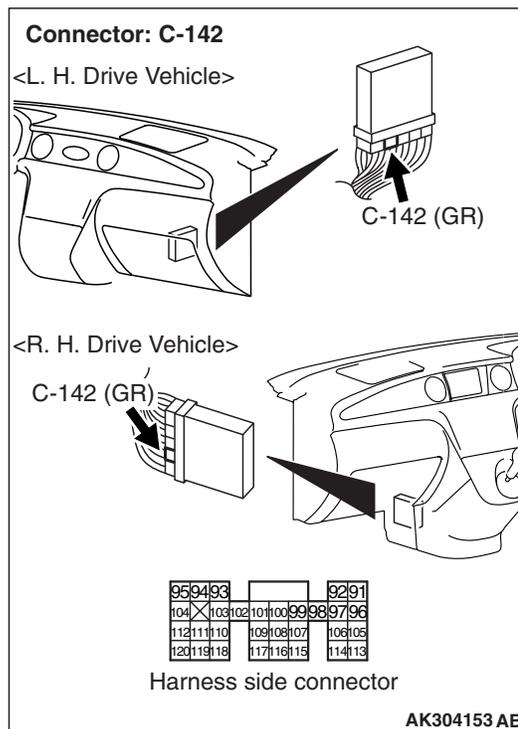
STEP 8. Check cylinder 1, 4 oxygen sensor (front) itself.

- Check cylinder 1, 4 oxygen sensor (front) itself (Refer to [P.13C-432](#)).

Q: Is the check result normal?

YES : Go to Step 9 .

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

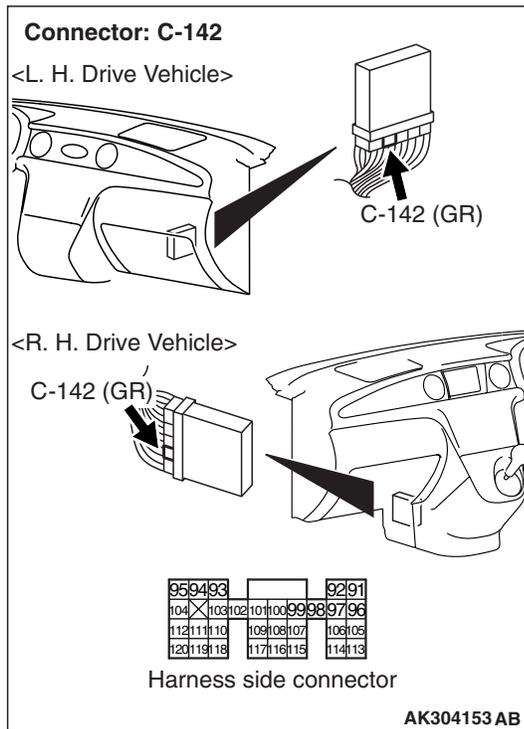
STEP 9. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**Q: Is the check result normal?**

YES : Check and repair harness between B-39 (terminal No. 4) Cylinder 1, 4 oxygen sensor (front) connector and C-142 (terminal No. 109) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

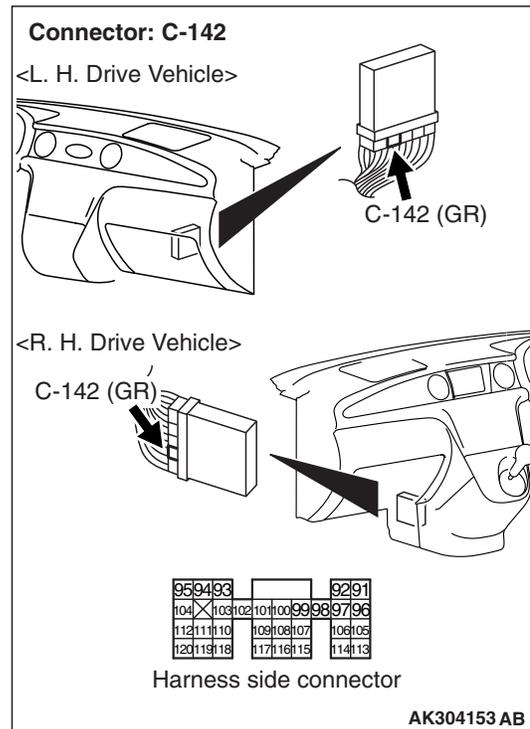
- Check output line for damage.

NO : Repair.

STEP 10. Perform voltage measurement at C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 11. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

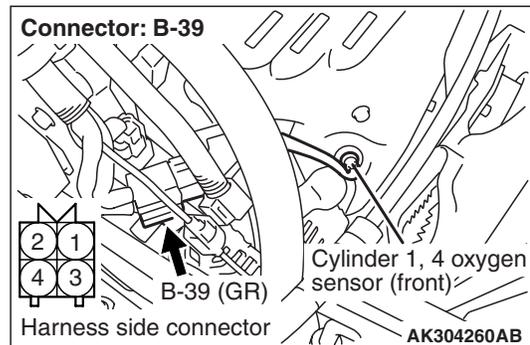
OK:

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

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .



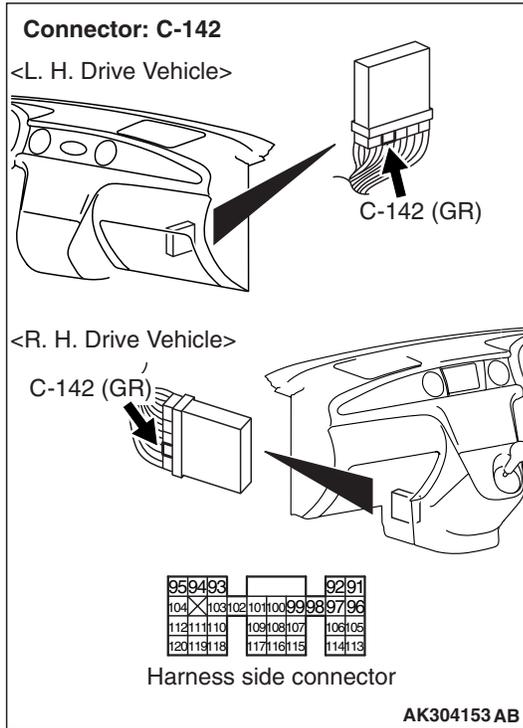
Q: Is the check result normal?

YES : Check and repair harness between B-39 (terminal No. 4) oxygen sensor (front) connector and C-142 (terminal No. 109) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

**STEP 12. Connector check: C-142 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



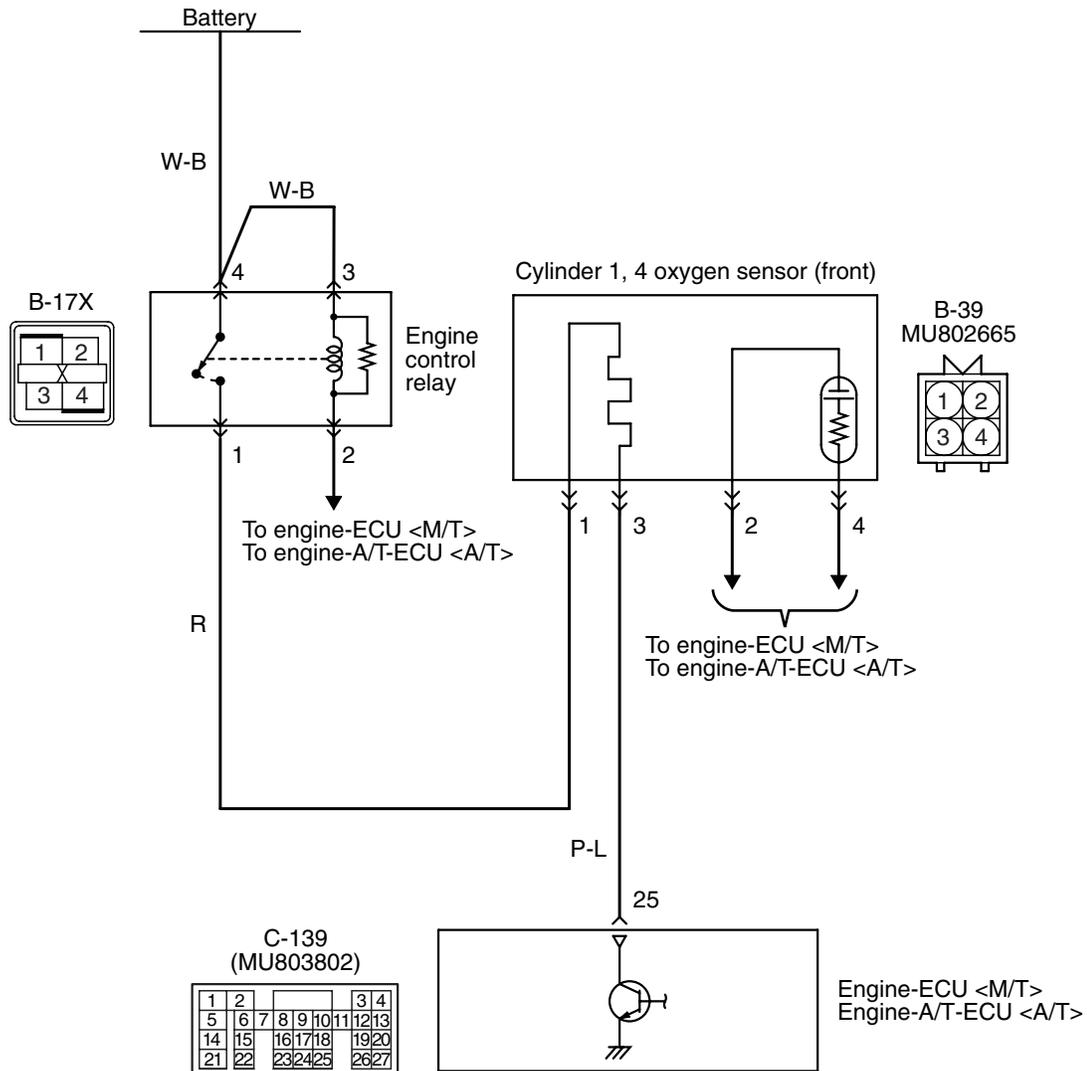
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

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

Cylinder 1, 4 oxygen sensor (front) heater circuit



Wire colour code

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

AK401170AB

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

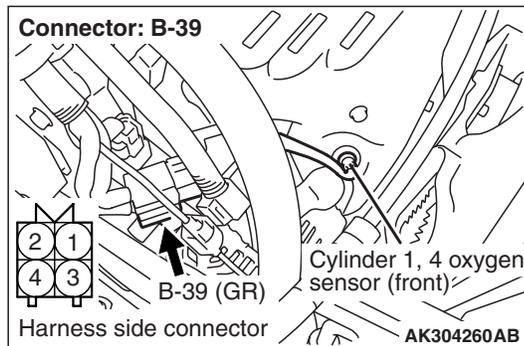
- Cylinder 1, 4 oxygen sensor (front) heater current has continued to be 0.16 A or lower, or 7.5 A or higher for 4 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-39 cylinder 1, 4 oxygen sensor (front) connector

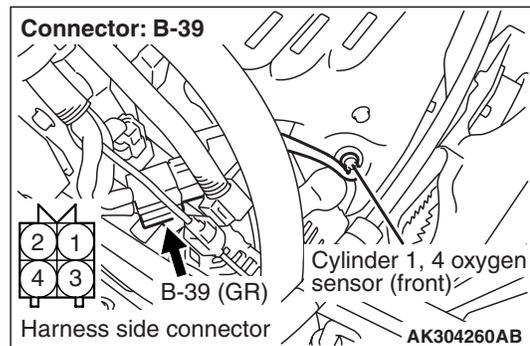


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

STEP 2. Perform resistance measurement at B-39 cylinder 1, 4 oxygen sensor (front) connector.



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

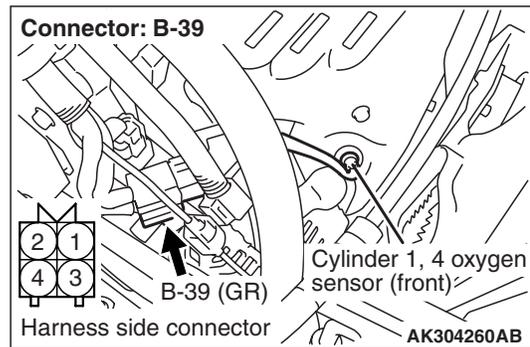
OK: 4.5 – 8.0 Ω

Q: Is the check result normal?

YES : Go to Step 3 .

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

STEP 3. Perform voltage measurement at B-39 cylinder 1, 4 oxygen sensor (front) connector.



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

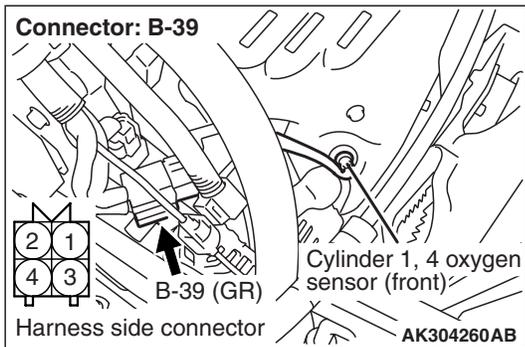
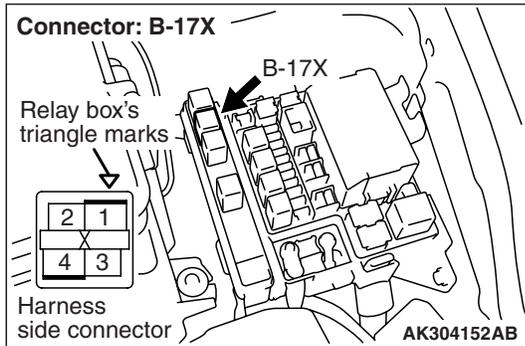
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

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



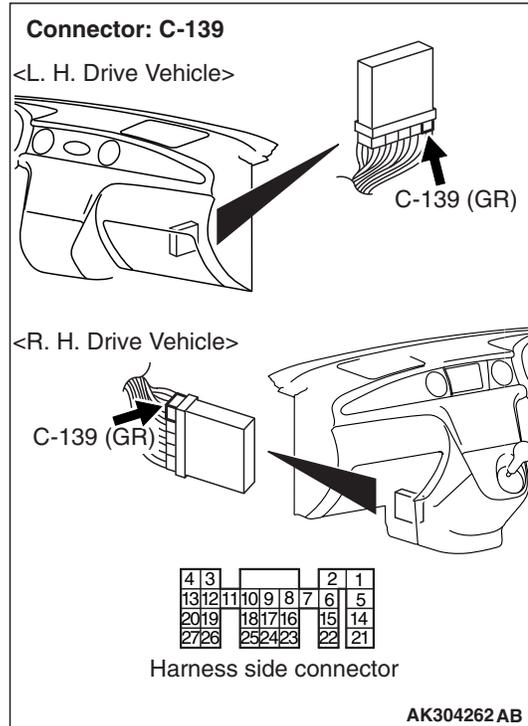
Q: Is the check result normal?

YES : Check and repair harness between B-39 (terminal No. 1) cylinder 1, 4 oxygen sensor (front) connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair.

STEP 5. Perform voltage measurement at C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

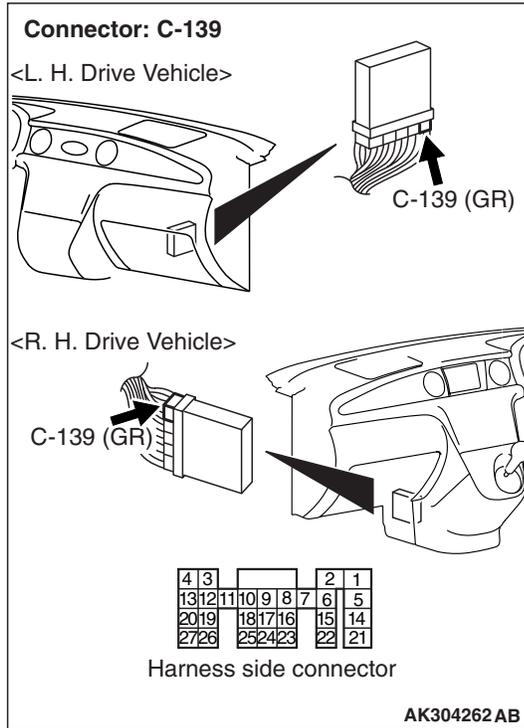
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

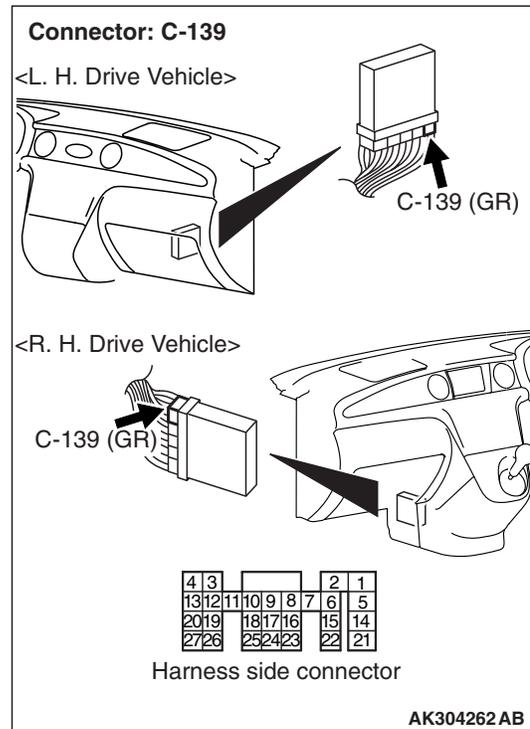
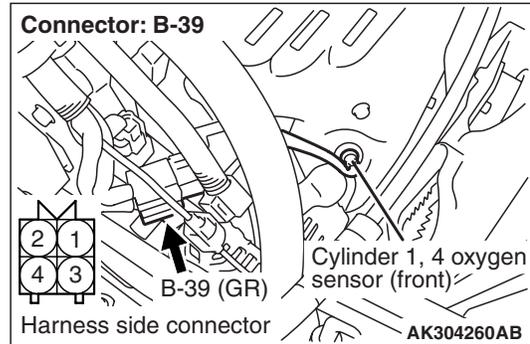
NO : Go to Step 6 .

STEP 6. Connector check: C-139 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.

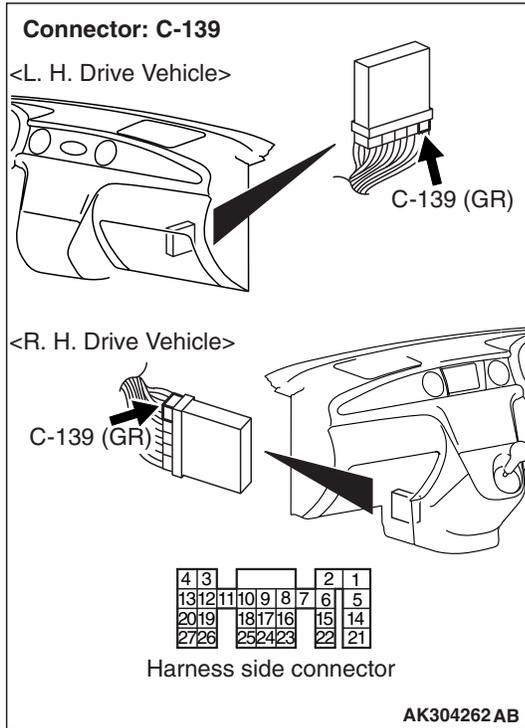
STEP 7. Check harness between B-39 (terminal No. 3) cylinder 1, 4 oxygen sensor (front) connector and C-139 (terminal No. 25) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open/short circuit.

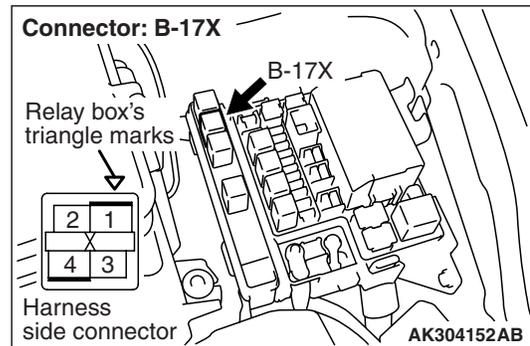
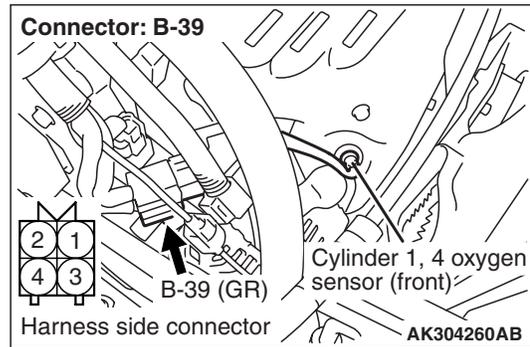
Q: Is the check result normal?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Repair.

STEP 8. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

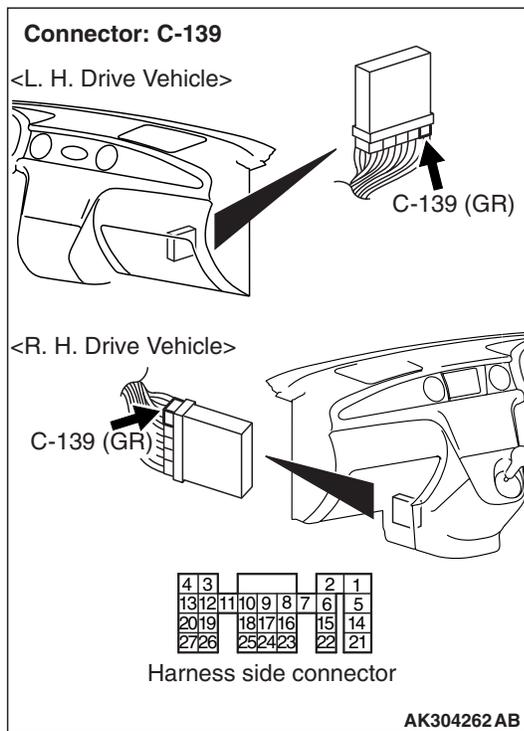
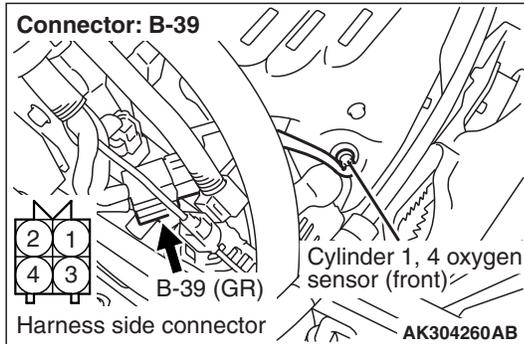
STEP 9. Check harness between B-39 (terminal No. 1) cylinder 1, 4 oxygen sensor (front) connector and B-17X (terminal No. 1) engine control relay connector.



- Check power supply line for damage.

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

STEP 10. Check harness between B-39 (terminal No. 3) cylinder 1, 4 oxygen sensor (front) connector and C-139 (terminal No. 25) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

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

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

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

Check Conditions

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

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

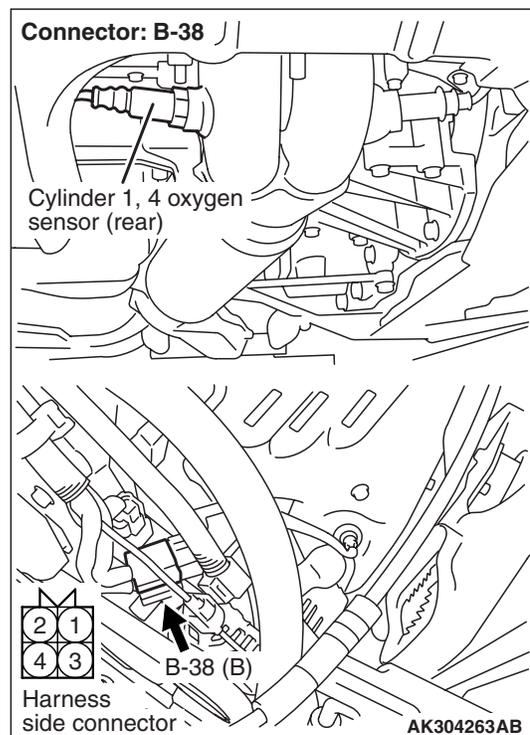
- Refer to Data List Reference Table P.13C-402.
 - a. Item 59: Cylinder 1, 4 oxygen sensor (rear)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-38 cylinder 1, 4 oxygen sensor (rear) connector

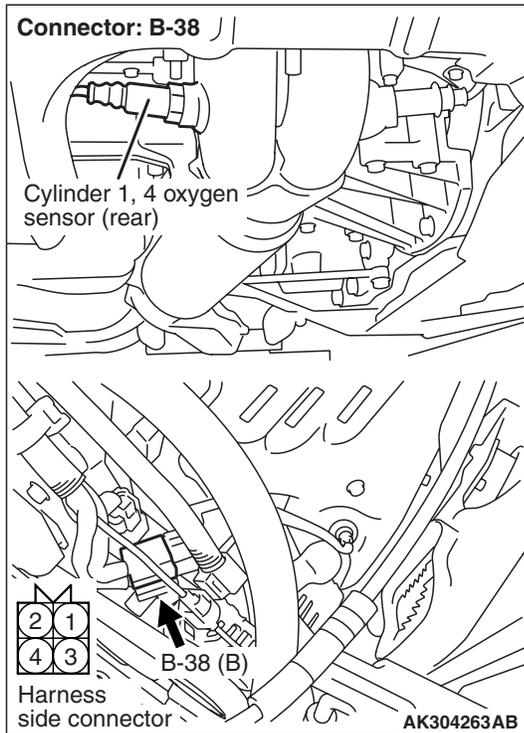


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

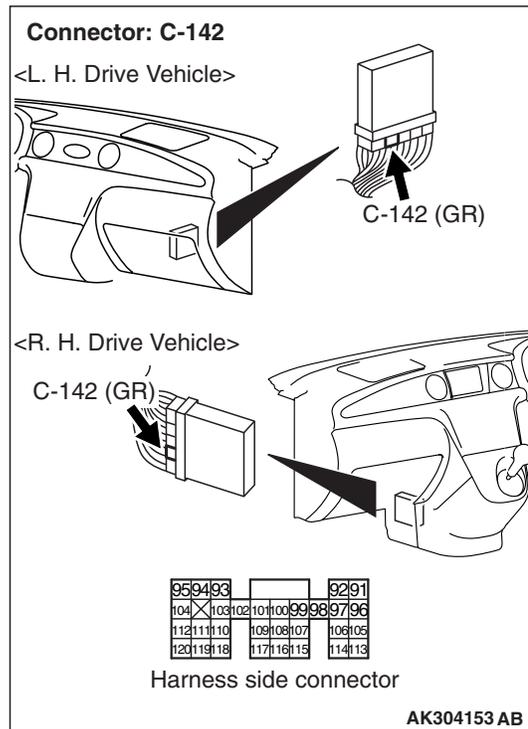
STEP 3. Perform resistance measurement at B-38 cylinder 1, 4 oxygen sensor (rear) connector.



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

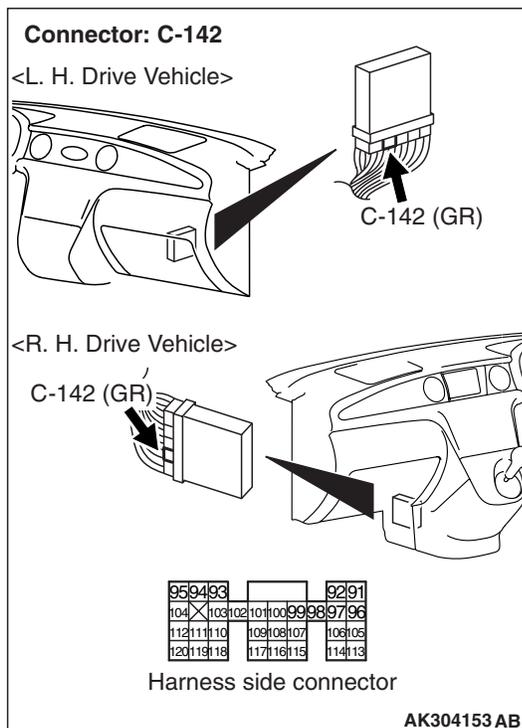
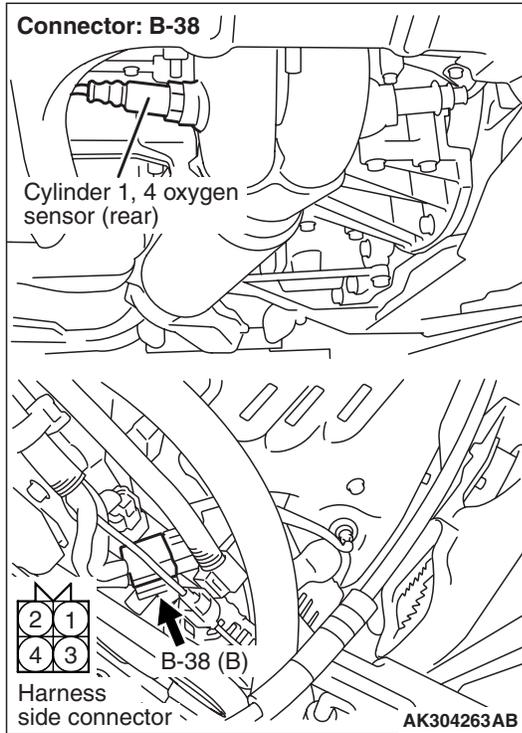
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

STEP 4. Connector check: C-142 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.

STEP 5. Check harness between B-38 (terminal No. 2) cylinder 1, 4 oxygen sensor (rear) connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

- Check earthing line for open circuit.

Q: Is the check result normal?

- YES :** Go to Step 6 .
- NO :** Repair.

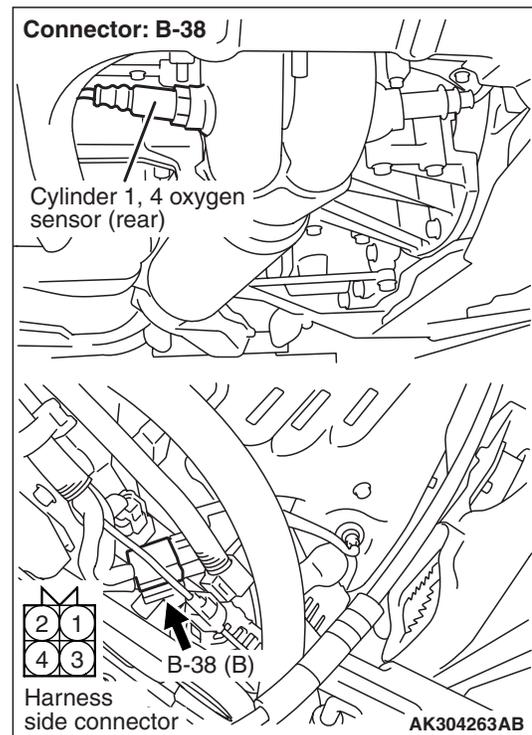
STEP 6. M.U.T.-II/III data list

- Refer to Data List Reference Table [P.13C-402](#).
 - a. Item 59: Cylinder 1, 4 oxygen sensor (rear)

Q: Is the check result normal?

- YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).
- NO :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Perform voltage measurement at B-38 cylinder 1, 4 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 Cylinder 1, 4 oxygen sensor (rear) itself.

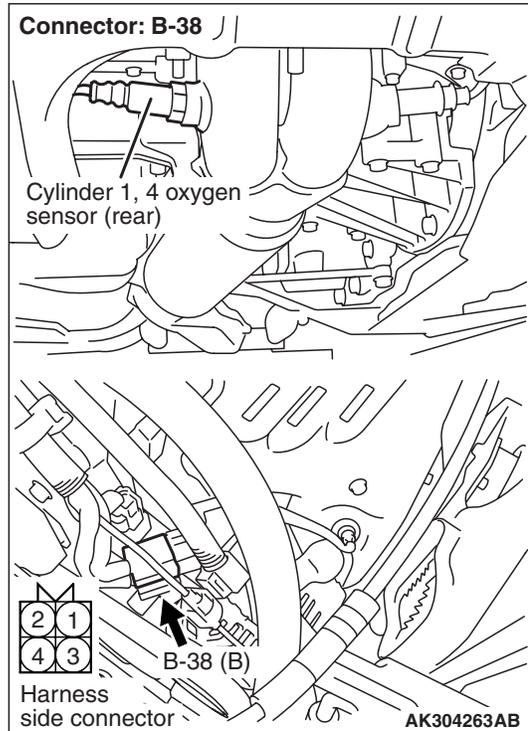
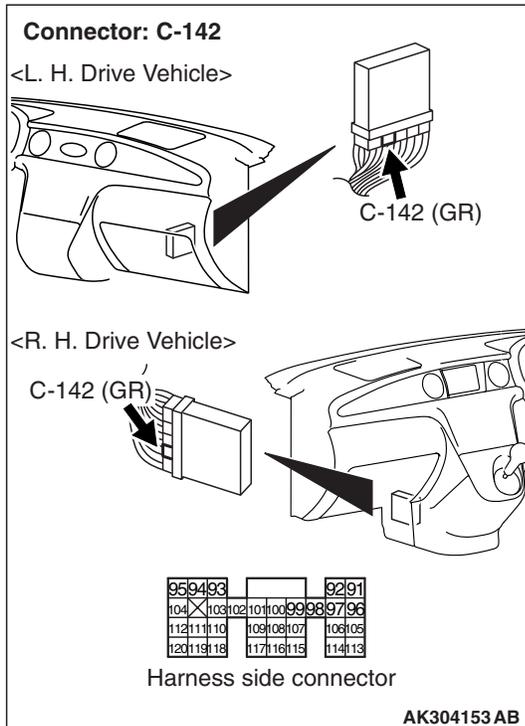
- Check cylinder 1, 4 oxygen sensor (rear) itself (Refer to P.13C-432).

Q: Is the check result normal?

YES : Go to Step 9 .

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

STEP 9. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



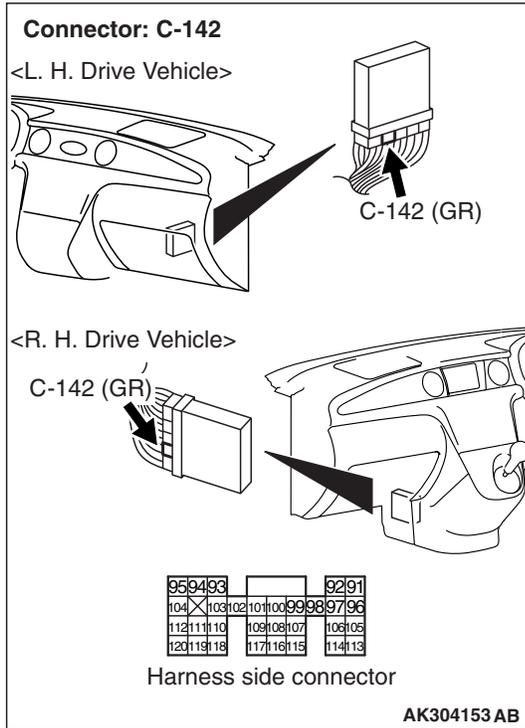
Q: Is the check result normal?

YES : Check and repair harness between B-38 (terminal No. 4) cylinder 1, 4 oxygen sensor (rear) connector and C-142 (terminal No. 117) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

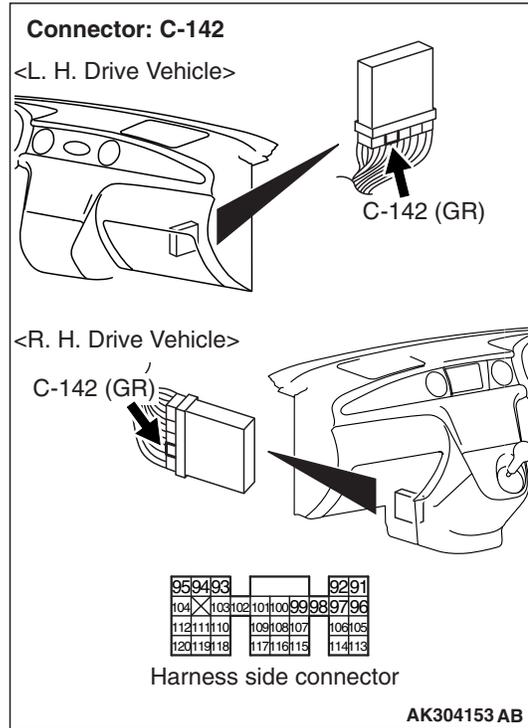
- Check output line for damage.

NO : Repair.

STEP 10. Perform voltage measurement at C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 11. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

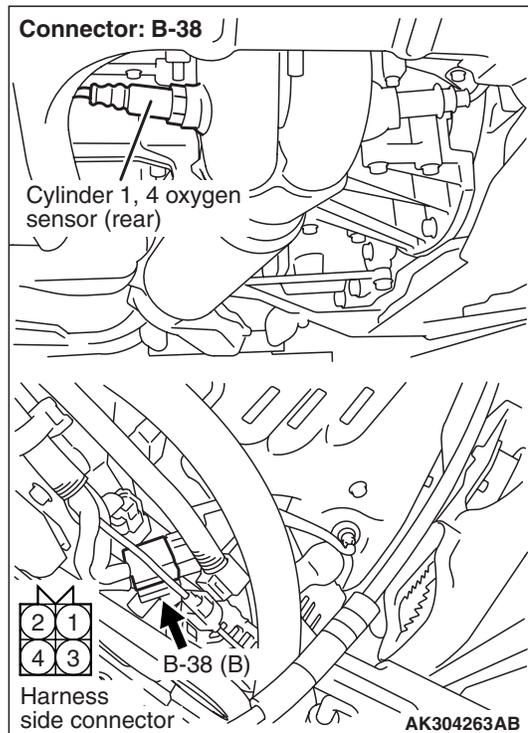
OK:

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

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .



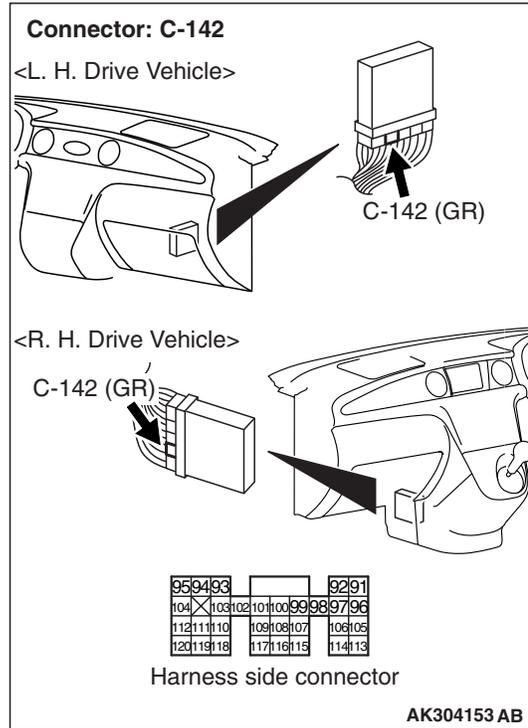
Q: Is the check result normal?

YES : Check and repair harness between B-38 (terminal No. 4) cylinder 1, 4 oxygen sensor (rear) connector and C-142 (terminal No. 117) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

STEP 12. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



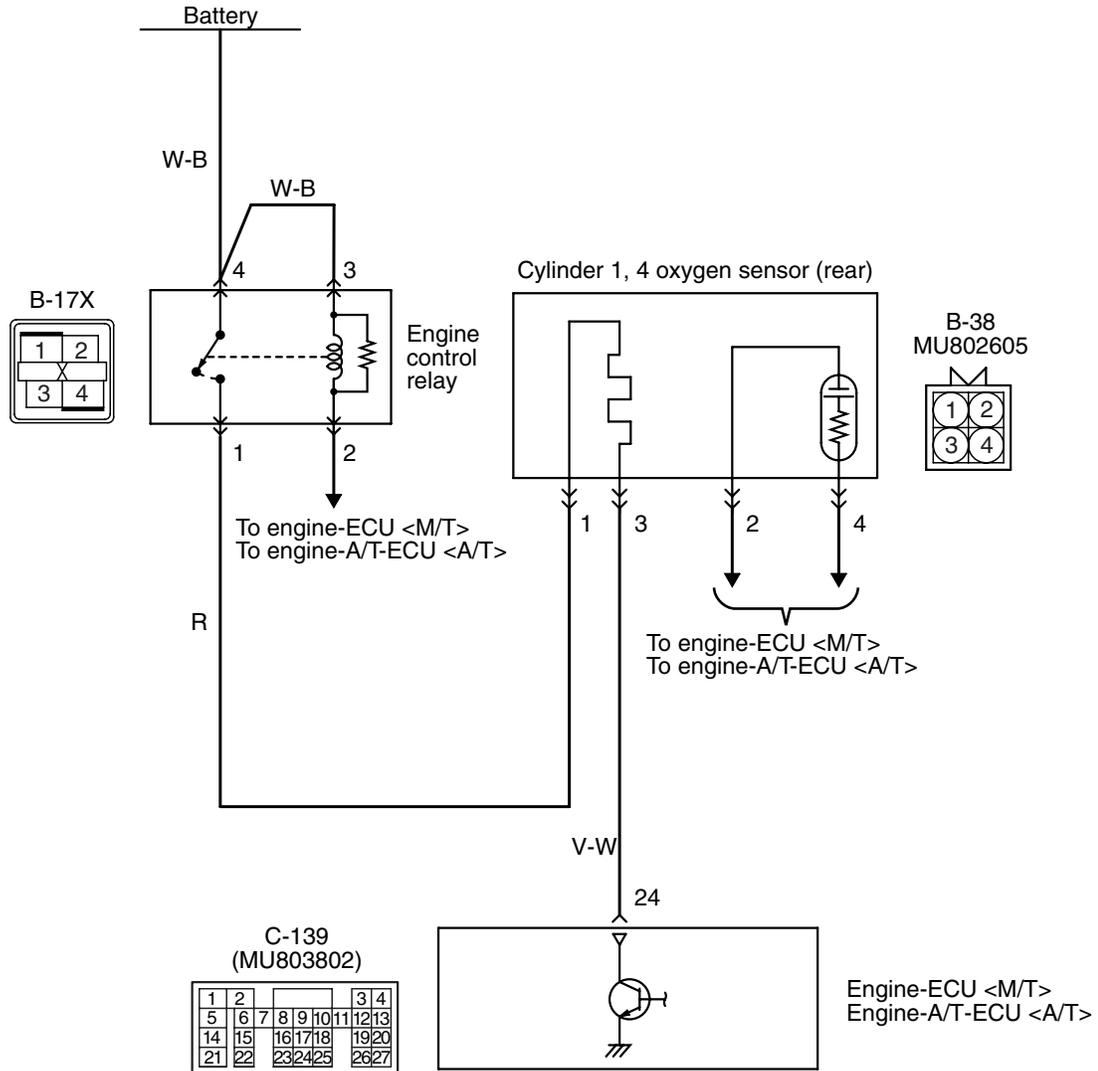
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

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

Cylinder 1,4 oxygen sensor (rear) heater circuit



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

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OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

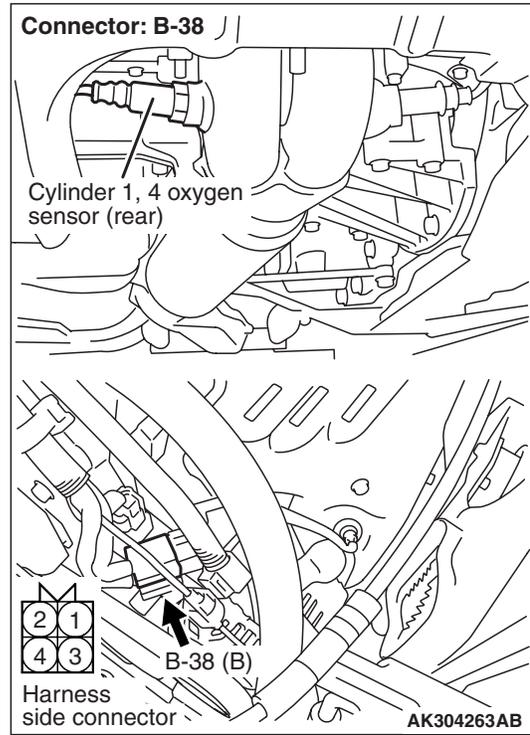
- Cylinder 1, 4 oxygen sensor (rear) heater currents have continued to be 0.16 A or lower, or 5.0 A or higher for 4 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-38 cylinder 1, 4 oxygen sensor (rear) connector

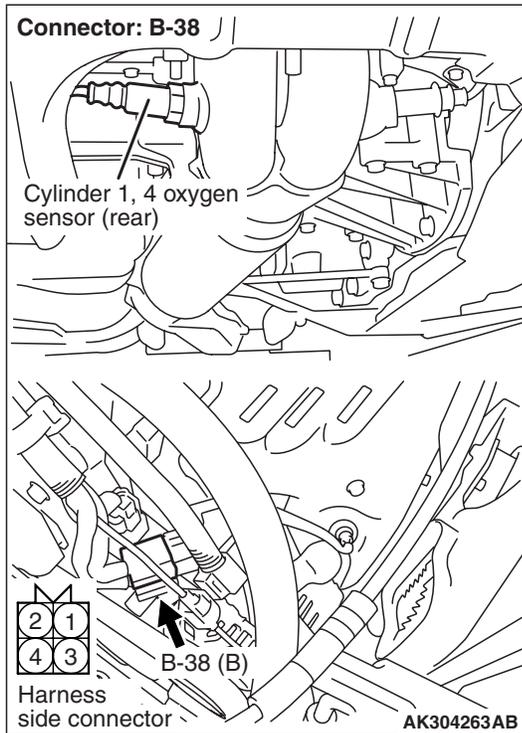


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

STEP 2. Perform resistance measurement at B-38 cylinder 1, 4 oxygen sensor (rear) connector.



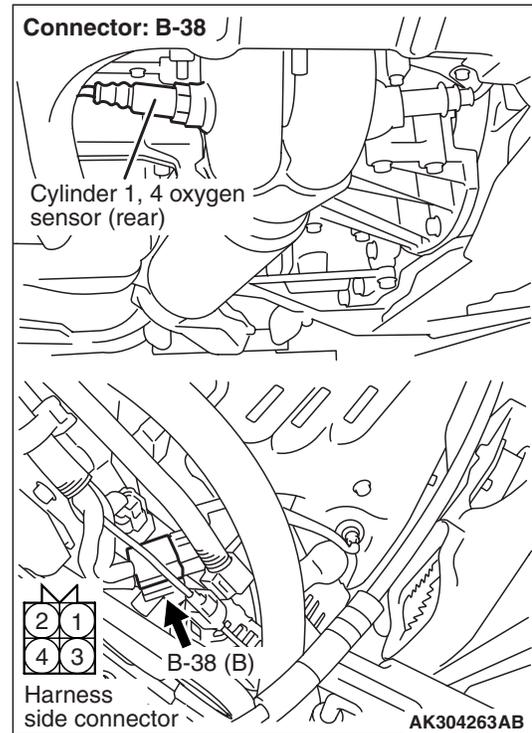
- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 3.
OK: 11 – 18 Ω

Q: Is the check result normal?

YES : Go to Step 3 .

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

STEP 3. Perform voltage measurement at B-38 cylinder 1, 4 oxygen sensor (rear) connector.



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

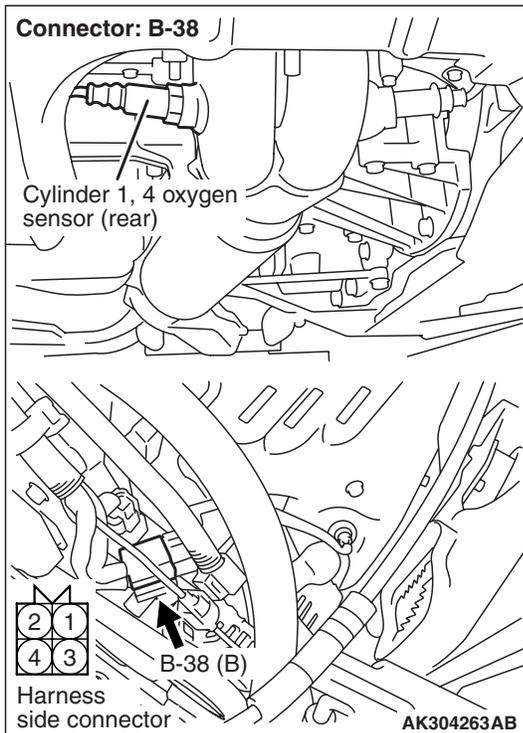
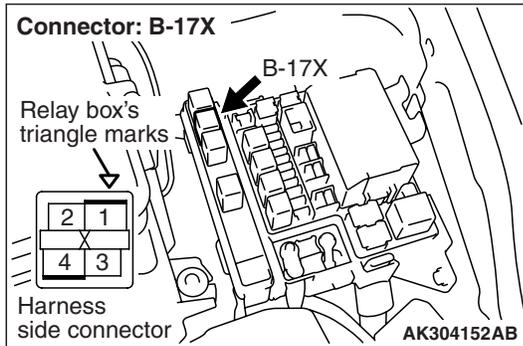
OK: System voltage

Q: Is the check result normal?

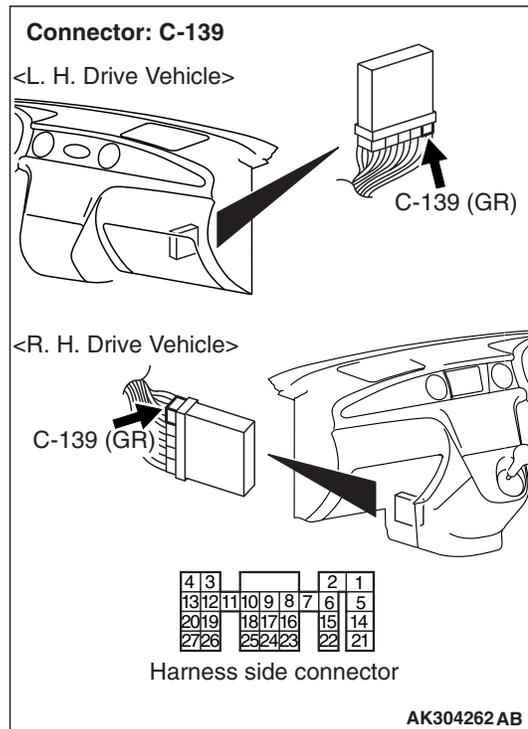
YES : Go to Step 5 .

NO : Go to Step 4 .

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



STEP 5. Perform voltage measurement at C-139 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. 24 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 6 .

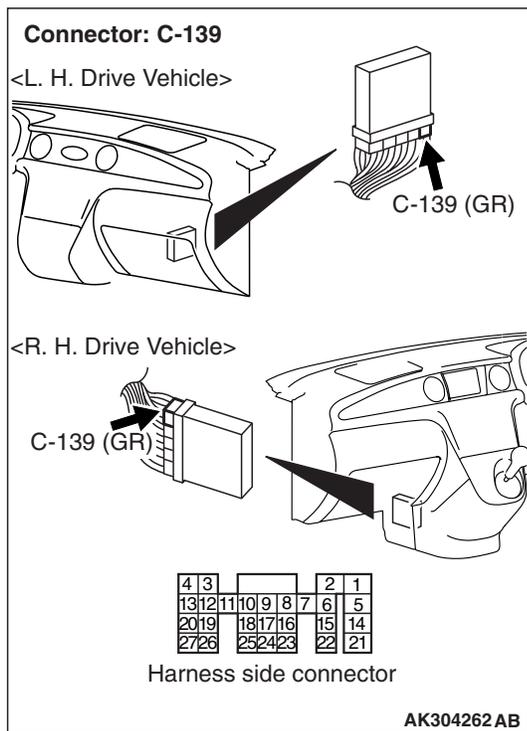
Q: Is the check result normal?

YES : Check and repair harness between B-38 (terminal No. 1) cylinder 1, 4 oxygen sensor (rear) connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

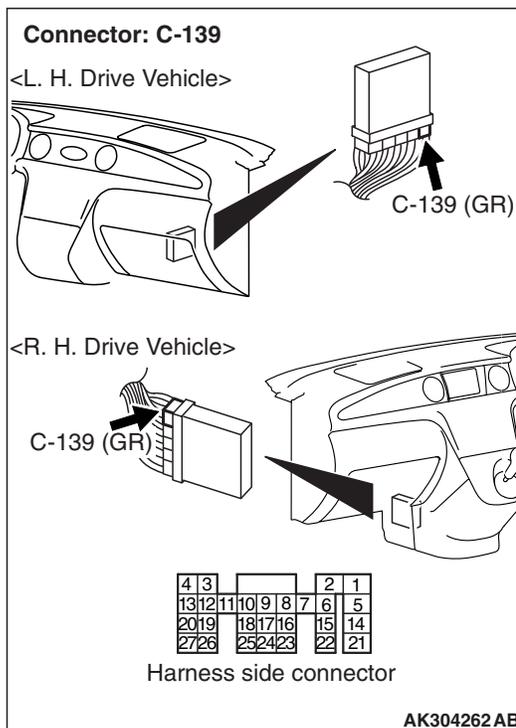
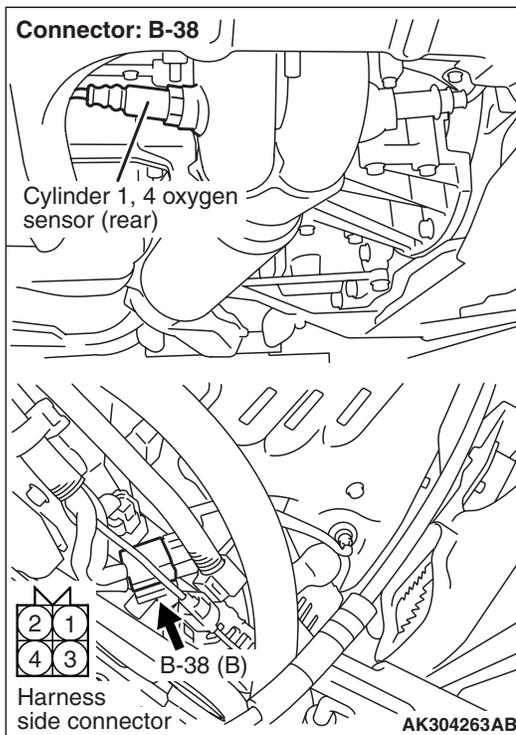
NO : Repair.

STEP 6. Connector check: C-139 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.

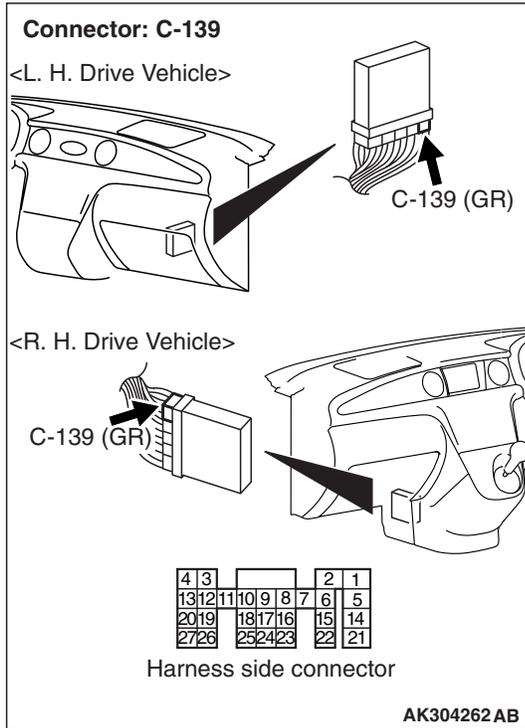
STEP 7. Check harness between B-38 (terminal No. 3) cylinder 1, 4 oxygen sensor (rear) connector and C-139 (terminal No. 24) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open/short circuit.

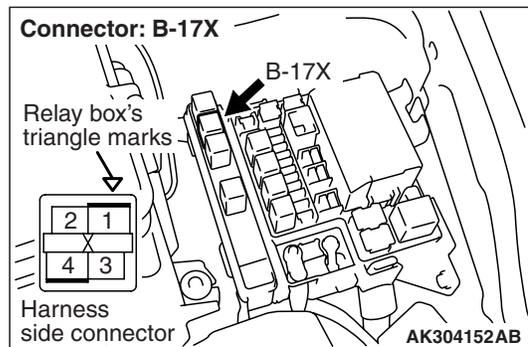
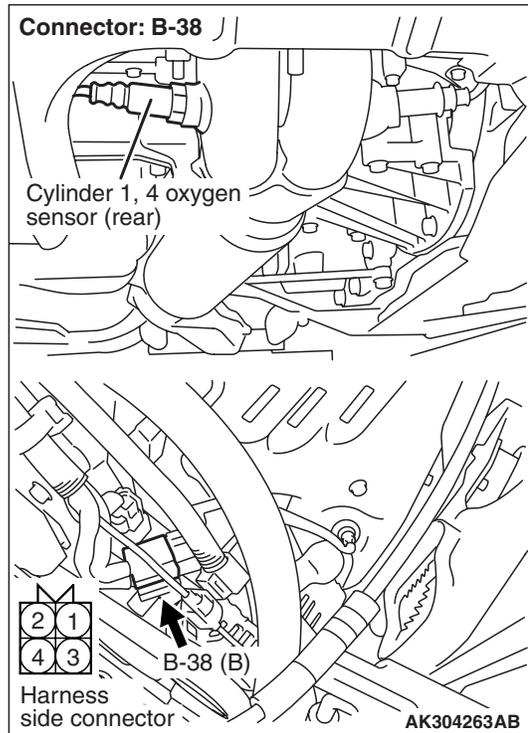
Q: Is the check result normal?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Repair.

STEP 8. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

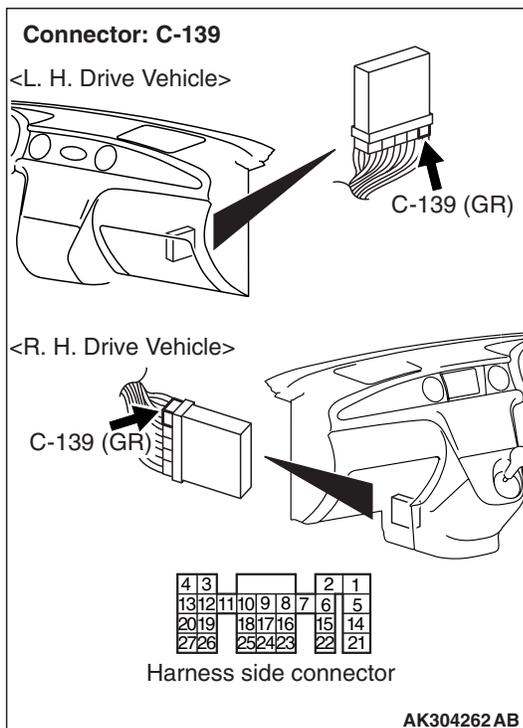
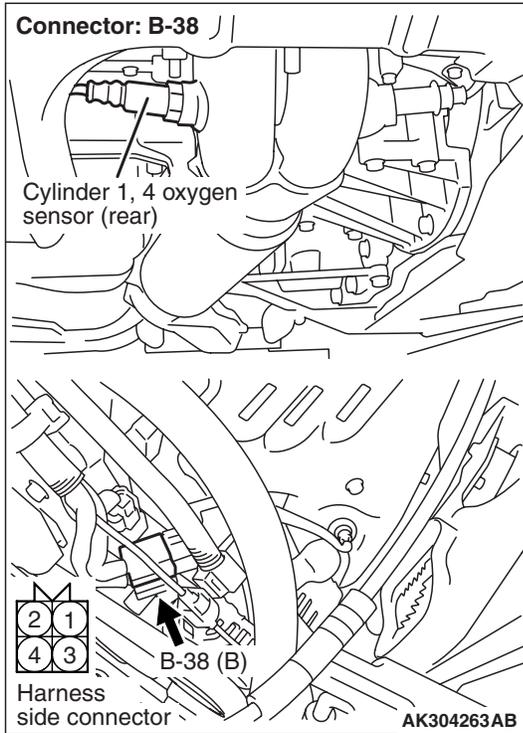
STEP 9. Check harness between B-38 (terminal No. 1) cylinder 1, 4 oxygen sensor (rear) connector and B-17X (terminal No. 1) engine control relay connector.



- Check power supply line for damage.

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

STEP 10. Check harness between B-38 (terminal No. 3) cylinder 1, 4 oxygen sensor (rear) connector and C-139 (terminal No. 24) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

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

- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

Judgment Criteria

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

Check Conditions

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

Judgment Criteria

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

PROBABLE CAUSE

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

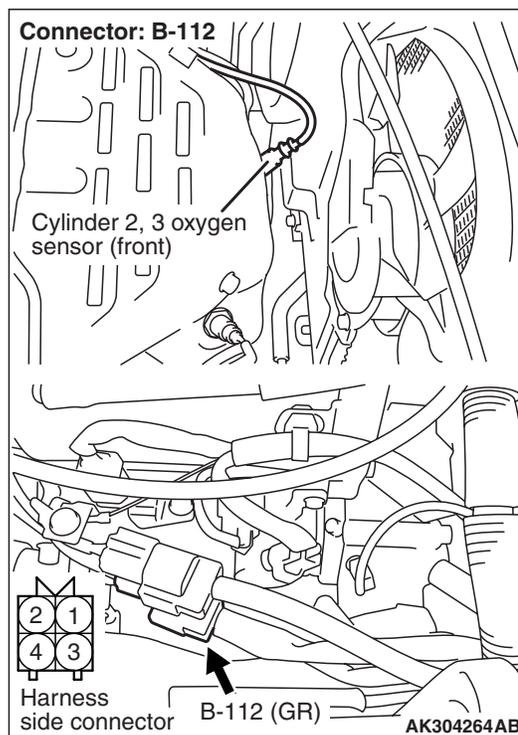
DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-II/III data list**

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 39: Cylinder 2, 3 oxygen sensor (front)

Q: Is the check result normal?

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

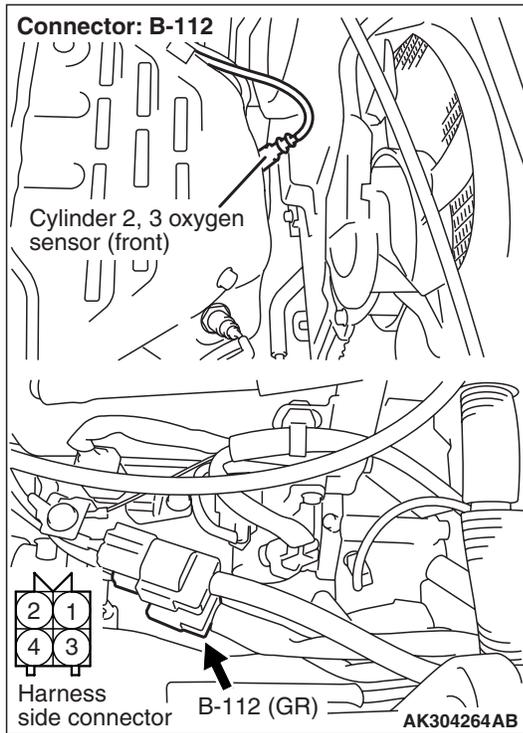
NO : Go to Step 2 .

STEP 2. Connector check: B-112 cylinder 2, 3 oxygen sensor (front) connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair.

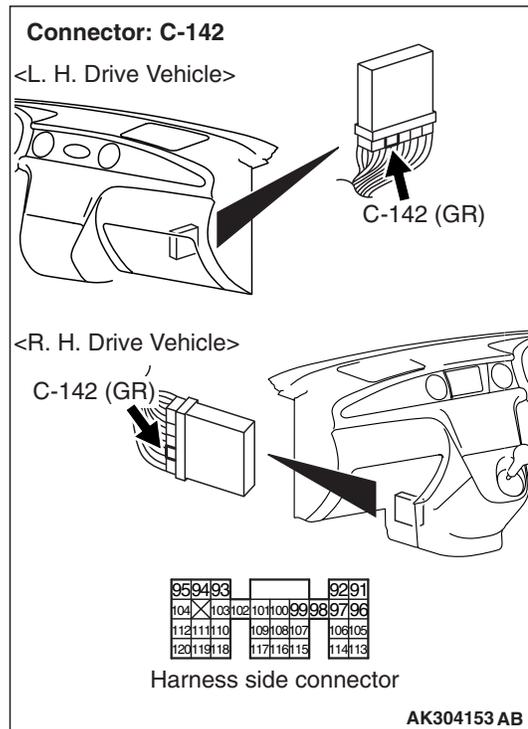
STEP 3. Perform resistance measurement at B-112 cylinder 2, 3 oxygen sensor (front) connector.



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

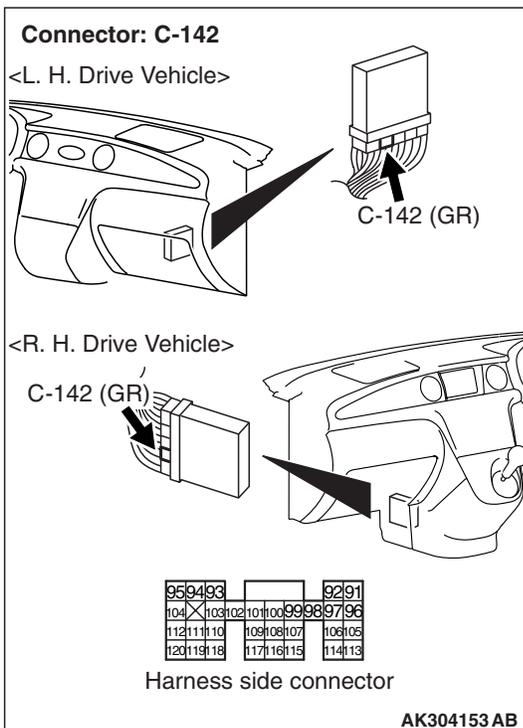
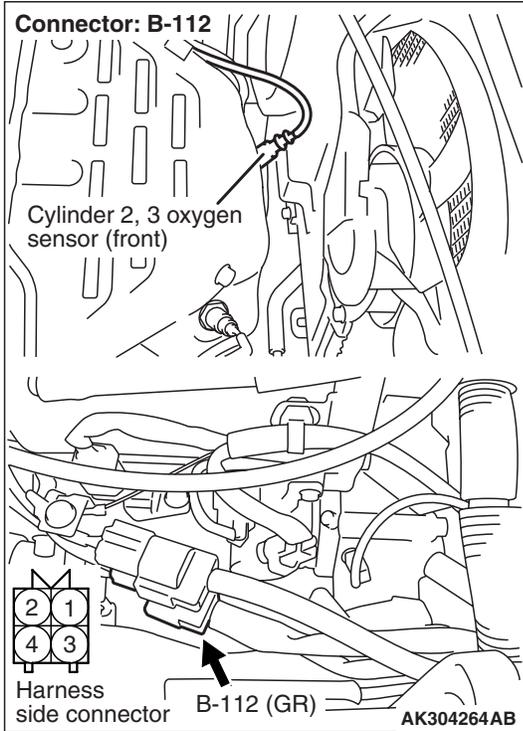
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

STEP 4. Connector check: C-142 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.

STEP 5. Check harness between B-112 (terminal No. 2) cylinder 2, 3 oxygen sensor (front) connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

- Check earthing line for open circuit and damage.

Q: Is the check result normal?

- YES :** Go to Step 6 .
- NO :** Repair.

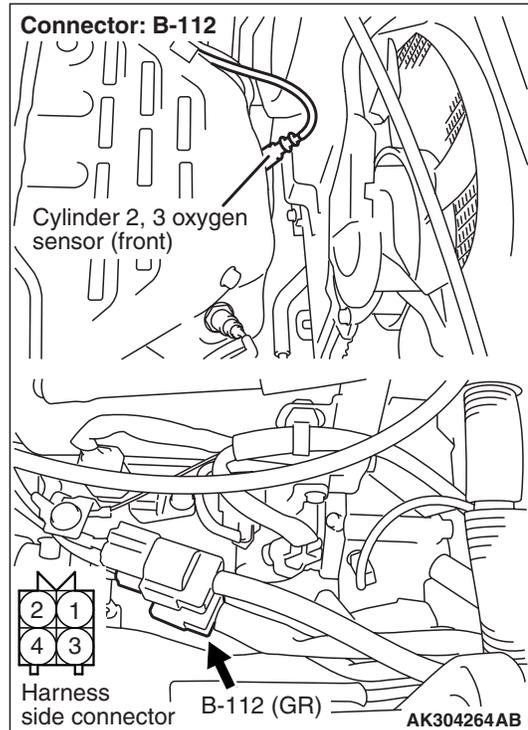
STEP 6. M.U.T.-II/III data list

- Refer to Data List Reference Table P.13C-402.
 - a. Item 11: Cylinder 2, 3 oxygen sensor (front)

Q: Is the check result normal?

- YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).
- NO :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Perform voltage measurement at B-112 cylinder 2, 3 oxygen sensor (front) connector.



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

OK:

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

Q: Is the check result normal?

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

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

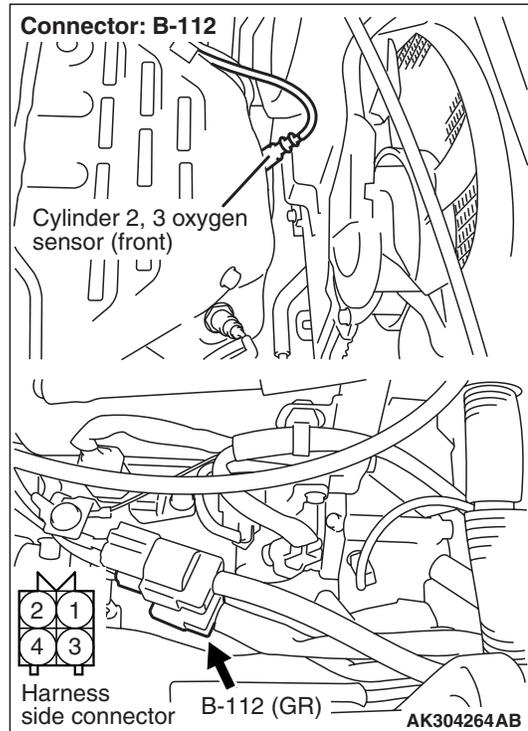
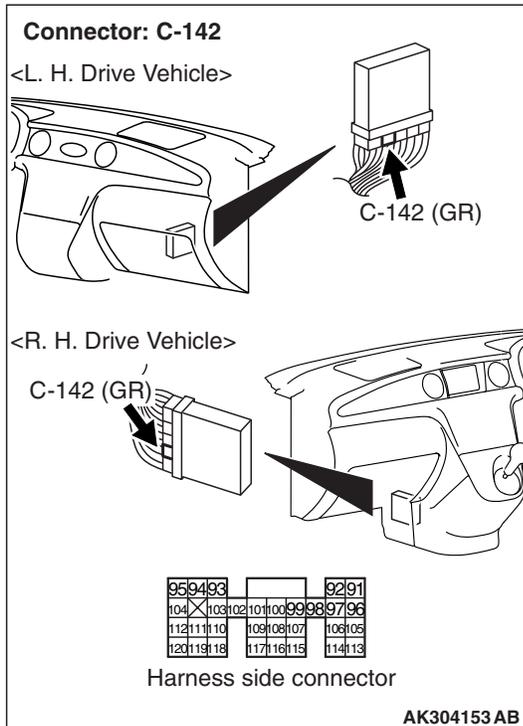
- Check cylinder 2, 3 oxygen sensor (front) itself (Refer to P.13C-432).

Q: Is the check result normal?

YES : Go to Step 9 .

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

STEP 9. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



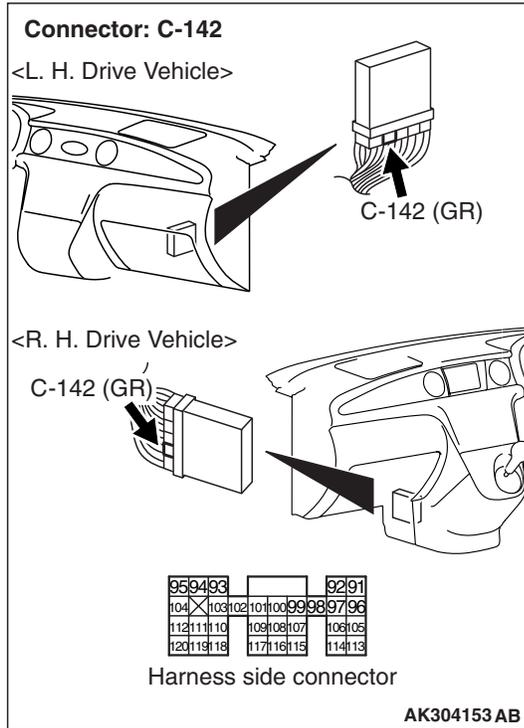
Q: Is the check result normal?

YES : Check and repair harness between B-112 (terminal No. 4) cylinder 2, 3 oxygen sensor (front) connector and C-142 (terminal No. 108) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

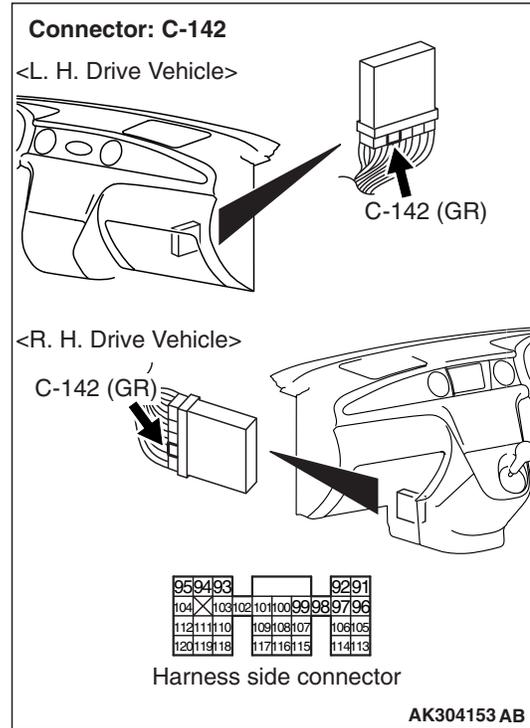
- Check output line for damage.

NO : Repair.

STEP 10. Perform voltage measurement at C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 11. Connector check: C-142 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.

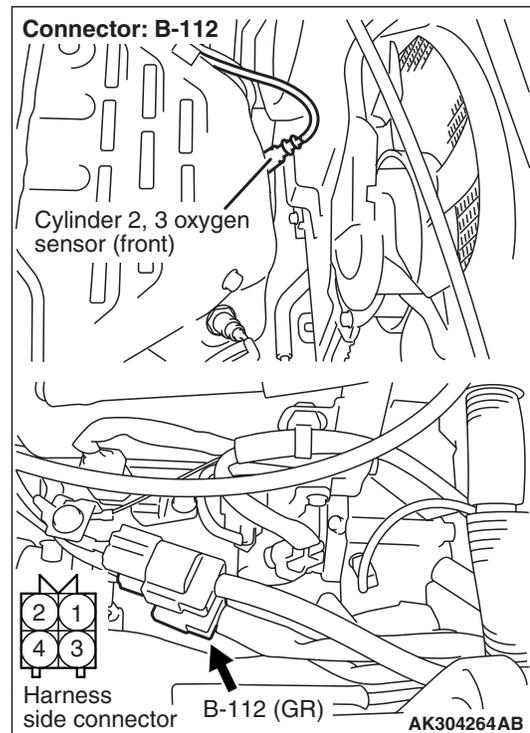
OK:

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 .



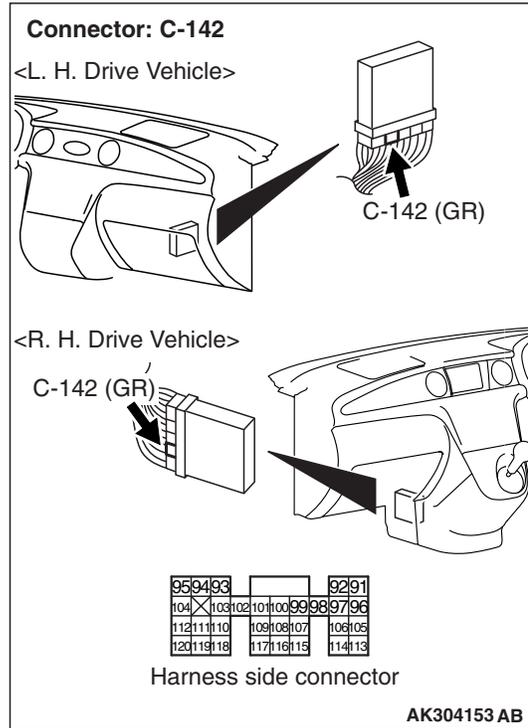
Q: Is the check result normal?

YES : Check and repair harness between B-112 (terminal No. 4) cylinder 2, 3 oxygen sensor (front) connector and C-142 (terminal No. 108) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

STEP 12. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



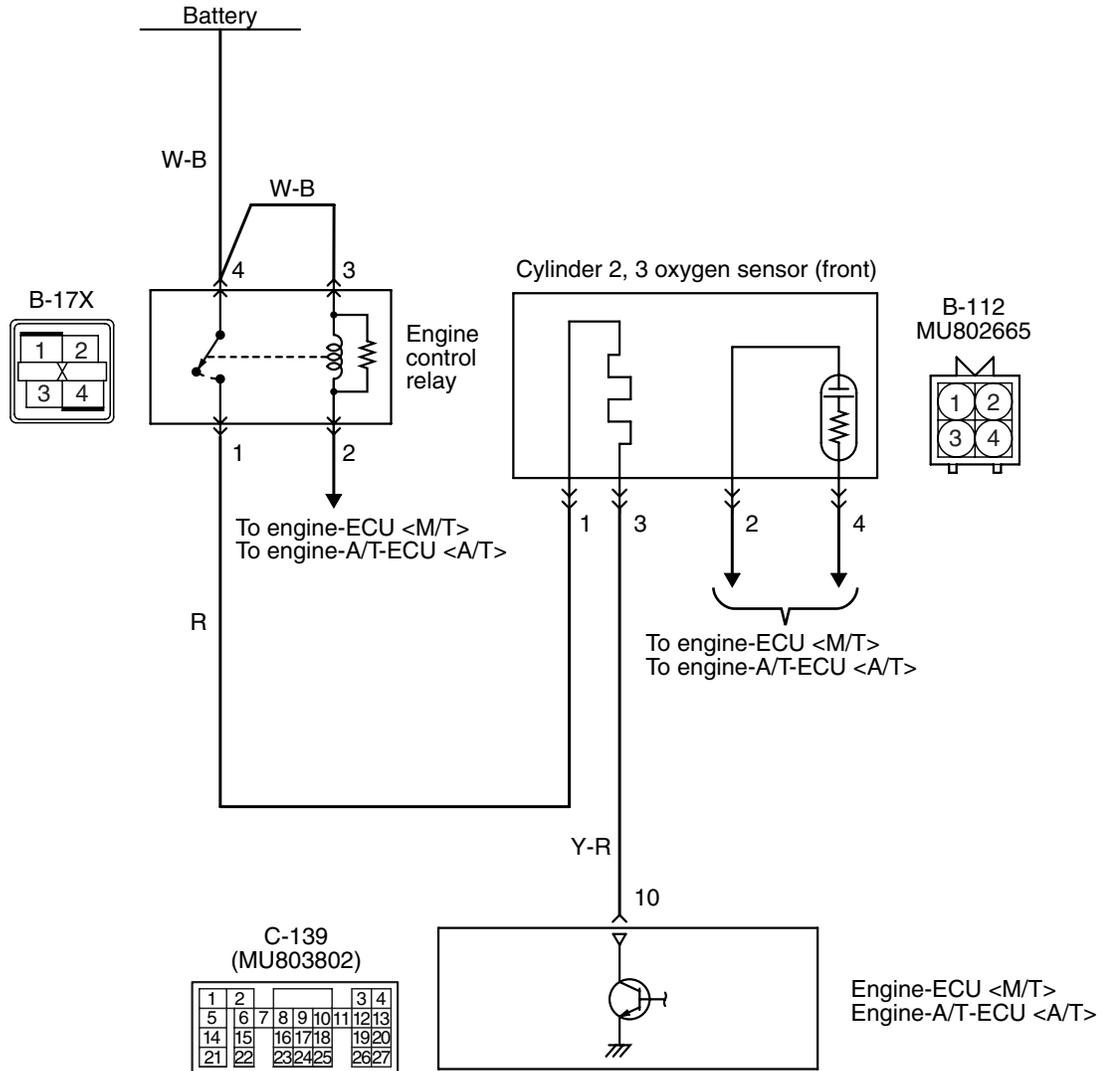
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

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

Cylinder 2, 3 oxygen sensor (front) heater circuit



Wire colour code

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

AK401174AB

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

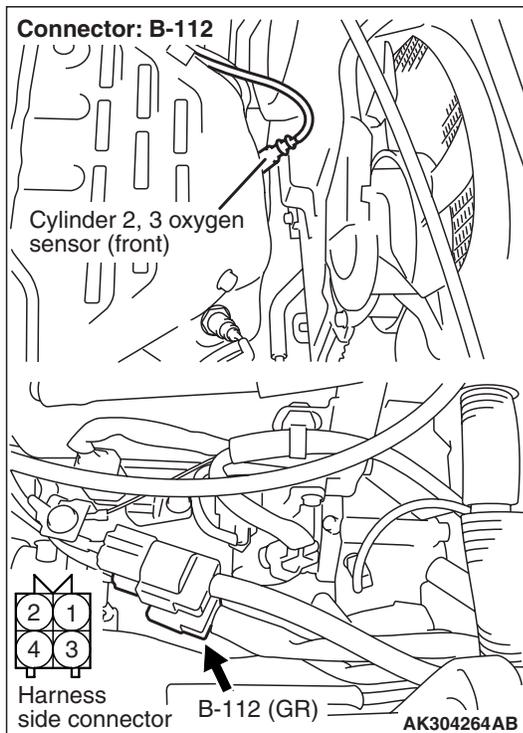
- Cylinder 2, 3 oxygen sensor (front) heater currents has continued to be 0.16 A or lower, or 7.5 A or higher for 4 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-112 cylinder 2, 3 oxygen sensor (front) connector

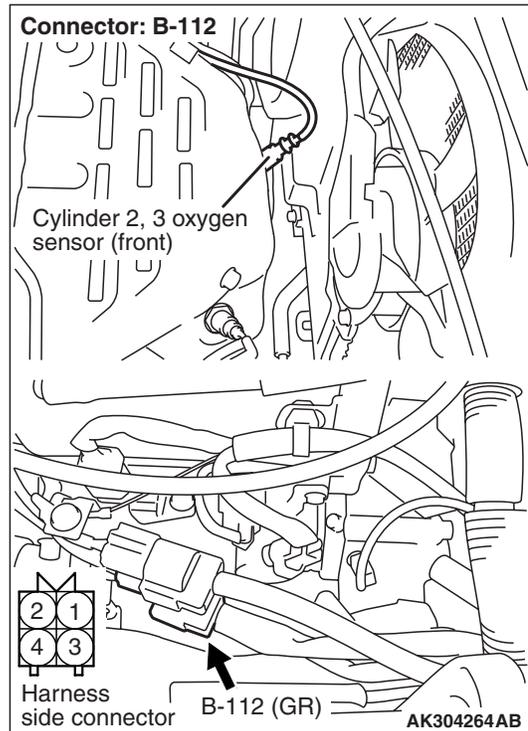


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

STEP 2. Perform resistance measurement at B-112 cylinder 2, 3 oxygen sensor (front) connector.



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

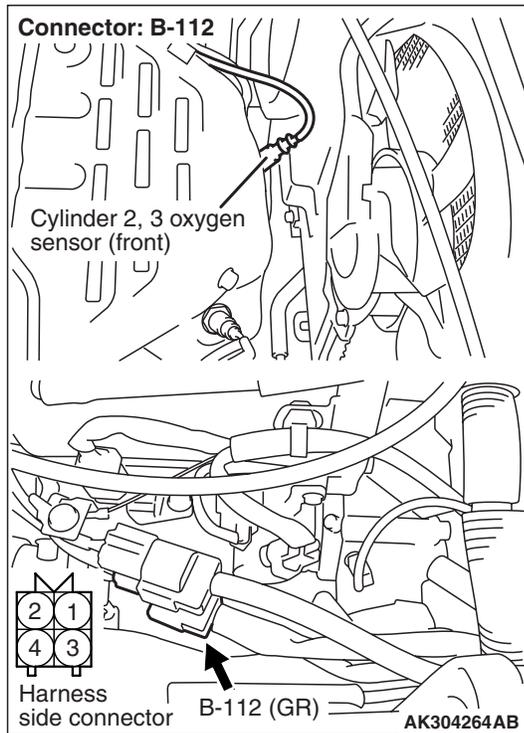
OK: 4.5 – 8.0 Ω

Q: Is the check result normal?

YES : Go to Step 3 .

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

STEP 3. Perform voltage measurement at B-112 cylinder 2, 3 oxygen sensor (front) connector.



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

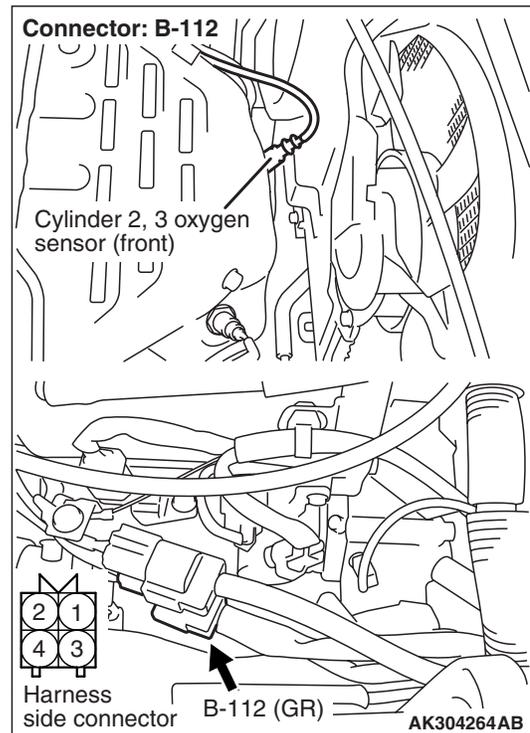
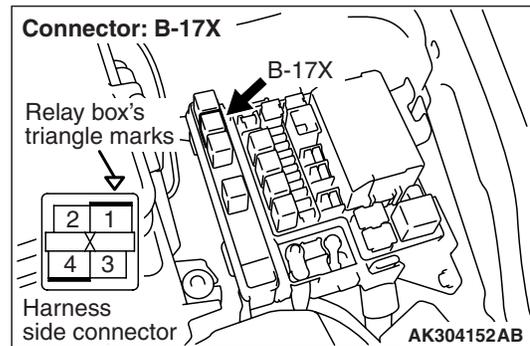
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

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



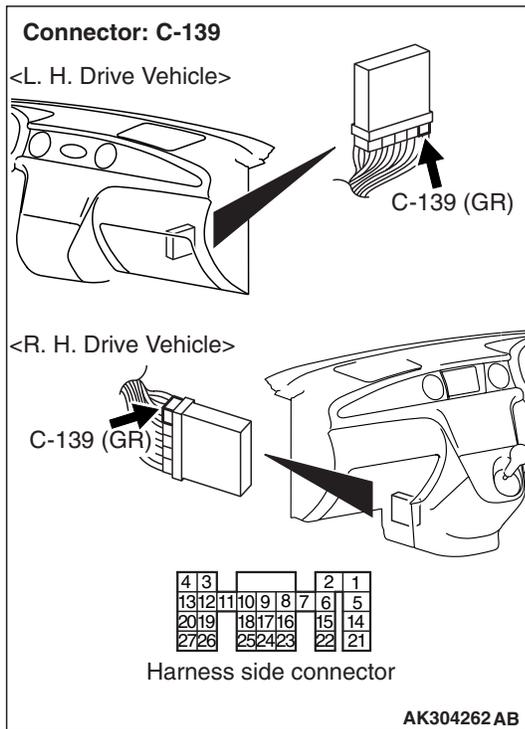
Q: Is the check result normal?

YES : Check and repair harness between B-112 (terminal No. 1) cylinder 2, 3 oxygen sensor (front) connector and B-17X (terminal No. 1) engine control relay connector.

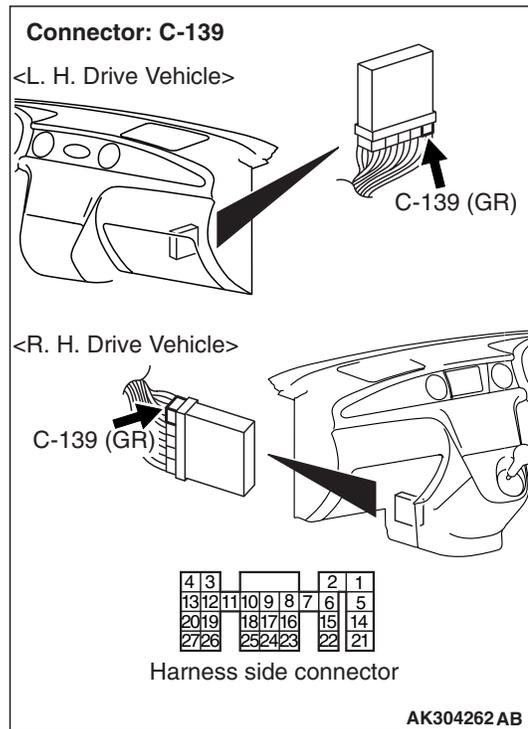
- Check power supply line for open/short circuit.

NO : Repair.

STEP 5. Perform voltage measurement at C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 6. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

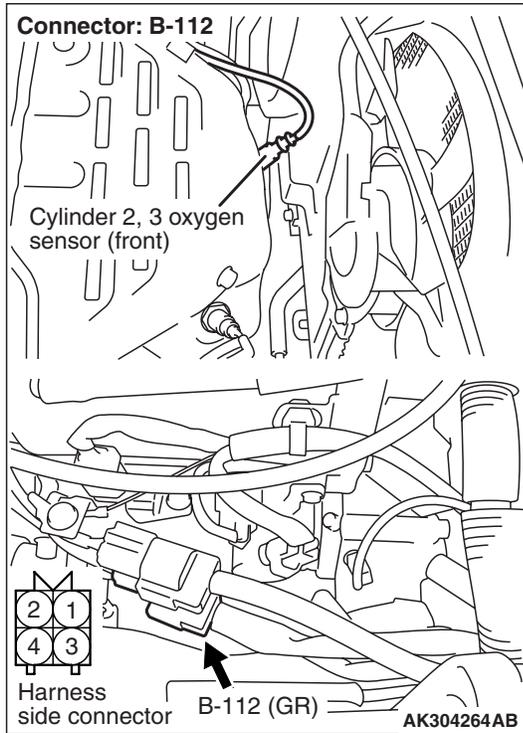
NO : Go to Step 6 .

Q: Is the check result normal?

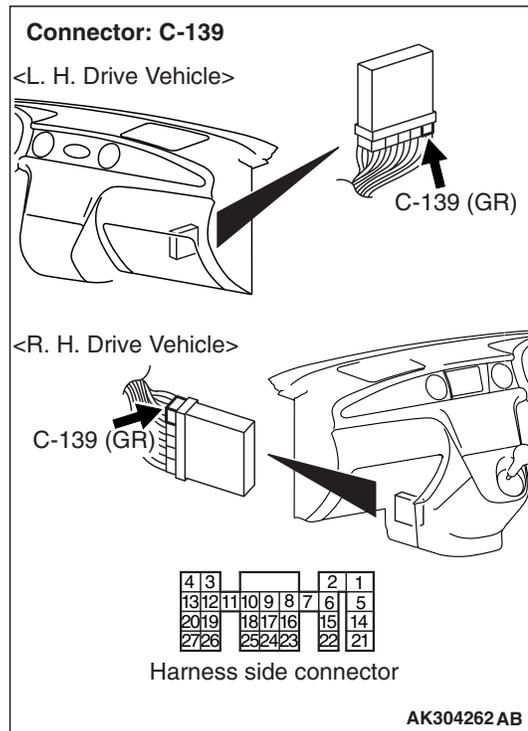
YES : Go to Step 7 .

NO : Repair.

STEP 7. Check harness between B-112 (terminal No. 3) cylinder 2, 3 oxygen sensor (front) connector and C-139 (terminal No. 10) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



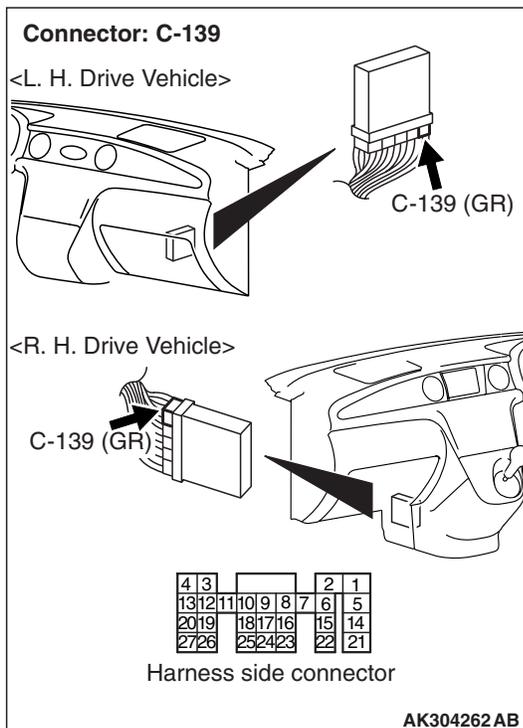
STEP 8. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.



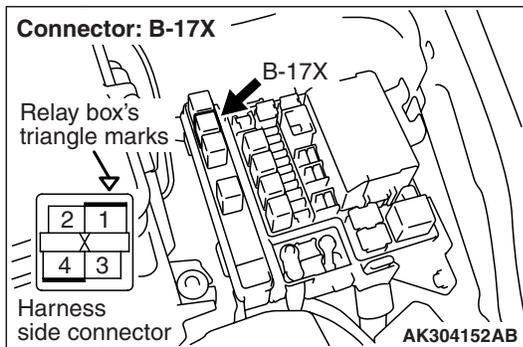
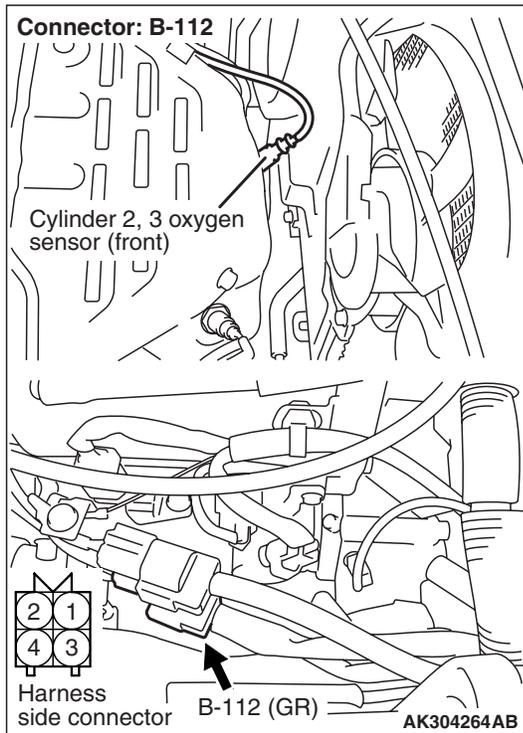
- Check earthing line for open/short circuit.

Q: Is the check result normal?

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

NO : Repair.

STEP 9. Check harness between B-112 (terminal No. 1) cylinder 2, 3 oxygen sensor (front) connector and B-17X (terminal No. 1) engine control relay connector.

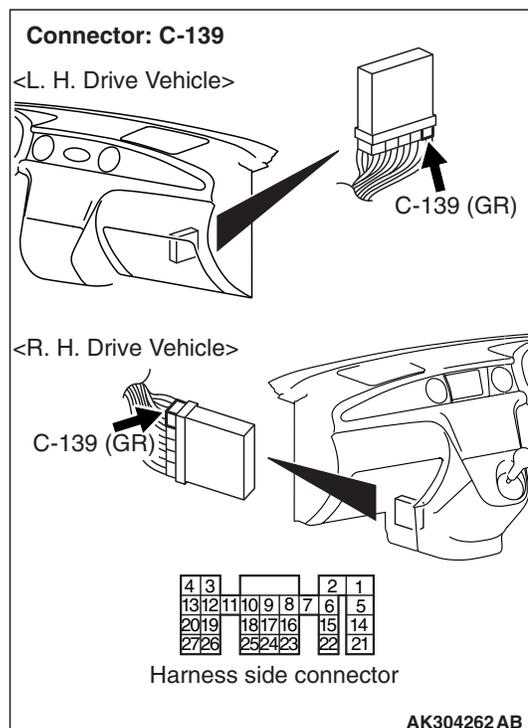
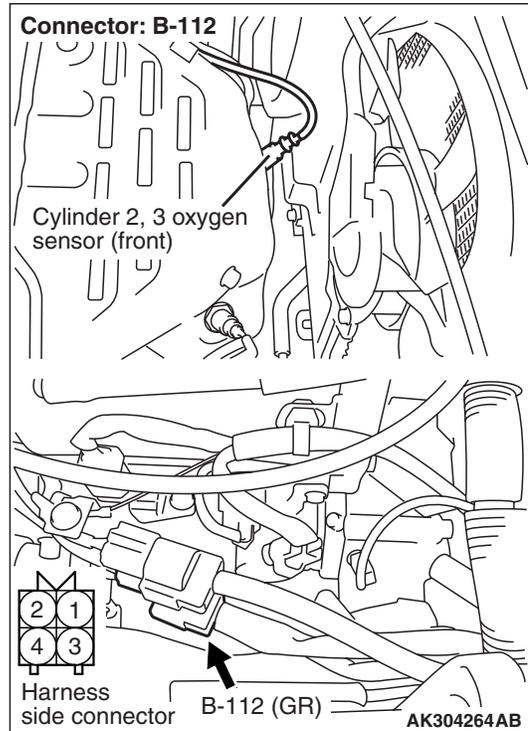


- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Repair.

STEP 10. Check harness between B-112 (terminal No. 3) cylinder 2, 3 oxygen sensor (front) connector and C-139 (terminal No. 10) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .
NO : Repair.

STEP 11. Check the trouble symptoms.

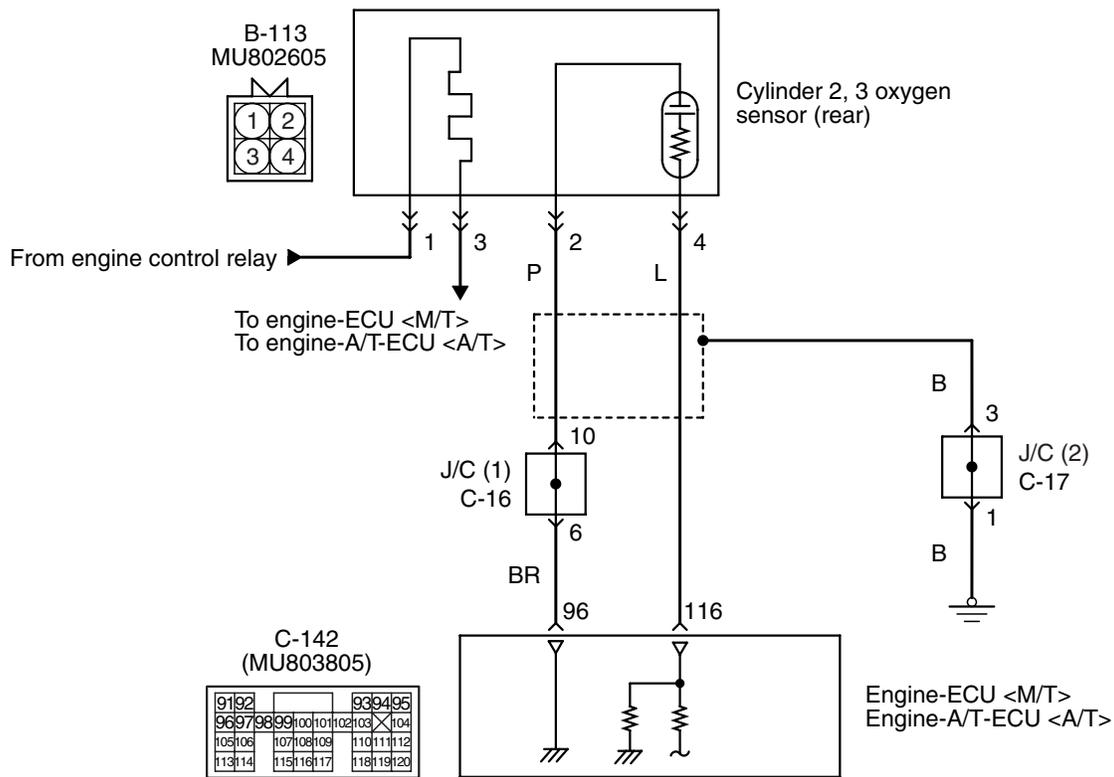
Q: Does trouble symptom persist?

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

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

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

Cylinder 2, 3 oxygen sensor (rear) circuit



Wire colour code

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

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

FUNCTION

- The cylinder 2, 3 oxygen sensor (rear) converts the concentration of oxygen in the exhaust emission into a voltage and inputs the signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- When the air-fuel ratio is richer than the theoretical air-fuel ratio, the cylinder 2, 3 oxygen sensor (rear) outputs a voltage of about 1 V. When it is leaner than the theoretical air-fuel ratio, it outputs a voltage of about 0 V.
- Based on this signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> corrects the deviation in the signal that is output by the cylinder 2, 3 oxygen sensor (front).

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

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

Check Conditions

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

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

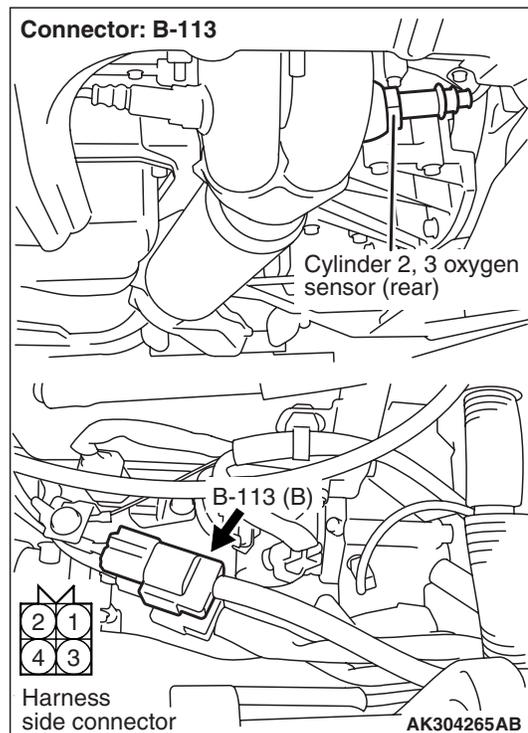
- Refer to Data List Reference Table [P.13C-402](#).
 - Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-113 cylinder 2, 3 oxygen sensor (rear) connector

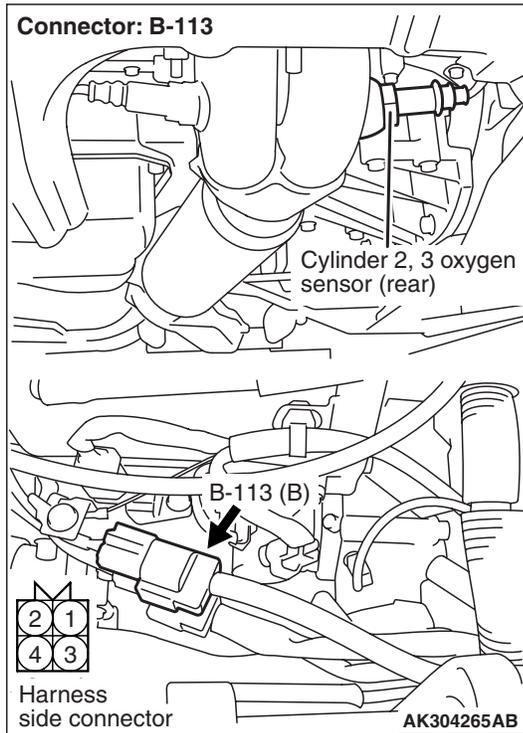


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

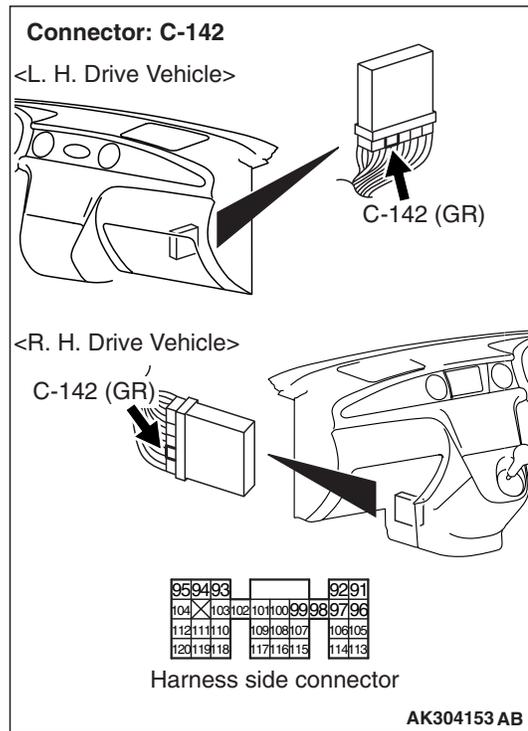
STEP 3. Perform resistance measurement at B-113 cylinder 2, 3 oxygen sensor (rear) connector.



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

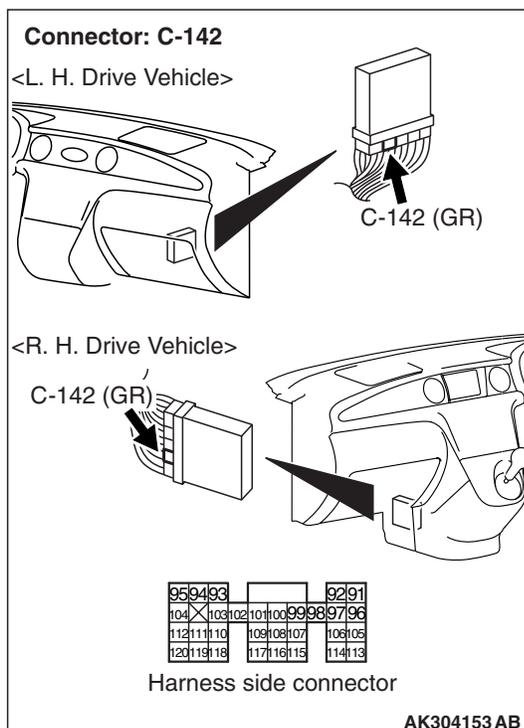
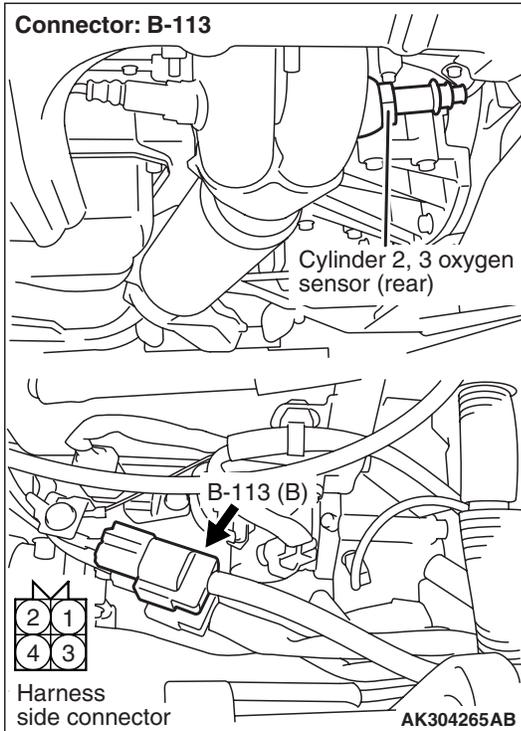
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Go to Step 4 .

STEP 4. Connector check: C-142 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.

STEP 5. Check harness between B-113 (terminal No. 2) cylinder 2, 3 oxygen sensor (rear) connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

- Check earthing line for open circuit and damage.

Q: Is the check result normal?

- YES :** Go to Step 6 .
NO : Repair.

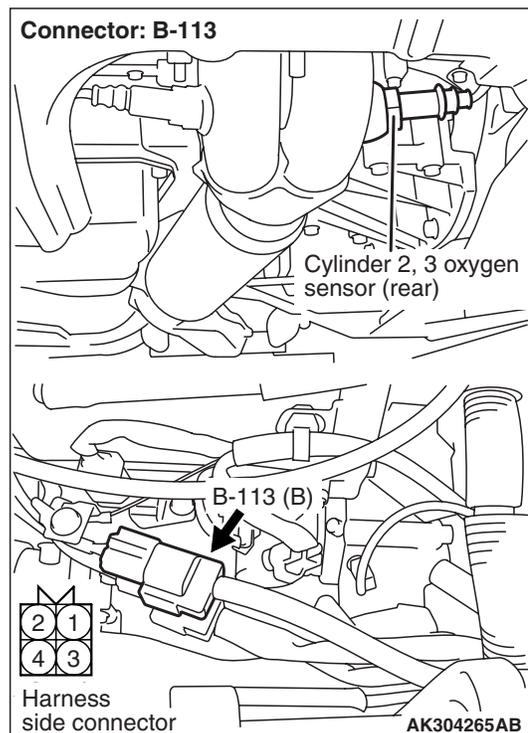
STEP 6. M.U.T.-II/III data list

- Refer to Data List Reference Table P.13C-402.
 - a. Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Is the check result normal?

- YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 7. Perform voltage measurement at B-113 cylinder 2, 3 oxygen sensor (rear) connector.



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

OK:

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

Q: Is the check result normal?

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

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

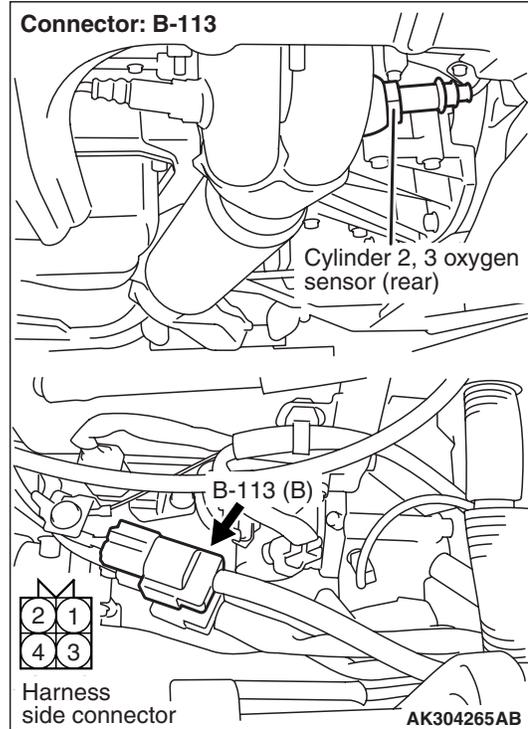
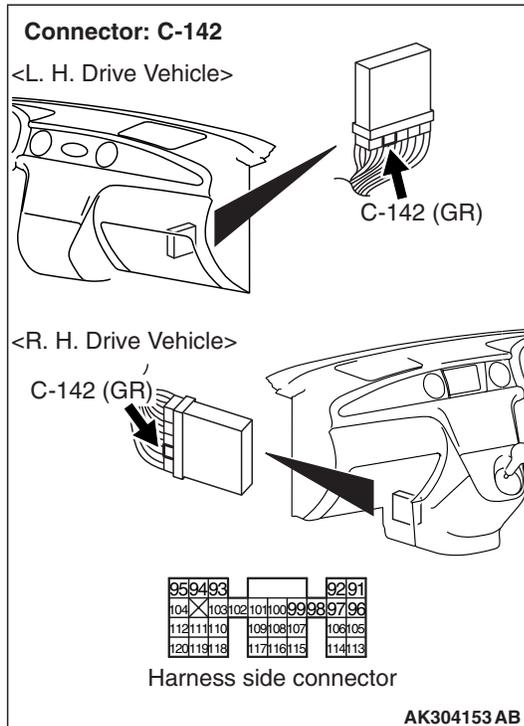
- Check cylinder 2, 3 oxygen sensor (rear) itself (Refer to P.13C-432).

Q: Is the check result normal?

YES : Go to Step 9 .

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

STEP 9. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



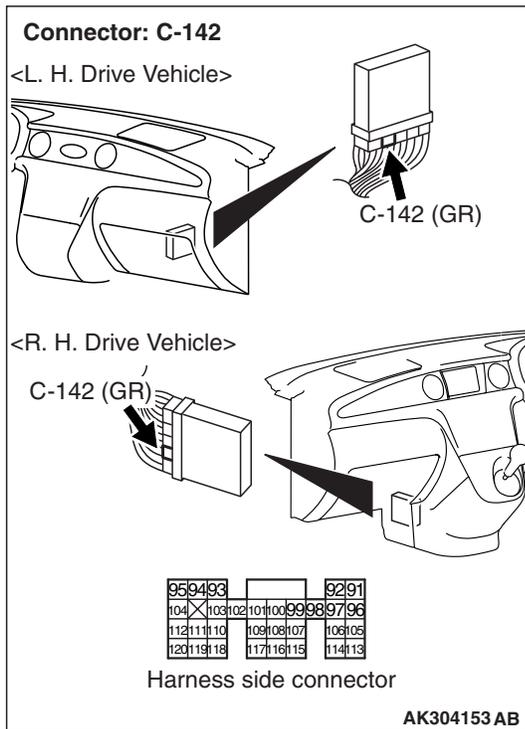
Q: Is the check result normal?

YES : Check and repair harness between B-113 (terminal No. 4) cylinder 2, 3 oxygen sensor (rear) connector and C-142 (terminal No. 116) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

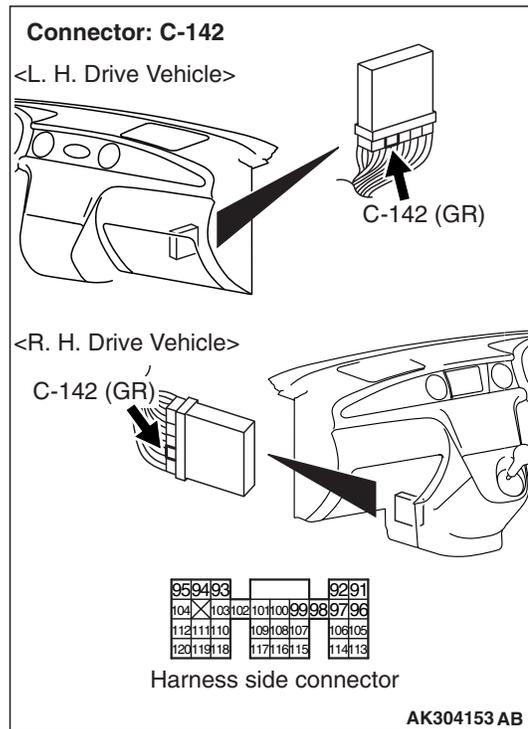
- Check output line for damage.

NO : Repair.

STEP 10. Perform voltage measurement at C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 11. Connector check: C-142 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.

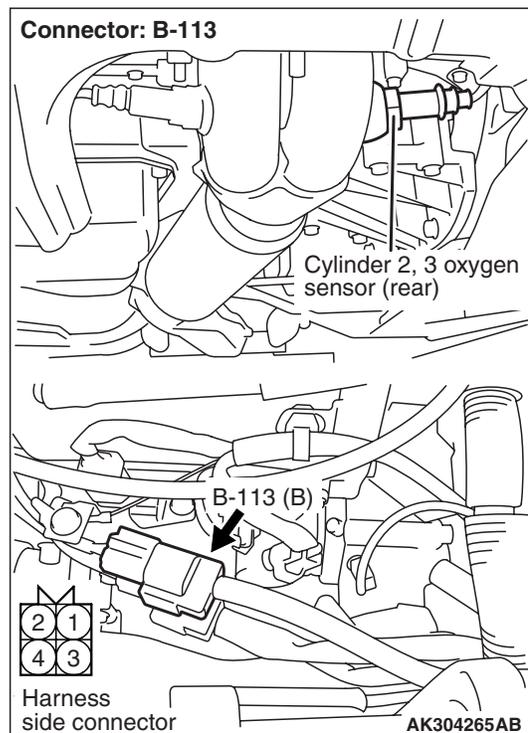
OK:

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 .



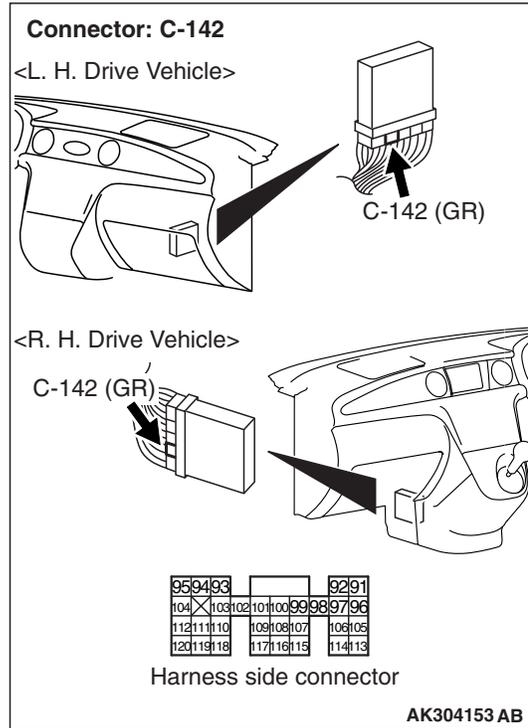
Q: Is the check result normal?

YES : Check and repair harness between B-113 (terminal No. 4) cylinder 2, 3 oxygen sensor (rear) connector and C-142 (terminal No. 116) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

STEP 12. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



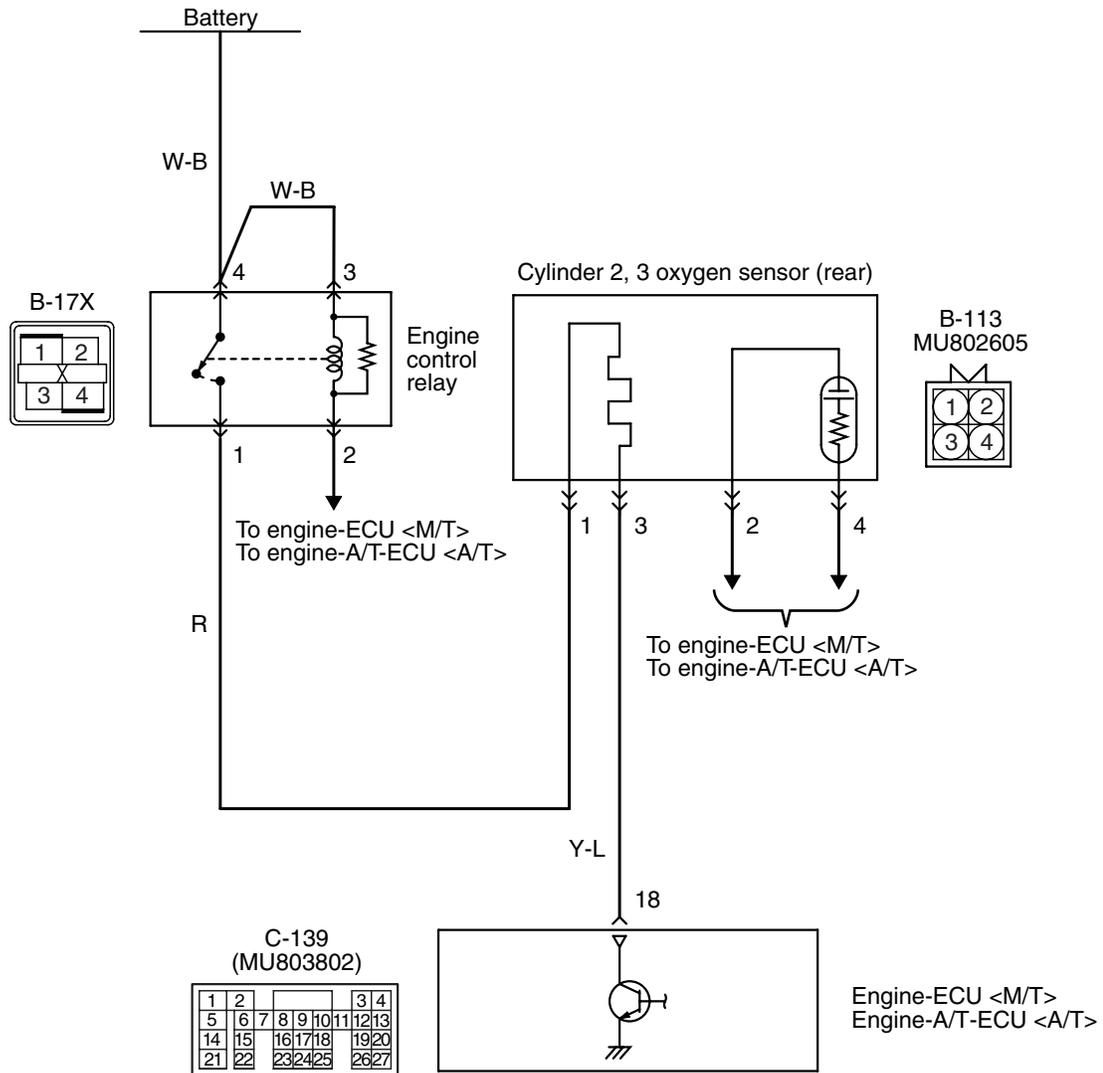
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

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

Cylinder 2,3 oxygen sensor (rear) heater circuit



Wire colour code

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

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OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

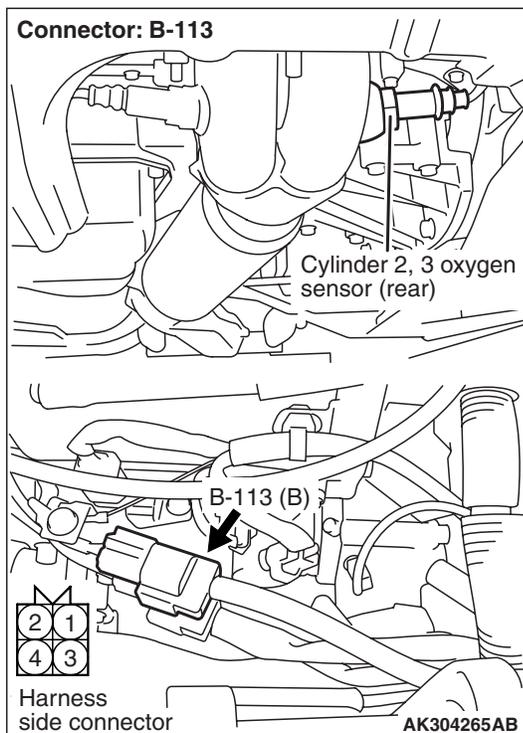
- Cylinder 2, 3 oxygen sensor (rear) heater currents have continued to be 0.16 A or lower, or 5.0 A or higher for 4 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-113 cylinder 2, 3 oxygen sensor (rear) connector

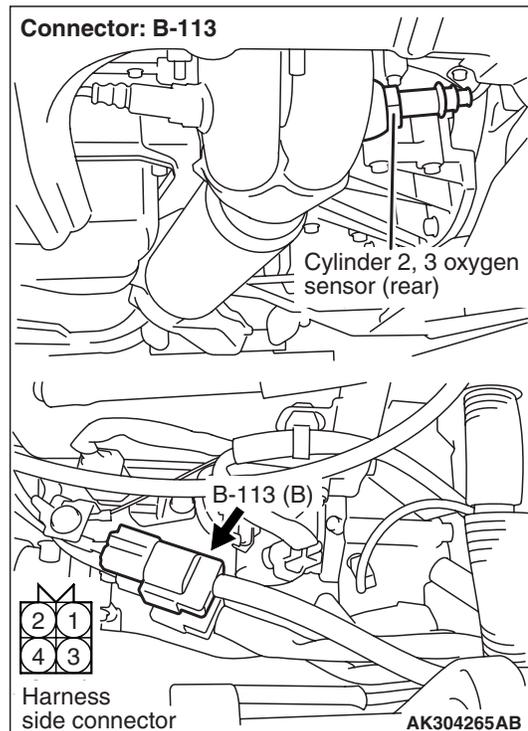


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

STEP 2. Perform resistance measurement at B-113 cylinder 2, 3 oxygen sensor (rear) connector.



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

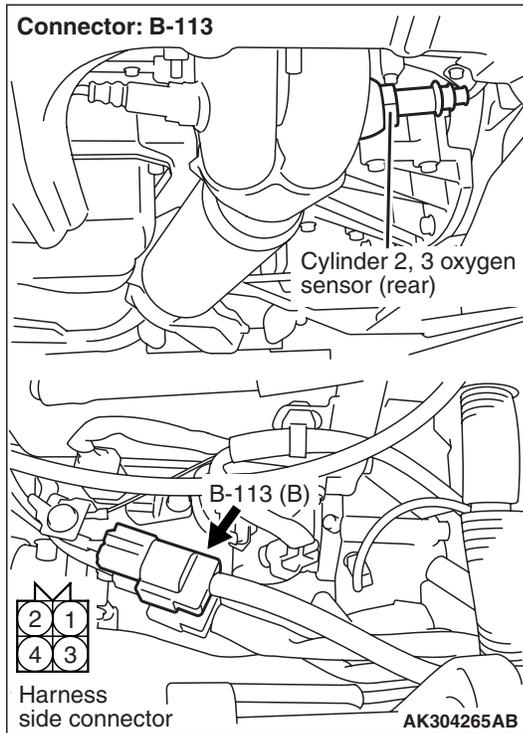
OK: 11 – 18 Ω

Q: Is the check result normal?

YES : Go to Step 3 .

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

STEP 3. Perform voltage measurement at B-113 cylinder 2, 3 oxygen sensor (rear) connector.



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

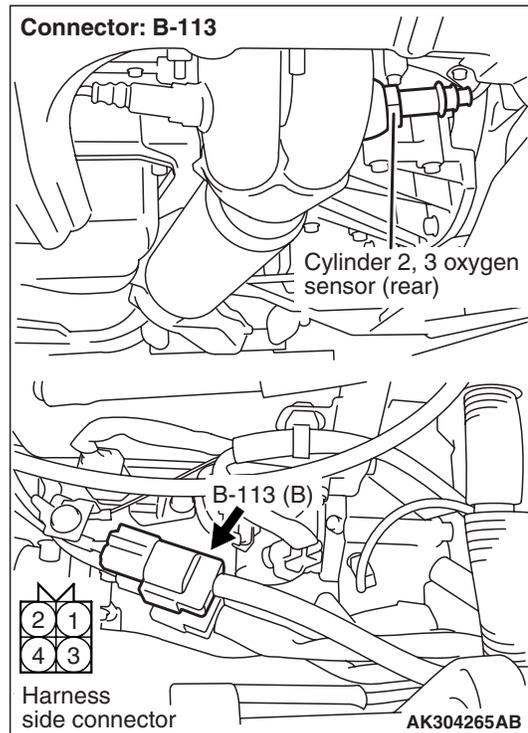
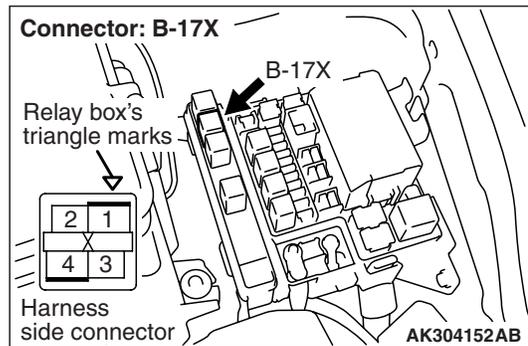
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

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



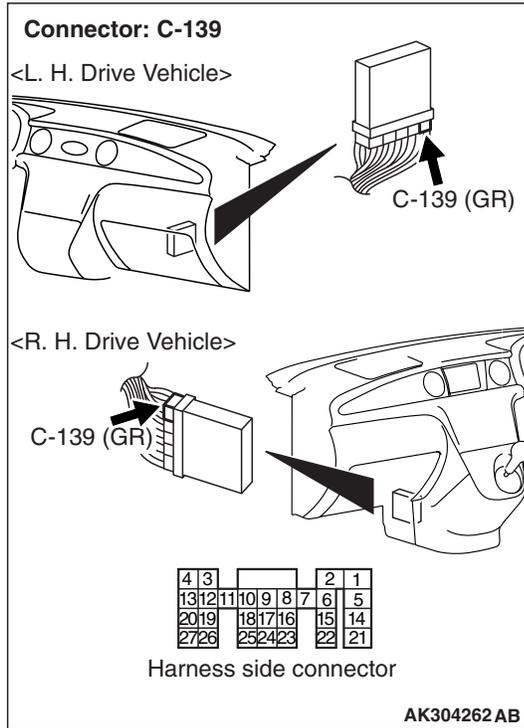
Q: Is the check result normal?

YES : Check and repair harness between B-113 (terminal No. 1) cylinder 2, 3 oxygen sensor (rear) connector and B-17X (terminal No. 1) engine control relay connector.

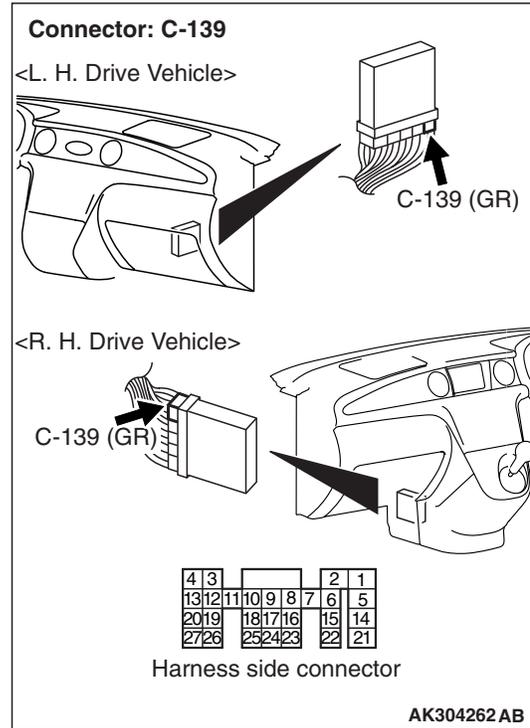
- Check power supply line for open/short circuit.

NO : Repair.

STEP 5. Perform voltage measurement at C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 6. Connector check: C-139 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 .

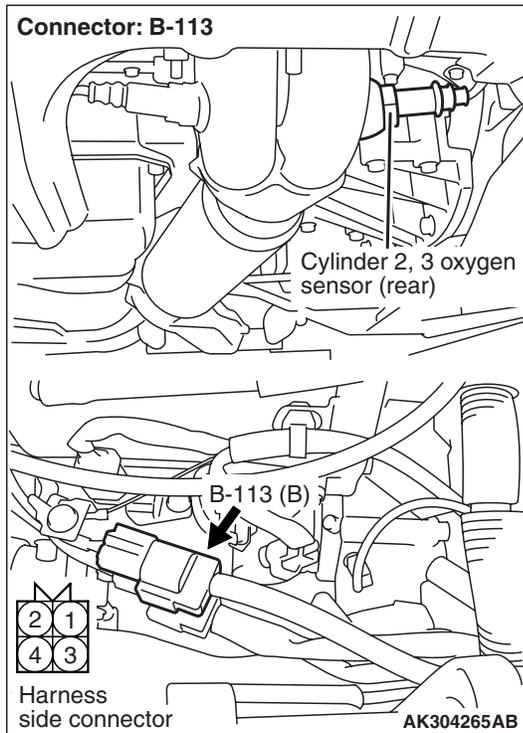
NO : Go to Step 6 .

Q: Is the check result normal?

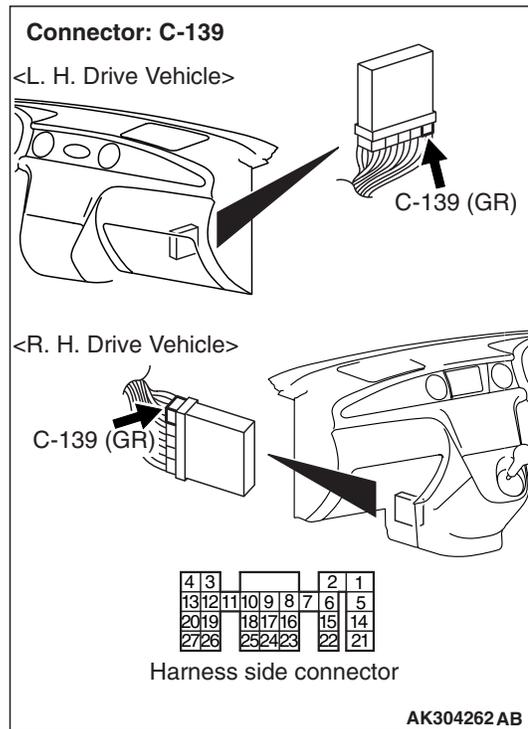
YES : Go to Step 7 .

NO : Repair.

STEP 7. Check harness between B-113 (terminal No. 3) cylinder 2, 3 oxygen sensor (rear) connector and C-139 (terminal No. 18) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



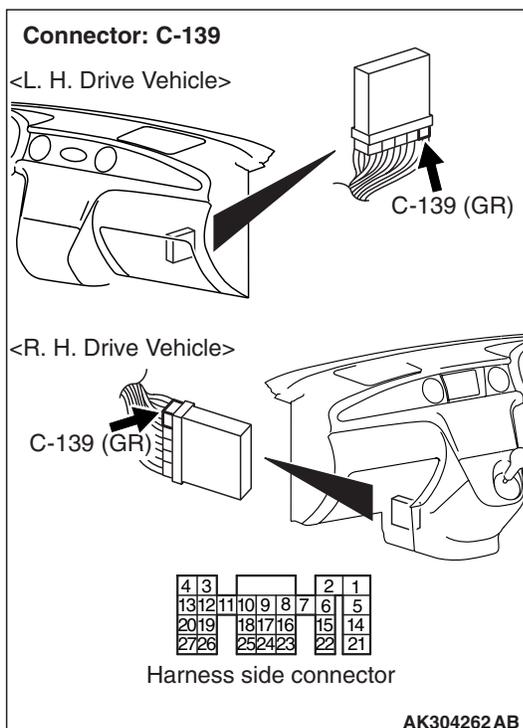
STEP 8. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.



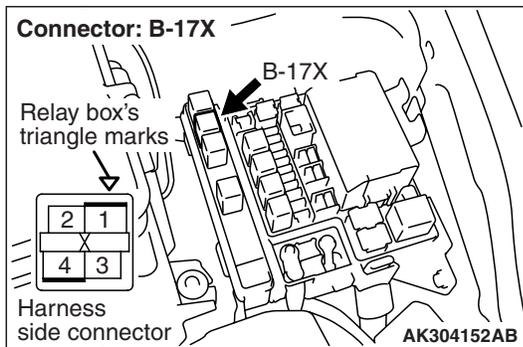
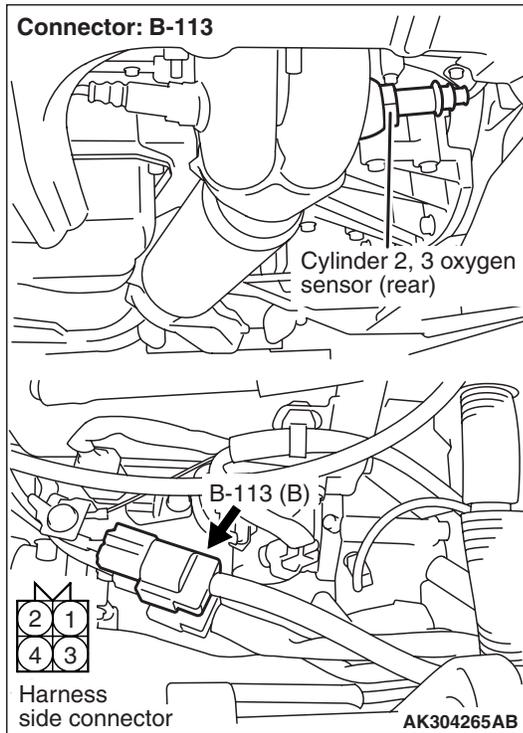
- Check earthing line for open/short circuit.

Q: Is the check result normal?

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

NO : Repair.

STEP 9. Check harness between B-113 (terminal No. 1) cylinder 2, 3 oxygen sensor (rear) connector and B-17X (terminal No. 1) engine control relay connector.

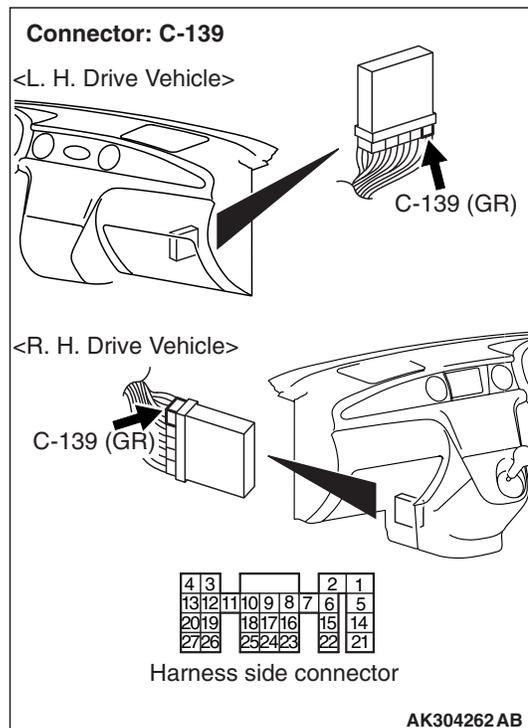
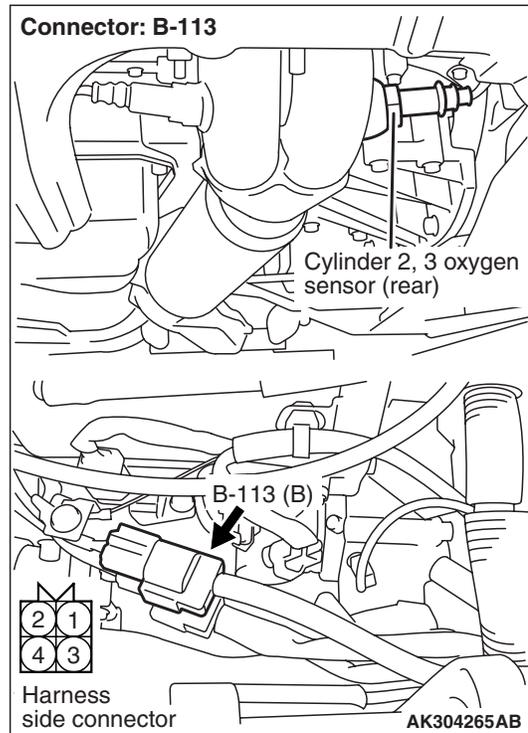


- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Repair.

STEP 10. Check harness between B-113 (terminal No. 3) cylinder 2, 3 oxygen sensor (rear) connector and C-139 (terminal No. 18) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .
NO : Repair.

STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

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

Code No. P0170: Abnormal Fuel System (Cylinder 1,4)

OPERATION

- Refer to Code No. P0201: No. 1 Injector System [P.13C-126](#).
- Refer to Code No. P0204: No. 4 Injector System [P.13C-141](#).

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 Conditions

- In learning the air-fuel ratio.

Judgment Criteria

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

Or

- Long-term fuel trim has continued to be -12.5% or 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.13C-21](#)).

NO : Go to Step 2 .

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

- Refer to Data List Reference Table [P.13C-402](#).
 - 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.13C-21](#)).

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

- Refer to Data List Reference Table [P.13C-402](#).
 - a. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 4 .

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

STEP 4. Check 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.13C-425](#)).

STEP 5. Check for intake of air from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

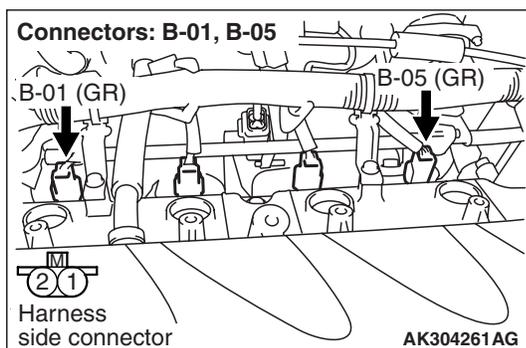
STEP 6. Check for leakage of exhaust emission from exhaust manifold.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Connector Check: Injector connector



- a. B-01 (No. 1 injector connector).
- b. B-05 (No. 4 injector connector).

Q: Are the check results normal?

YES : Go to Step 8 .

NO : Replace.

STEP 8. Check injector itself.

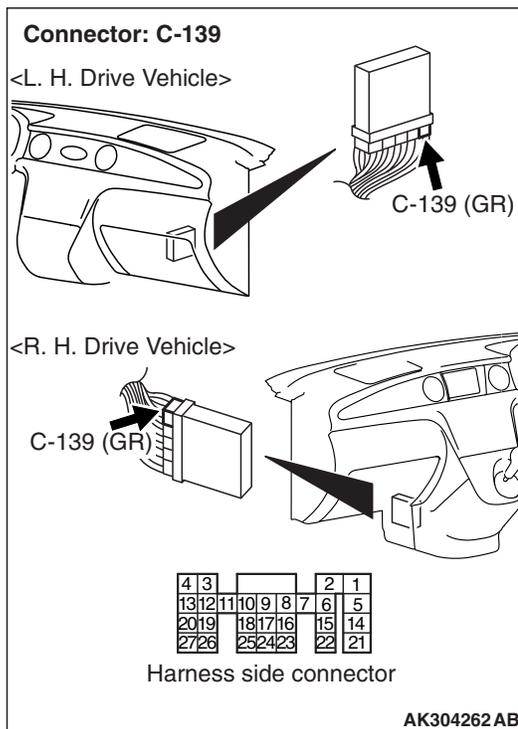
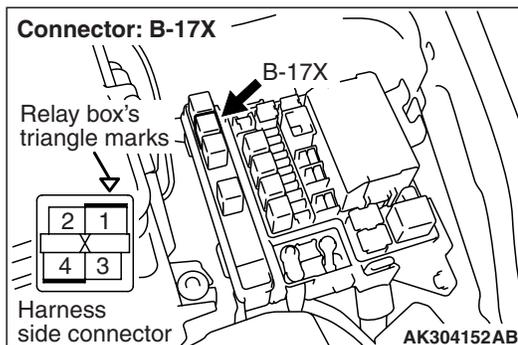
- Check Injector itself (Refer to [P.13C-435](#)).

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace injector.

STEP 9. Connector check: B-17X engine control relay connector and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

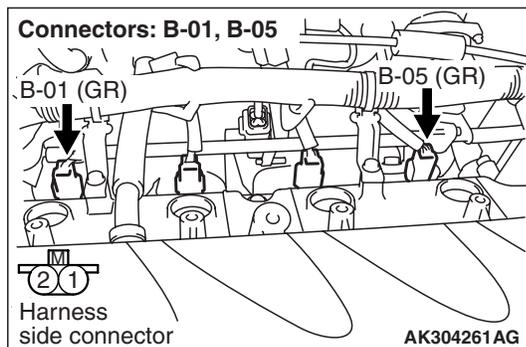
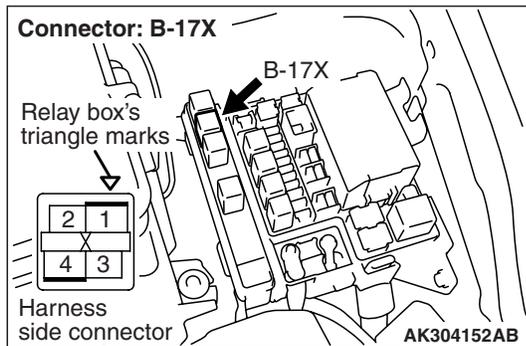


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

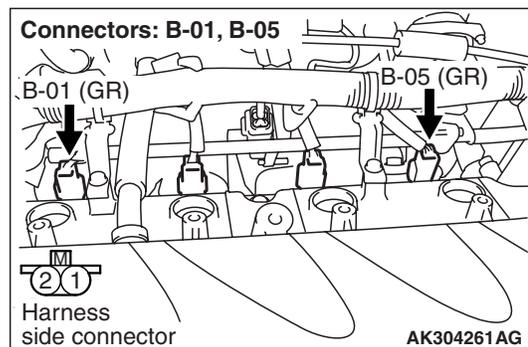
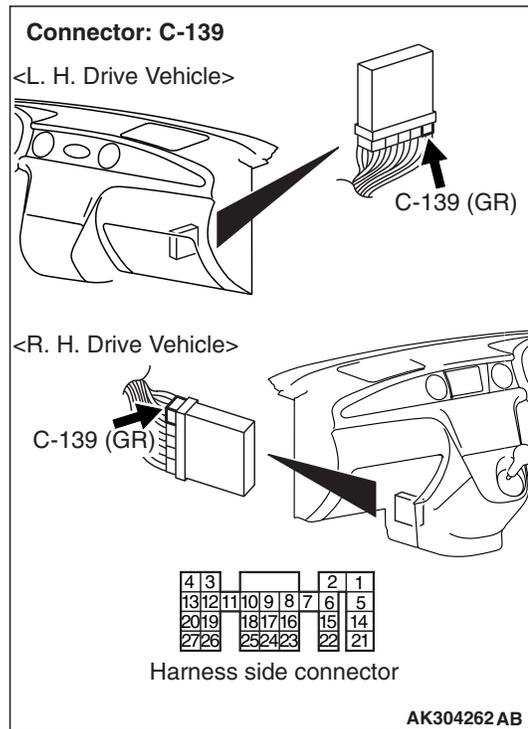
STEP 10. Check harness between B-17X engine control relay connector and injector connector.



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

STEP 11. Check harness between injector connector and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-139 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-139 (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.

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.17-65](#)).

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

- Fuel pressure measurement (Refer to [P.13C-425](#)).

Q: Is the check result normal?**YES** : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.**NO** : Repair.**Code No. P0173: Abnormal Fuel System (cylinder 2, 3)****OPERATION**

- Refer to Code No. P0202 No. 2 Injector System [P.13C-131](#).
- Refer to Code No. P0203 No. 3 Injector System [P.13C-136](#).

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 Conditions**

- In learning the air-fuel ratio.

Judgment Criteria

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

Or

- Long-term fuel trim has continued to be -12.5% or 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 P0173 output?****YES** : Inspection chart for diagnosis code (Refer to [P.13C-21](#)).**NO** : Go to Step 2 .**STEP 2. M.U.T.-II/III data list**

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 12: Air flow sensor
 - Item 13: Intake air temperature sensor
 - Item 21: Engine coolant temperature sensor
 - Item 95: Manifold absolute 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.13C-21](#)).**STEP 3: M.U.T.-II/III data list**

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 25: Barometric pressure sensor

Q: Are the check results normal?**YES** : Go to Step 4 .**NO** : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.**STEP 4. Check 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.13C-425](#)).

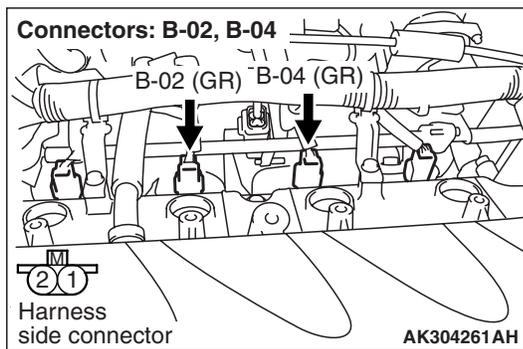
STEP 5. Check for intake of air from intake hose and inlet manifold.

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

STEP 6. Check for leakage of exhaust emission from exhaust manifold.

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

STEP 7. Connector Check: Injector connector



- a. B-02 (No. 2 injector connector).
- b. B-04 (No. 3 injector connector).

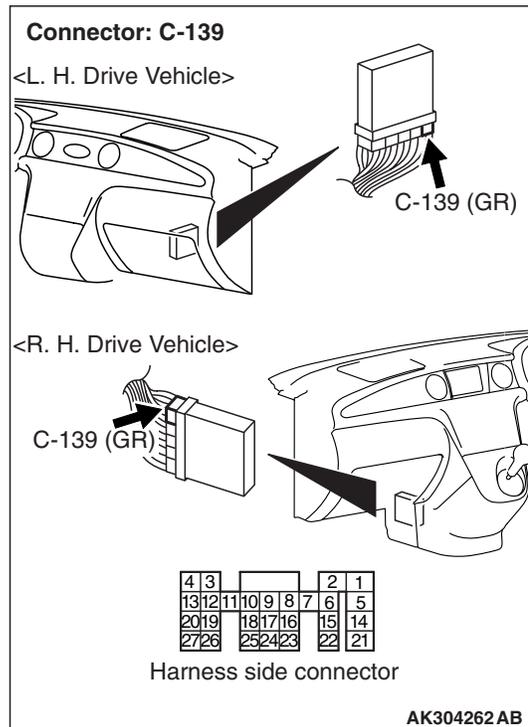
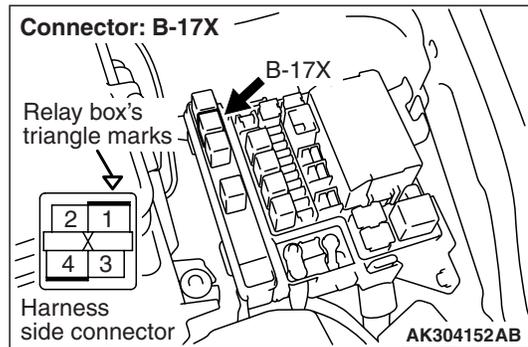
Q: Are the check results normal?
YES : Go to Step 8 .
NO : Replace.

STEP 8. Check injector itself.

- Check Injector itself (Refer to P.13C-435).

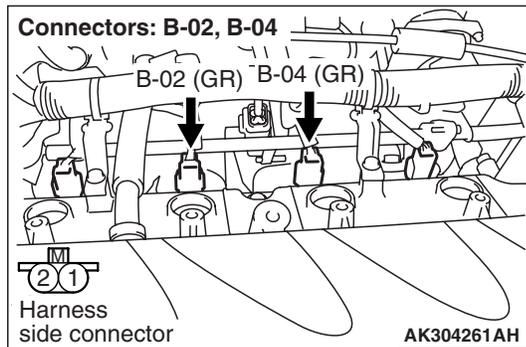
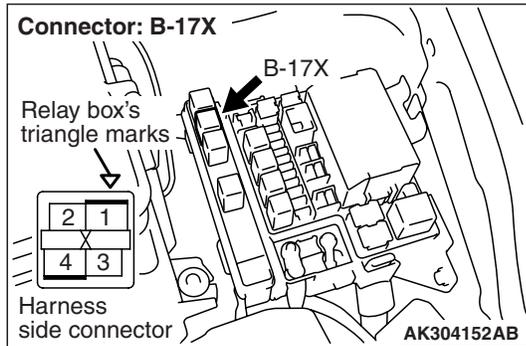
Q: Is the check result normal?
YES : Go to Step 9 .
NO : Replace injector.

STEP 9. Connector check: B-17X engine control relay connector and C-139 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.

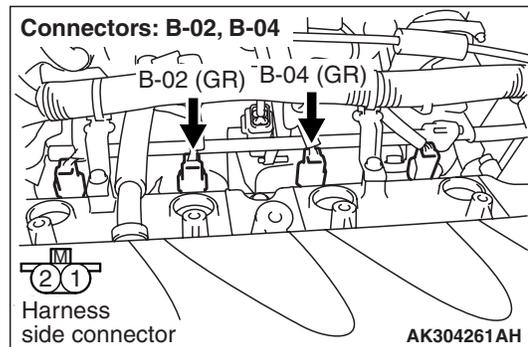
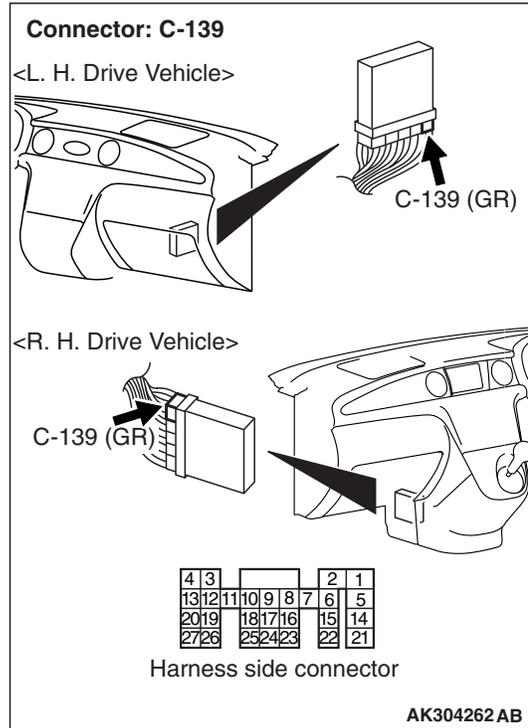
STEP 10. Check harness between B-17X engine control relay connector and injector connector.



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

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

STEP 11. Check harness between injector connector and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-139 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-139 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

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

STEP 12. Check purge control solenoid valve itself.

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

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Replace purge control solenoid valve.

STEP 13. Fuel pressure measurement.

- Fuel pressure measurement (Refer to [P.13C-425](#)).

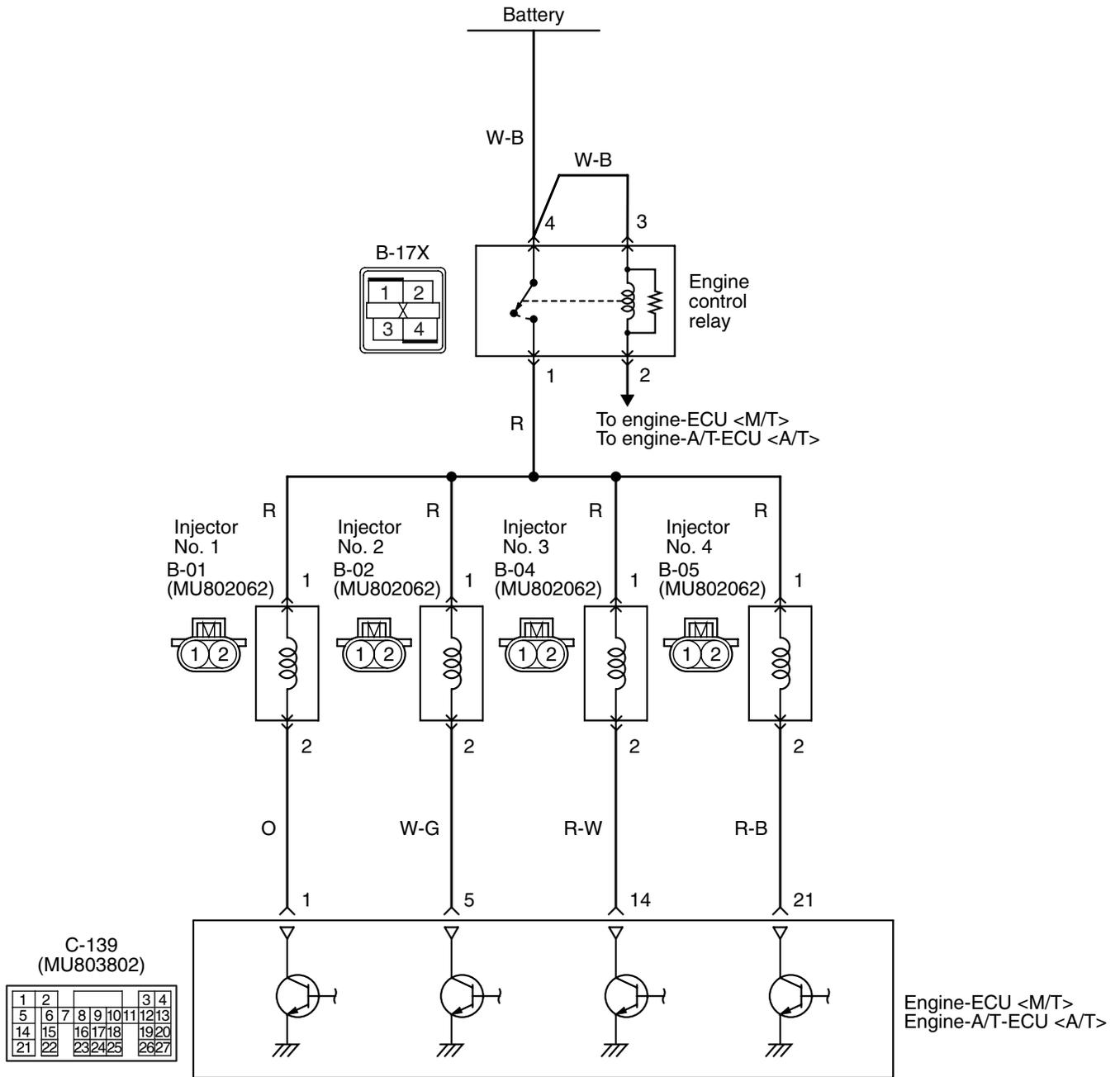
Q: Is the check result normal?

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

NO : Repair.

Code No. P0201: No. 1 Injector System

Injector circuit



Wire colour code

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

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 1) 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 Conditions

- While engine is running.

Judgment Criteria

- 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

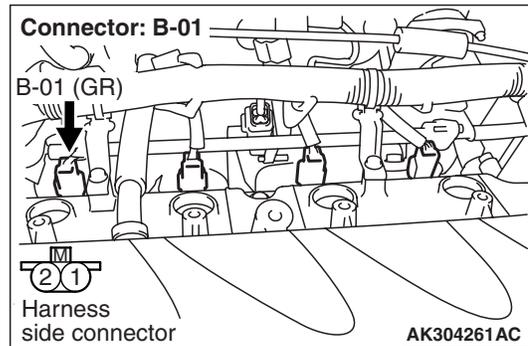
OK: Idling state varies.

Q: Is the check result normal?

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

NO : Go to Step 2 .

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check No. 1 injector itself.

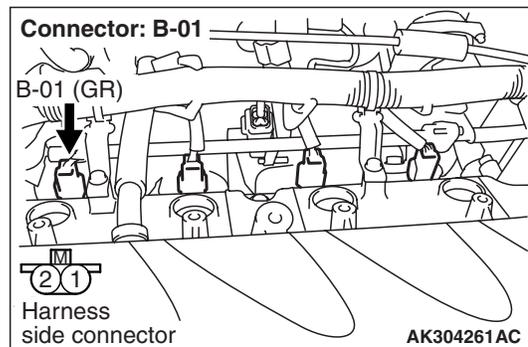
- Check No. 1 Injector itself (Refer to P.13C-435).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 1 injector.

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



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

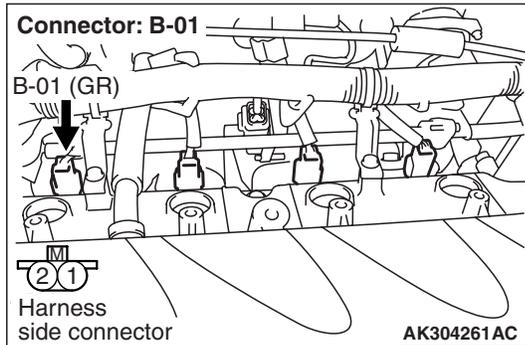
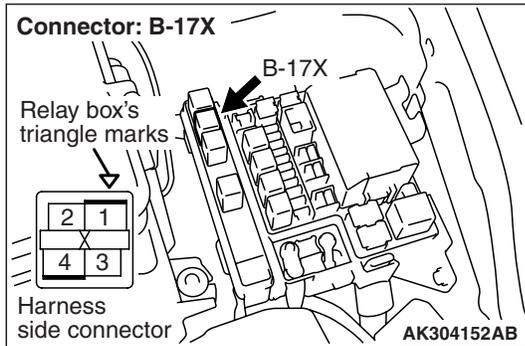
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-17X engine control relay connector



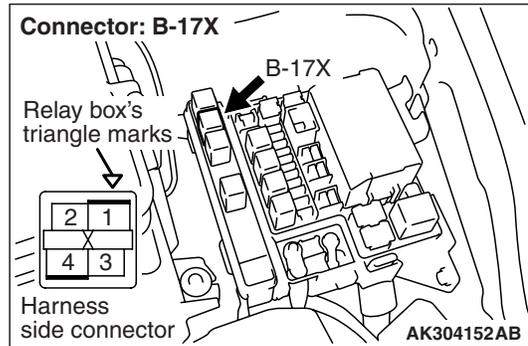
Q: Is the check result normal?

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

- Check power supply line for open/short circuit.

NO : Repair.

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

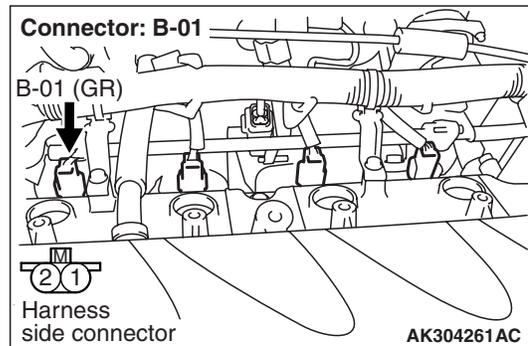
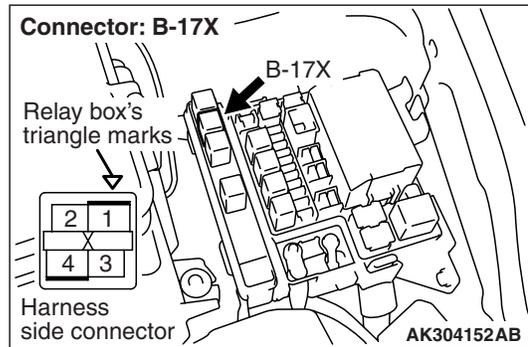


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

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



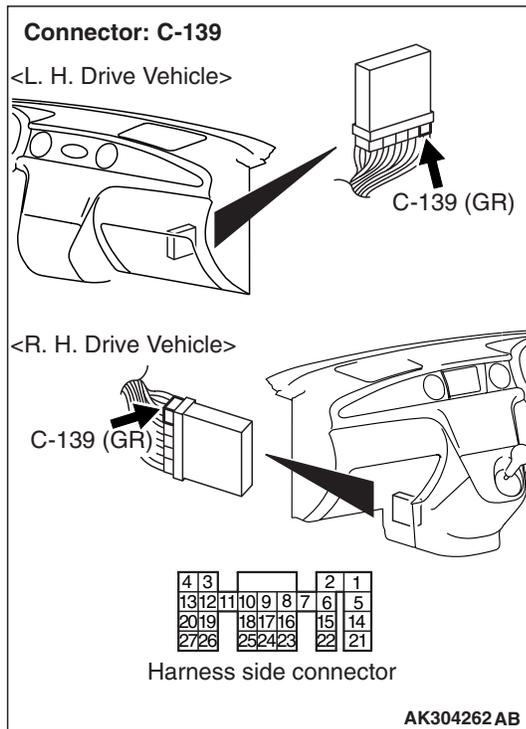
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

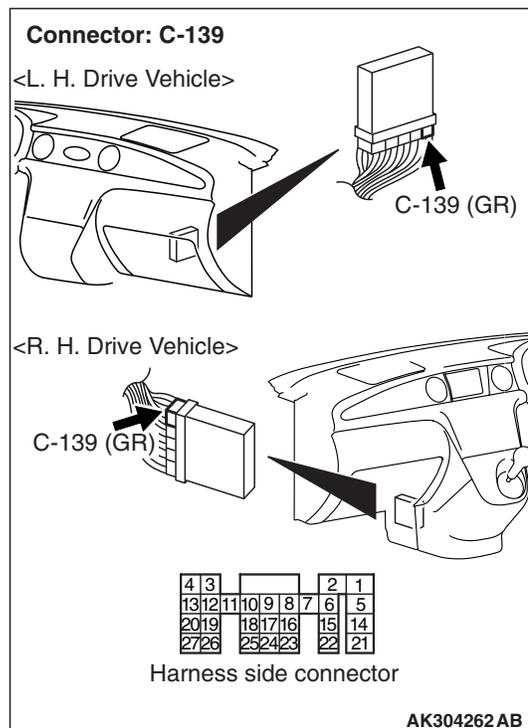
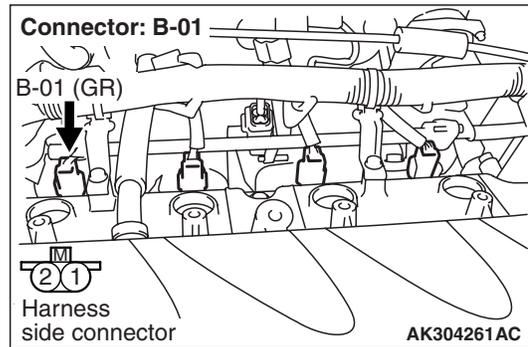
NO : Repair.

STEP 8. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

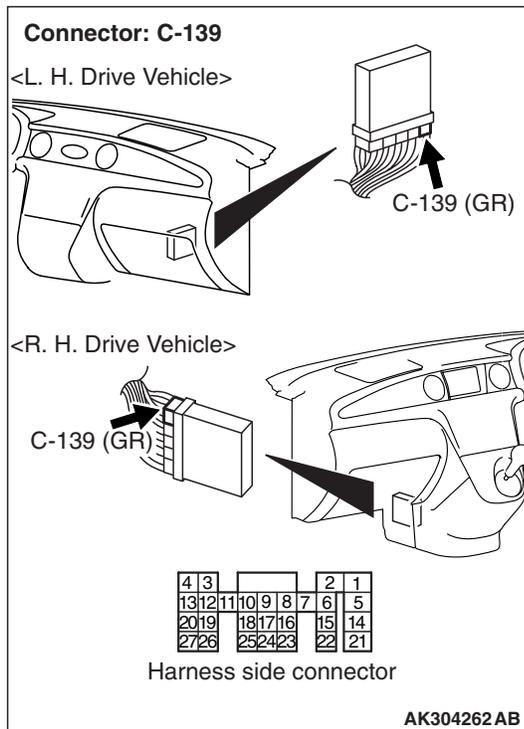
STEP 9. Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-139 (terminal No. 1) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

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

STEP 10. Perform signal wave pattern measurement at C-139 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.13C-419).

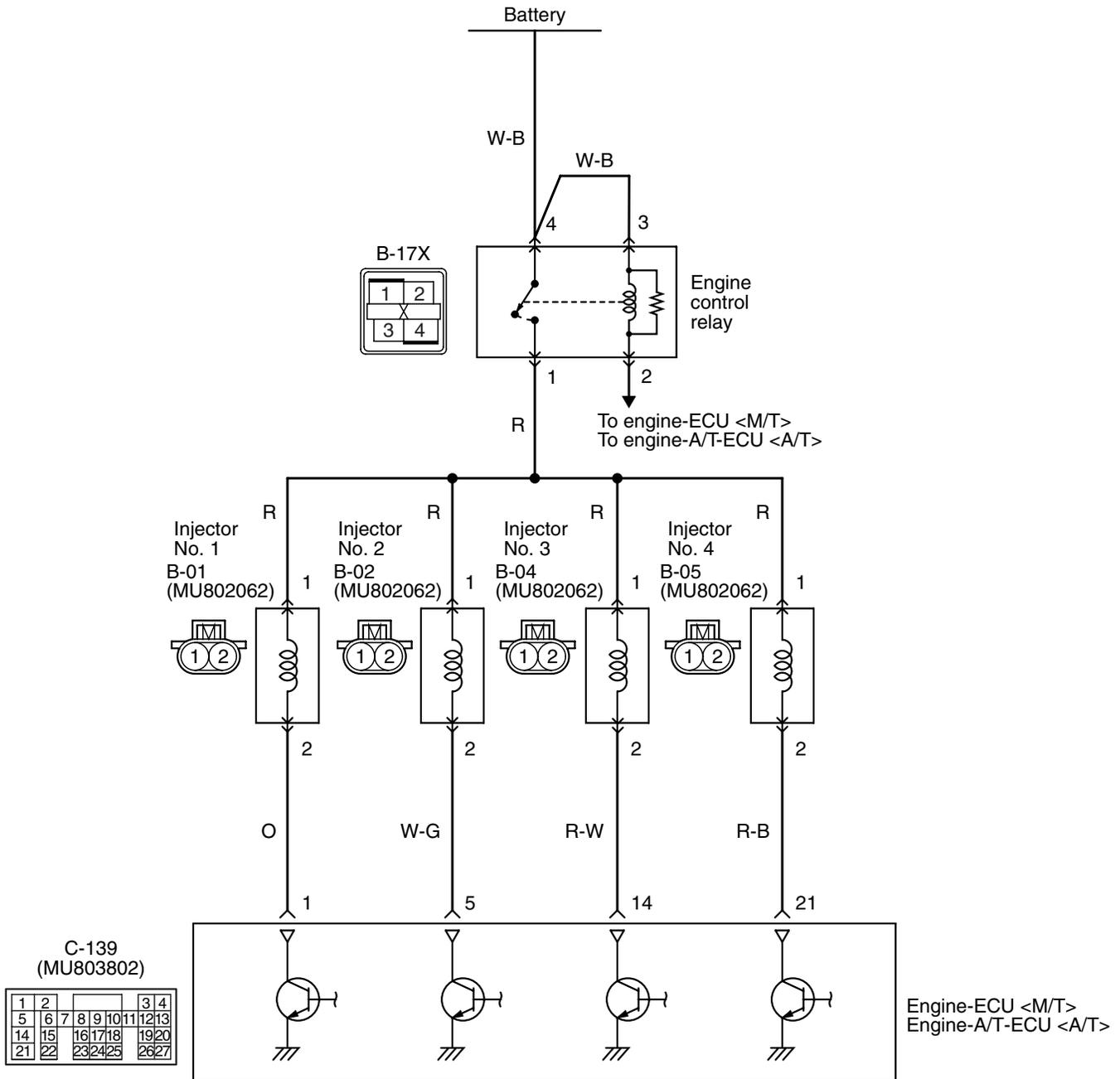
Q: Is the check result normal?

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

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

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

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

- While engine is running.

Judgment Criteria

- 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**

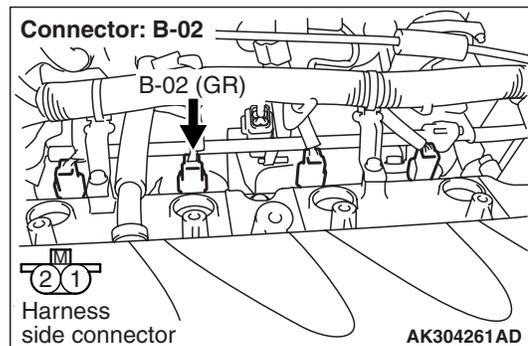
- Item 02: No. 2 injector

OK: Idling state varies.

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-02 No. 2 injector connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair.

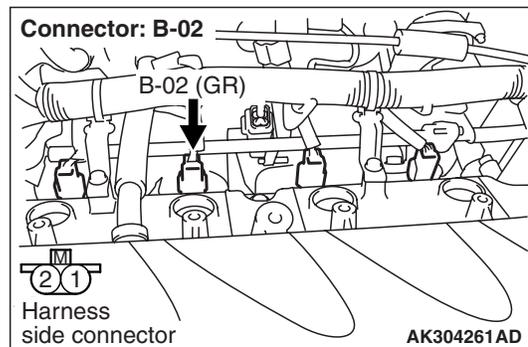
STEP 3. Check No. 2 injector itself.

- Check No. 2 Injector itself (Refer to P.13C-435).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 2 injector.

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

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

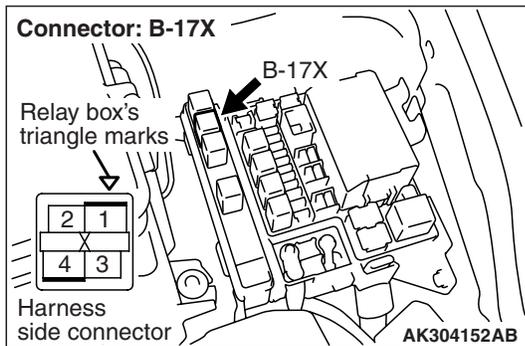
OK: System voltage

Q: Is the check result normal?

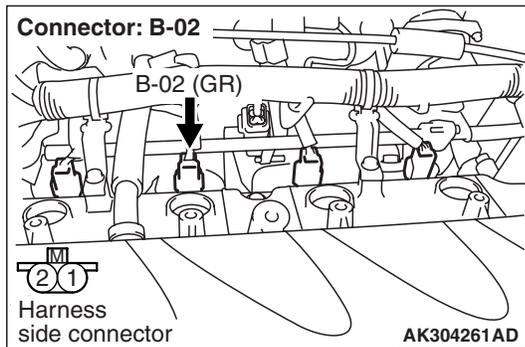
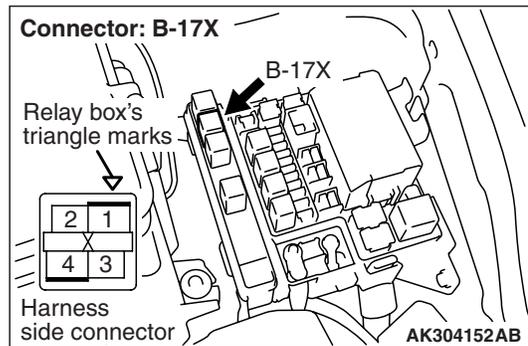
YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-17X engine control relay connector



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



Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

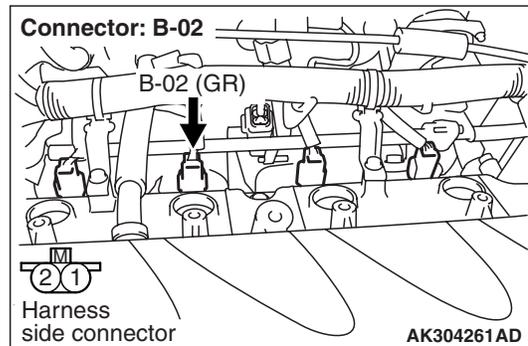
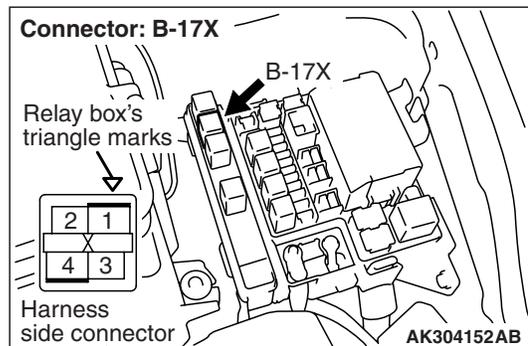
STEP 7. Check harness between B-17X (terminal No. 1) engine control relay connector and B-02 (terminal No. 1) No. 2 injector connector.

Q: Is the check result normal?

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

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

NO : Repair.



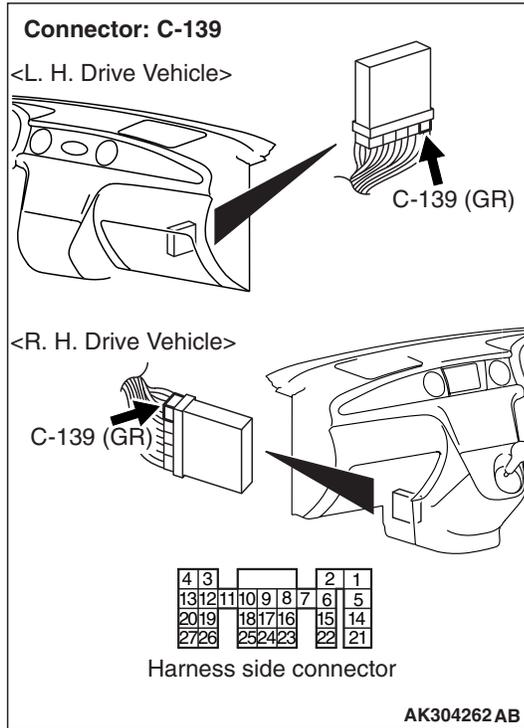
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

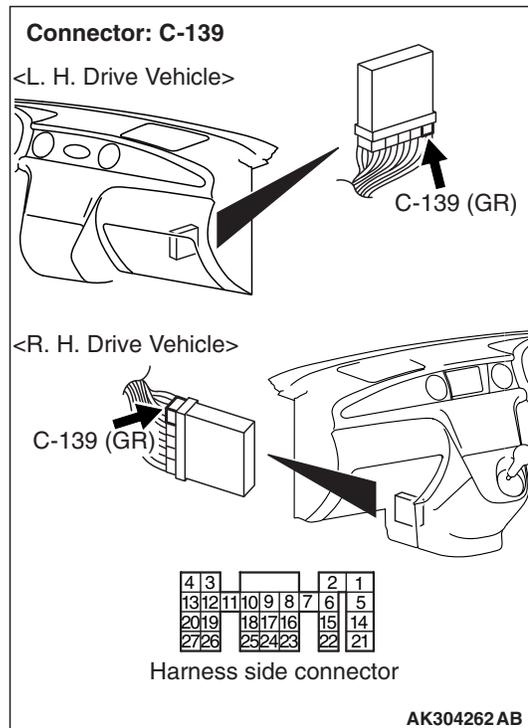
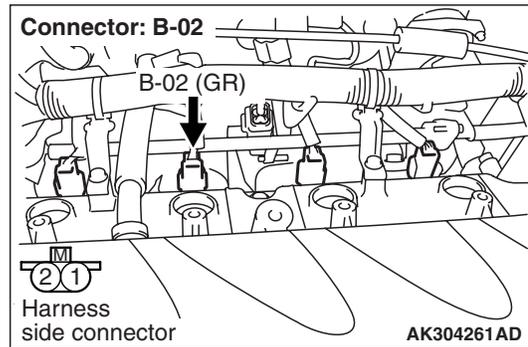
NO : Repair.

STEP 8. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

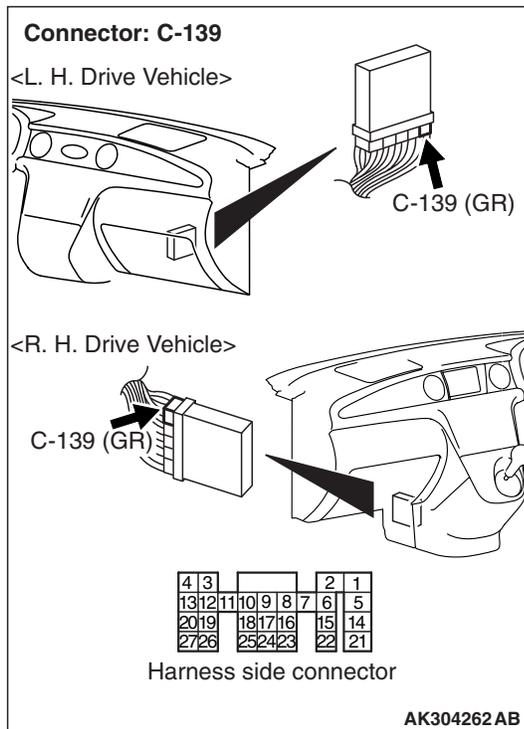
STEP 9. Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-139 (terminal No. 5) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

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

STEP 10. Perform signal wave pattern measurement at C-139 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.13C-419).

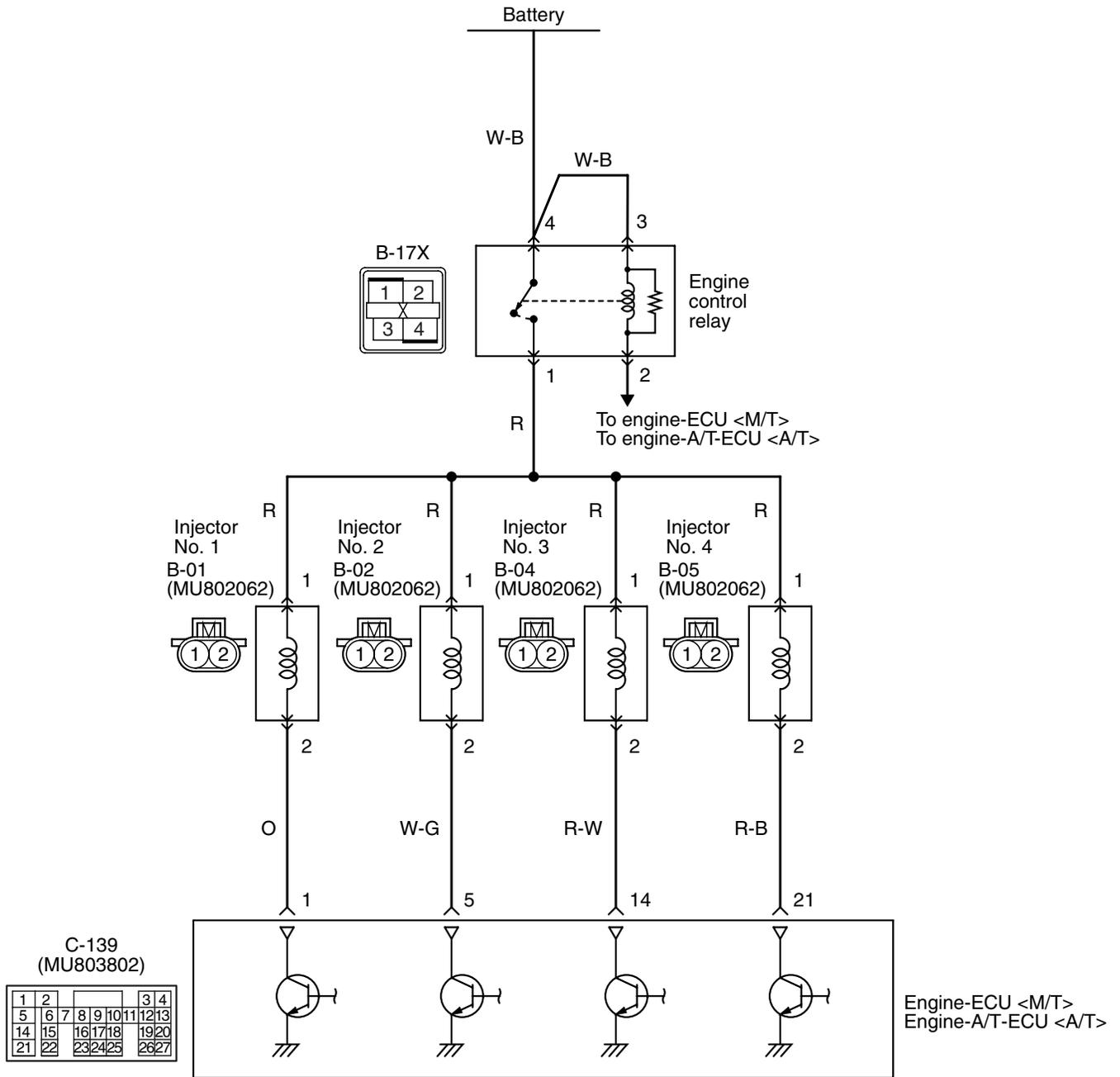
Q: Is the check result normal?

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

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

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

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- While engine is running.

Judgment Criteria

- 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

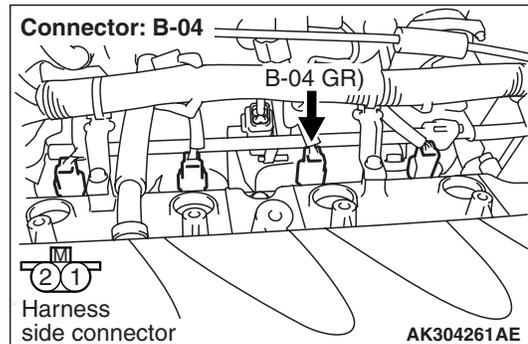
OK: Idling state varies.

Q: Is the check result normal?

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

NO : Go to Step 2 .

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check No. 3 injector itself.

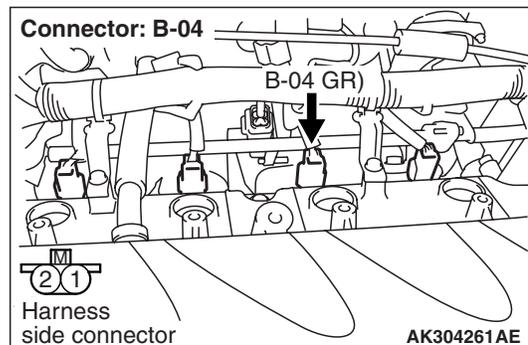
- Check No. 3 Injector itself (Refer to P.13C-435).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 3 injector.

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



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

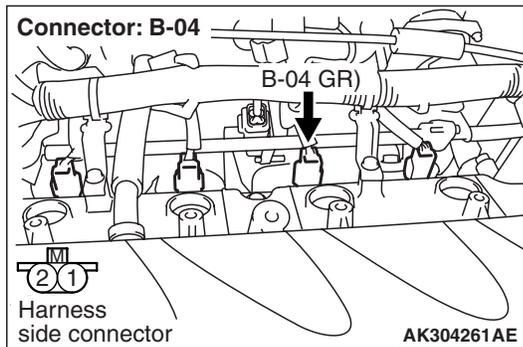
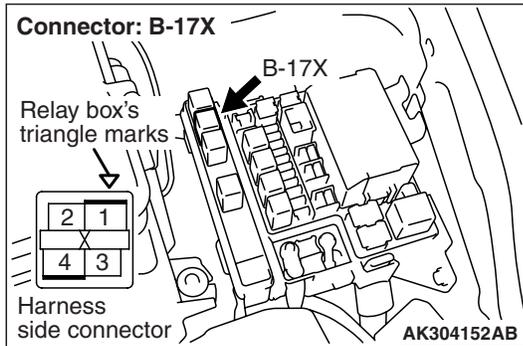
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-17X engine control relay connector



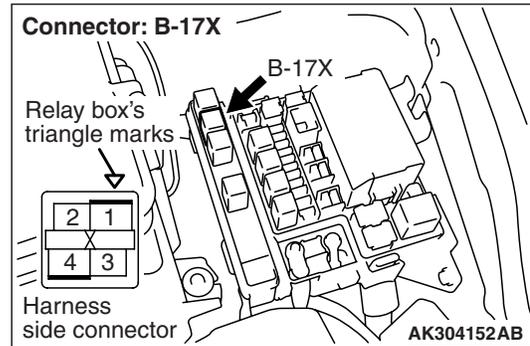
Q: Is the check result normal?

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

- Check power supply line for open/short circuit.

NO : Repair.

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

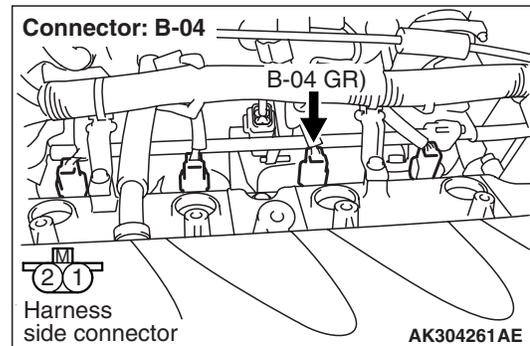
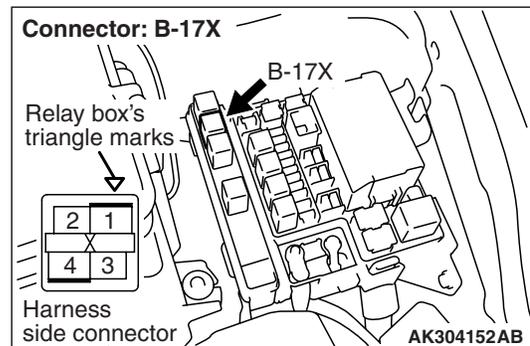


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

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



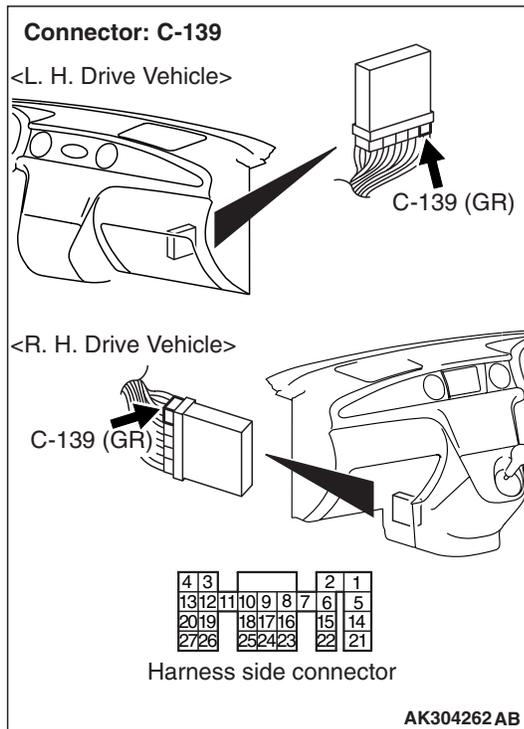
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

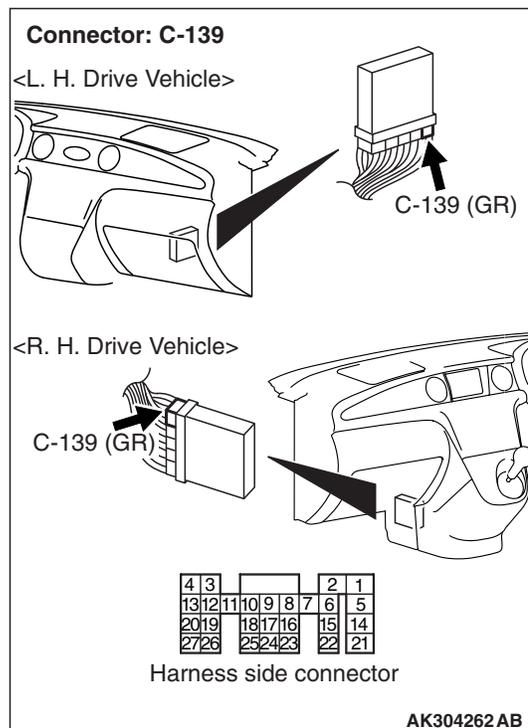
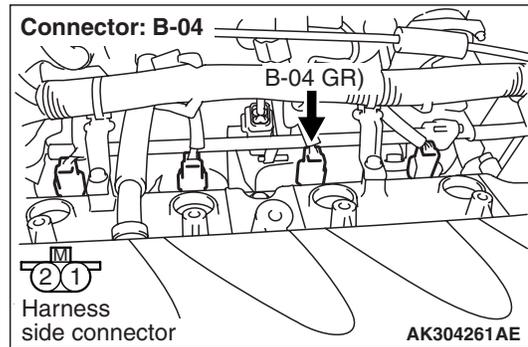
NO : Repair.

STEP 8. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

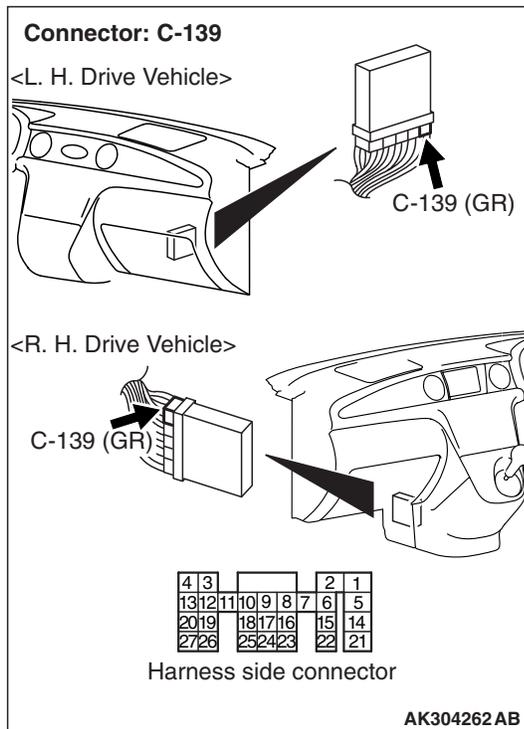
STEP 9. Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-139 (terminal No. 14) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

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

STEP 10. Perform signal wave pattern measurement at C-139 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.13C-419).

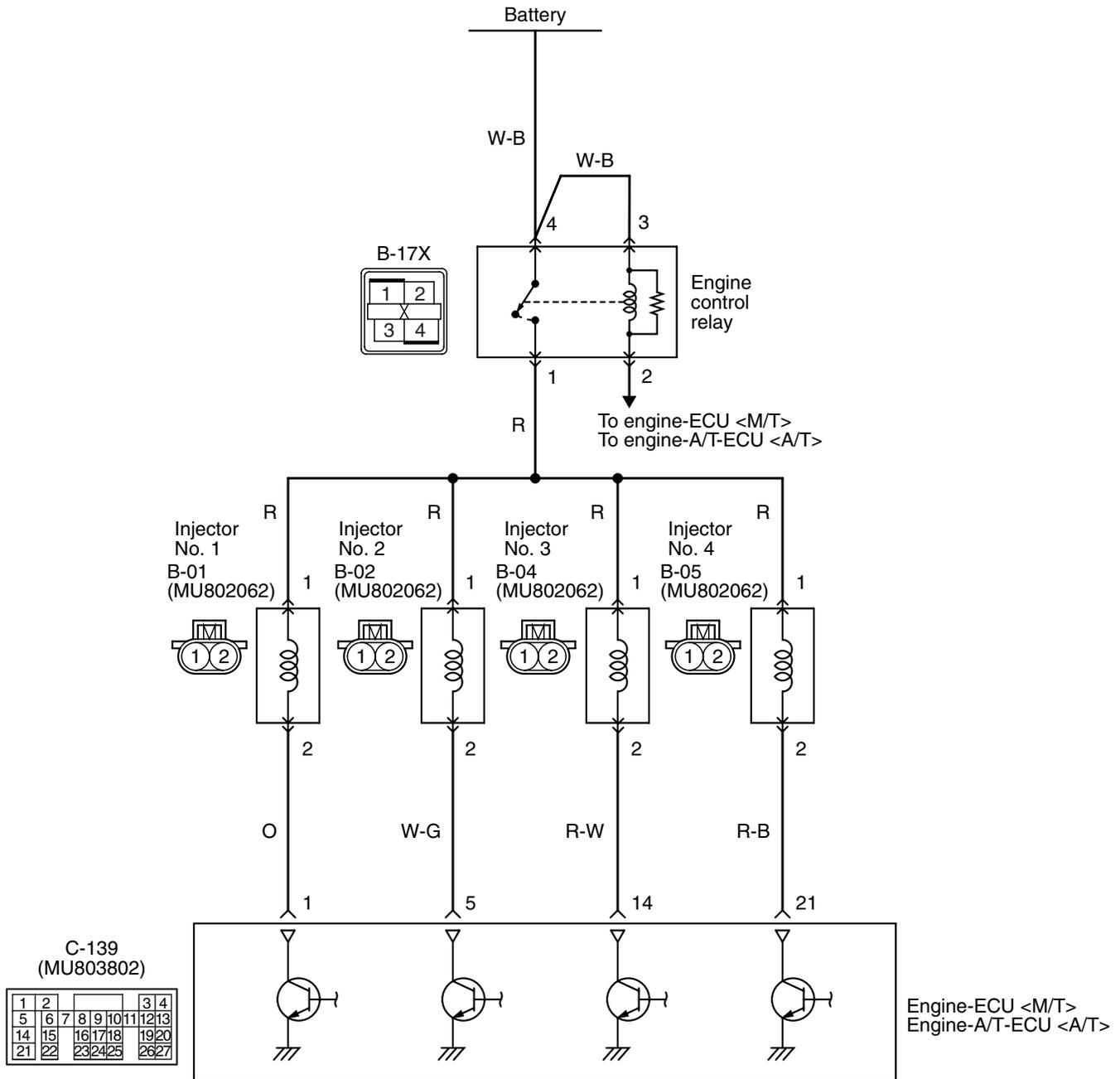
Q: Is the check result normal?

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

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

Code No. P0204: No. 4 Injector System

Injector circuit



Wire colour code

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

OPERATION

- Power is supplied to the injector (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 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 Conditions**

- While engine is running.

Judgment Criteria

- 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**

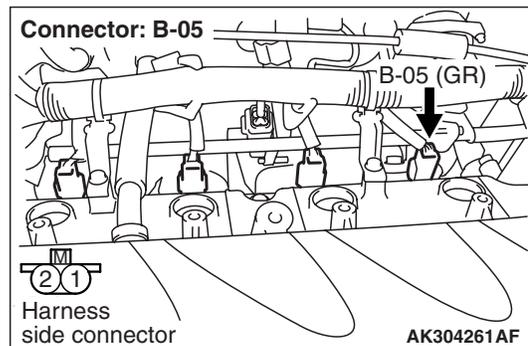
- Item 04: No. 4 injector

OK: Idling state varies.

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-05 No. 4 injector connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair.

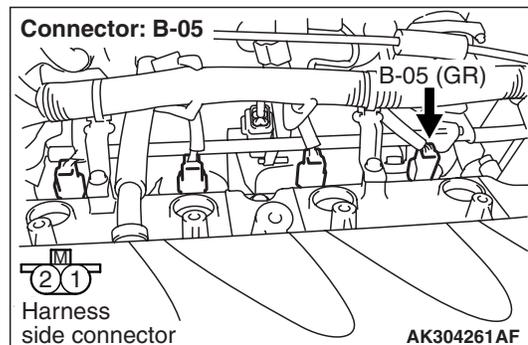
STEP 3. Check No. 4 injector itself.

- Check No. 4 Injector (Refer to P.13C-435) itself.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 4 injector.

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

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

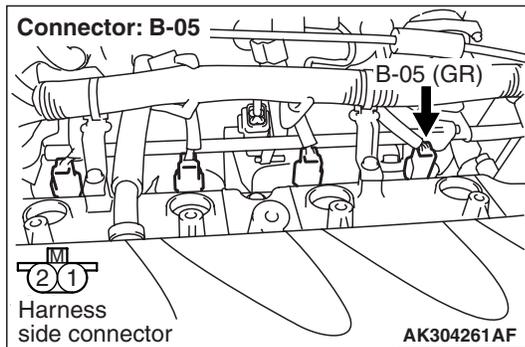
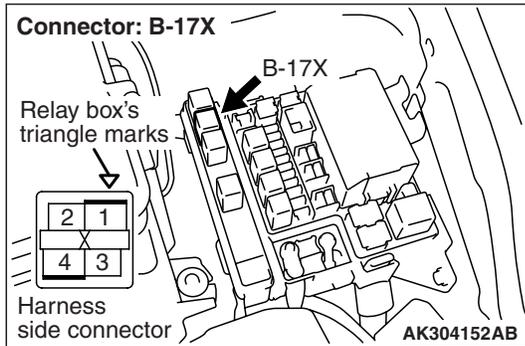
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-17X engine control relay connector



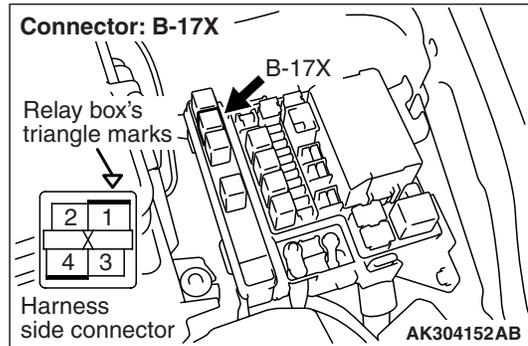
Q: Is the check result normal?

YES : Check and repair harness between B-17X (terminal No. 1) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.

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

NO : Repair.

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

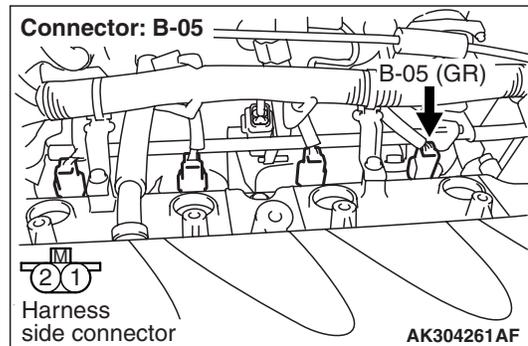
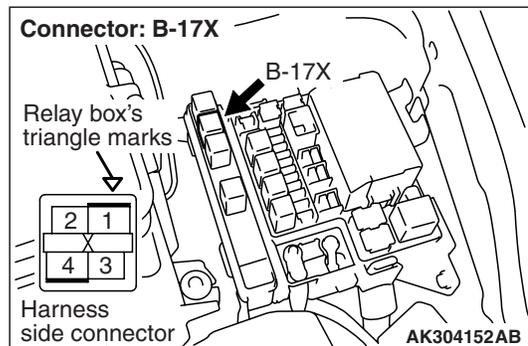


Q: Is the check result normal?

YES : Go to Step 7.

NO : Repair.

STEP 7. Check harness between B-17X (terminal No. 1) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.



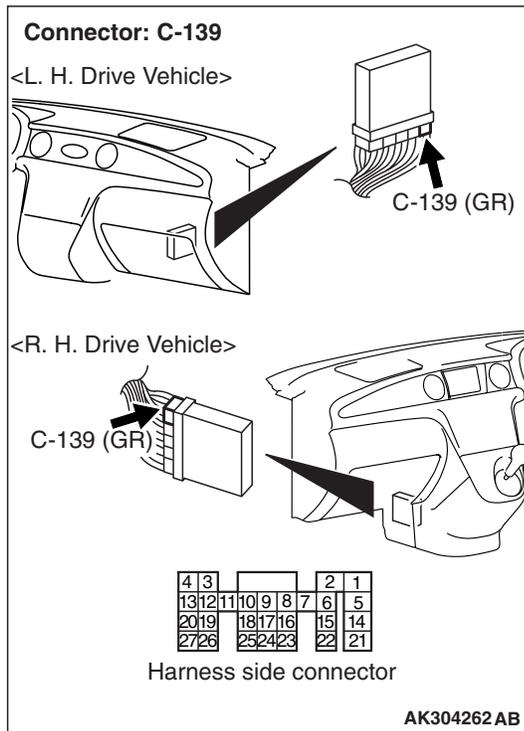
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

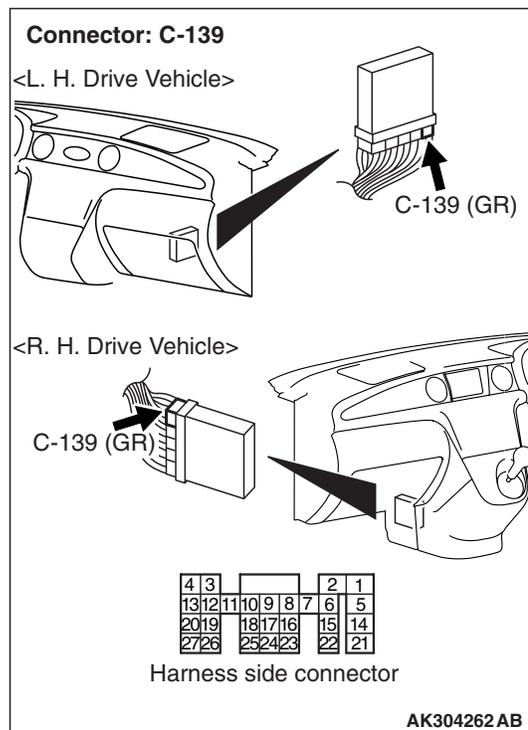
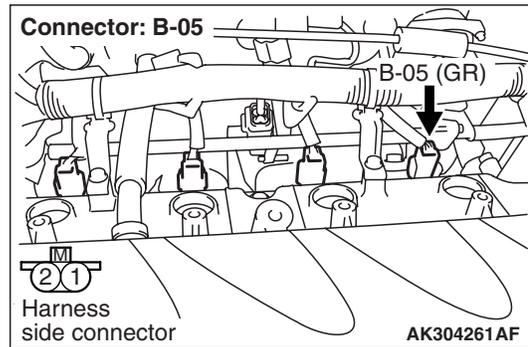
NO : Repair.

STEP 8. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

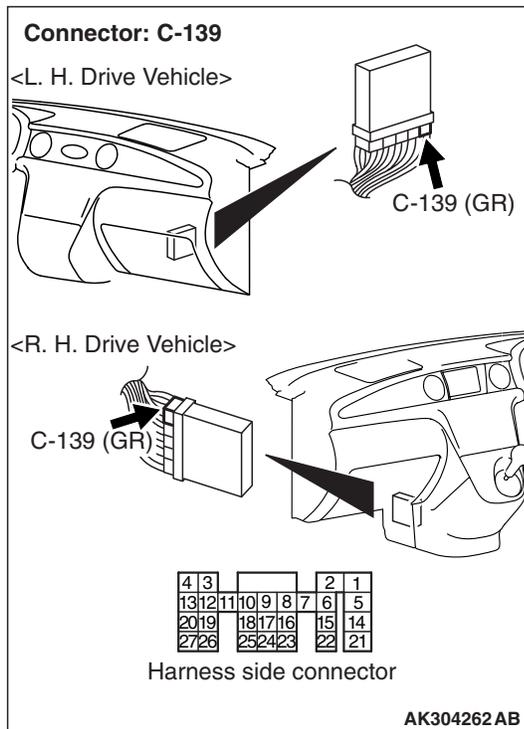
STEP 9. Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-139 (terminal No. 21) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

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

STEP 10. Perform signal wave pattern measurement at C-139 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.13C-419).

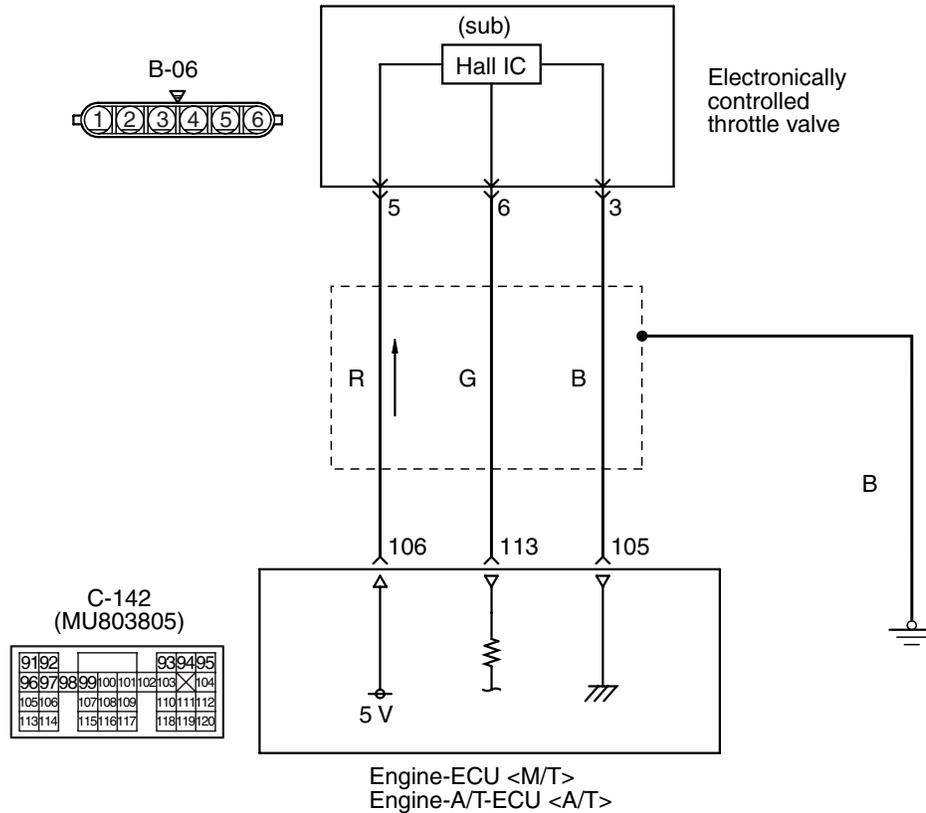
Q: Is the check result normal?

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

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

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

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OPERATION

- A power voltage of 5 V is applied to the electronically 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 electronically 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 electronically 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 Conditions**

- Ignition switch is in "ON" position.

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

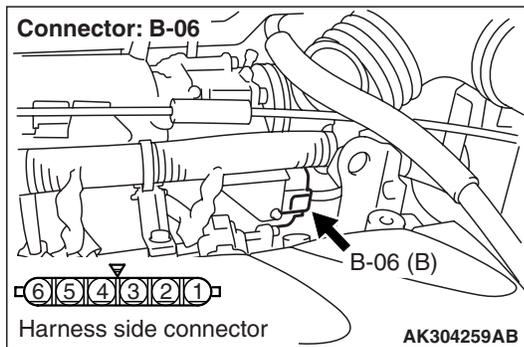
- Refer to Data list reference table [P.13C-402](#).
 - Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

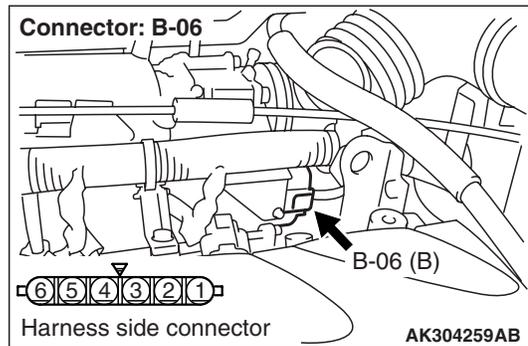


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

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



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

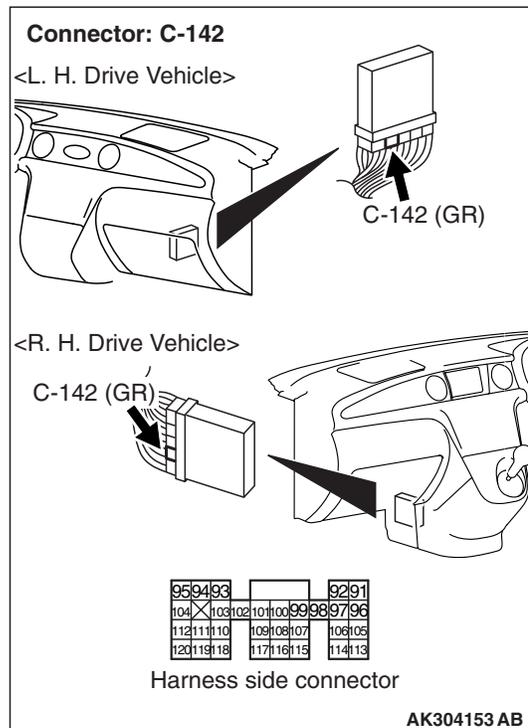
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

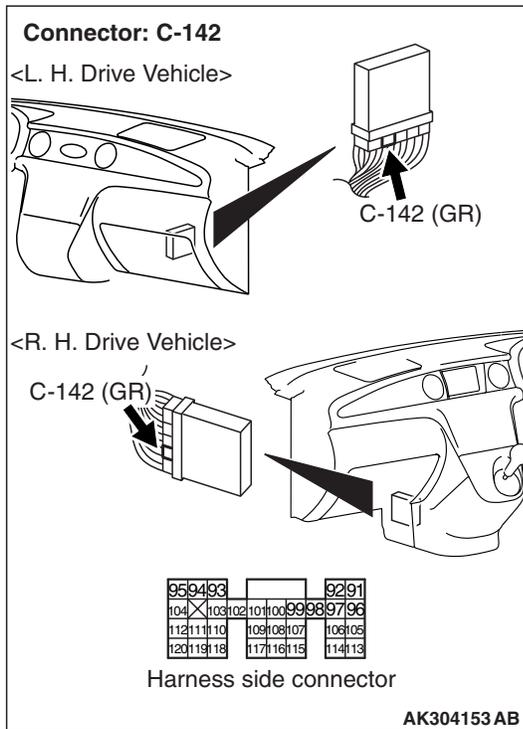
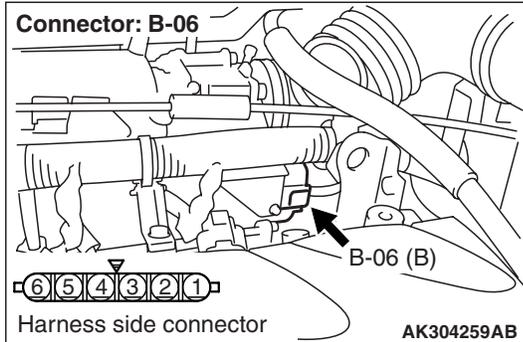


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check harness between B-06 (terminal No. 5) electronically controlled throttle valve connector and C-142 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for open/short circuit.

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

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

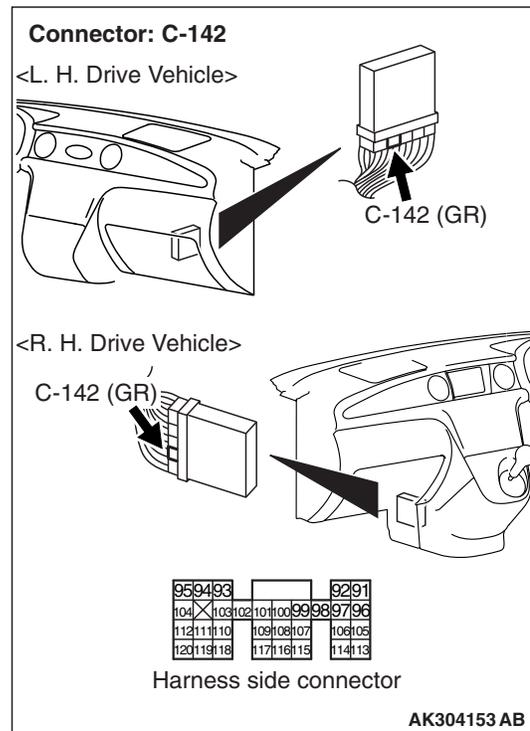
- Refer to Data List Reference Table P.13C-402.
 a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

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

STEP 7. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

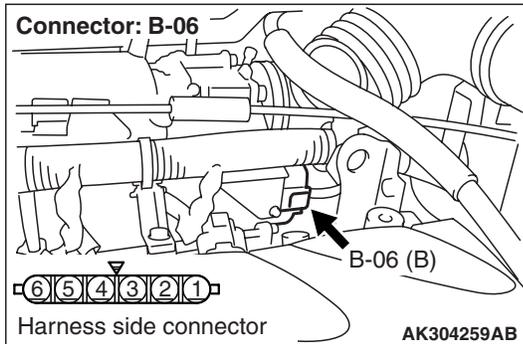


Q: Is the check result normal?

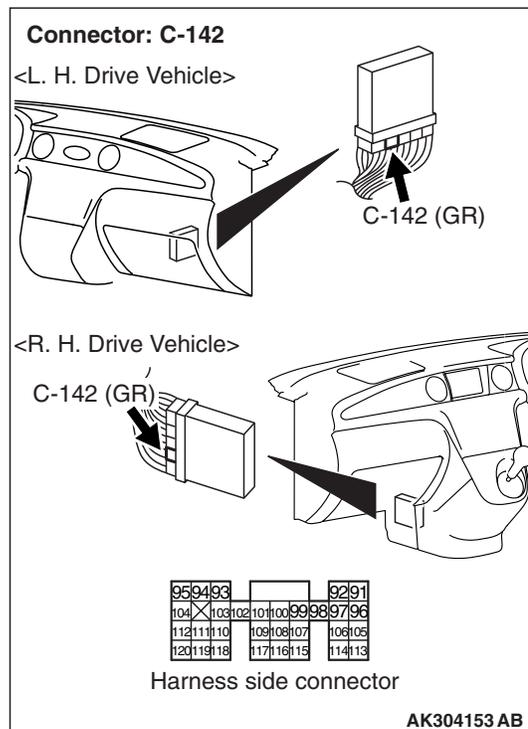
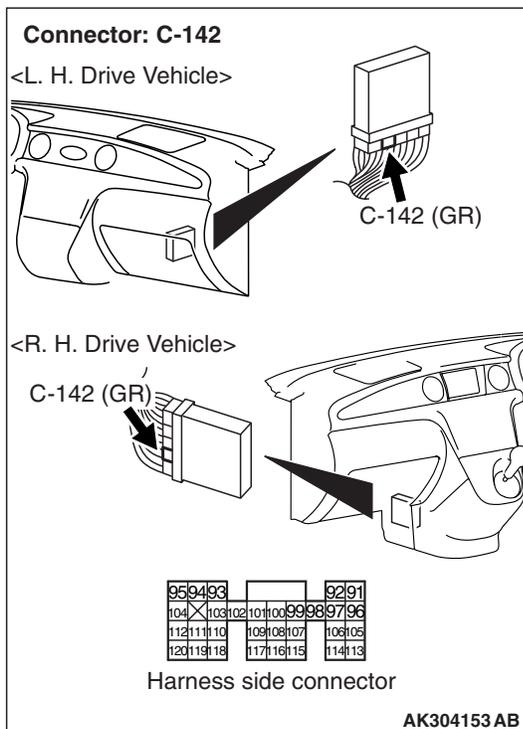
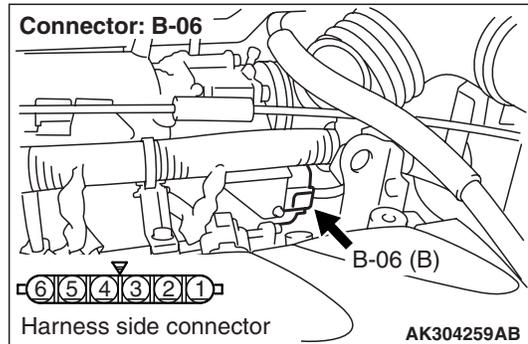
YES : Go to Step 8 .

NO : Repair.

STEP 8. Check harness between B-06 (terminal No. 5) electronically controlled throttle valve connector and C-142 (terminal No. 106) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 9. Check harness between B-06 (terminal No. 6) electronically controlled throttle valve connector and C-142 (terminal No. 113) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for damage.

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

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

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

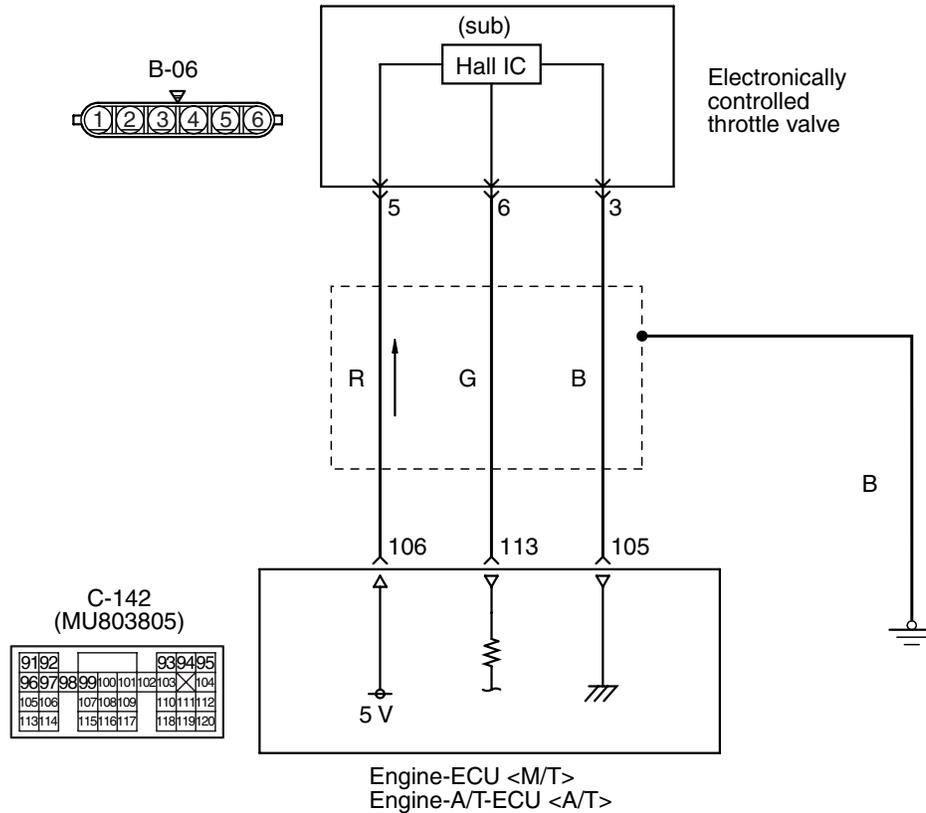
STEP 10. Replace the electronically controlled throttle valve

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

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

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

Throttle position sensor (sub) circuit



Wire colour code

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

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OPERATION

- A power voltage of 5 V is applied to the electronically 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 electronically 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 electronically 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 Conditions**

- Ignition switch is in "ON" position.

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

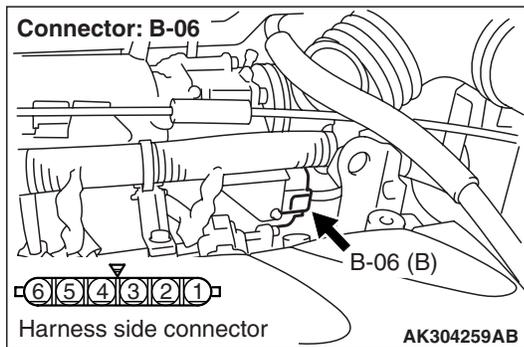
- Refer to Data List Reference Table P.13C-402.
 - Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

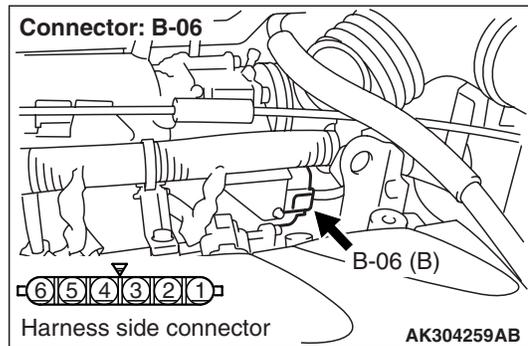


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

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



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

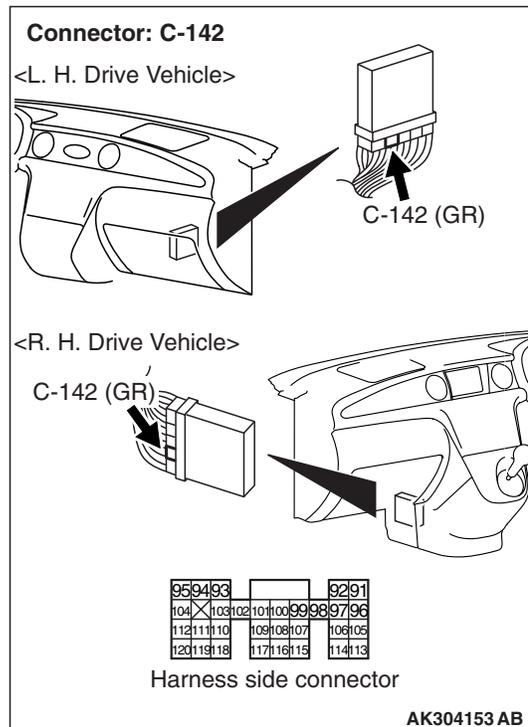
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

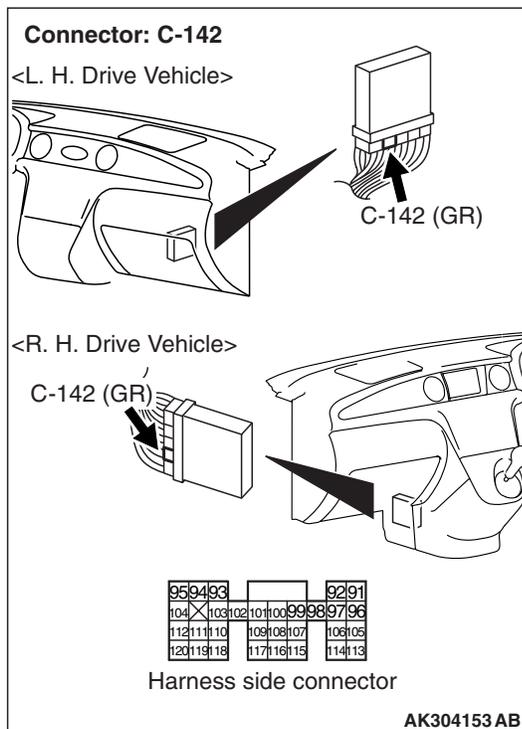
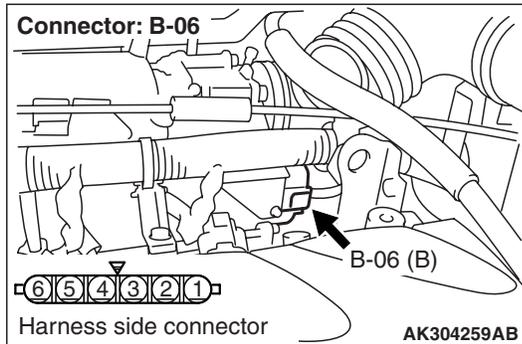


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check harness between B-06 (terminal No. 3) electronically controlled throttle valve connector and C-142 (terminal No. 105) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

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

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

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

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

STEP 7. Replace the electronically controlled throttle valve

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

Q: Is the check result normal?

YES : Check end.

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

Code No. P0300: Random/Multiple Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0201: No. 1 injector system [P.13C-126](#).
- Refer to Code No. P0202: No. 2 injector system [P.13C-131](#).
- Refer to Code No. P0203: No. 3 injector system [P.13C-136](#).
- Refer to Code No. P0204: No. 4 injector system [P.13C-141](#).

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

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

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

Or

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

PROBABLE CAUSE

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

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

DIAGNOSIS PROCEDURE

STEP 1.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.13C-170](#)).

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

- Refer to Data list reference table [P.13C-402](#).

- Item 21: Engine coolant temperature sensor
- Item 81: Long-term fuel compensation
- Item 82: Short-term fuel compensation

Q: Are the check results normal?

YES : Go to Step 3 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code [P.13C-21](#)).

STEP 3. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

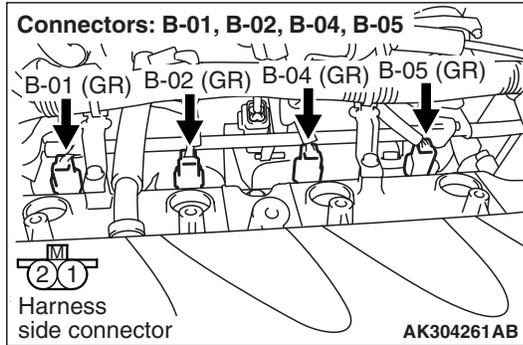
STEP 4. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).

NO : Replace the spark plug.

STEP 5. Connector check: Injector connector

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

Q: Are the check results normal?

- YES :** Go to Step 6 .
NO : Repair.

STEP 6. Check injector itself.

- Check Injector itself (Refer to [P.13C-435](#)).

Q: Is the check result normal?

- YES :** Go to Step 7 .
NO : Replace injector.

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13C-425](#))

Q: Is the check result normal?

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

STEP 8. Check for intake of air from intake hose and inlet manifold.

Q: Is the check result normal?

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

STEP 9. Check for skipped timing belt teeth.

Q: Is the check result normal?

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

STEP 10. 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 <4G69> [P.17-72](#)].

Q: Is the check result normal?

- YES :** Go to Step 11 .
NO : Replace EGR valve (stepper motor)

STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?

- YES :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

Code No. P0301: No. 1 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0201: No. 1 Injector System [P.13C-126](#).

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

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

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

Or

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

- YES :** Go to Step 3 .
- NO :** Go to Step 2 .

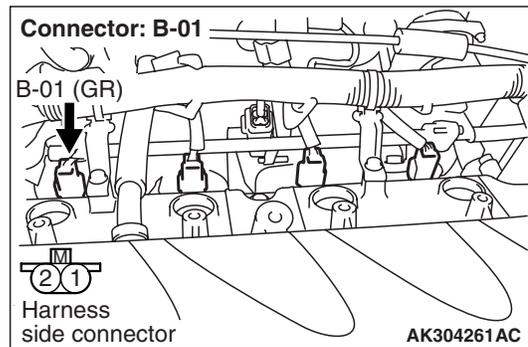
STEP 2. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

- YES :** Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).
- NO :** Replace the spark plug.

STEP 3. Connector check: B-01 No. 1 injector connector



Q: Is the check result normal?

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

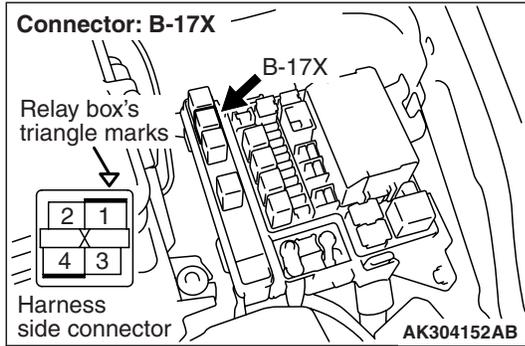
STEP 4. Check No. 1 injector itself.

- Check Injector itself (Refer to [P.13C-435](#)).

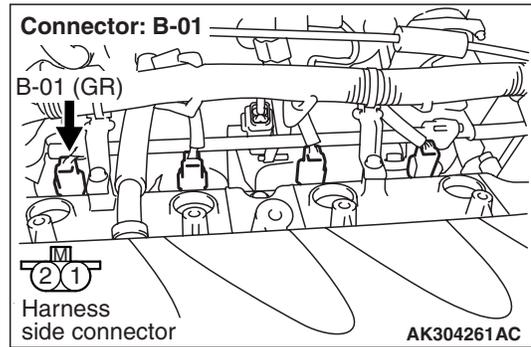
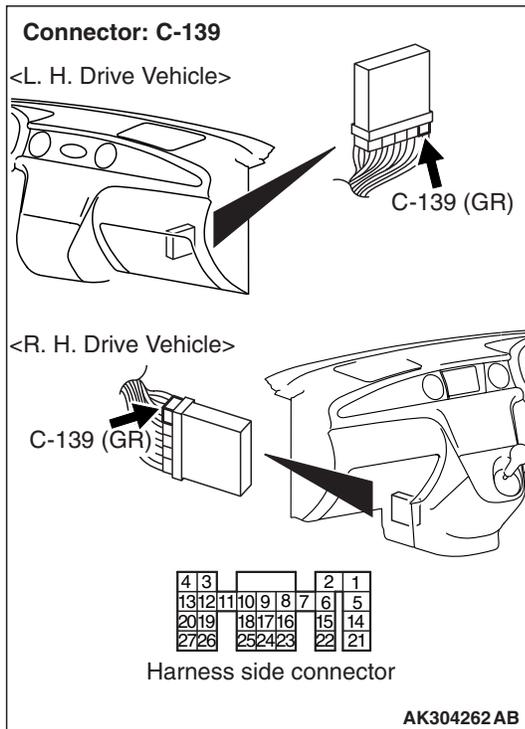
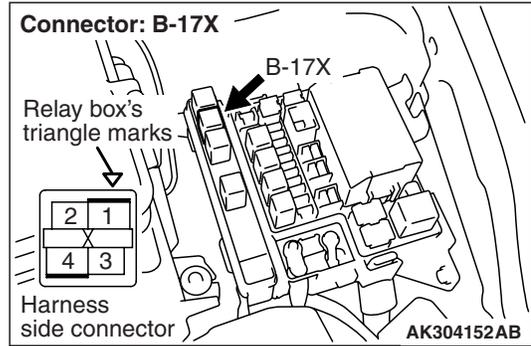
Q: Is the check result normal?

- YES :** Go to Step 5 .
- NO :** Replace No. 1 injector.

STEP 5. Connector check: B-17X engine control relay connector and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 6. Check harness between B-17X (terminal No. 1) engine control relay connector and B-01 (terminal No. 1) No. 1 injector connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

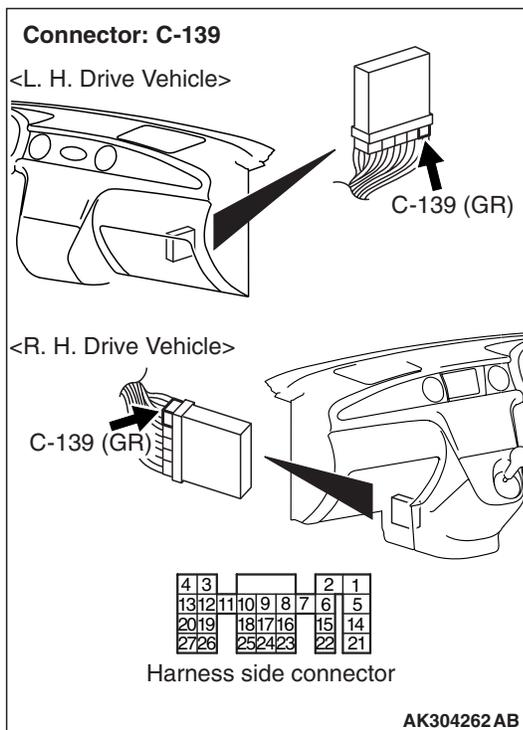
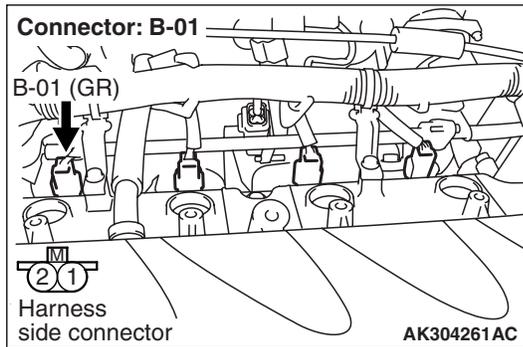
NO : Repair.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 7. Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-139 (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 8 .
NO : Repair.

STEP 8. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test [P.13C-425](#)).

Q: Is the check result normal?

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

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?

- YES :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

Code No. P0302: No. 2 Cylinder Misfire Detected**OPERATION**

- Refer to Code No. P0202 No. 2 Injector System P.13C-131.

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

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

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

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

Or

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

PROBABLE CAUSE

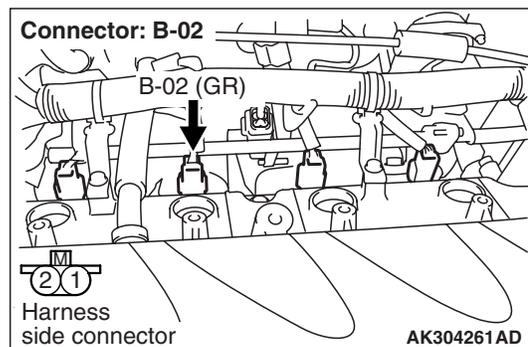
- Ignition system related part(s) failed
- Low compression pressure
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. Visual check of ignition spark.**

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?**YES** : Go to Step 3 .**NO** : Go to Step 2 .**STEP 2. Check spark plug.**

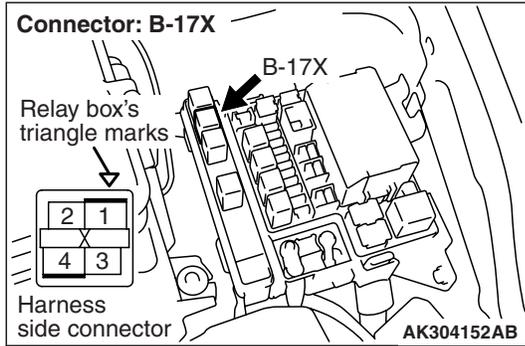
- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-40).

Q: Is the check result normal?**YES** : Check ignition circuit system (Refer to Inspection Procedure 31 P.13C-388).**NO** : Replace the spark plug.**STEP 3. Check connector: B-02 No. 2 injector connector****Q: Is the check result normal?****YES** : Go to Step 4 .**NO** : Repair.**STEP 4. Check No. 2 injector itself.**

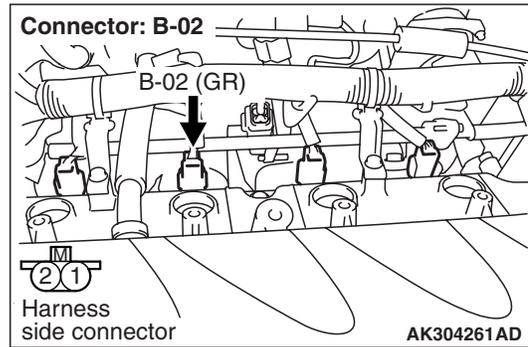
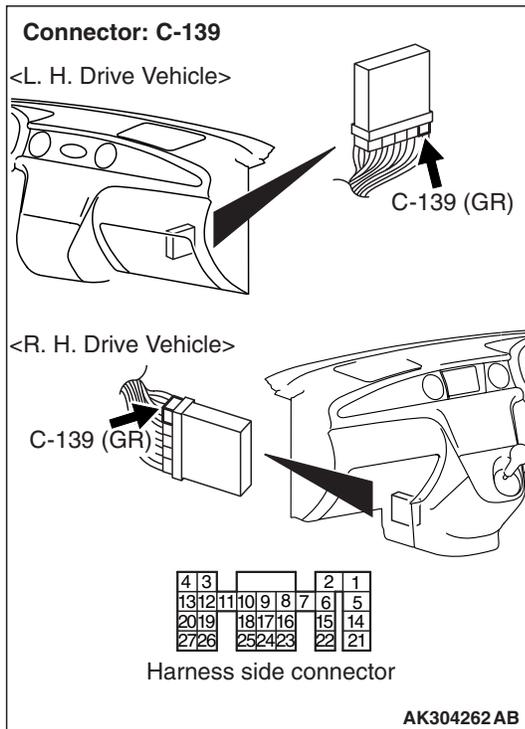
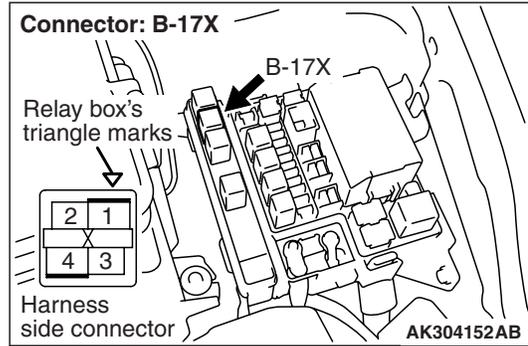
- Check Injector itself (Refer to P.13C-435).

Q: Is the check result normal?**YES** : Go to Step 5 .**NO** : Replace No. 2 injector.

STEP 5. Connector check: B-17X engine control relay connector and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 6. Check harness between B-17X (terminal No. 1) engine control relay connector and B-02(terminal No. 1) No. 2 injector connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

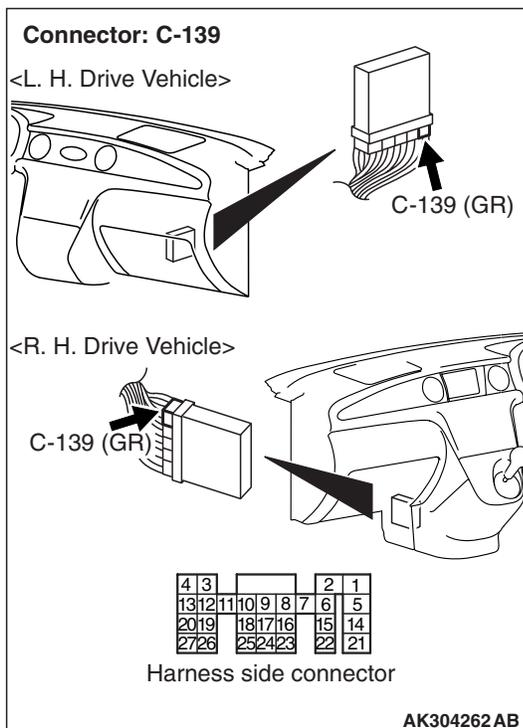
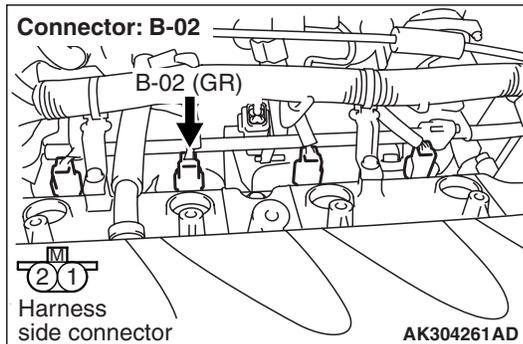
NO : Repair.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 7. Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-139 (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 8 .
NO : Repair.

STEP 8. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test [P.13C-425](#))

Q: Is the check result normal?

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

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?

- YES** : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

Code No. P0303: No. 3 Cylinder Misfire Detected

OPERATION

- Refer to Code No. P0203 No. 3 Injector System P.13C-136.

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

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

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

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

Or

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

- YES :** Go to Step 3 .
- NO :** Go to Step 2 .

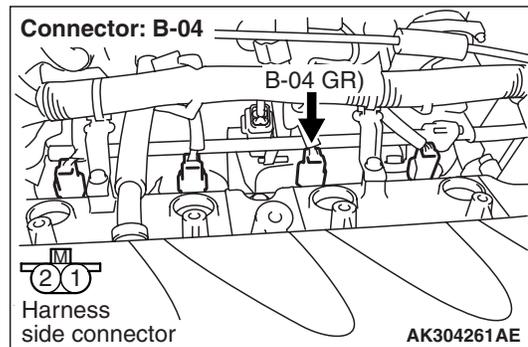
STEP 2. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-40).

Q: Is the check result normal?

- YES :** Check ignition circuit system (Refer to Inspection Procedure 31 P.13C-388).
- NO :** Replace the spark plug.

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



Q: Is the check result normal?

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

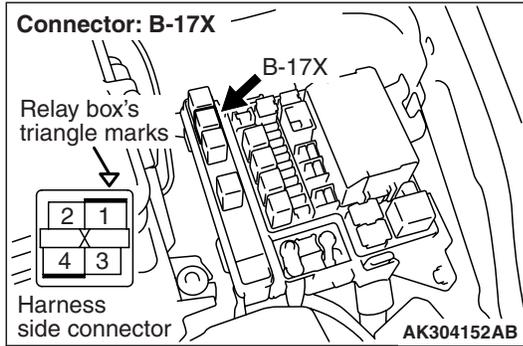
STEP 4. Check No. 3 injector itself.

- Check Injector itself (Refer to P.13C-435).

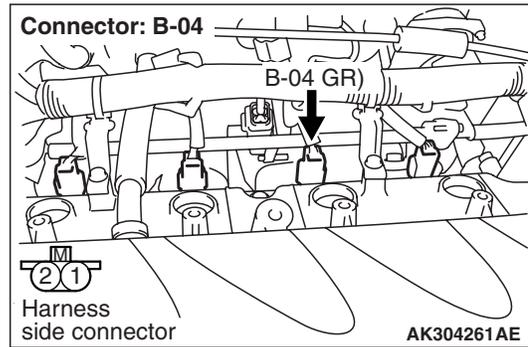
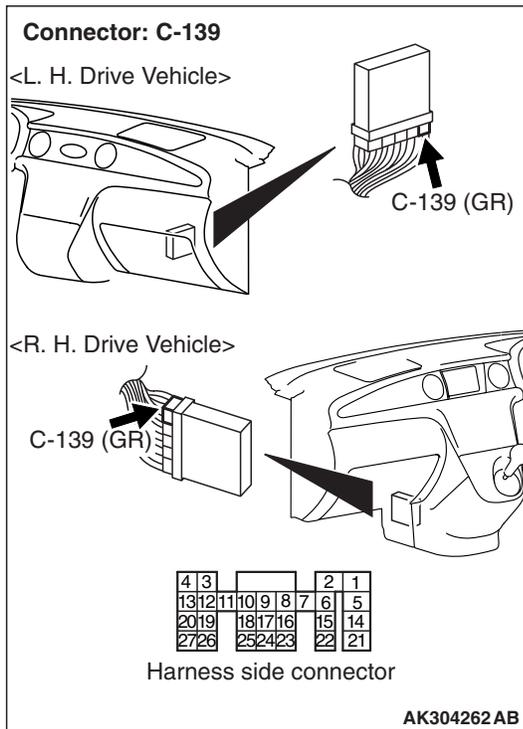
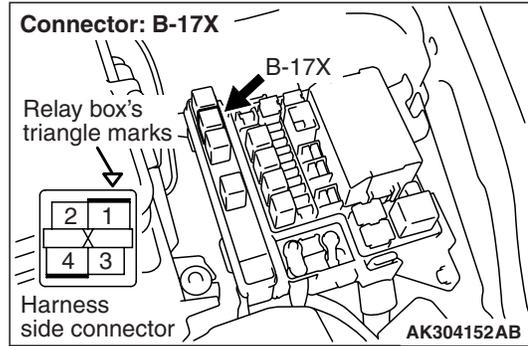
Q: Is the check result normal?

- YES :** Go to Step 5 .
- NO :** Replace No. 3 injector.

STEP 5. Connector check: B-17X engine control relay connector and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 6. Check harness between B-17X (terminal No. 1) engine control relay connector and B-04 (terminal No. 1) No. 3 injector connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

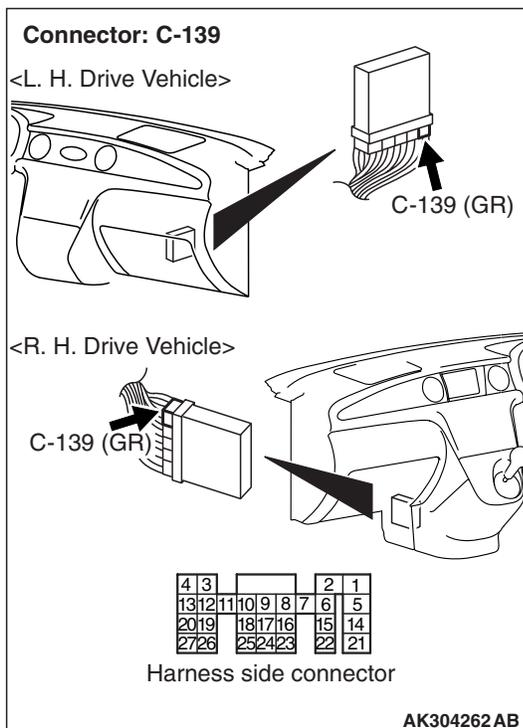
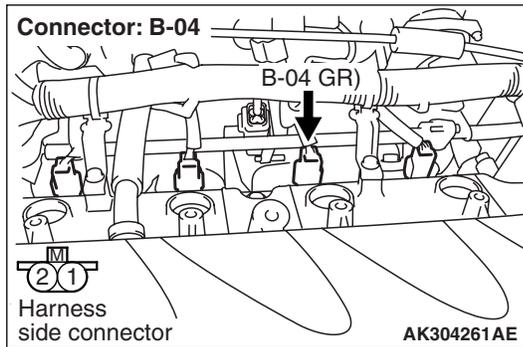
NO : Repair.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 7. Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-139 (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 8 .
NO : Repair.

STEP 8. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test [P.13C-425](#))

Q: Is the check result normal?

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

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?

- YES :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

Code No. P0304: No. 4 Cylinder Misfire Detected**OPERATION**

- Refer to Code No. P0204 No. 4 Injector System [P.13C-141](#).

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

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

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

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

Or

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE**STEP 1. Visual check of ignition spark.**

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

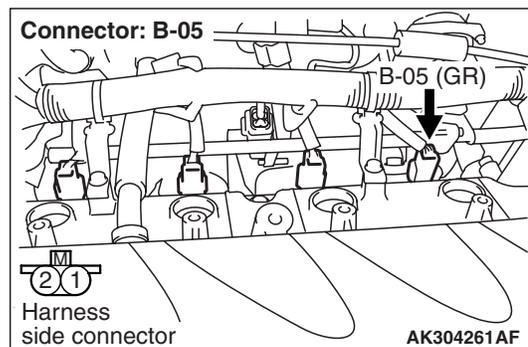
- YES** : Go to Step 3 .
NO : Go to Step 2 .

STEP 2. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

- YES** : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).
NO : Replace the spark plug.

STEP 3. Connector check: B-05 No. 4 injector connector**Q: Is the check result normal?**

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

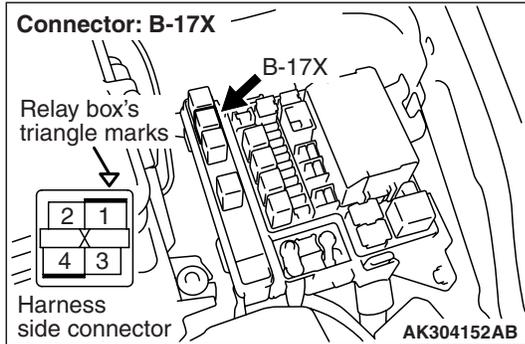
STEP 4. Check No. 4 injector itself.

- Check Injector itself (Refer to [P.13C-435](#)).

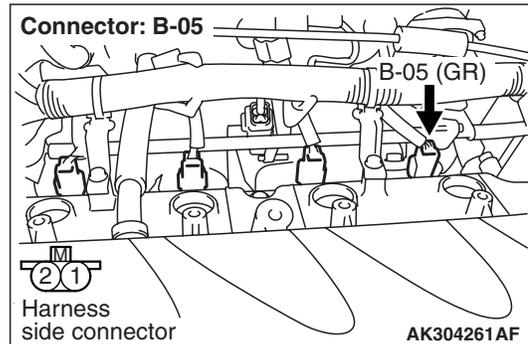
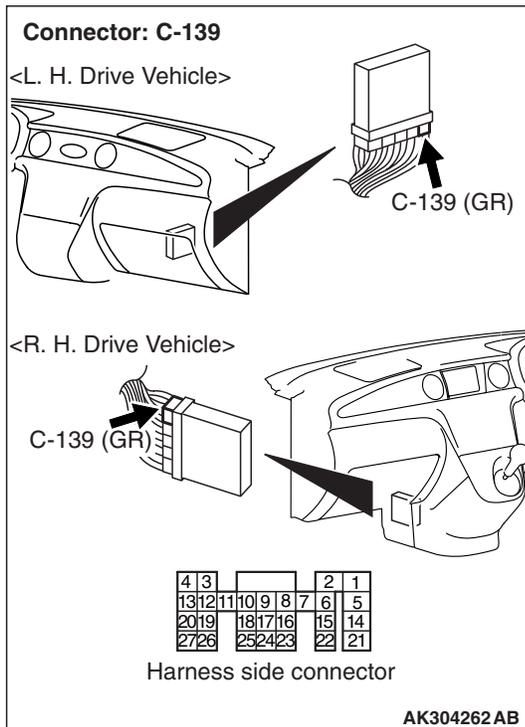
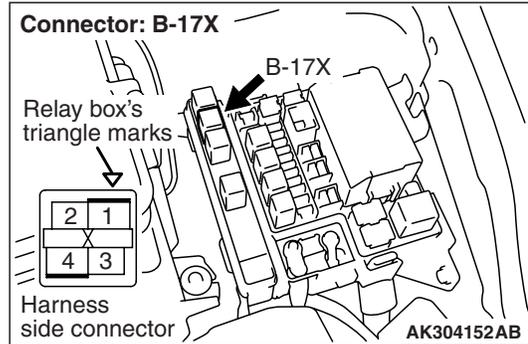
Q: Is the check result normal?

- YES** : Go to Step 5 .
NO : Replace No. 4 injector.

STEP 5. Connector check: B-17X engine control relay connector and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 6. Check harness between B-17X (terminal No. 1) engine control relay connector and B-05 (terminal No. 1) No. 4 injector connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

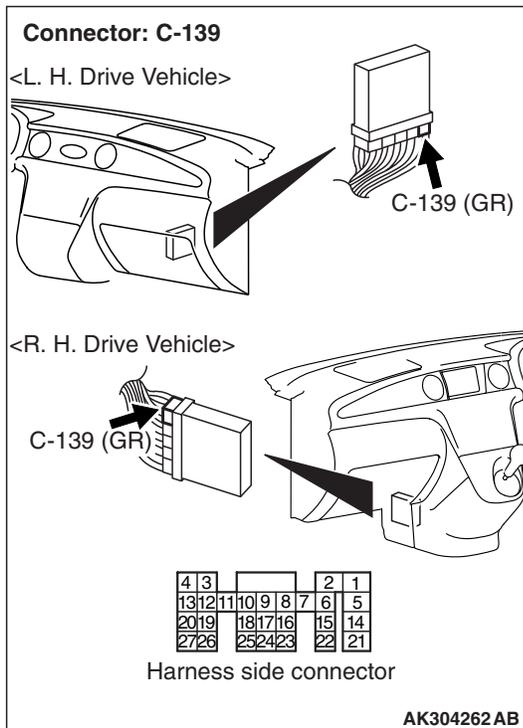
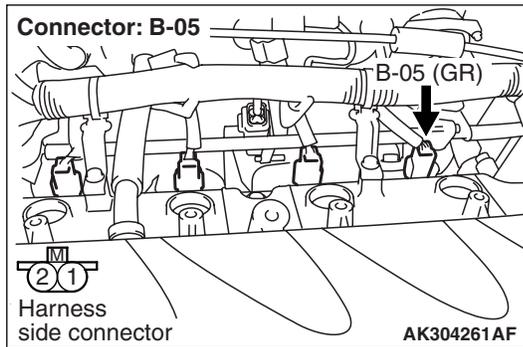
NO : Repair.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 7. Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-139 (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 8 .
- NO :** Repair.

STEP 8. Fuel pressure measurement.

- Fuel pressure measurement (Refer to Fuel Pressure Test [P.13C-425](#))

Q: Is the check result normal?

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

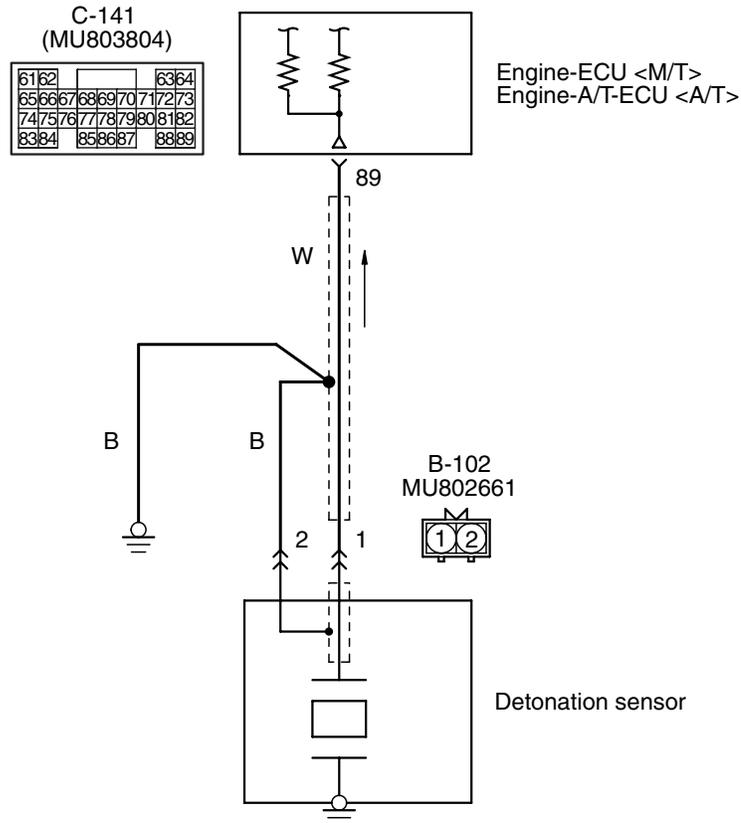
STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?

- YES :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- NO :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

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

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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

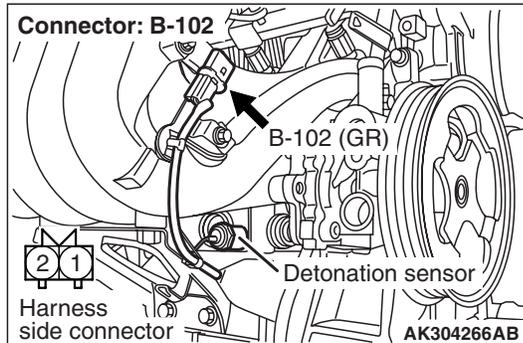
- After 2 seconds have passed since the engine starting sequence was completed.
- Engine speed is 2,500 r/min or higher.

Judgment Criteria

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

PROBABLE CAUSE

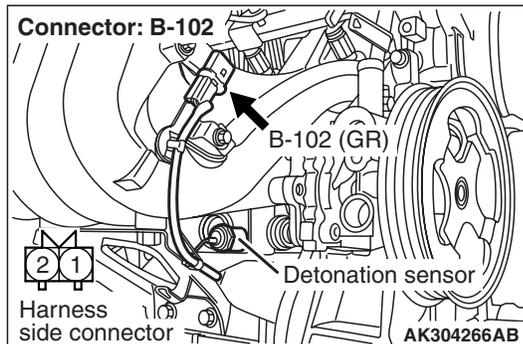
- Failed detonation sensor
- Open/short circuit in detonation sensor circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

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

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

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

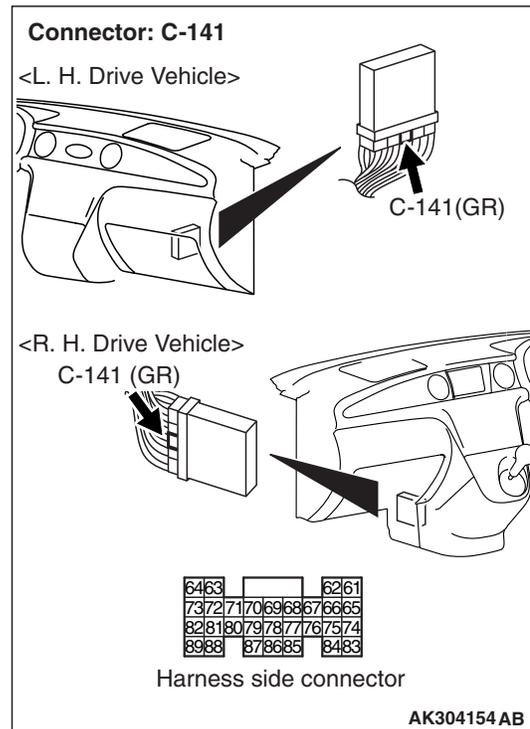
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 2 and earth.
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 3 .

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

- Check earthing line for open circuit and damage.

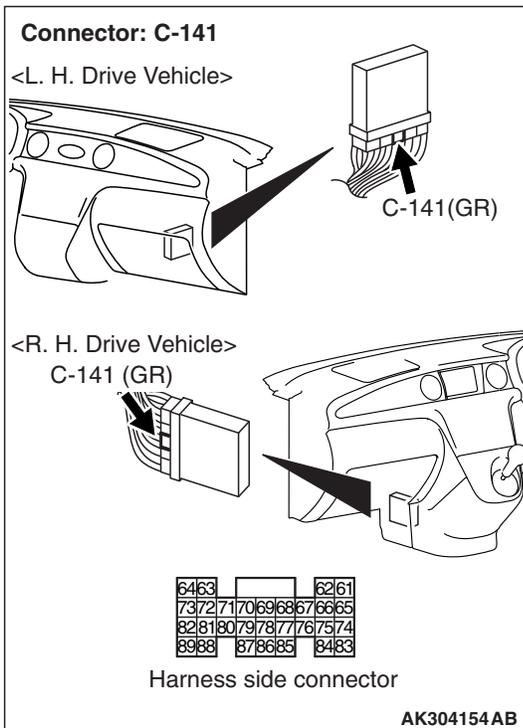
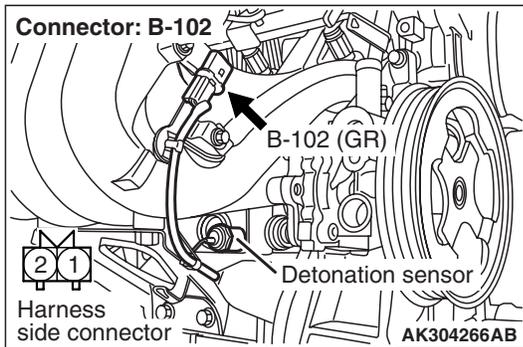
STEP 3. Connector check: C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

STEP 4. Check harness between B-102 (terminal No. 1) detonation sensor connector and C-141 (terminal No. 89) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

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

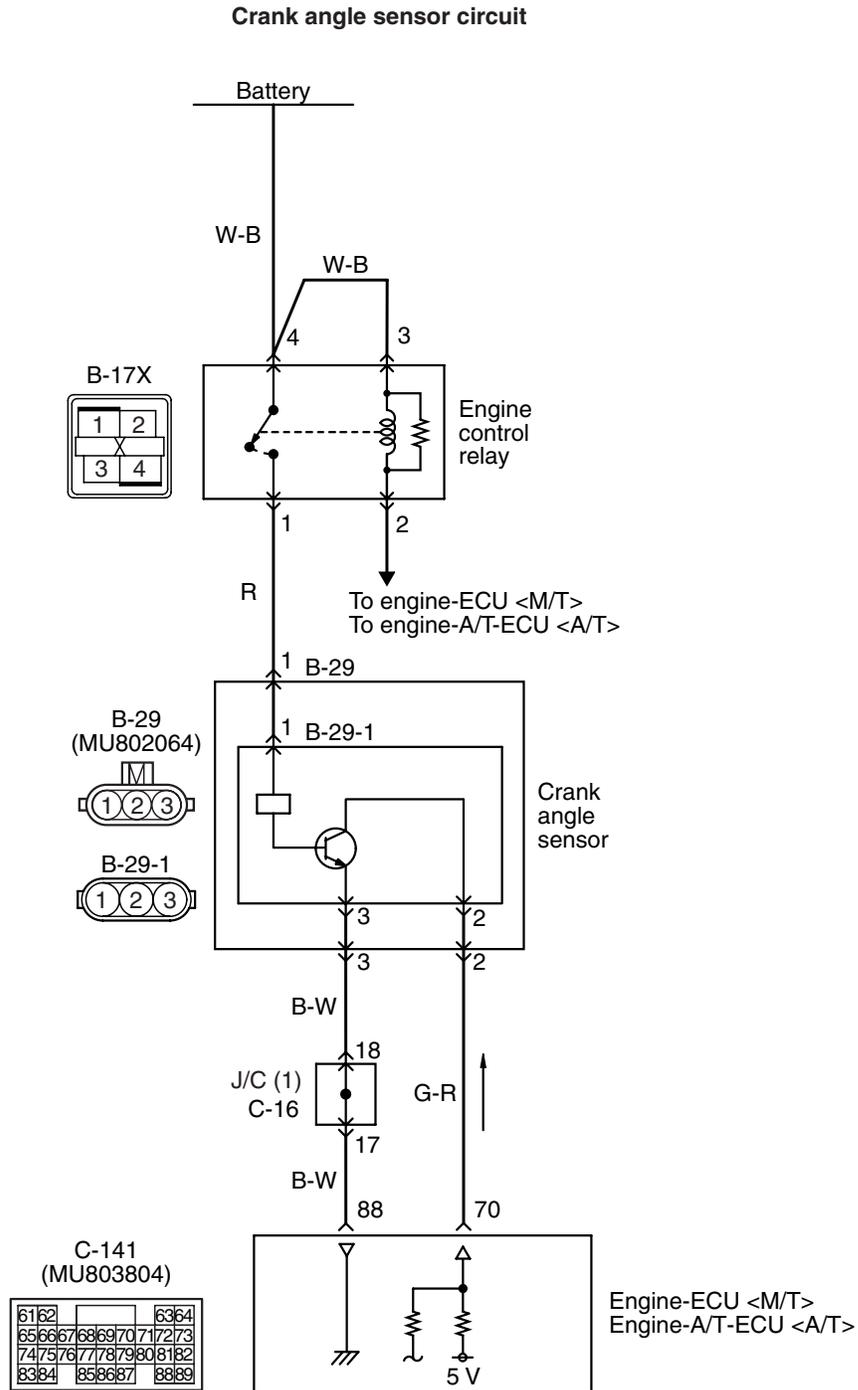
STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Go to Step 6 .
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 6. Replace detonation sensor.

- After replacing the detonation sensor, re-check the trouble symptoms.
- Q: Does trouble symptom persist?**
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Check end.

Code No. P0335: Crank Angle Sensor System



Wire colour code

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

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- While engine is being cranked.

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

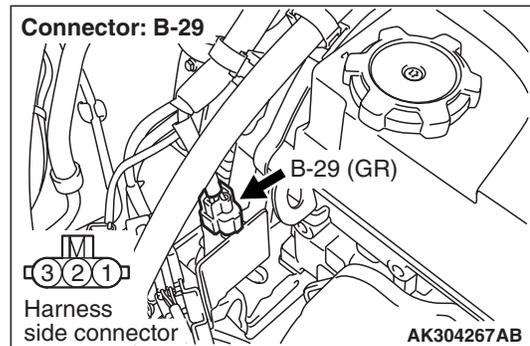
- Refer to Data List Reference Table [P.13C-402](#).
 - Item 22: Crank angle sensor

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

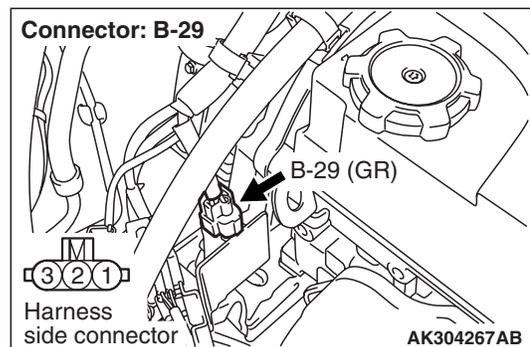


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

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



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

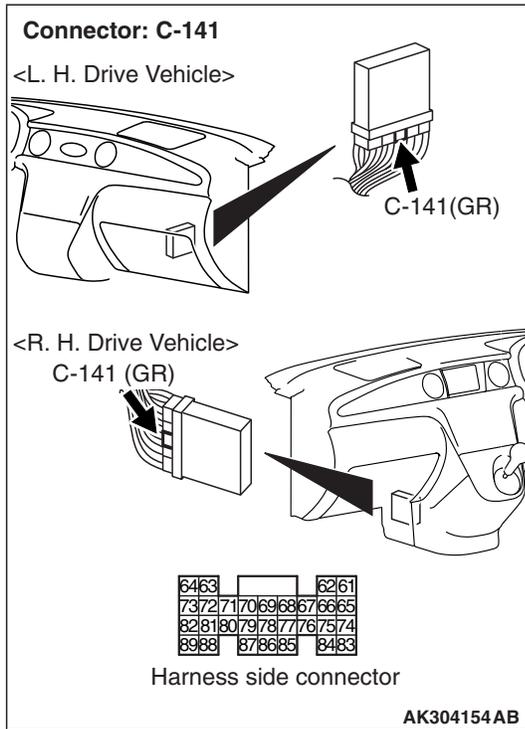
OK: 4.9 – 5.1 V

Q: Is the check result normal?

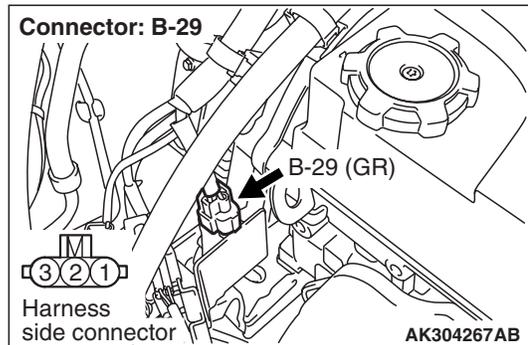
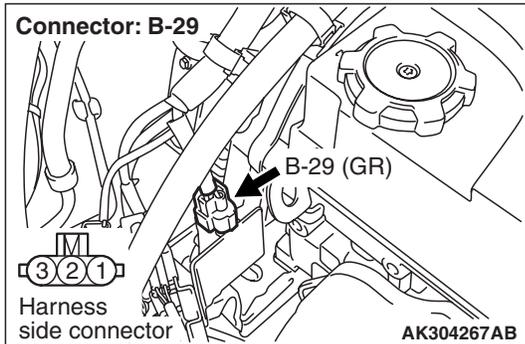
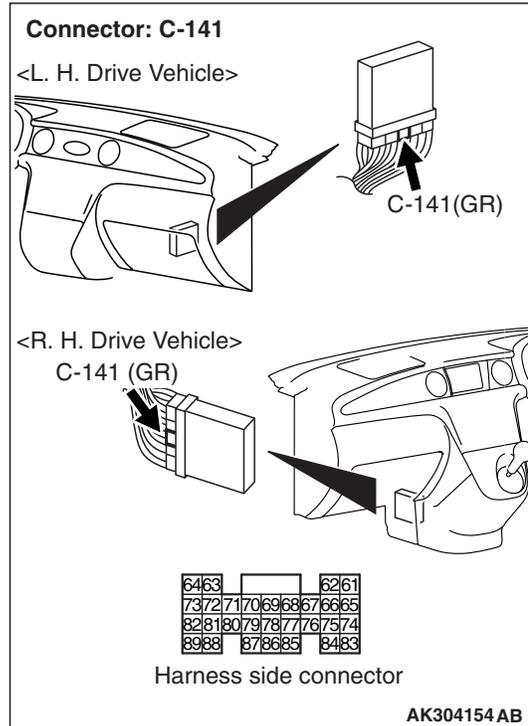
YES : Go to Step 9 .

NO : Go to Step 4 .

STEP 4. Perform voltage measurement at C-141 engine-ECU connector.



STEP 5. Connector check: C-141 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-29 crank angle sensor intermediate connector.
- Ignition switch: ON
- Voltage between terminal No. 70 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?

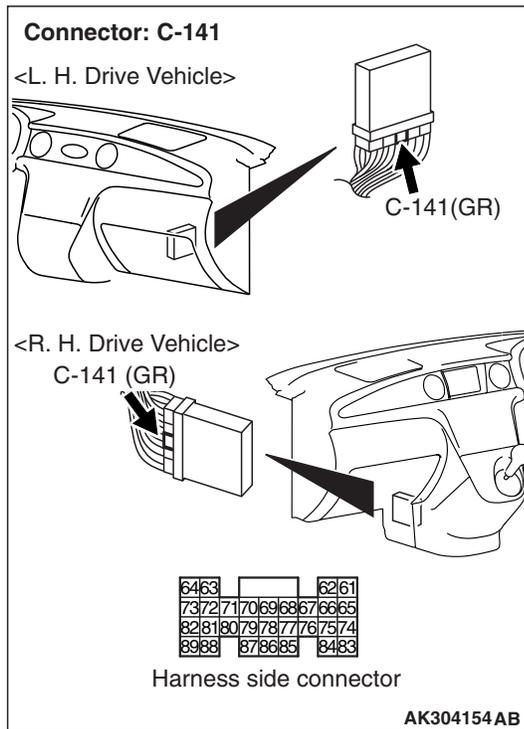
- YES :** Go to Step 5 .
- NO :** Go to Step 6 .

Q: Is the check result normal?

- YES :** Check and repair harness between B-29 (terminal No. 2) crank angle sensor intermediate connector and C-141 (terminal No. 70) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check output line for open circuit.

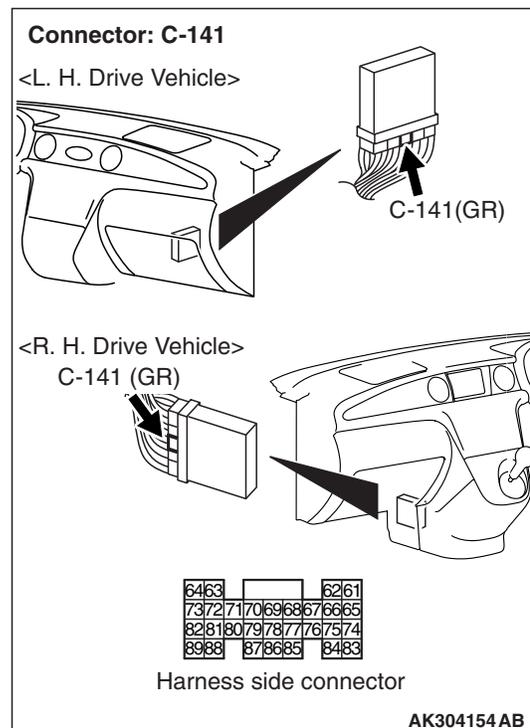
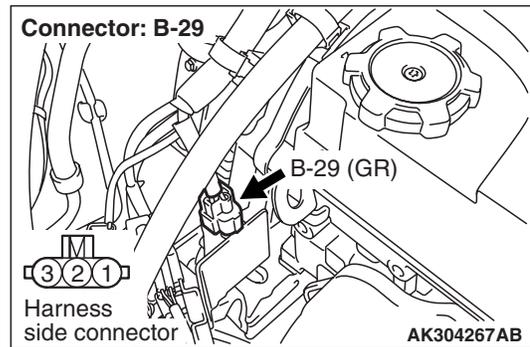
NO : Repair.

STEP 6. Connector check: C-141 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.

STEP 7. Check harness between B-29 (terminal No. 2) crank angle sensor intermediate connector and C-141 (terminal No. 70) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



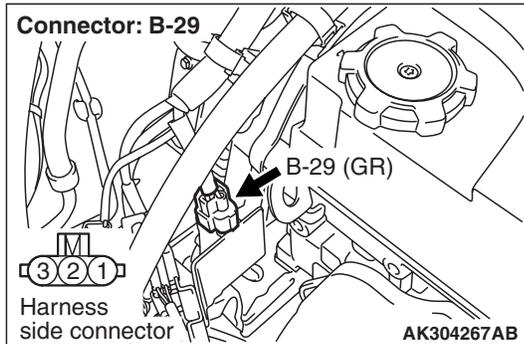
- Check output line for short circuit.

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

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

- Refer to Data List Reference Table [P.13C-402](#).
a. Item 22: Crank angle sensor

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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

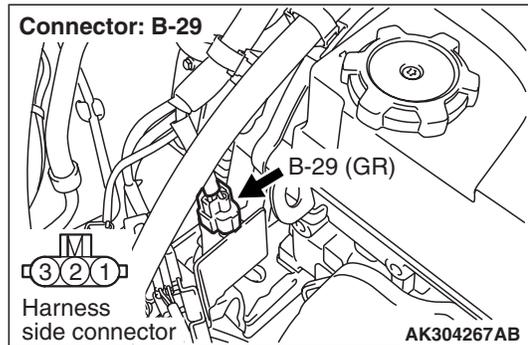
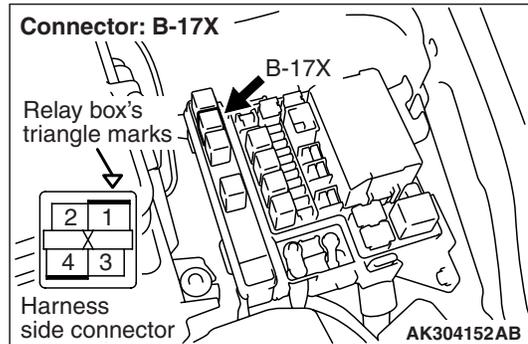
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 10 .

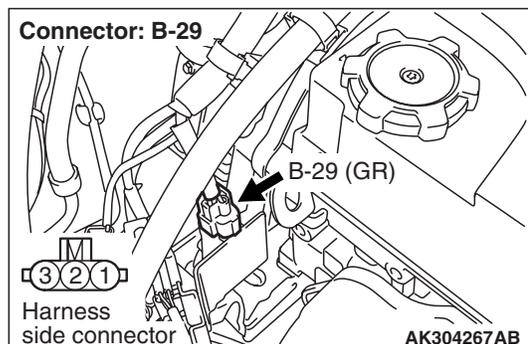
STEP 10. Connector check: B-17X engine control relay connector

Q: Is the check result normal?

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

- Check power supply line for open/short circuit.

NO : Repair.

STEP 11. Perform resistance measurement at B-29 crank angle sensor intermediate connector.

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

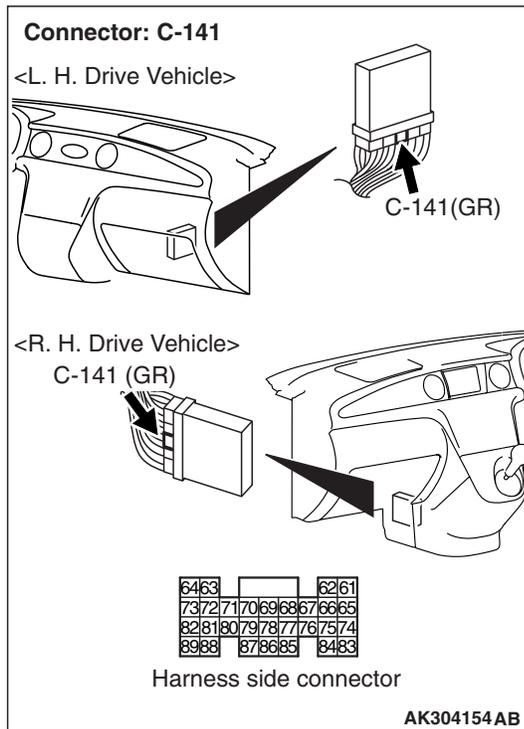
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 14 .

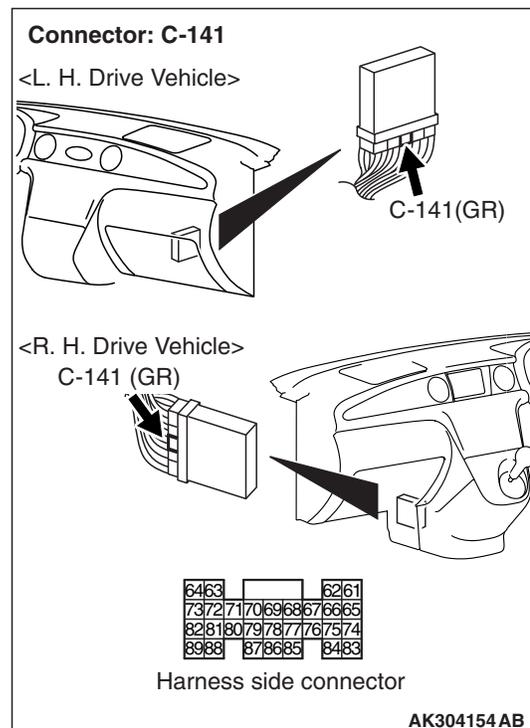
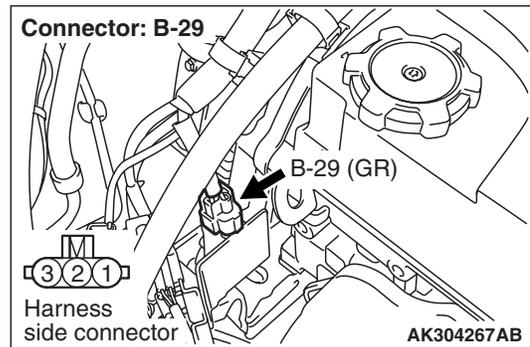
NO : Go to Step 12 .

STEP 12. Connector check: C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 13. Check harness between B-29 (terminal No. 3) crank angle sensor intermediate connector and C-141 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

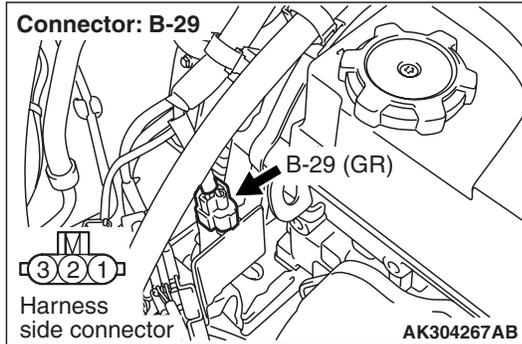


NOTE: Before checking harness, check intermediate connector C-16, and repair if necessary.

- Check earthing line for open circuit and damage.

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

STEP 14. Perform output wave pattern measurement at B-29 crank angle sensor 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.

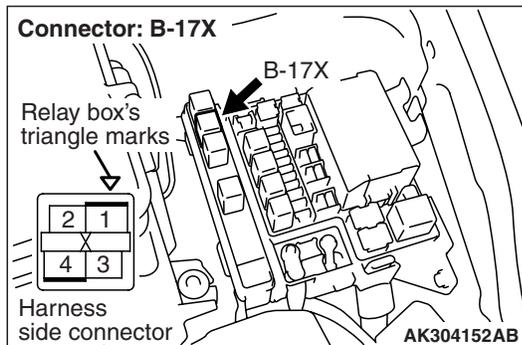
OK: Waveforms should be displayed on inspection procedure using an oscilloscope (Refer to P.13C-419), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 15 .

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

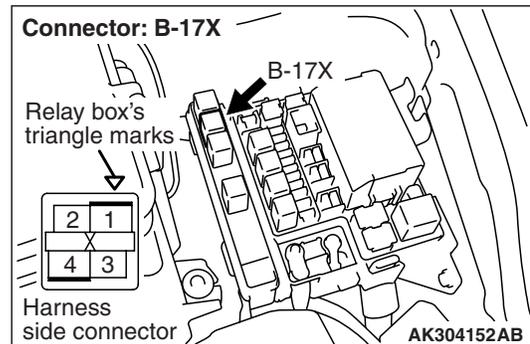
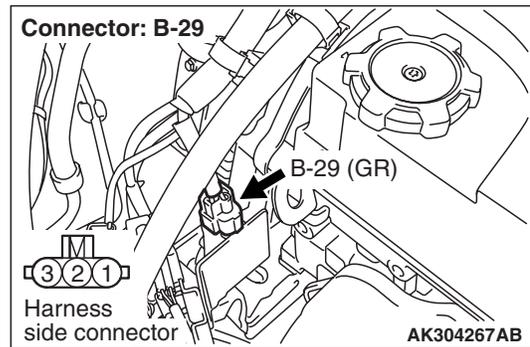


Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair.

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



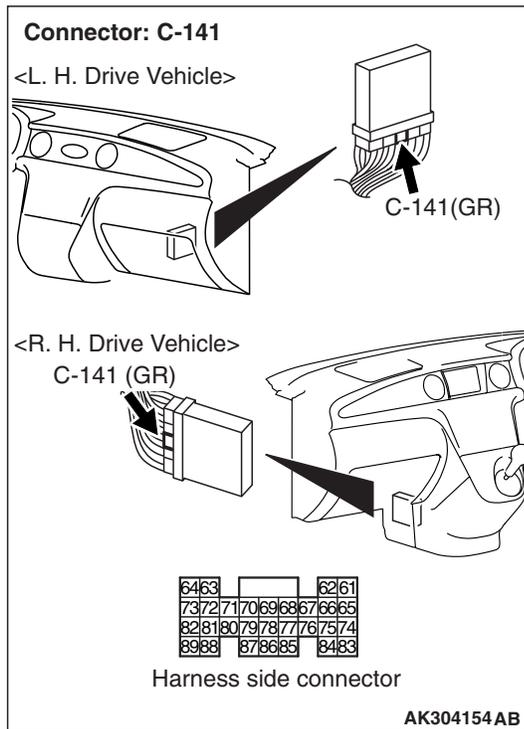
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 17 .

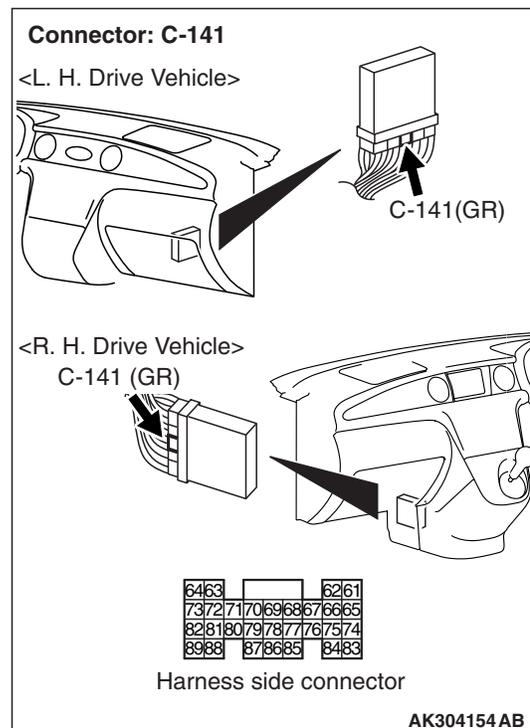
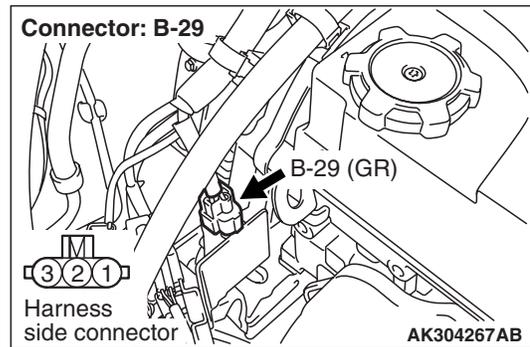
NO : Repair.

STEP 17. Connector check: C-141 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.

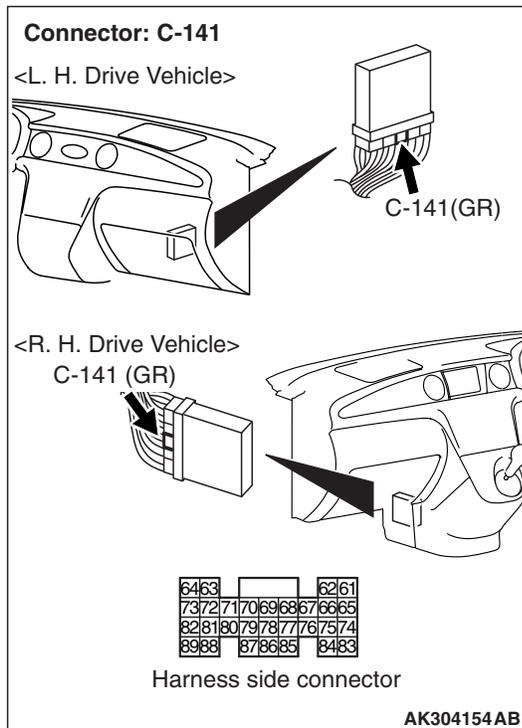
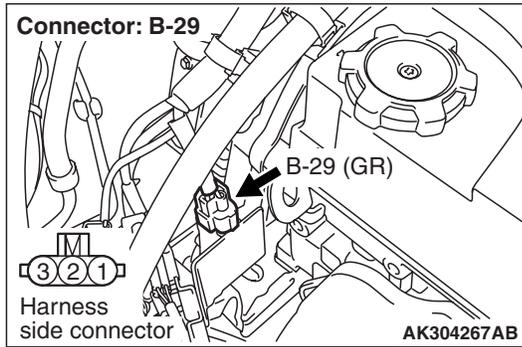
STEP 18. Check harness between B-29 (terminal No. 2) crank angle sensor intermediate connector and C-141 (terminal No. 70) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for damage.

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

STEP 19. Check harness between B-29 (terminal No. 3) crank angle sensor intermediate connector and C-141 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



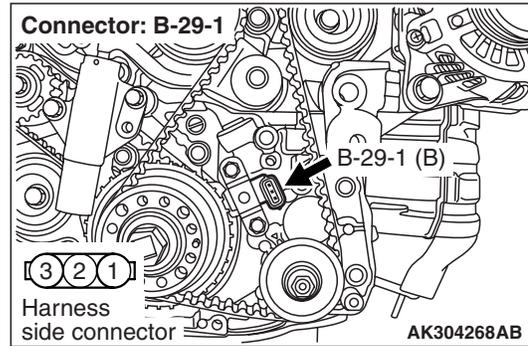
NOTE: Before checking harness, check intermediate connector C-16, and repair if necessary.

- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 20 .
NO : Repair.

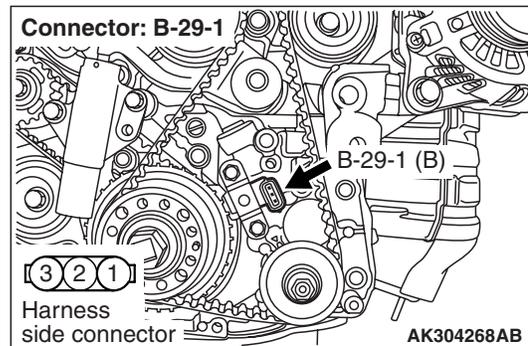
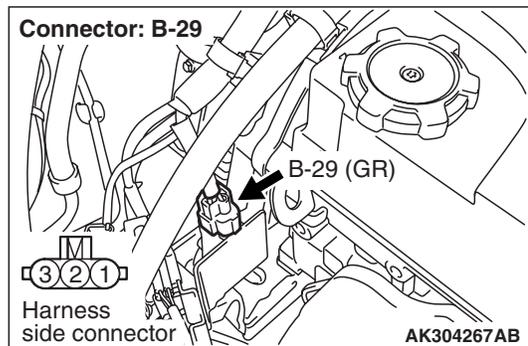
STEP 20. Connector check: B-29-1 crank angle sensor intermediate connector



Q: Is the check result normal?

YES : Go to Step 21 .
NO : Repair.

STEP 21. Check harness between B-29 crank angle sensor intermediate connector and B-29-1 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.13C-402](#).
 - a. Item 22: Crank angle sensor

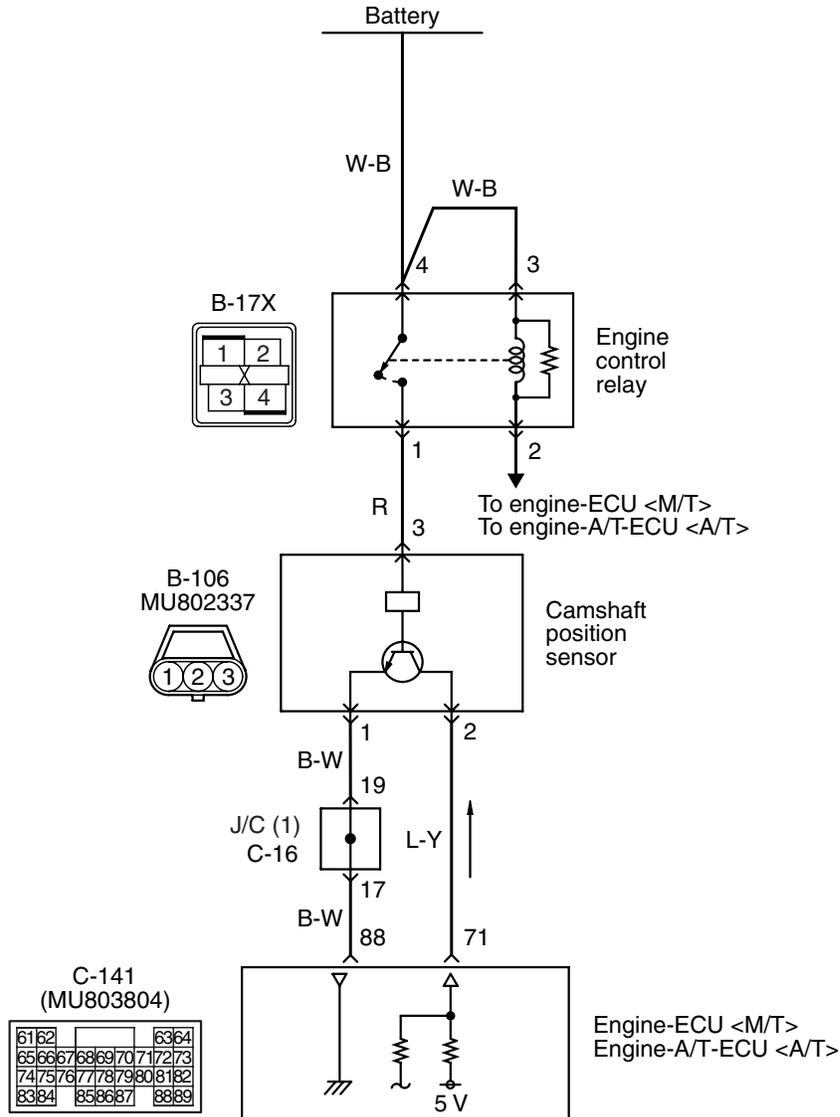
Q: Is the check result normal?

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

NO : Replace crank angle sensor.

Code No. P0340: Camshaft Position Sensor System

Camshaft position sensor circuit



Wire colour code

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

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OPERATION

- Power is supplied to the camshaft position sensor (terminal No. 3) from the engine control relay (terminal No. 1) and is earthed to the engine-ECU <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 Conditions

- Engine speed is 50 r/min or higher.

Judgment Criteria

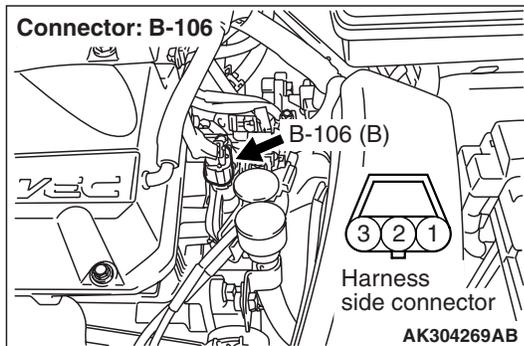
- Camshaft position sensor output voltage has not been changed (no pulse signal is has been input) for 2 seconds.

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

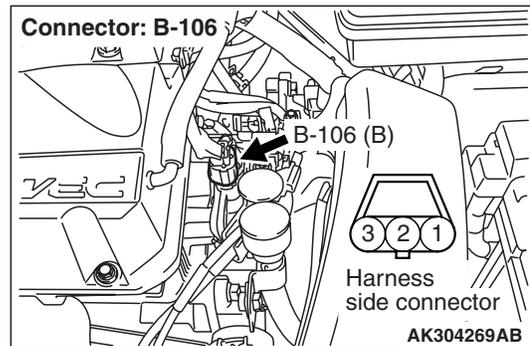
STEP 1. Connector check: B-106 camshaft position sensor connector



Q: Is the check result normal?

- YES** : Go to Step 2 .
NO : Repair.

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

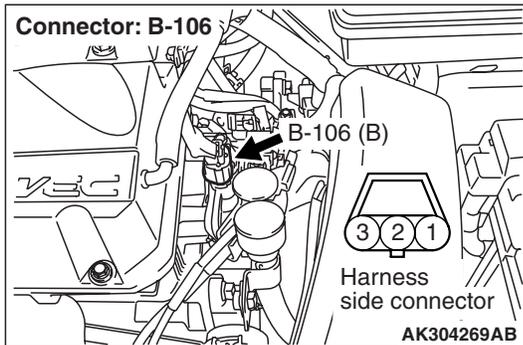
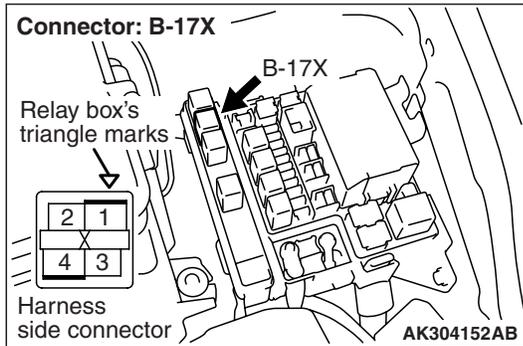


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?

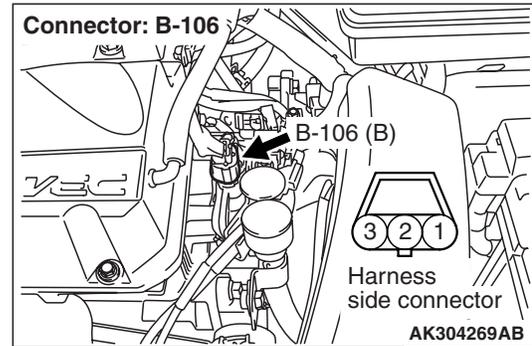
- YES** : Go to Step 4 .
NO : Go to Step 3 .

STEP 3. Connector check: B-17X engine control relay connector**Q: Is the check result normal?**

YES : Check and repair harness between B-106 (terminal No. 3) camshaft position sensor connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair.

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

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

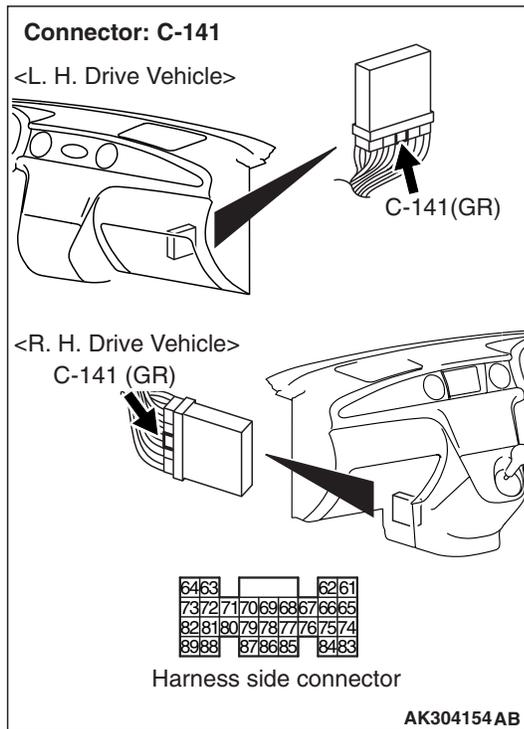
OK: 4.9 – 5.1 V

Q: Is the check result normal?

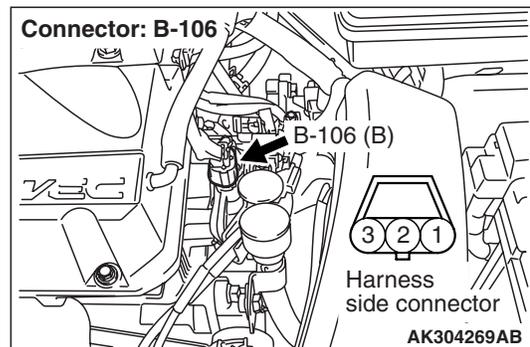
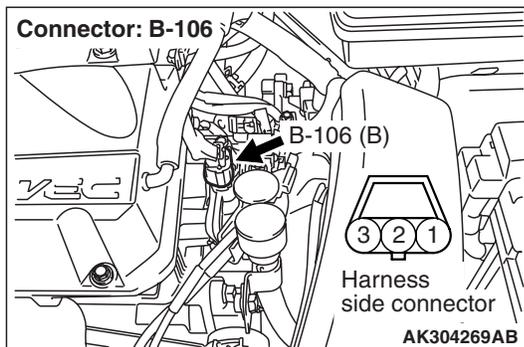
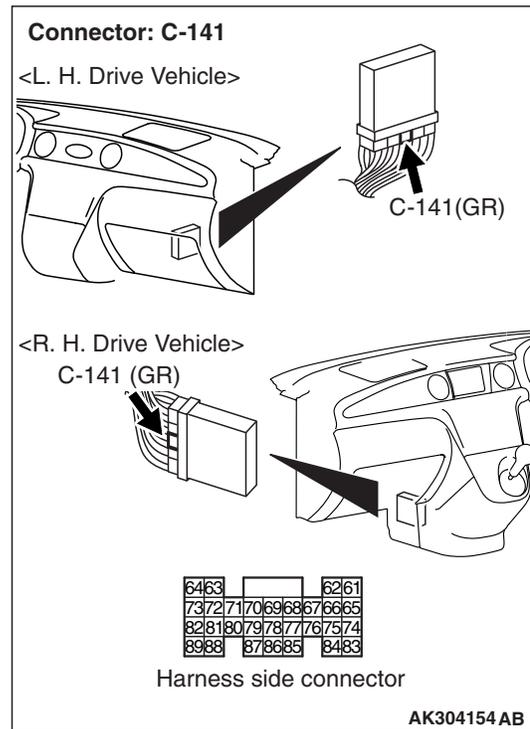
YES : Go to Step 10 .

NO : Go to Step 5 .

STEP 5. Perform voltage measurement at C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 6. Connector check: C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Disconnect B-106 camshaft position sensor connector.
- Ignition switch: ON
- Voltage between terminal No. 71 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 7 .

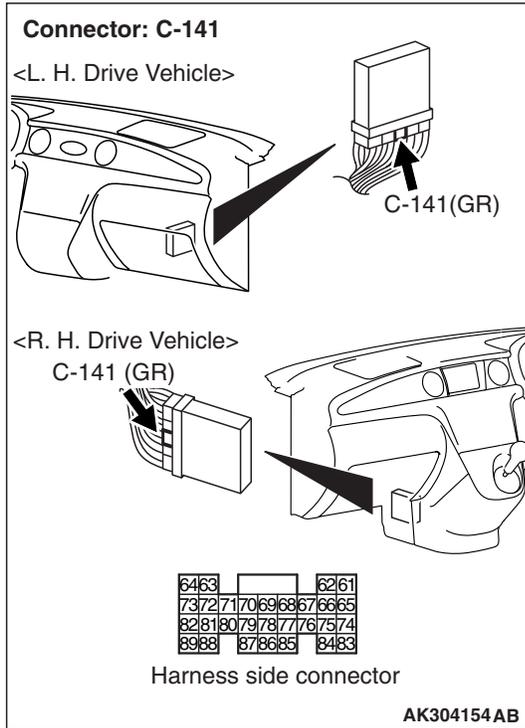
Q: Is the check result normal?

YES : Check and repair harness between B-106 (terminal No. 2) camshaft position sensor connector and C-141 (terminal No. 71) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

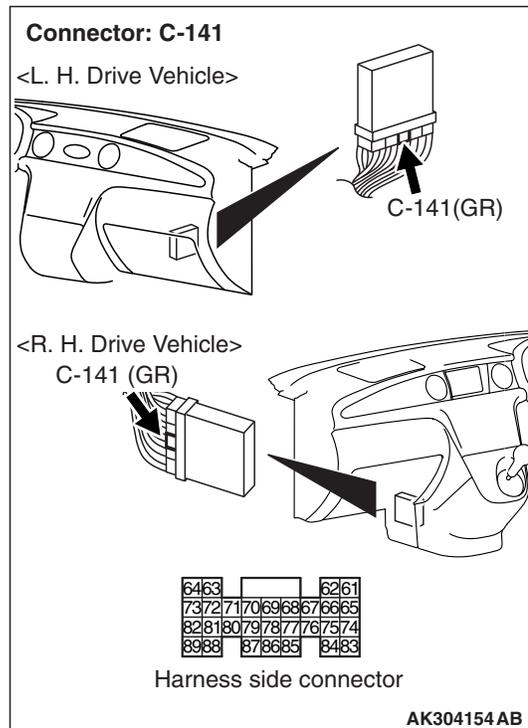
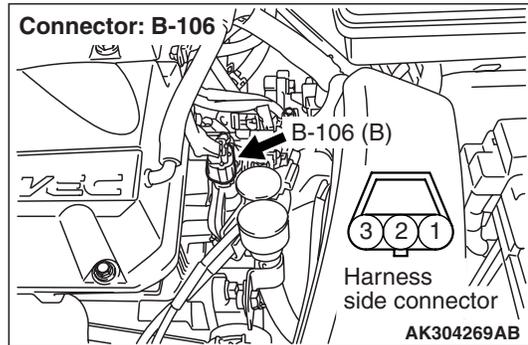
NO : Repair.

STEP 7. Connector check: C-141 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.

STEP 8. Check harness between B-106 (terminal No. 2) camshaft position sensor connector and C-141 (terminal No. 71) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



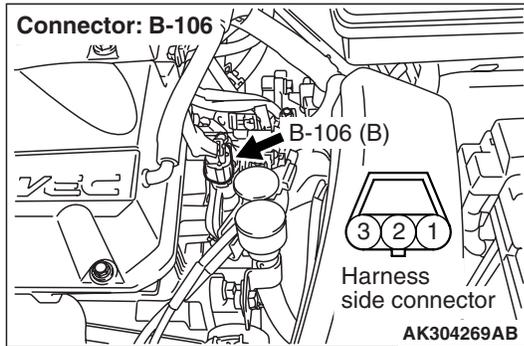
- Check output line for short circuit.

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

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 10. Perform resistance measurement at B-106 camshaft position sensor connector.

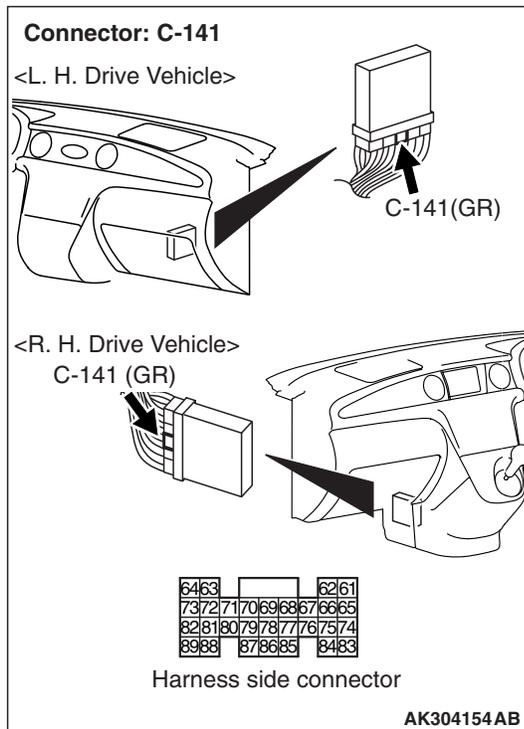


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

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

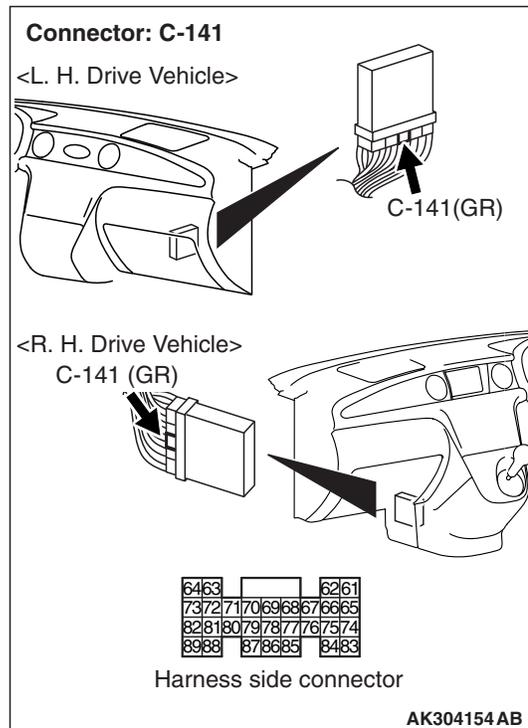
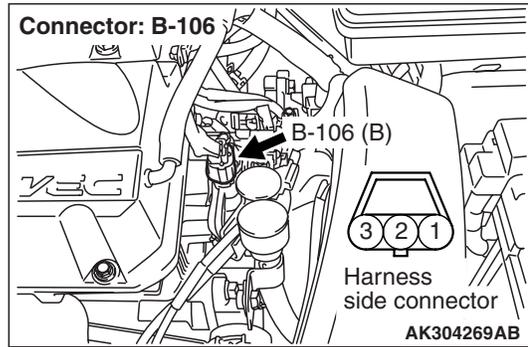
STEP 11. Connector check: C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

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

STEP 12. Check harness between B-106 (terminal No. 1) camshaft position sensor connector and C-141 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



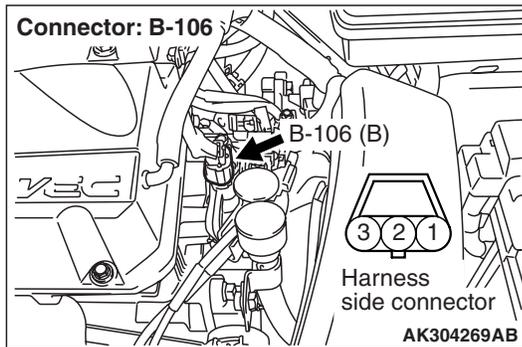
NOTE: Before checking harness, check intermediate connector C-16, and repair if necessary.

- Check earthing line for open circuit and damage.

Q: Is the check result normal?

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

STEP 13. Perform output wave pattern measurement at B-106 camshaft position sensor connector (Using an oscilloscope).



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

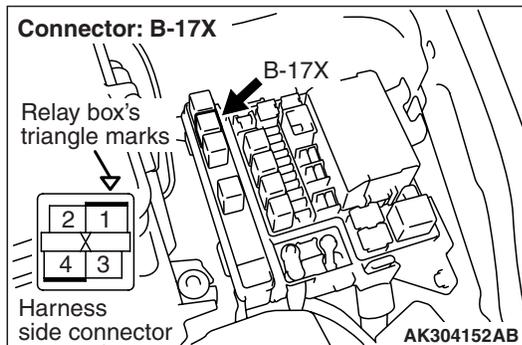
OK: Waveforms should be displayed on inspection procedure using an oscilloscope (Refer to P.13C-419), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 14 .

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

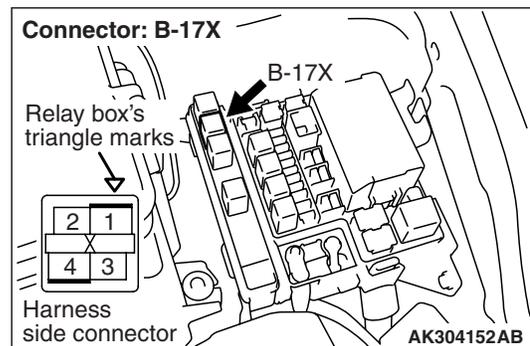
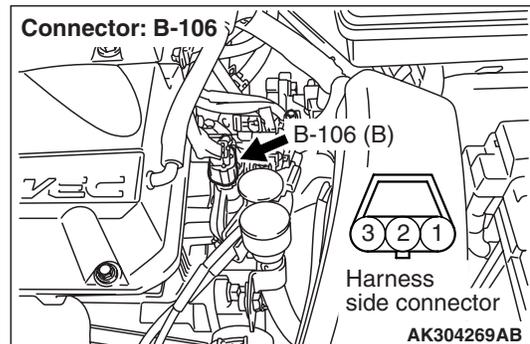


Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

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



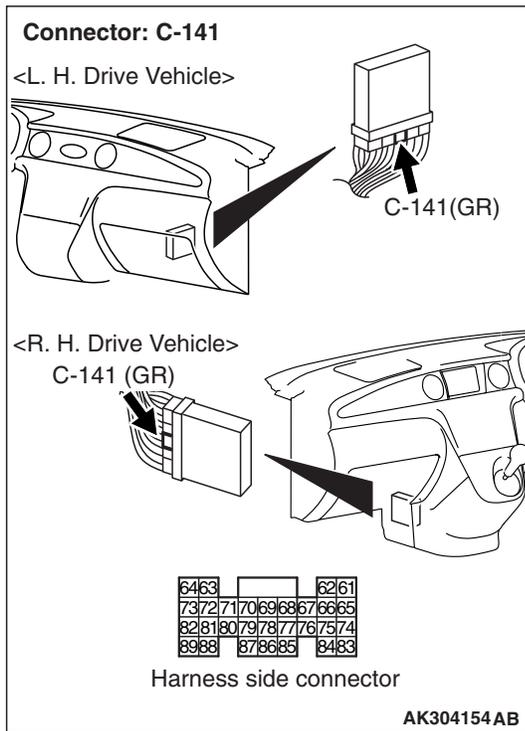
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 16 .

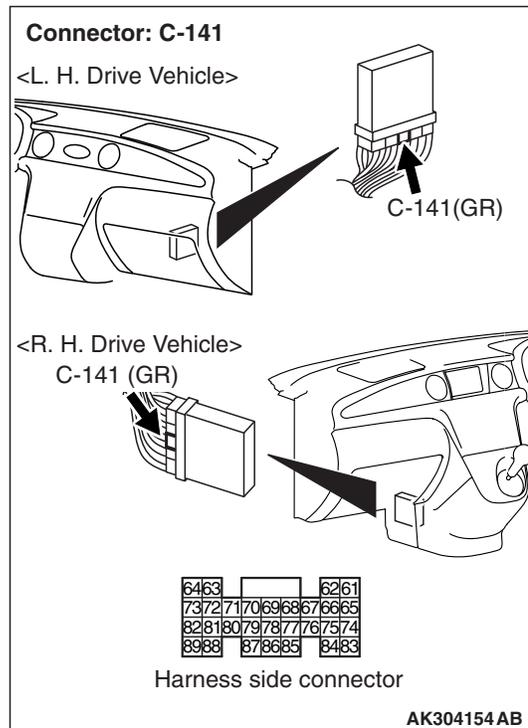
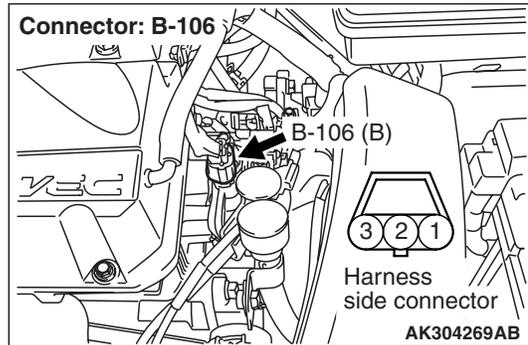
NO : Repair.

STEP 16. Connector check: C-141 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.

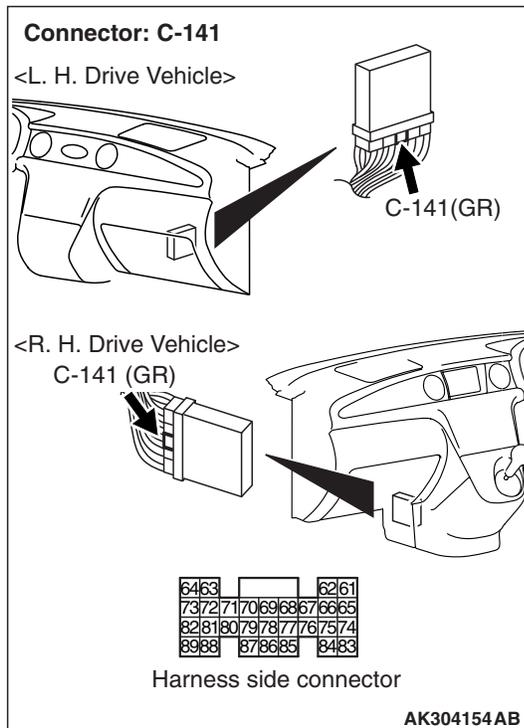
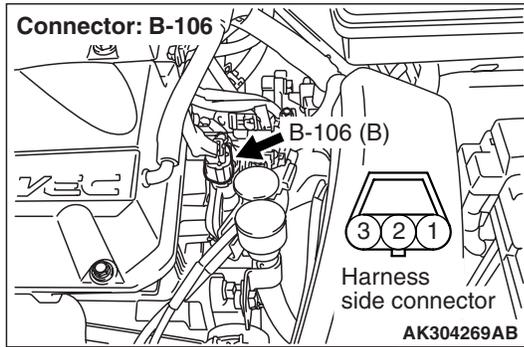
STEP 17. Check harness between B-106 (terminal No. 2) camshaft position sensor connector and C-141 (terminal No. 71) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for damage.

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

STEP 18. Check harness between B-106 (terminal No. 1) camshaft position sensor connector and C-141 (terminal No. 88) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

- Check earthing line for damage.

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

STEP 19. Check camshaft position sensing cylinder.

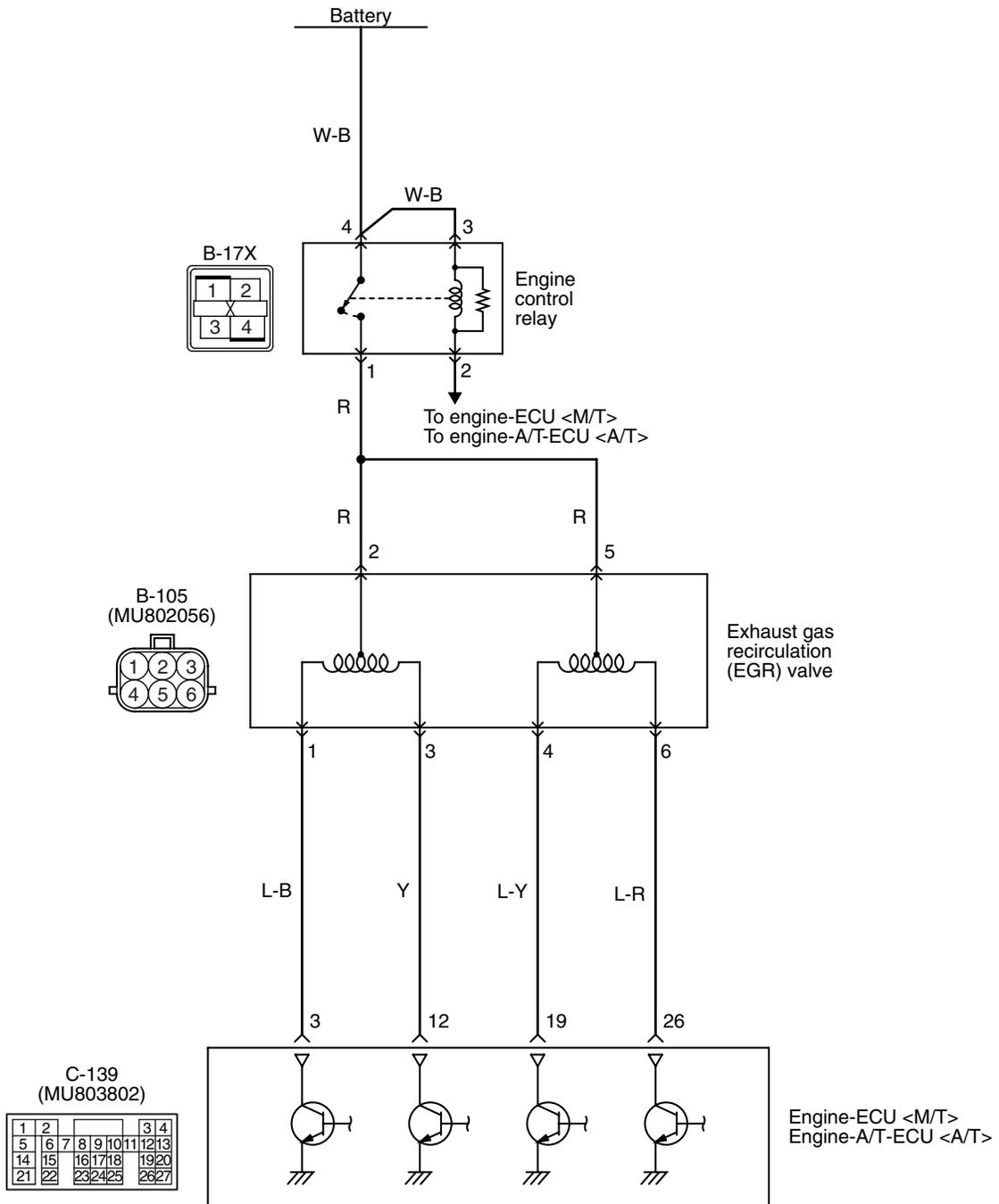
Q: Is the check result normal?
YES : Go to Step 20 .
NO : Replace camshaft position sensing cylinder.

STEP 20. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace camshaft position sensor.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

Code No. P0403: Exhaust Gas Recirculation Control System

EGR valve circuit



OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

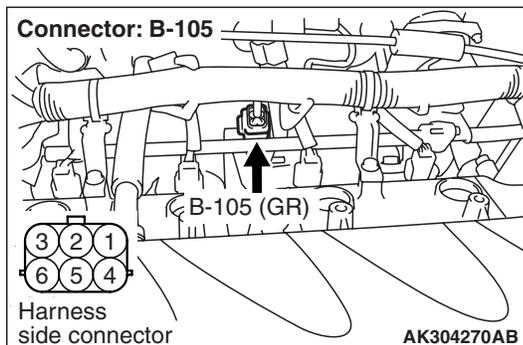
- Battery positive voltage is 10.3 V or higher.

Judgment Criteria

- 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-105 EGR valve connector****Q: Is the check result normal?**

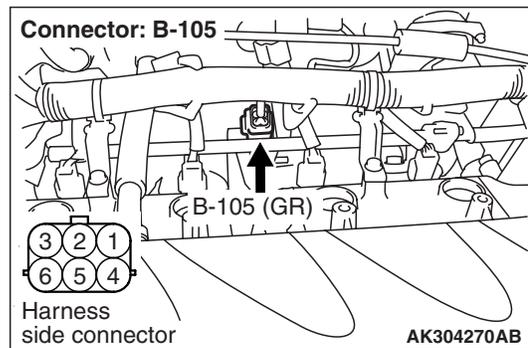
- YES** : Go to Step 2 .
NO : Repair.

STEP 2. Check EGR valve itself.

- Check EGR control solenoid valve itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (stepper motor) Check <4G69>P.17-72.

Q: Is the check result normal?

- YES** : Go to Step 3 .
NO : Replace EGR valve (stepper motor).

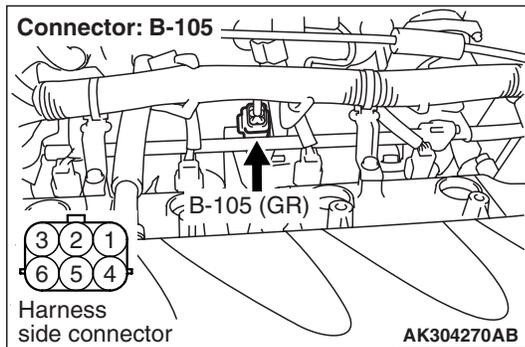
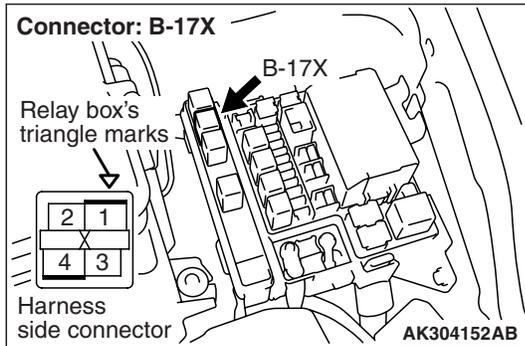
STEP 3. Perform voltage measurement at B-105 EGR valve connector.

- 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-17X engine control relay connector



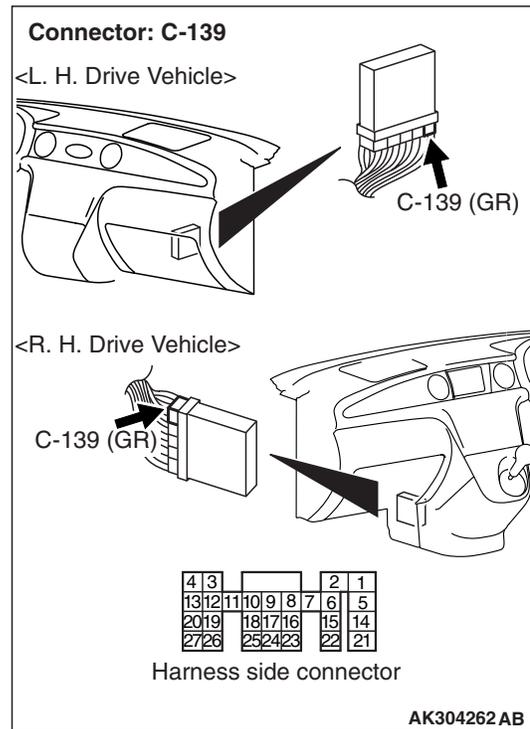
Q: Is the check result normal?

YES : Check and repair harness between B-105 (terminal No. 2, No. 5) EGR valve connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair.

STEP 5. Perform voltage measurement at C-139 engine-ECU connector or engine-A/T-ECU <A/T> connector.



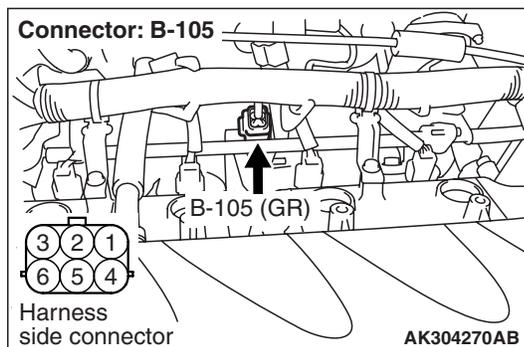
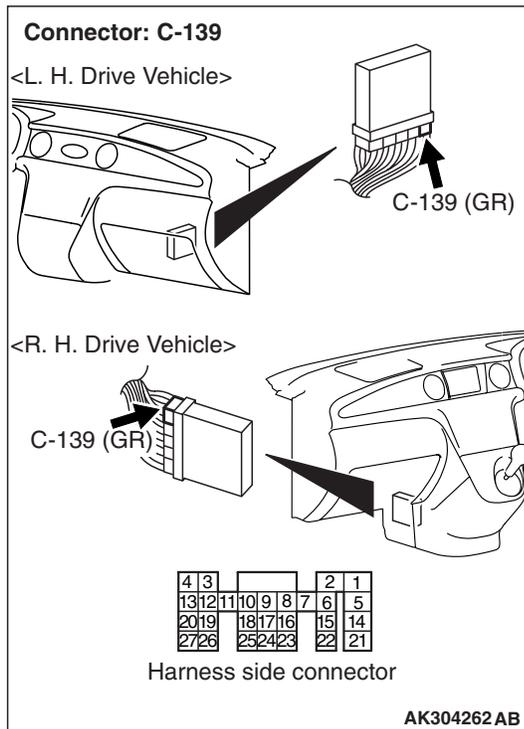
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3, No. 12, No. 19, No. 26 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 6 .

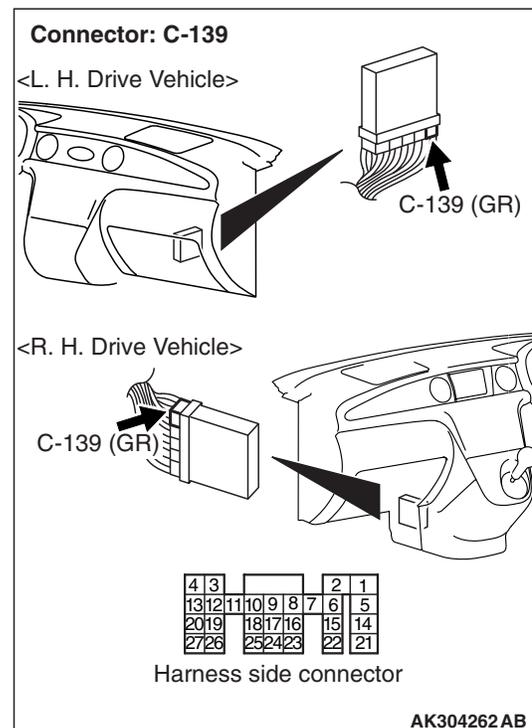
STEP 6. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**Q: Is the check result normal?**

YES : Check and repair harness between B-105 EGR valve connector and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

- a. Check harness between B-105 (terminal No. 1) EGR valve connector and C-139 (terminal No. 3) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
- b. Check harness between B-105 (terminal No. 3) EGR valve connector and C-139 (terminal No. 12) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

- c. Check harness between B-105 (terminal No. 4) EGR valve connector and C-139 (terminal No. 19) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
- d. Check harness between B-105 (terminal No. 6) EGR valve connector and C-139 (terminal No. 26) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check power supply line for open/short circuit.

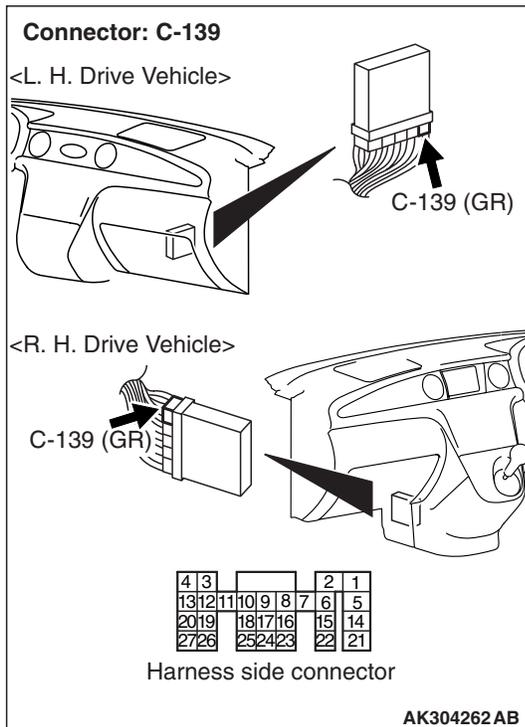
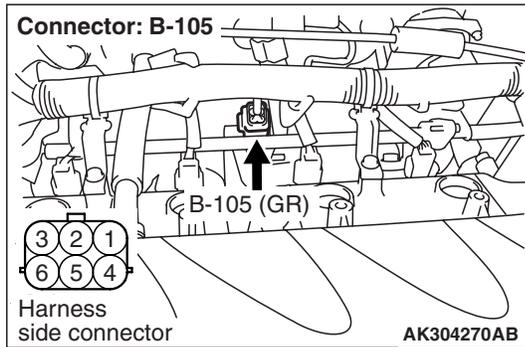
NO : Repair.

STEP 7. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**Q: Is the check result normal?**

YES : Go to Step 8 .

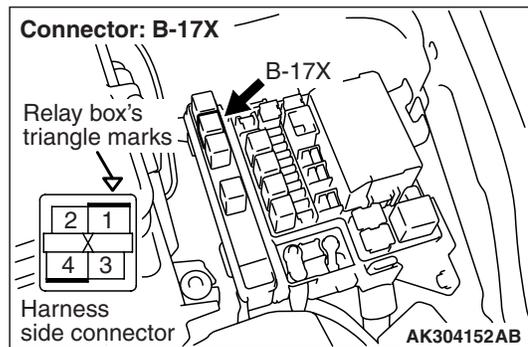
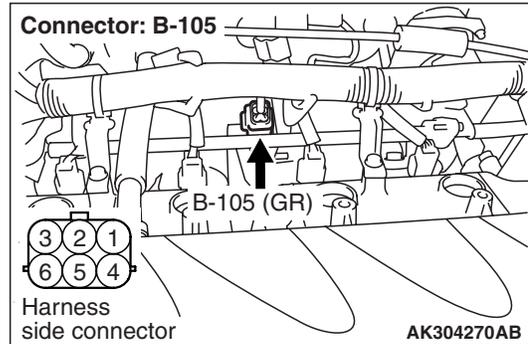
NO : Repair.

STEP 8. Check harness between B-105 EGR valve connector and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



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

STEP 9. Check harness between B-105 (terminal No. 2, No. 5) EGR valve connector and B-17X (terminal No. 1) engine control relay connector.



- Check power supply line for damage.

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

- Check harness between B-105 (terminal No. 1) EGR valve connector and C-139 (terminal No. 3) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check harness between B-105 (terminal No. 3) EGR valve connector and C-139 (terminal No. 12) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check harness between B-105 (terminal No. 4) EGR valve connector and C-139 (terminal No. 19) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
 - Check harness between B-105 (terminal No. 6) EGR valve connector and C-139 (terminal No. 26) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector
- Check output line for damage.

Code No. P0421: Warm Up Catalyst Malfunction (cylinder 1,4)**FUNCTION**

- The signal from the cylinder 1, 4 oxygen sensor (rear) differs from the cylinder 1, 4 oxygen sensor (front). That is because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the cylinder 1, 4 oxygen sensor (front) becomes similar to the cylinder 1, 4 oxygen sensor (rear).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> compares the output of the cylinder 1, 4 oxygen sensor signals (front and rear).

TROUBLE JUDGMENT**Check Conditions**

- Engine speed is 3,000 r/min or lower.
- The accelerator pedal is open.
- Air flow sensor output is 8 g/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 Criteria

- The cylinder 1, 4 oxygen sensor (rear) signal frequency divided by cylinder 1, 4 oxygen sensor (front) signal frequency is 0.8 or more.

PROBABLE CAUSE

- Catalytic converter deteriorated
- Failed cylinder 1, 4 oxygen sensor (front)
- Failed cylinder 1, 4 oxygen sensor (rear)
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. Check for leakage of exhaust emission from exhaust manifold.****Q: Is the check result normal?****YES :** Go to Step 2 .**NO :** Repair.**STEP 2. M.U.T.-II/III data list**

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 11: Cylinder 1, 4 oxygen sensor (front)
 - Item 59: Cylinder 1, 4 oxygen sensor (rear)

Q: Is the check result normal?**YES :** Go to Step 3 .**NO :** Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code [P.13C-21](#)).**STEP 3. M.U.T.-II/III data list**

- Item 11: Cylinder 1, 4 oxygen sensor (front)

OK: 0 – 0.4 and 0.6 – 1.0 volt should alternate 15 times or more within 10 seconds (engine speed at 2,000 r/min).**Q: Is the check result normal?****YES :** Go to Step 4 .**NO :** Replace the cylinder 1, 4 oxygen sensor (front).**STEP 4. Replace the cylinder 1, 4 oxygen sensor (rear).**

- After replacing the cylinder 1, 4 oxygen sensor (rear), re-check the trouble symptoms.

Q: Is the check result normal?**YES :** Check end.**NO :** Go to Step 5 .**STEP 5. Replace the catalytic converter (cylinder 1, 4).**

- After replacing the catalytic converter (cylinder 1, 4), re-check the trouble symptoms.

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

Code No. P0431: Warm Up Catalyst Malfunction (Cylinder 2, 3)

FUNCTION

- The signal from the cylinder 2, 3 oxygen sensor (rear) differs from the cylinder 2, 3 oxygen sensor (front). That is because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the cylinder 2, 3 oxygen sensor (front) becomes similar to the cylinder 2, 3 oxygen sensor (rear).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> compares the output of the cylinder 2, 3 oxygen sensor signals (front and rear).

TROUBLE JUDGMENT

Check Conditions

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

Judgment Criteria

- The cylinder 2, 3 oxygen sensor (rear) signal frequency divided by cylinder 2, 3 oxygen sensor (front) signal frequency is 0.8 or more.

PROBABLE CAUSE

- Catalytic converter deteriorated
- Failed cylinder 2, 3 oxygen sensor (front)
- Failed cylinder 2, 3 oxygen sensor (rear)
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

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

Q: Is the check result normal?

- YES :** Go to Step 2 .
- NO :** Repair.

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

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 39: Cylinder 2, 3 oxygen sensor (front)
 - Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Is the check result normal?

- YES :** Go to Step 3 .
- NO :** Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code [P.13C-21](#)).

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

- Item 39: Cylinder 2, 3 oxygen sensor (front)
 - OK: 0 – 0.4 and 0.6 – 1.0 volt should alternate 15 times or more within 10 seconds (engine speed at 2,000 r/min).**

Q: Is the check result normal?

- YES :** Go to Step 4 .
- NO :** Replace the cylinder 2, 3 oxygen sensor (front).

STEP 4. Replace the cylinder 2, 3 oxygen sensor (rear).

- After replacing the cylinder 2, 3 oxygen sensor (rear), re-check the trouble symptoms.

Q: Is the check result normal?

- YES :** Check end.
- NO :** Go to Step 5 .

STEP 5. Replace the catalytic converter (cylinder 2, 3).

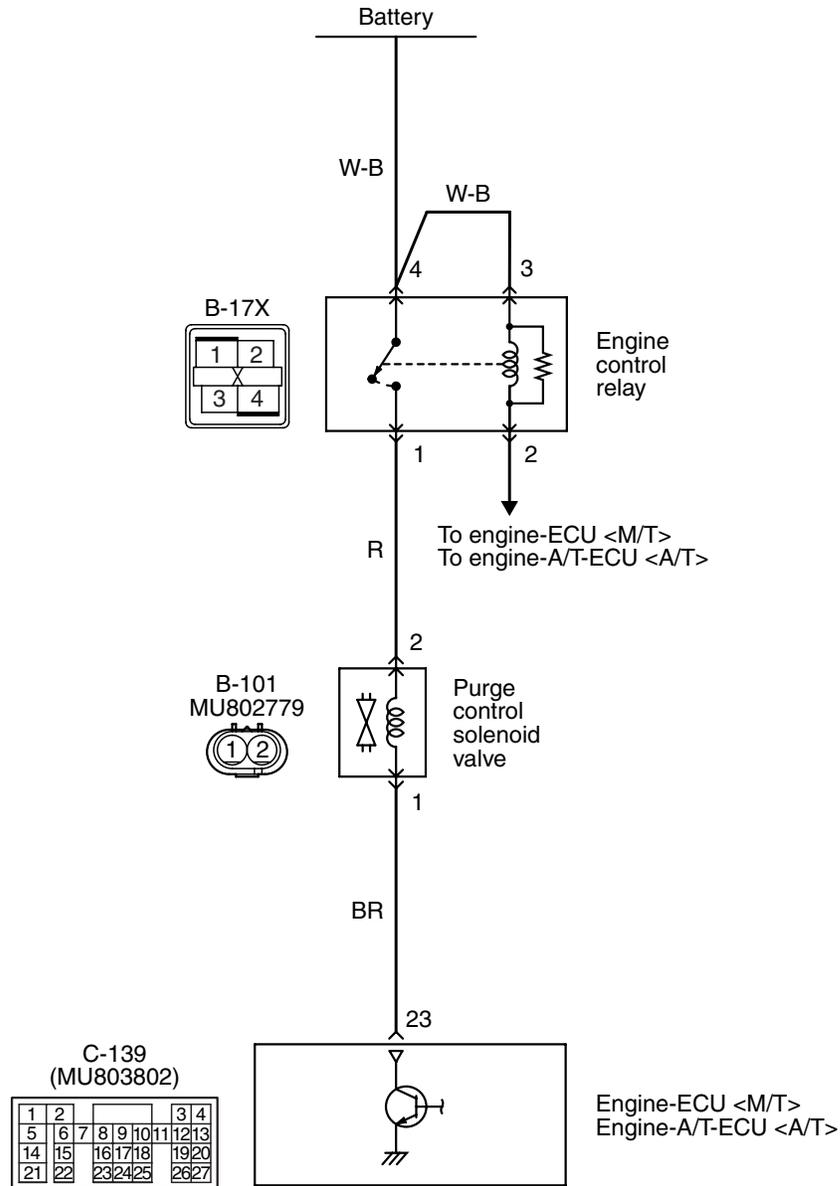
- After replacing the catalytic converter (cylinder 2, 3), re-check the trouble symptoms.

Q: Is the check result normal?

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

Code No. P0443: Purge Control Solenoid Valve System

Purge control solenoid valve circuit



Wire colour code

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

AK401181AB

OPERATION

- Power is supplied to the purge control solenoid valve (terminal No. 2) from the engine control relay (terminal No. 1).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 23) makes the power transistor in the unit be in "ON" position, and that makes currents go on the purge control solenoid valve (terminal No. 1).

FUNCTION

- In response to a signal from the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the purge control solenoid valve controls the flow rate of the purge air to be introduced into the surge tank.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is in "ON" position.
- Battery positive voltage is 10 V or higher.

Judgment Criteria

- The surge voltage (system voltage +2 V) of solenoid coil is not detected when the purge control solenoid valve is turned in OFF position from ON.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

- Item 08: Purge control solenoid valve

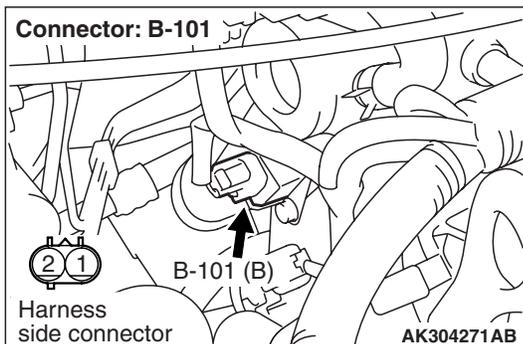
OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-101 purge control solenoid valve connector

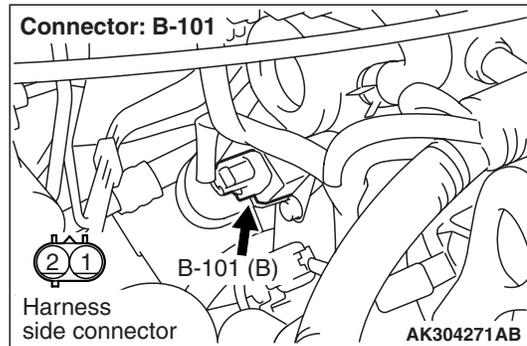


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3: Perform resistance measurement at B-101 purge control solenoid valve connector.



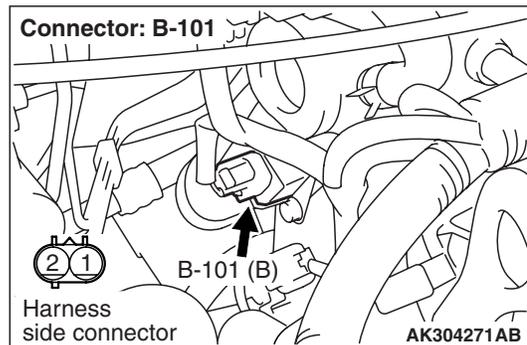
- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.
OK: 30 – 34 Ω (at 20°C)

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace purge control solenoid valve.

STEP 4. Perform voltage measurement at B-101 purge control solenoid valve connector.



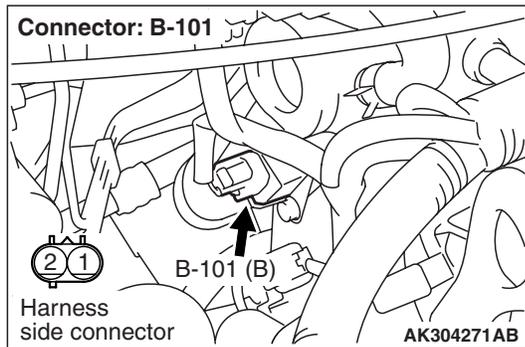
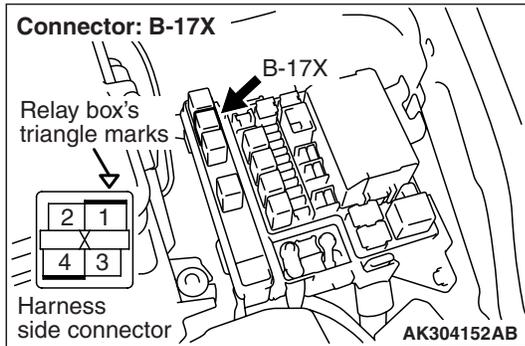
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

STEP 5. Connector check: B-17X engine control relay connector



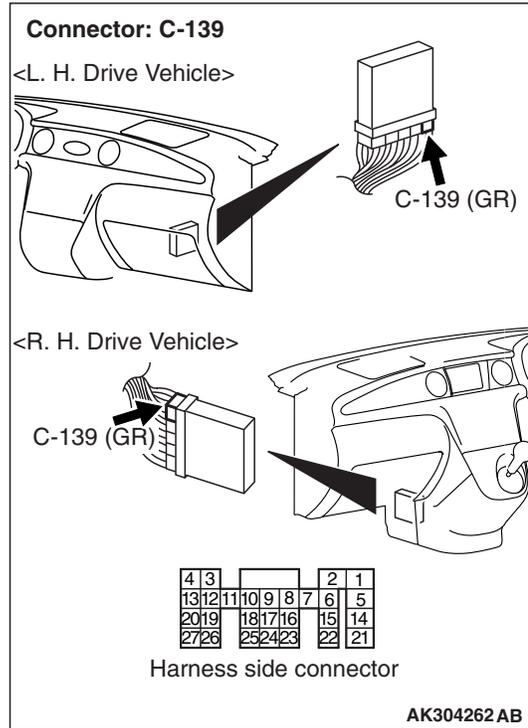
Q: Is the check result normal?

YES : Check and repair harness between B-101 (terminal No. 2) purge control solenoid valve connector and B-17X (terminal No. 1) engine control relay connector.

- Check power line for open/short circuit.

NO : Repair.

STEP 6. Perform voltage measurement at C-139 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.

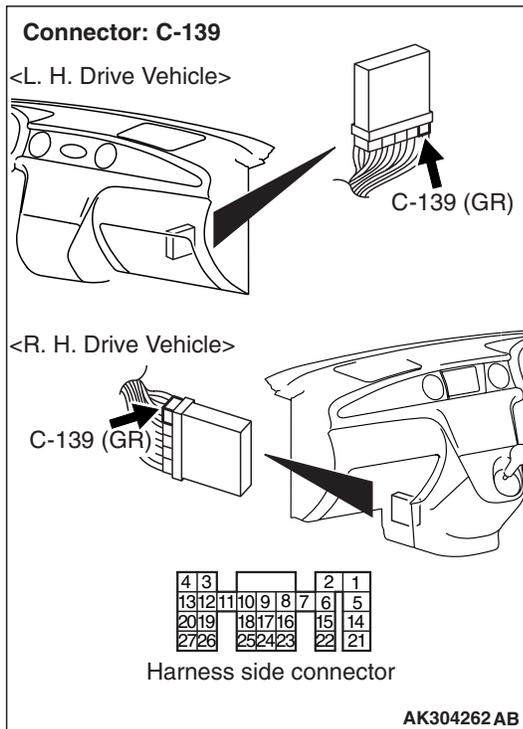
OK: System voltage

Q: Is the check result normal?

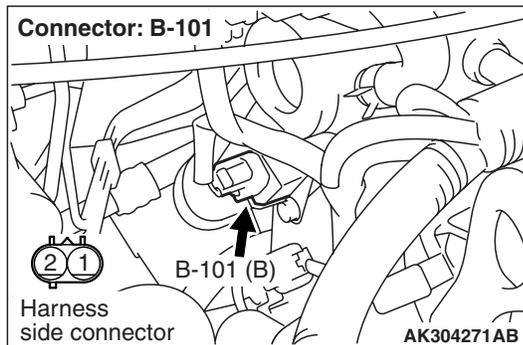
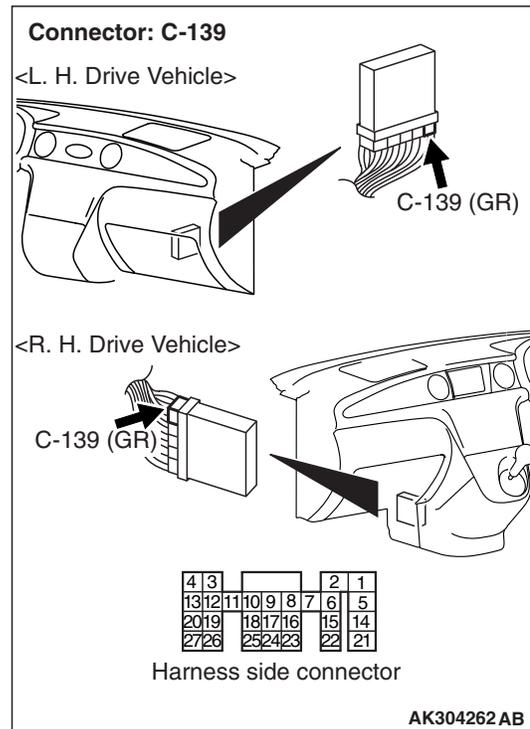
YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 8. Connector check: C-139 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.

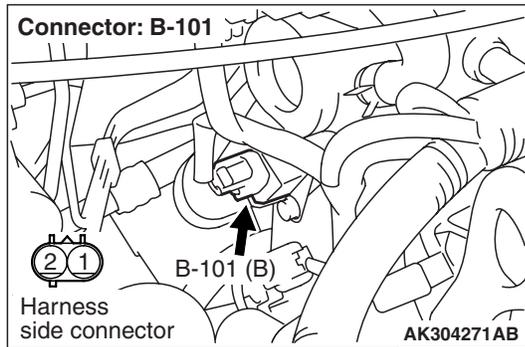
Q: Is the check result normal?

YES : Check and repair harness between B-101 (terminal No. 1) purge control solenoid valve connector and C-139 (terminal No. 23) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

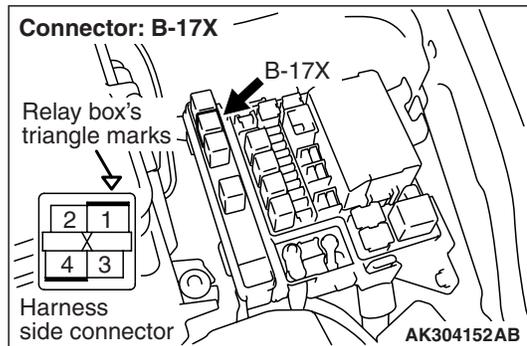
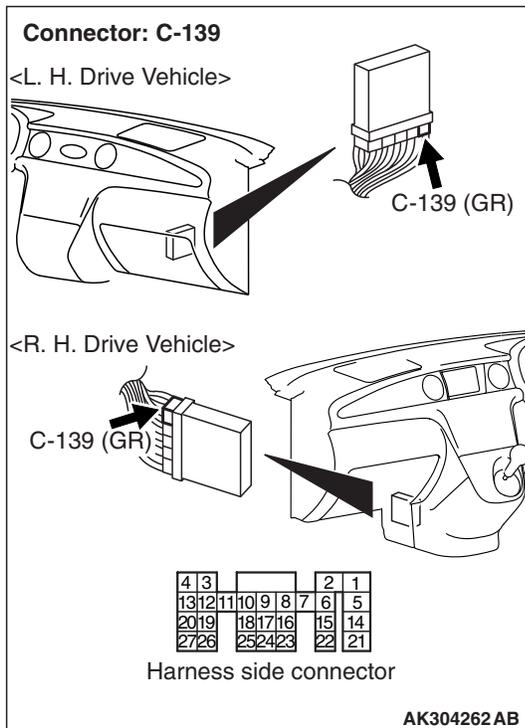
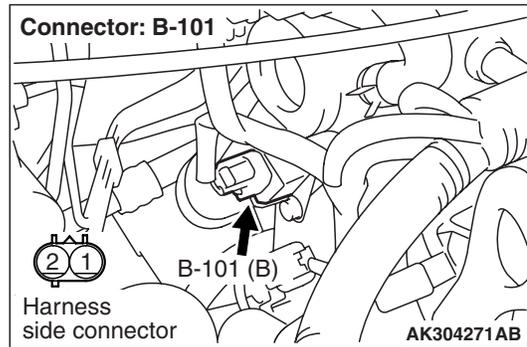
- Check output line for open/short circuit.

NO : Repair.

STEP 9. Check harness between B-101 (terminal No. 1) purge control solenoid valve connector and C-139 (terminal No. 23) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 10. Check harness between B-101 (terminal No. 2) purge control solenoid valve connector and B-17X (terminal No. 1) engine control relay connector.



- Check output line for damage.

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

- Check power line for damage.

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

STEP 11. M.U.T.-II/III actuator test

- Item 08: purge control solenoid valve

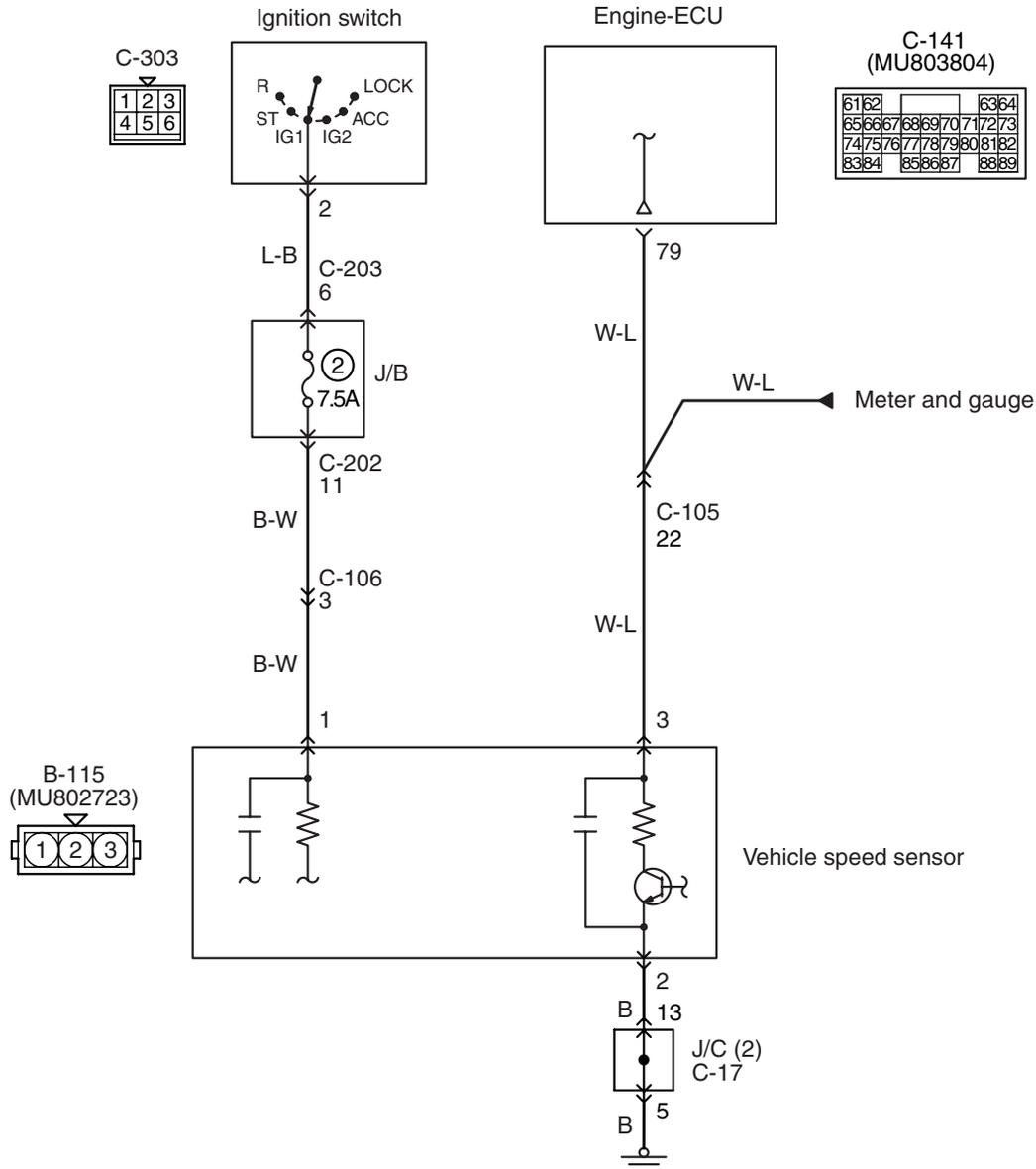
OK: Operating sound can be heard and the valve vibrates

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).
NO : Replace engine-ECU <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

AK401182AB

OPERATION

- A power voltage of 5 V is applied to the vehicle speed sensor (terminal No. 3) from the engine-ECU (terminal No. 79).

FUNCTION

- The vehicle speed sensor converts the vehicle speed to the voltage, and then input it into the engine-ECU

TROUBLE JUDGMENT**Check Conditions**

- 2 seconds later after the engine has started up.
- Engine speed: 2,500 r/min or more.
- 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 – Speedmeter Check P.54A-57).

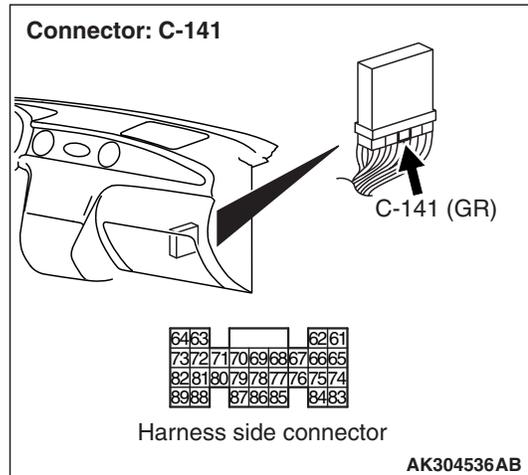
STEP 2.M.U.T.-II/III data list

- Refer to Data list reference table P.13C-402.
 - Item 24: Vehicle speed sensor

Q: Is the check result normal?

YES : Go to Step 3 .

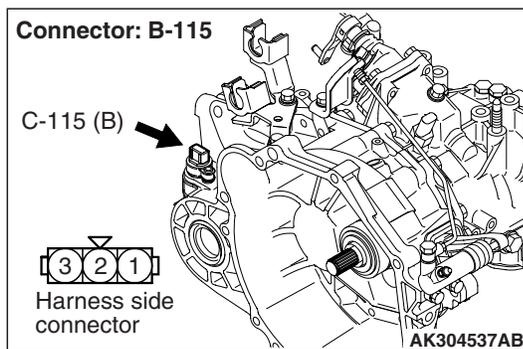
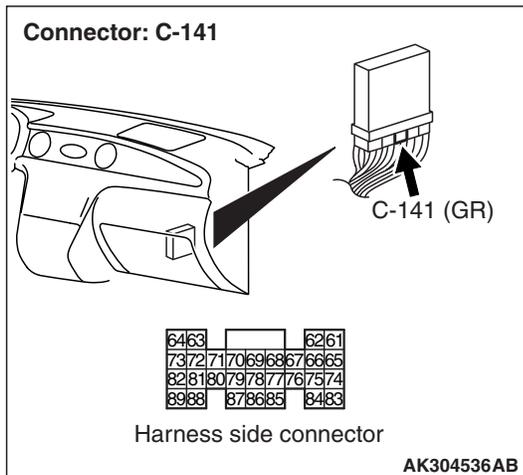
NO : Intermittent malfunction (Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 3. Check connector: C-141 engine-ECU connector**Q: Is the check result normal?**

YES : Go to Step 4 .

NO : Repair.

STEP 4. Check harness between C-141 (terminal No. 79) engine-ECU connector and B-115 (terminal No. 3) Vehicle speed sensor connector.



NOTE: Before checking harness, check intermediate connector C-105, and repair if necessary.

- Check output line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check the trouble symptoms.

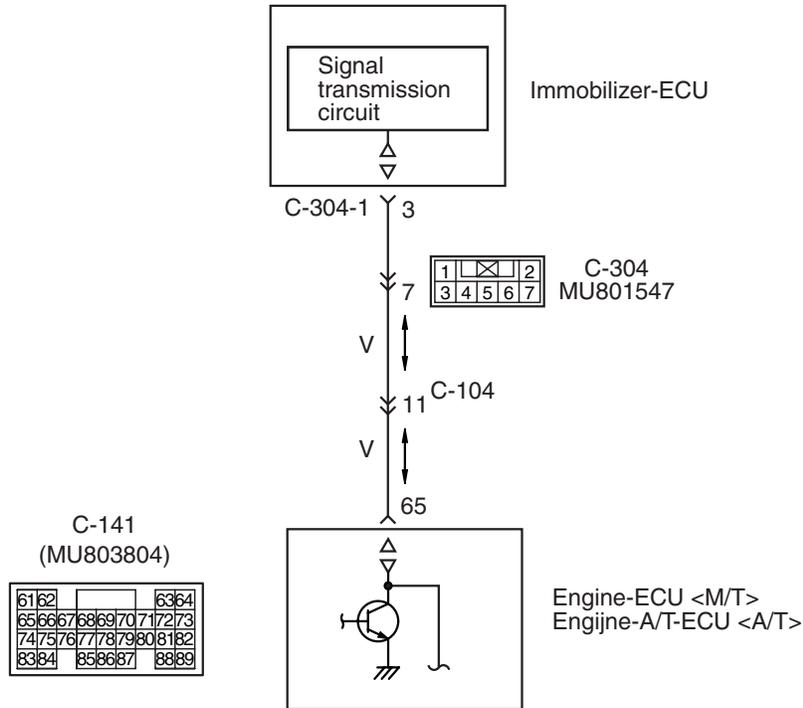
Q: Does trouble symptom persist?

YES : Replacing engine-ECU.

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

Code No. P0513: Immobilizer Malfunction

Immobilizer-ECU circuit



AK304151AC

OPERATION

- The signals are sent and received between engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 65) and immobilizer-ECU (terminal No. 7).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> sends or receives the control signals to or from immobilizer-ECU to certify the ignition key.

NOTE:

- If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
- This code may be displayed when registering the key encrypted code.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgment Criterion

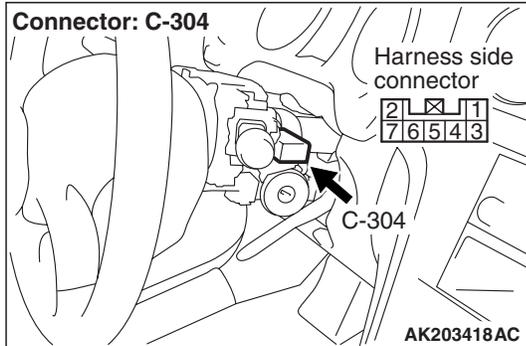
- When the communication error between engine-ECU <M/T> or engine-A/T-ECU <A/T> and the immobilizer-ECU continues for 2 seconds or more.

PROBABLE CAUSE

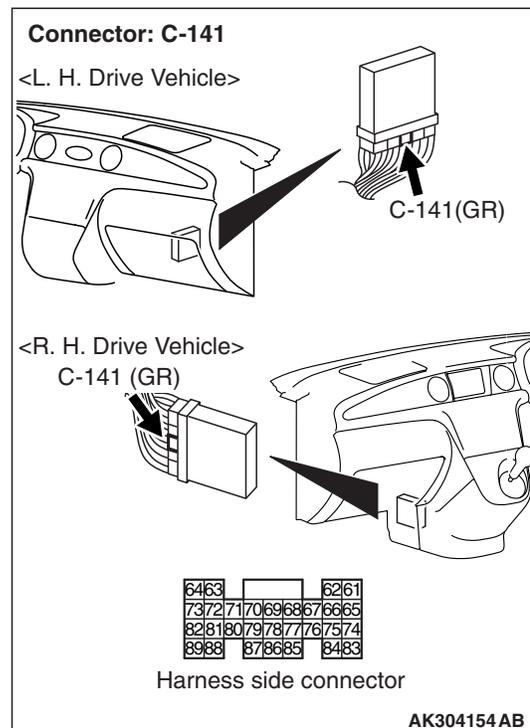
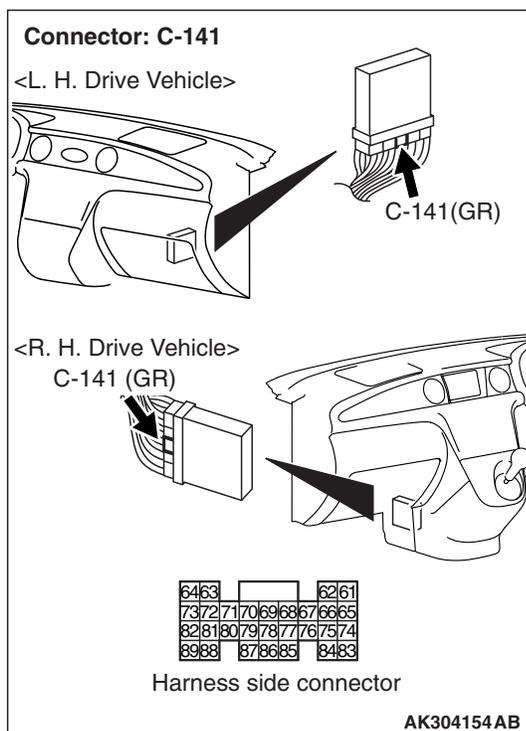
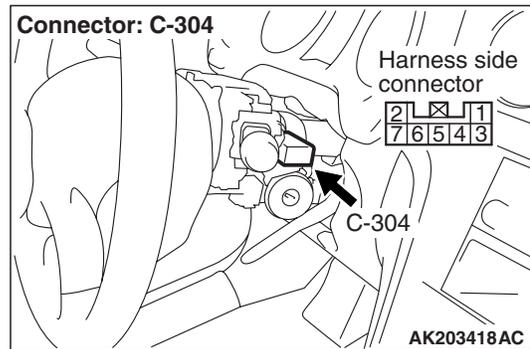
- Open/short circuit in immobilizer system circuit or loose connector contact
- Failed immobilizer-ECU
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-304 immobilizer-ECU connector and C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 2. Check harness between C-304 (terminal No. 3) immobilizer-ECU connector and C-141 (terminal No. 65) 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.

NOTE: Before checking harness, check intermediate connector C-104, and repair if necessary.

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

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

STEP 3. Check the trouble symptoms.

Q: Is the check result normal?
YES : Go to Step 4 .
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 4. After replacing the immobilizer-ECU, re-check the trouble symptoms.

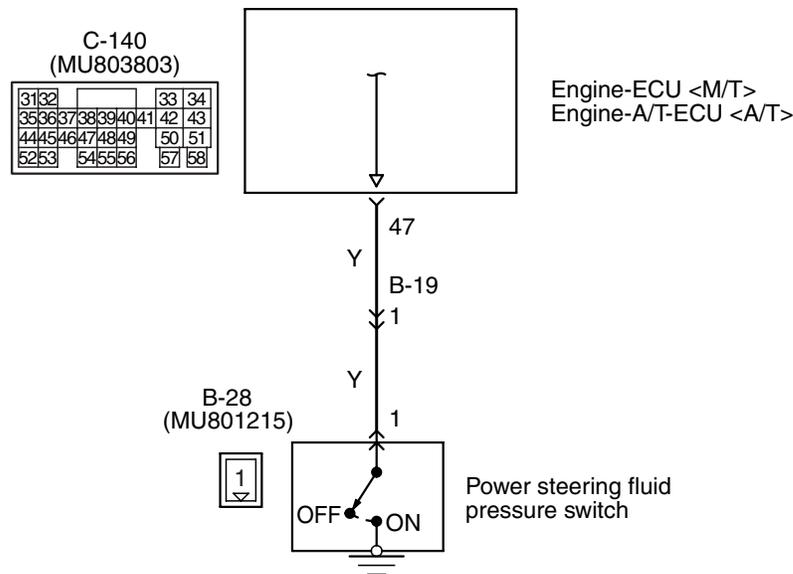
Q: Is the check result normal?

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

NO : Check 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

AK304134 AC

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 30°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 Criteria

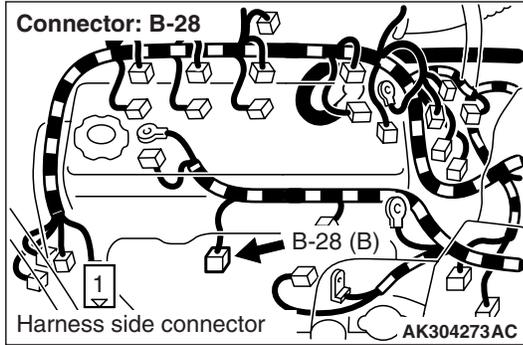
- Power steering pressure switch continues to be in "ON".

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>

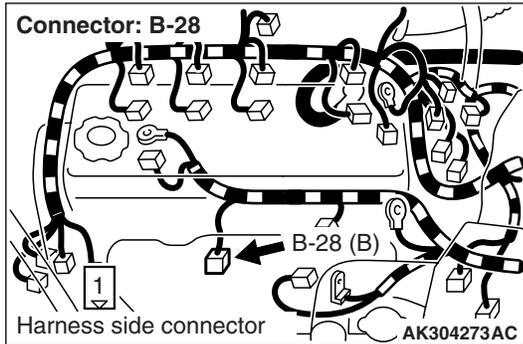
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-28 power steering fluid pressure switch connector



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

STEP 2. Perform voltage measurement at B-28 power steering fluid pressure switch connector.

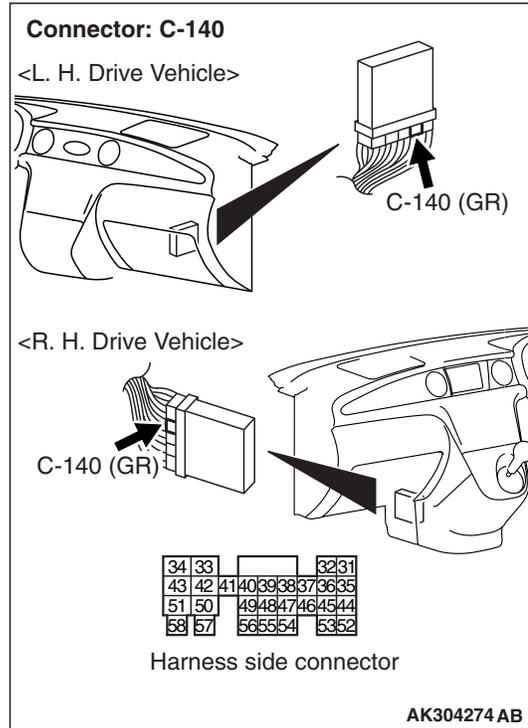


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

- Q: Is the check result normal?**
YES : Go to Step 8 .
NO : Go to Step 3 .

STEP 3. Perform voltage measurement at C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

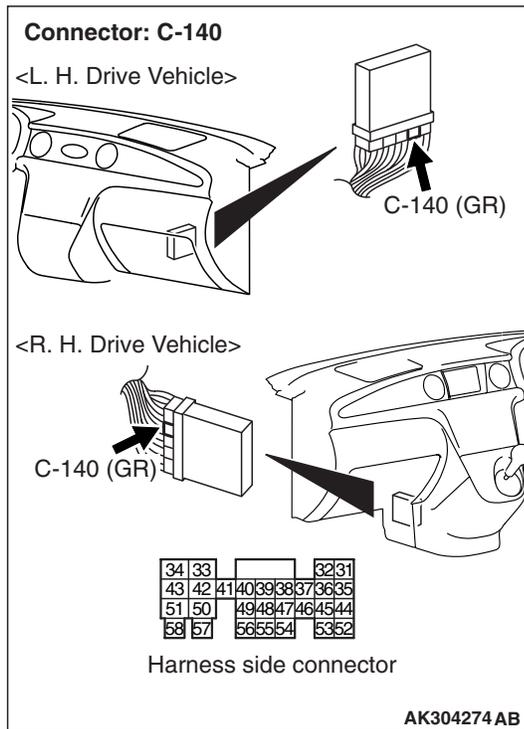


- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 47 and earth.

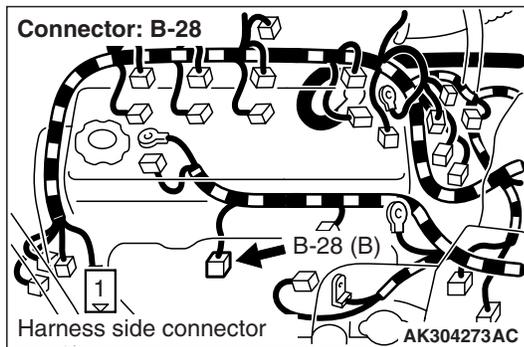
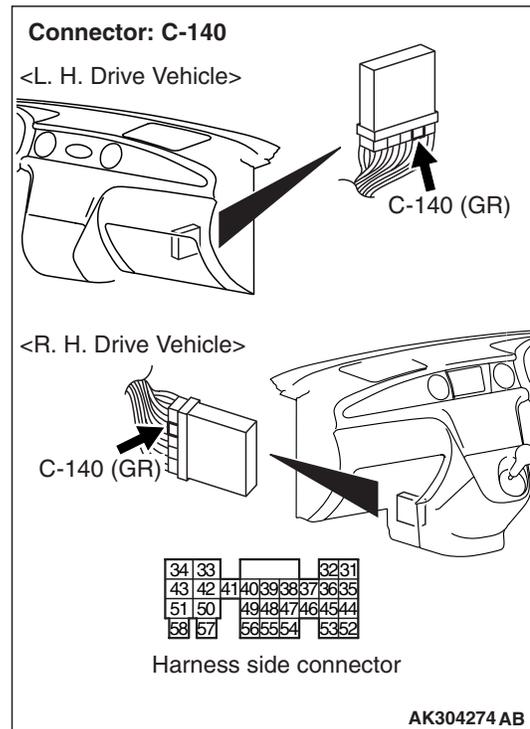
OK: System voltage

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

STEP 4. Connector check: C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 5. Connector check: C-140 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.

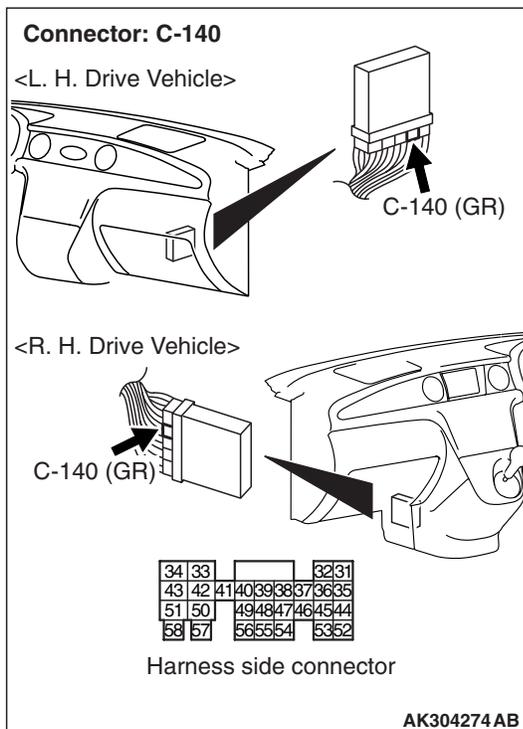
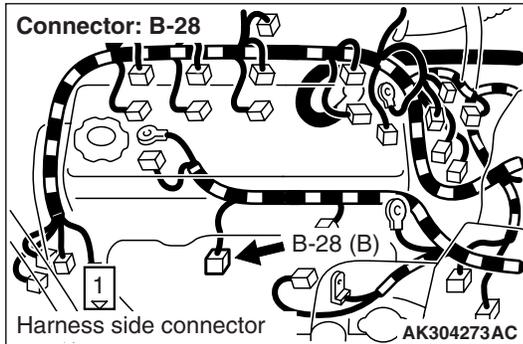
Q: Is the check result normal?

YES : Check and repair harness between B-28 (terminal No. 1) power steering fluid pressure switch connector and C-140 (terminal No. 47) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

STEP 6. Check harness between B-28 (terminal No. 1) power steering fluid pressure switch connector and C-140 (terminal No. 47) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit.

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

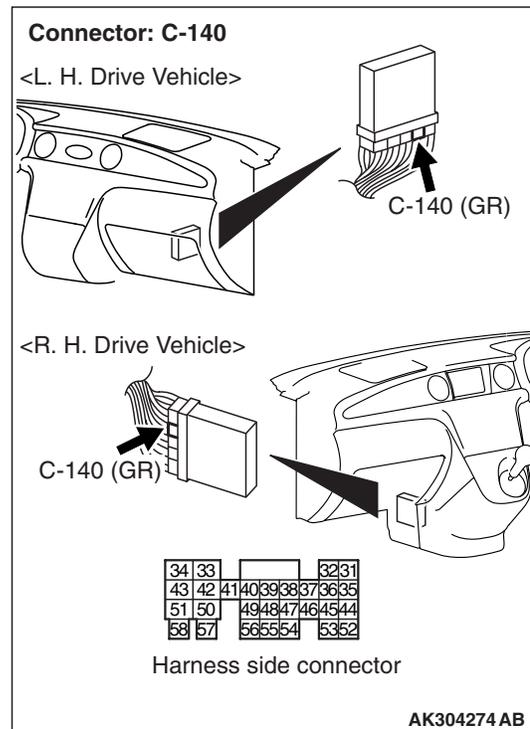
STEP 7. M.U.T.-II/III data List

- Refer to Data list reference table [P.13C-402](#).
 - 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 [P.00-6](#)).
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 8. Perform voltage measurement at C-140 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.

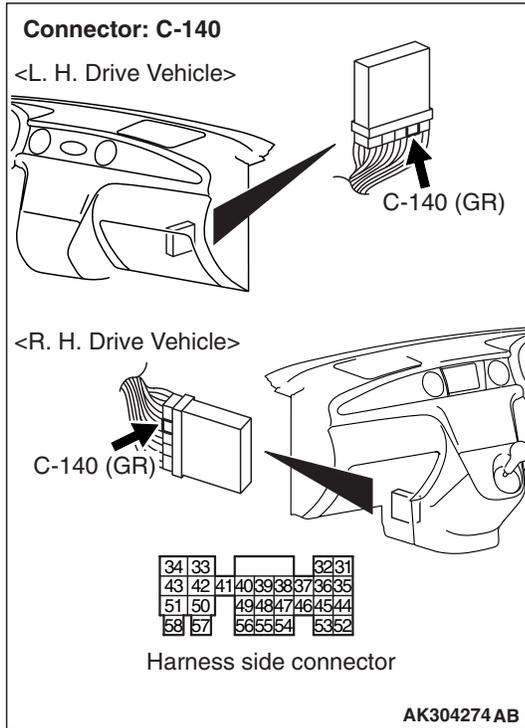
OK:

**System voltage (Steering wheel: Stationary)
 1 V or less (Steering wheel: Turned)**

Q: Is the check result normal?

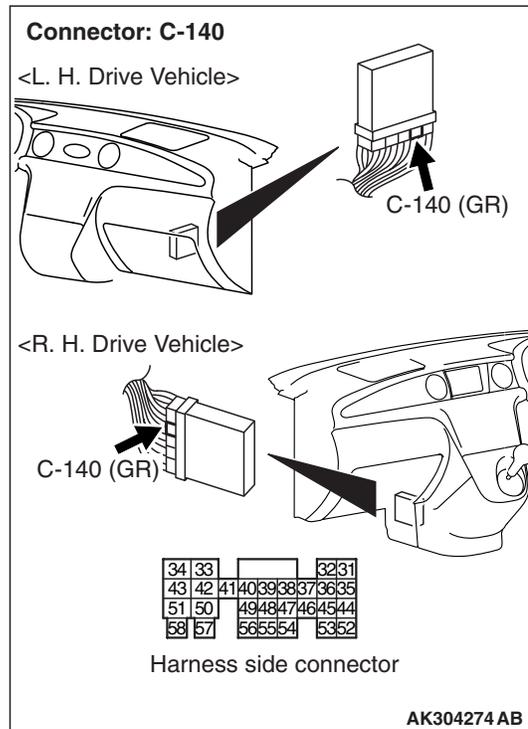
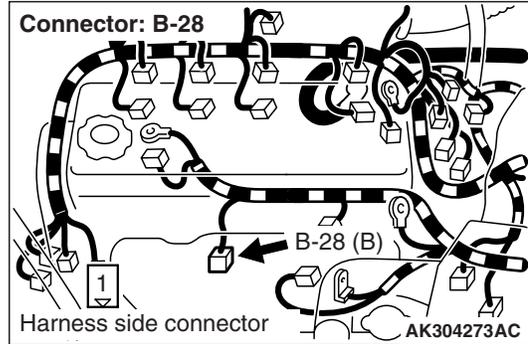
YES : Go to Step 11 .
NO : Go to Step 9 .

STEP 9. Connector check: C-140 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.

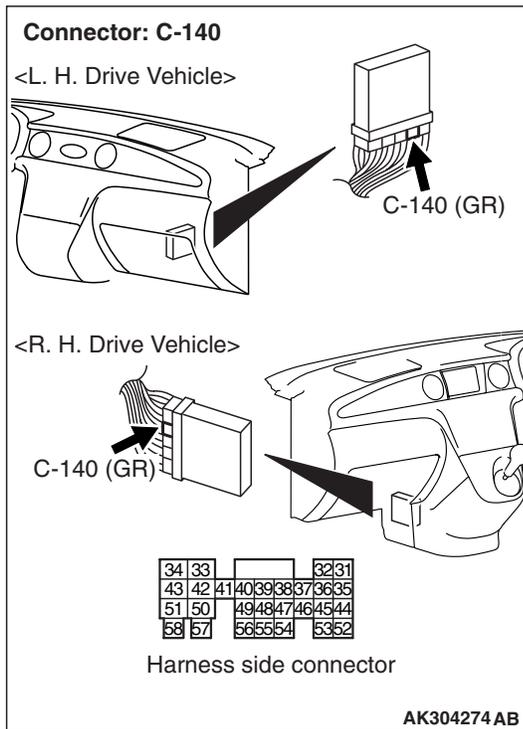
STEP 10. Check harness between B-28 (terminal No. 1) power steering fluid pressure switch connector and C-140 (terminal No. 47) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for damage.

Q: Is the check result normal?
YES : Replace power steering fluid pressure switch.
NO : Repair.

STEP 11. Connector check: C-140 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.

DTC P0606: Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Main Processor Malfunction

FUNCTION

- System LSI checks the engine-ECU <M/T> or engine-A/T-ECU <A/T> for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch is "ON" position.

Judgement Criteria

- No surveillance pulse signals is input for 0.5 second.

PROBABLE CAUSE

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

DIAGNOSIS

STEP 1. Check the trouble symptoms.

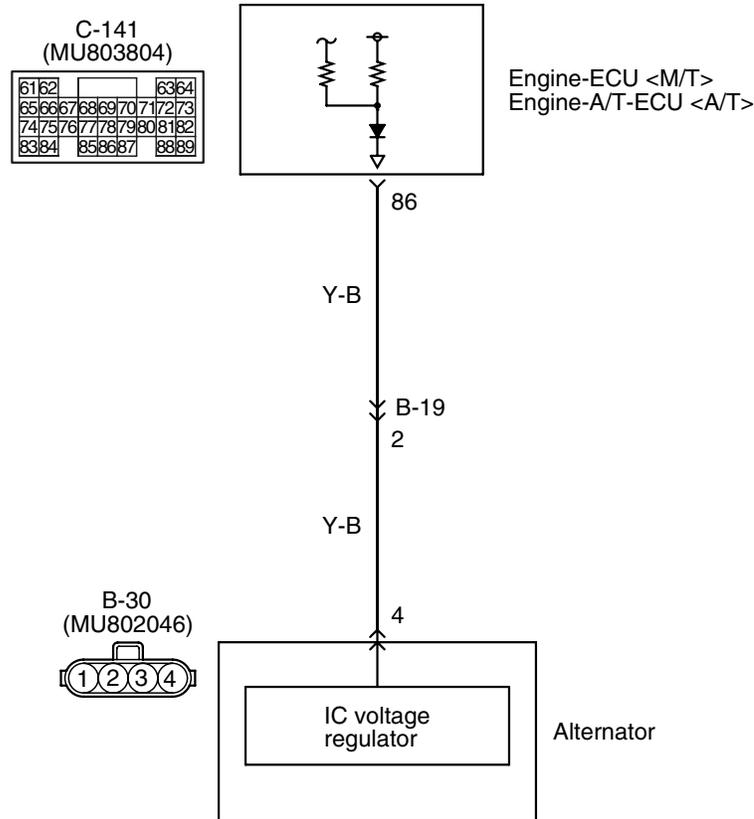
Q: Does trouble symptom persist?

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

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

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

AK304135AB

OPERATION

- The energized state of the alternator field coil is inputted from the alternator (terminal No. 4) to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 86).

FUNCTION

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

TROUBLE JUDGMENT

Check Condition

- Engine speed is 50 r/min or higher.

Judgment Criterion

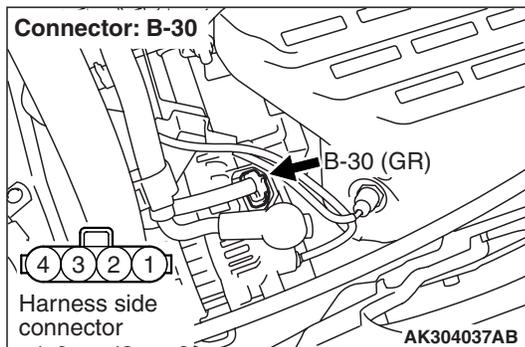
- Input voltage from the alternator FR terminal has continued to be approximately battery positive voltage for 20 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-30 alternator connector

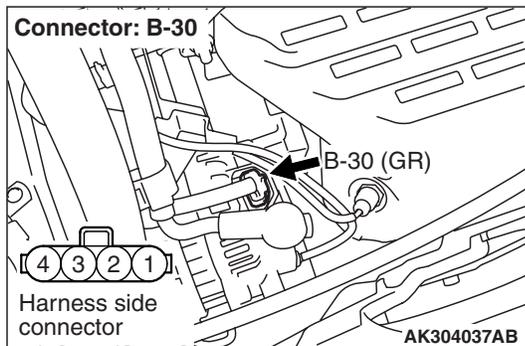


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

STEP 2. Perform voltage measurement at B-30 alternator connector.



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

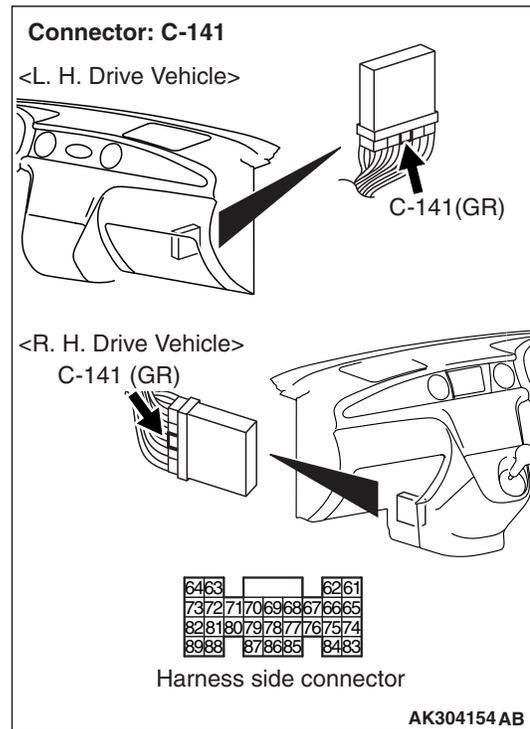
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 3 .

STEP 3. Connector check: C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

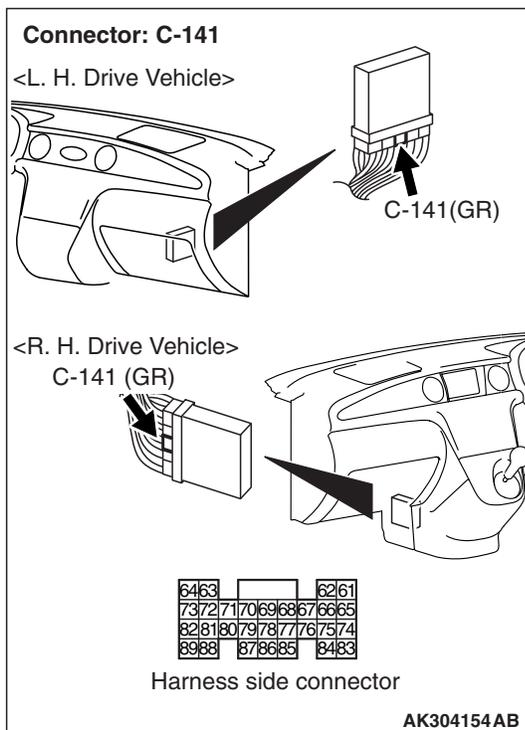
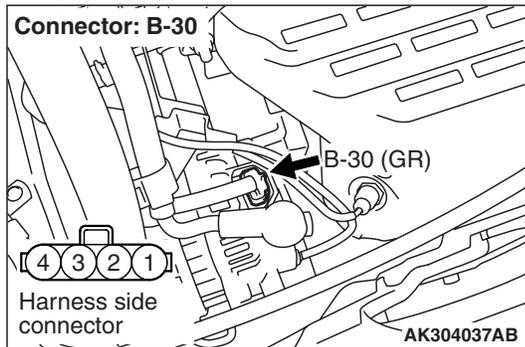


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

STEP 4. Check harness between B-30 (terminal No. 4) alternator connector and C-141 (terminal No. 86) 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 5 .
NO : Repair.

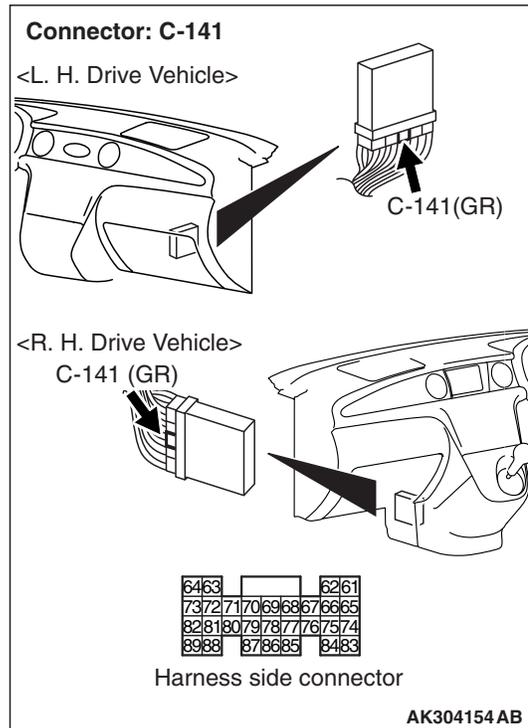
STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

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

STEP 6. Perform voltage measurement at C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



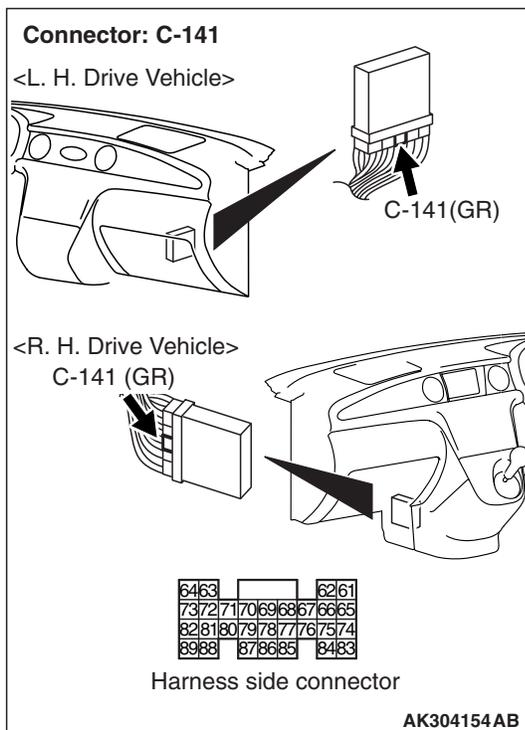
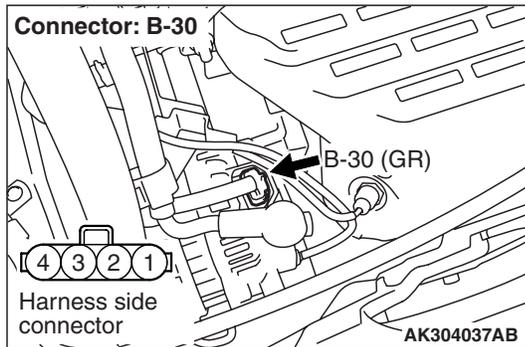
- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Engine: Idle after warm-up
- Transmission: Neutral <M/T> or P range <A/T>
- Radiator fan: Inactive
- Voltage between terminal No. 86 and earth.

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

Q: Is the check result normal?

YES : Go to Step 7 .
NO : Go to Step 5 .

STEP 7. Check harness between B-30 (terminal No. 4) alternator connector and C-141 (terminal No. 86) 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 8 .

NO : Repair.

STEP 8. Check trouble symptom.

Q: Same symptoms regenerated?

YES : Replace alternator.

NO : Intermittent malfunction (Refer to Group 00

– How to Use troubleshooting/Inspection Service Points [P.00-6](#)).

DTC P0638: Throttle Valve Control Servo Circuit Range/Performance Problem

OPERATION

- Refer to P2101 – Throttle valve control servo circuit [P.13C-240](#).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the electronic controlled throttle system for abnormal conditions.

TROUBLE JUDGMENT**Check Conditions**

- Battery positive voltage is 8.3 V or higher.
- Throttle position sensor (main) output voltage is 0.35 – 4.8 V.
- Drop of throttle position sensor (main) output voltage per 100 milliseconds is 0.04 V or more.

Judgement Criteria

- Throttle position sensor (main) output voltage has continued to be above 0.5 V higher than the target throttle position sensor (main) voltage for 0.5 second.

Check Conditions

- Battery positive voltage is 8.3 V or higher.
- Throttle position sensor (main) output voltage is 0.35 – 4.8 V.

Judgement Criteria

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is 1 V or higher for 4 seconds.

PROBALE 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.13C-402](#).
 - a. Item 9A: Throttle position sensor (main) mid opening learning value

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Replace throttle body assembly.

STEP 2. Check the throttle valve control servo itself.

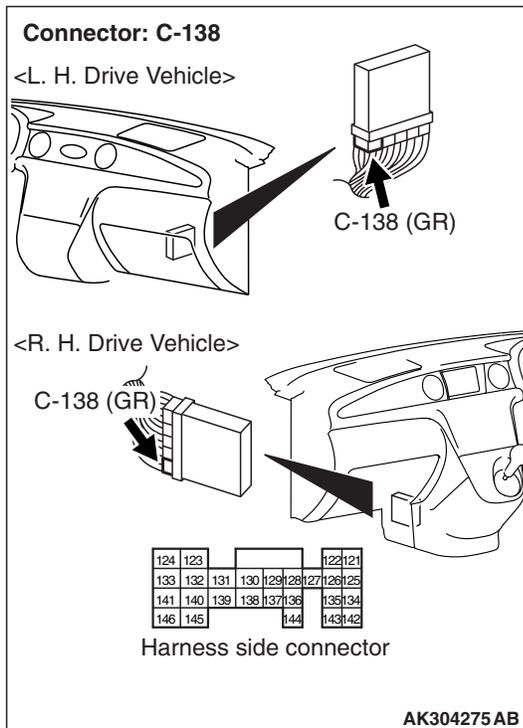
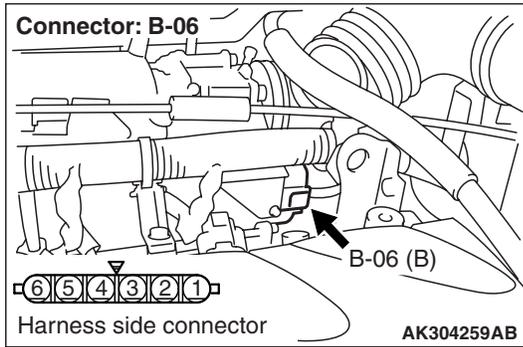
- Check the throttle valve control servo control motor itself (Refer to [P.13C-436](#))

Q: Is the check result normal?

YES : Go to Step 3 .

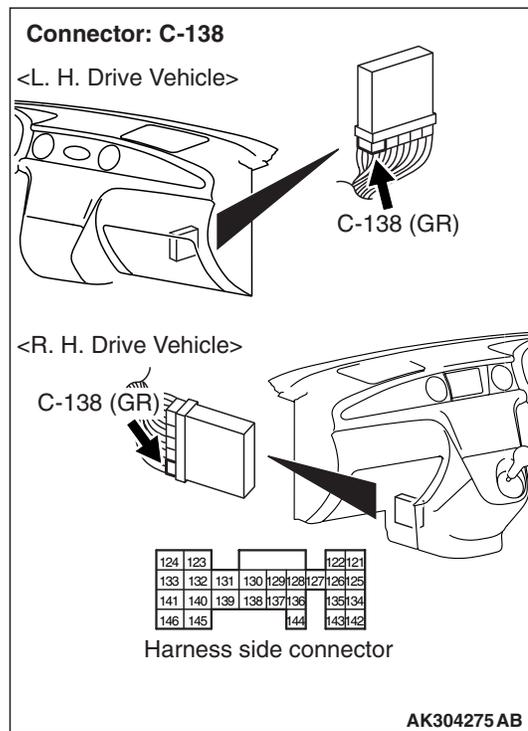
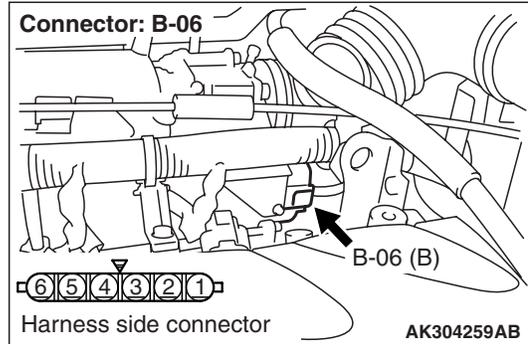
NO : Replace electronically controlled throttle valve.

STEP 3. Connector check: B-06 electronically controlled throttle valve connector and C-138 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.

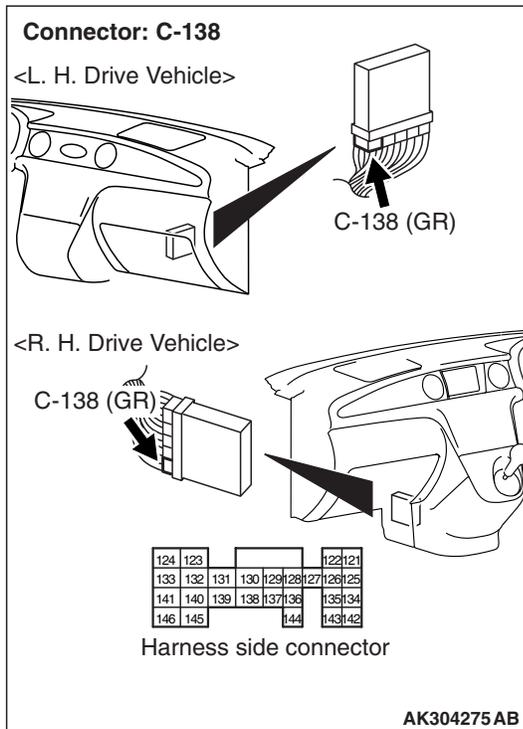
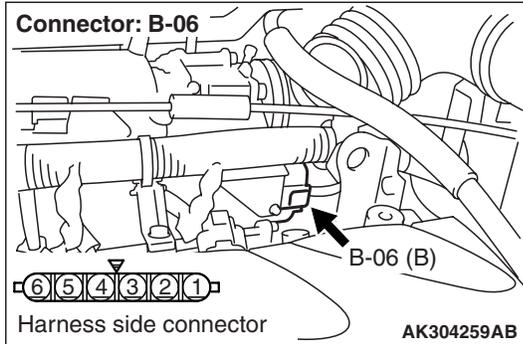
STEP 4. Check harness between B-06 (terminal No. 1) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit and damage.

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

STEP 5. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-138 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

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

DTC P0642: Throttle Position Sensor Power Supply

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the throttle position sensor power voltage for abnormal conditions.

TROUBLE JUDGMENT

Check Conditions

- Battery positive voltage is 6.3 V or higher.

Judgement Criteria

- Throttle position sensor power voltage is 4.1 V or less for 0.5 second.

PROBALE CAUSE

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

DIAGNOSIS

STEP 1. Check the trouble symptoms.

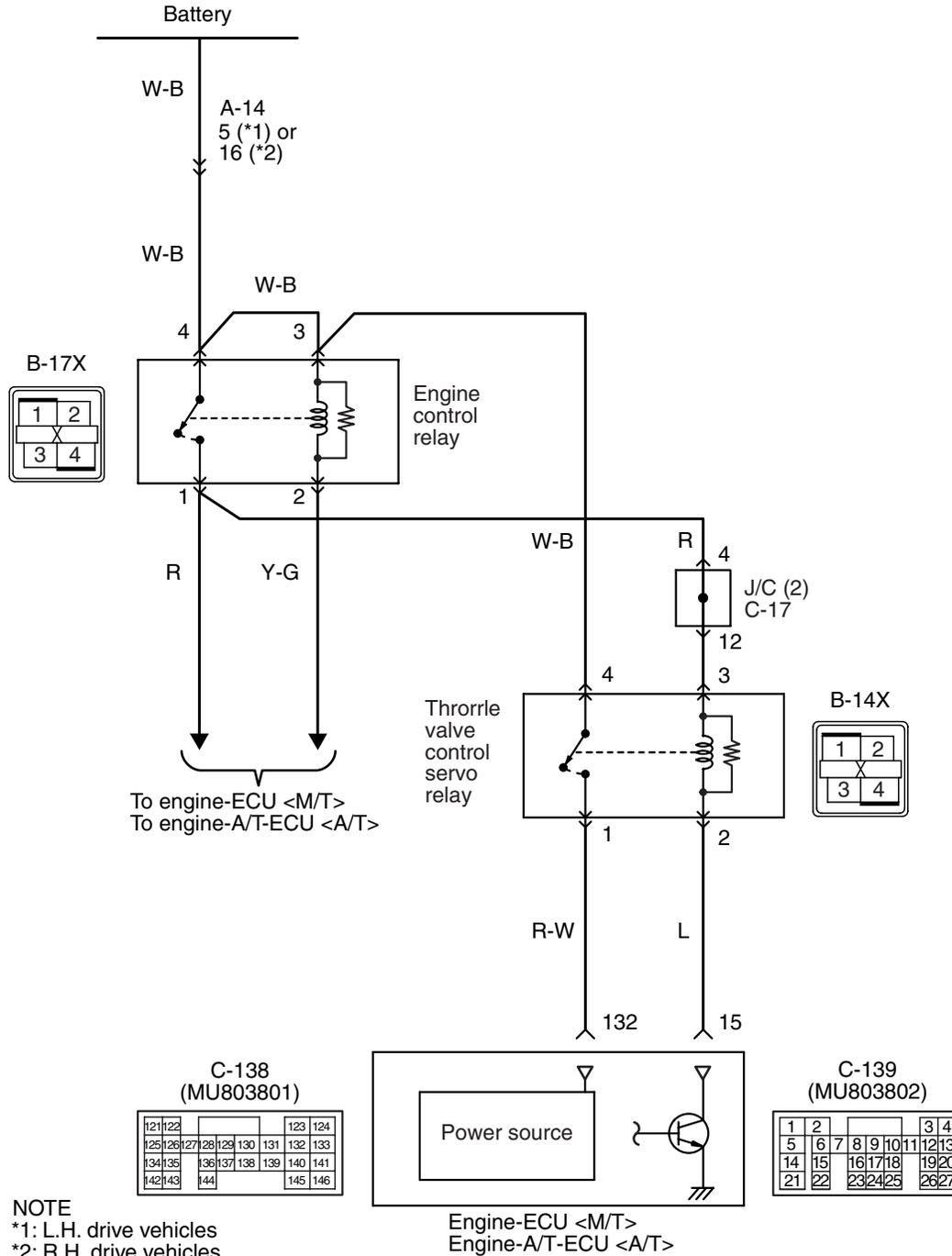
Q: Does trouble symptom persist?

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

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

DTC P0657: Throttle Valve Control Servo Relay Circuit Malfunction

Throttle valve control srvo relay circuit



NOTE

- *1: L.H. drive vehicles
- *2: R.H. drive vehicles

Wire colour code

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

AK401183AB

OPERATION

- Battery voltage is applied to the Throttle valve control servo relay terminal (terminal No. 4).
- Battery voltage is applied to the Throttle valve control servo relay terminal (terminal No. 3) from the engine control relay (terminal No. 1).
- Engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 15) applies current to the throttle valve control servo relay coil by turning ON the power transistor in the unit in order to turn the relay ON.

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

FUNCTION

- When the ignition switch ON signal is input into the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> turns ON the Throttle valve control servo.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgement Criteria

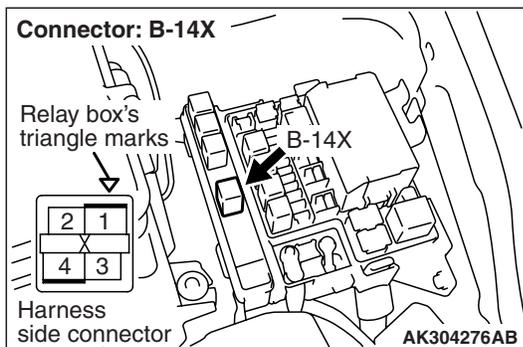
- The power line voltage of the electronic controlled throttle system is 4.0 V or less for 1 second.

PROBALE 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-14X throttle valve control servo relay connector



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

STEP 2. Check throttle valve control servo relay itself.

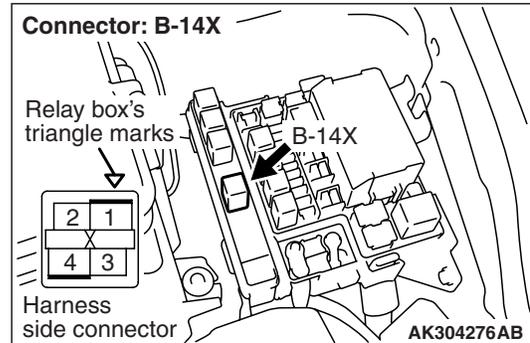
- Check throttle valve control servo relay (Refer to P.13C-430).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Perform voltage measurement at B-14X throttle valve control servo relay connector.



- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth.

OK: System voltage

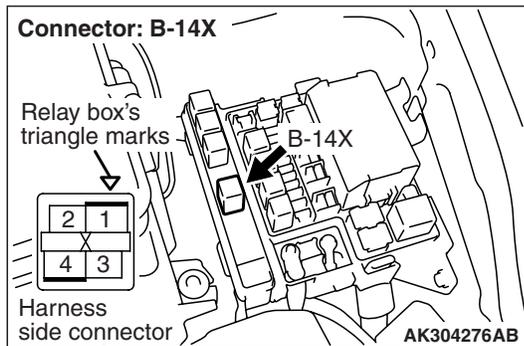
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between B-14X (terminal No. 4) throttle valve control servo relay connector and battery.

- Check power supply line for open/short circuit.

STEP 4. Perform voltage measurement at B-14X throttle valve control servo relay connector.



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

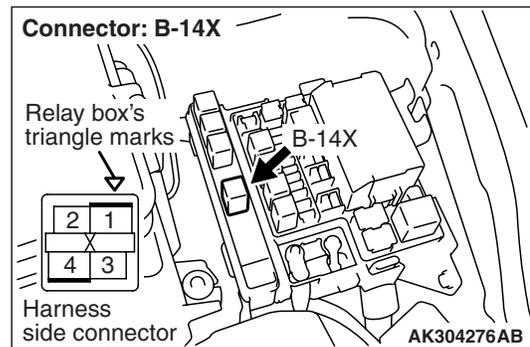
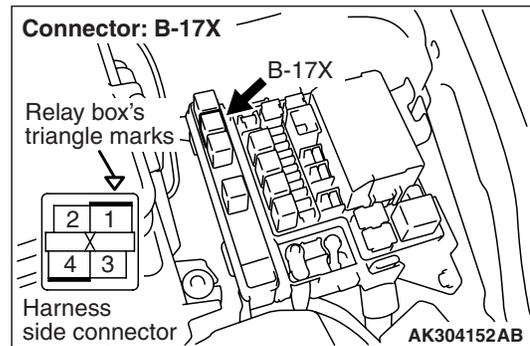
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: B-17X engine control relay connector



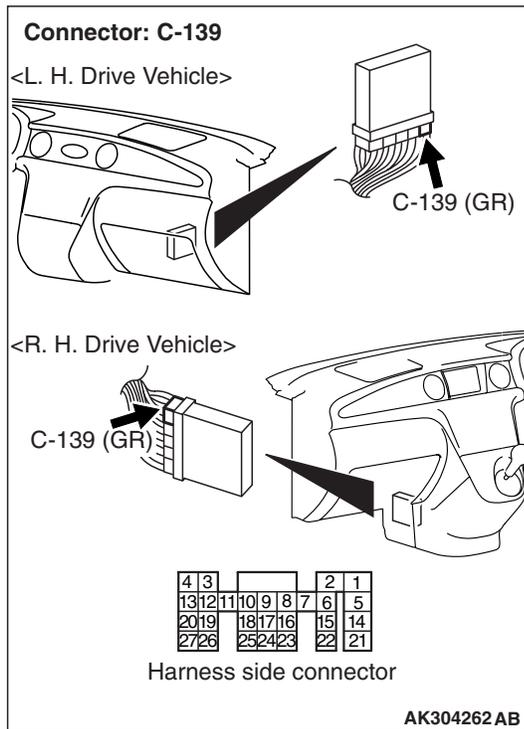
Q: Is the check result normal?

YES : Check intermediate connector C-17, and repair if necessary. If intermediate connector is normal, check and repair harness between B-17X (terminal No. 1) engine control relay connector and B-14X (terminal No. 3) throttle valve control servo relay connector.

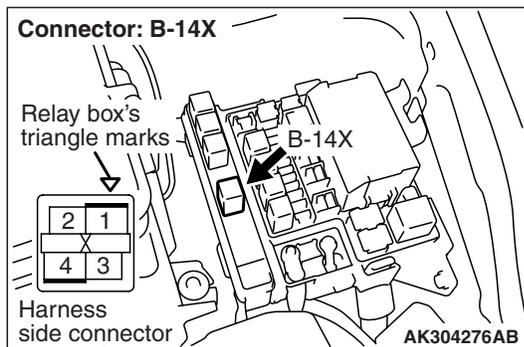
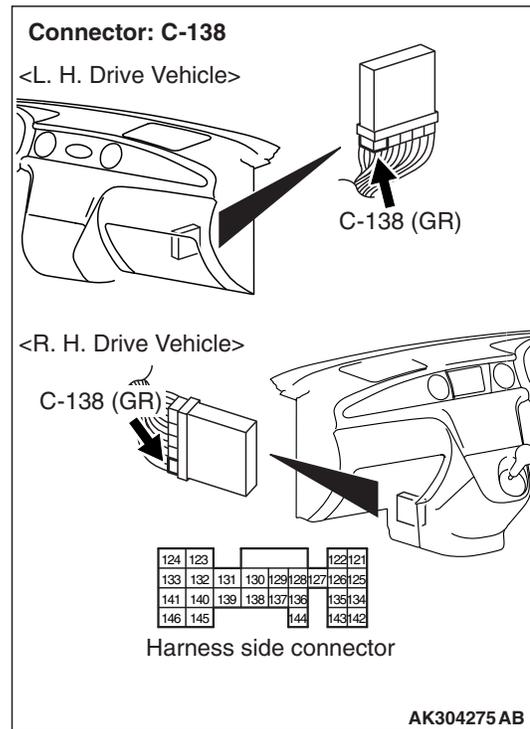
- Check power supply line for open/short circuit.

NO : Repair.

STEP 6. Perform voltage measurement at C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 7. Perform voltage measurement at C-138 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 .

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

OK: System voltage

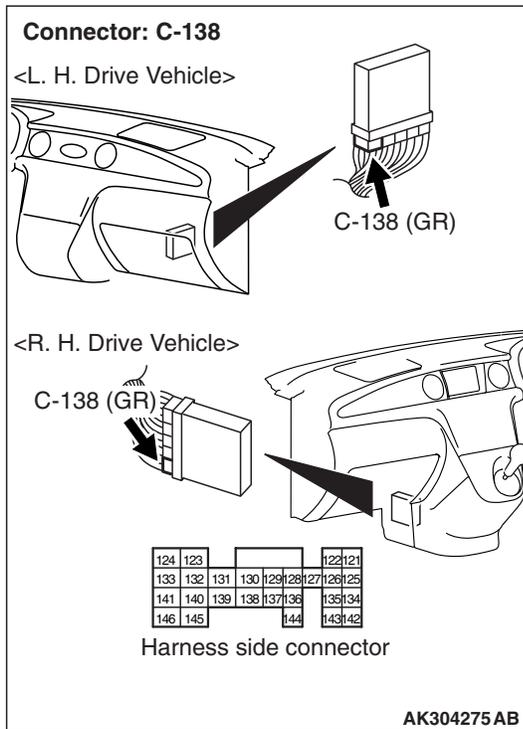
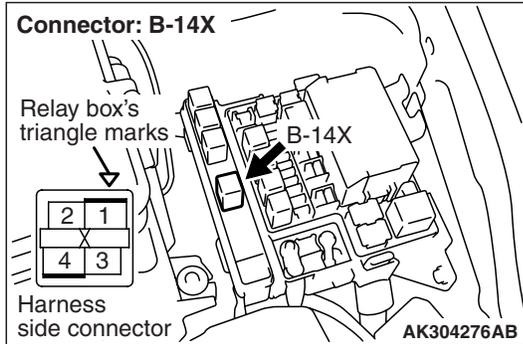
Q: Is the check result normal?

YES : Check and repair harness between B-14X (terminal No. 2) throttle valve control servo relay connector and C-139 (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 .

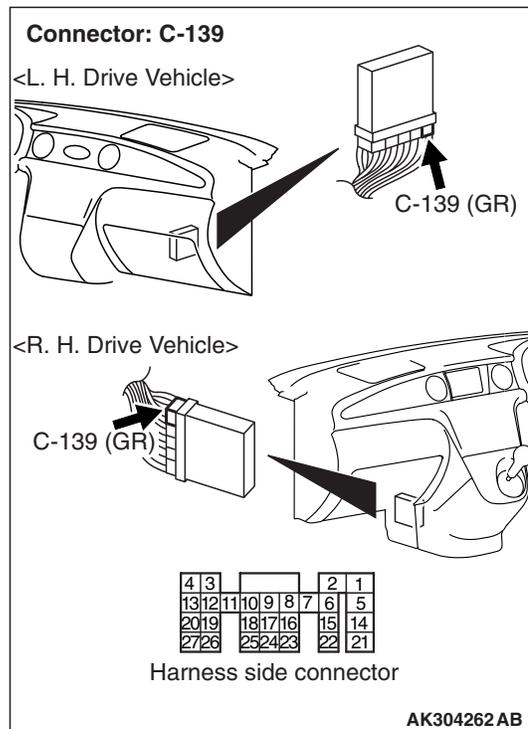
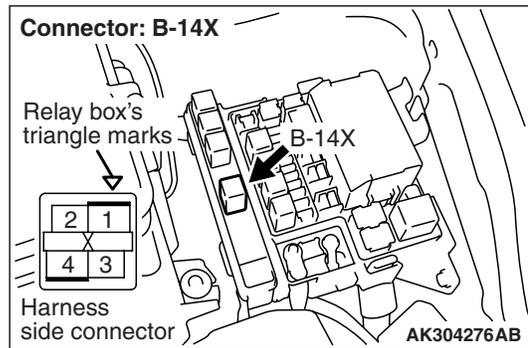
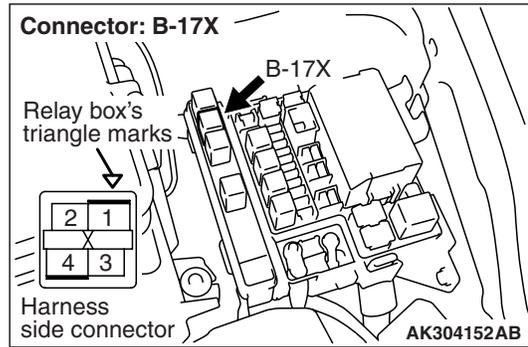
STEP 8. Check harness between B-14X (terminal No. 1) throttle valve control servo relay connector and C-138 (terminal No. 132) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for open/short circuit.

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

STEP 9. Check harness between B-17X (terminal No. 1) engine control relay connector and B-14X (terminal No. 3) throttle valve control servo relay connector.



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

- Check output line for damage.

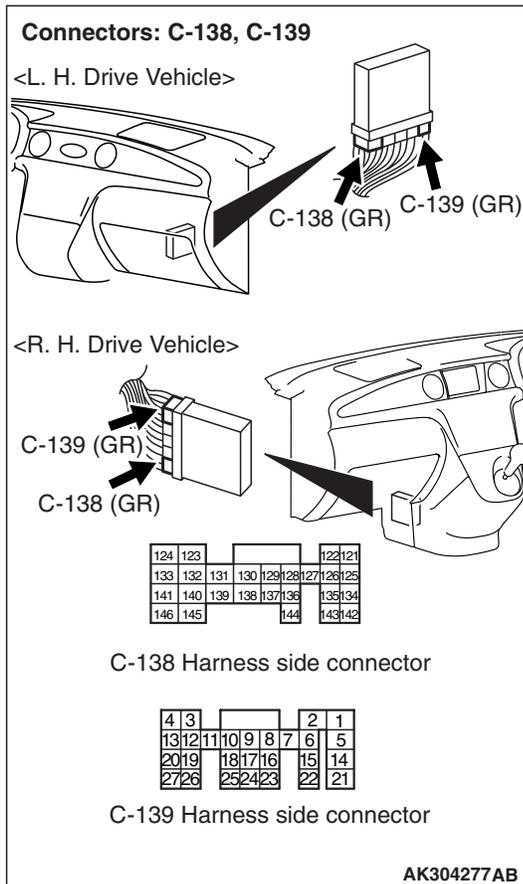
Q: Is the check result normal?

YES : Check and repair harness between B-14X (terminal No. 2) throttle valve control servo relay connector and C-139 (terminal No. 15) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

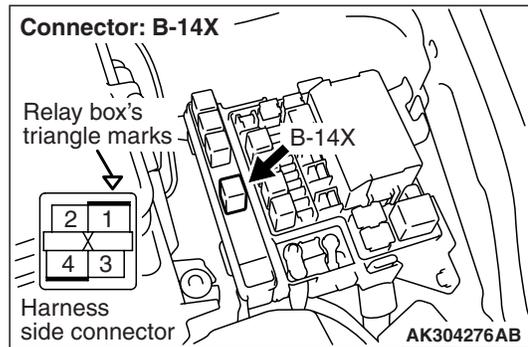
- Check earthing line for open/short circuit.

NO : Repair.

STEP 10. Connector check: C-138 and C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 11. Check and repair harness between B-14X (terminal No. 4) throttle valve control servo relay connector and battery.



- Check power supply line for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 12 .

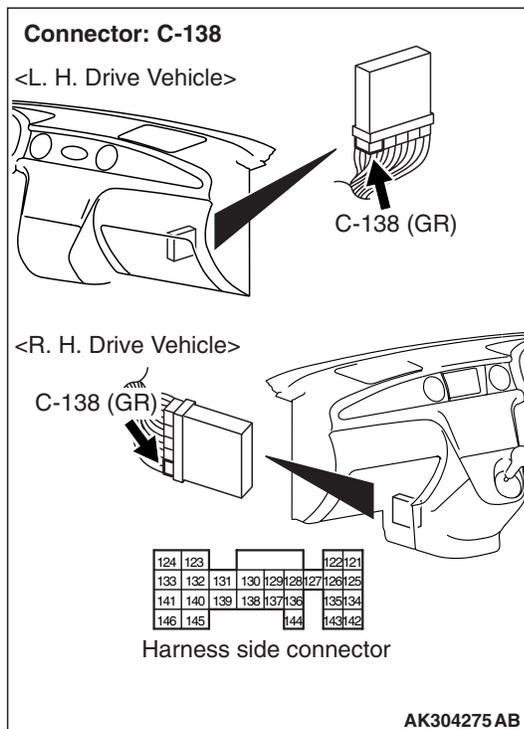
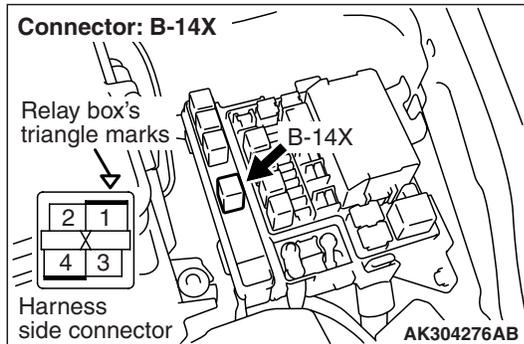
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

Q: Is the check result normal?

YES : Go to Step 11 .

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

STEP 12. Check and repair harness between B-14X (terminal No. 1) throttle valve control servo relay connector and C-138 (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 [P.00-6](#)).

STEP 13. Check the trouble symptoms.

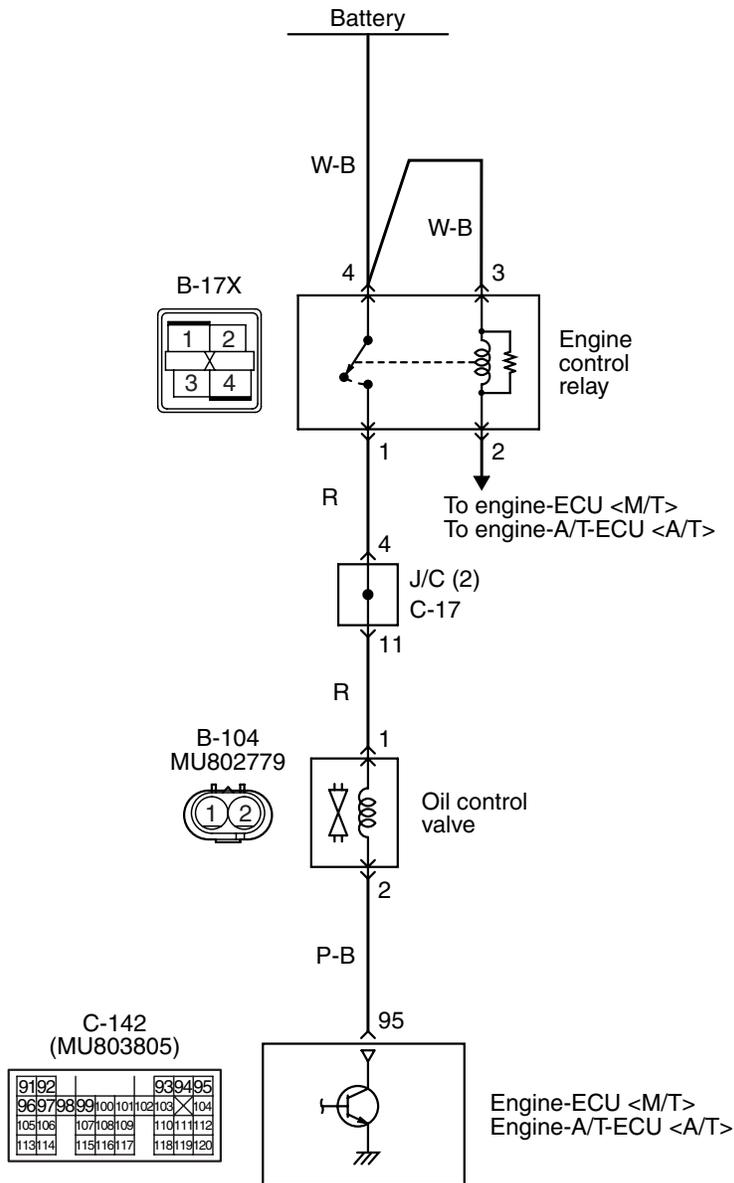
Q: Does trouble symptom persist?

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

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

Code No. P1010: Oil Control Valve Circuit

Engine 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

OPERATION

- Power is supplied to the oil control valve (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 95) makes the power transistor in the unit be in "ON" position, and that makes currents go on the oil control valve (terminal No. 2).

FUNCTION

- The oil control valve switches the cams to operate the MIVEC 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**

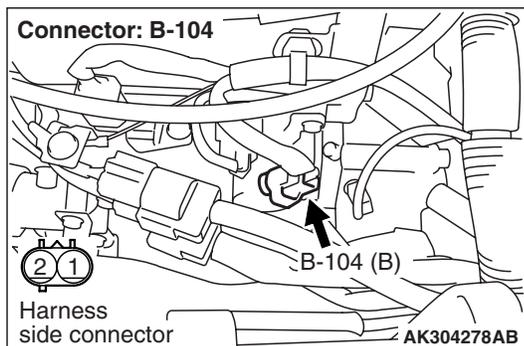
- Ignition switch is "ON" position
- Battery positive voltage is higher than 10 V.
- MIVEC operating in the low-speed mode.

Judgment Criteria

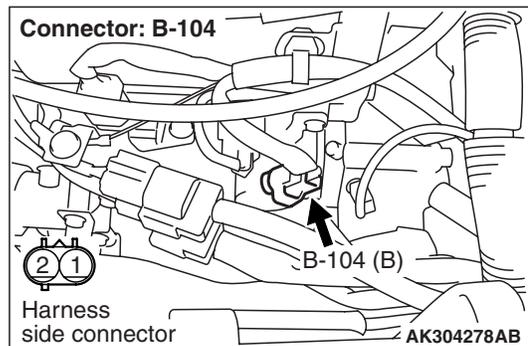
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage of oil control valve circuit is less than 1.5 V for 2 seconds.

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-104 oil control valve connector****Q: Is the check result normal?**

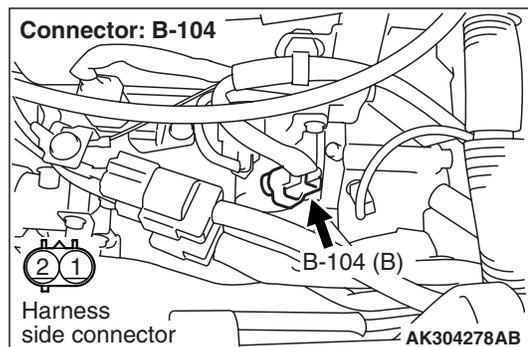
- YES** : Go to Step 2 .
NO : Repair.

STEP 2: Perform resistance measurement at B-104 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 oil control valve.

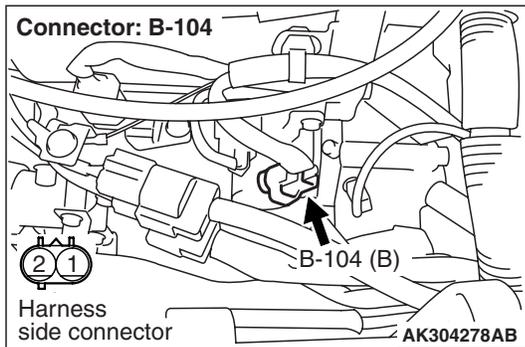
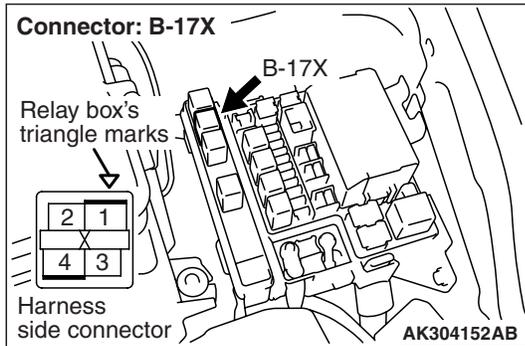
STEP 3. Perform voltage measurement at B-104 oil control valve connector.

- 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-17X engine control relay connector



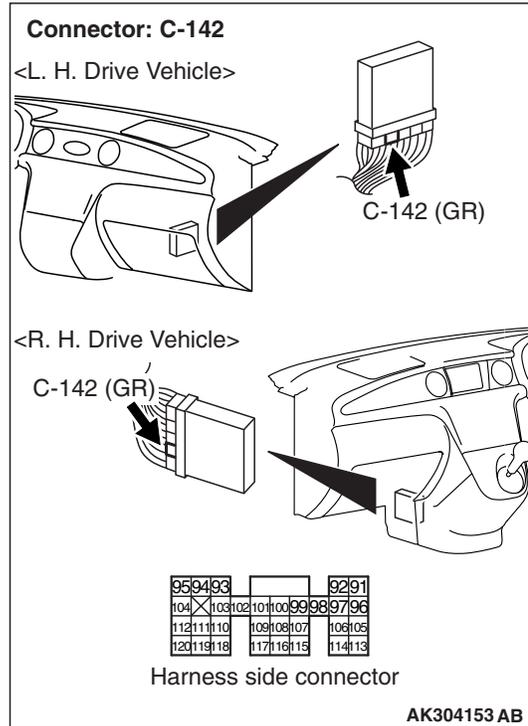
Q: Is the check result normal?

YES : Check intermediate connector C-17, and repair if necessary. If intermediate connector is normal, check and repair harness between B-104 (terminal No. 1) oil control valve connector and B-17X (terminal No. 1) engine control relay connector.

- Check power line for open/short circuit.

NO : Repair.

STEP 5. Perform voltage measurement at C-142 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.

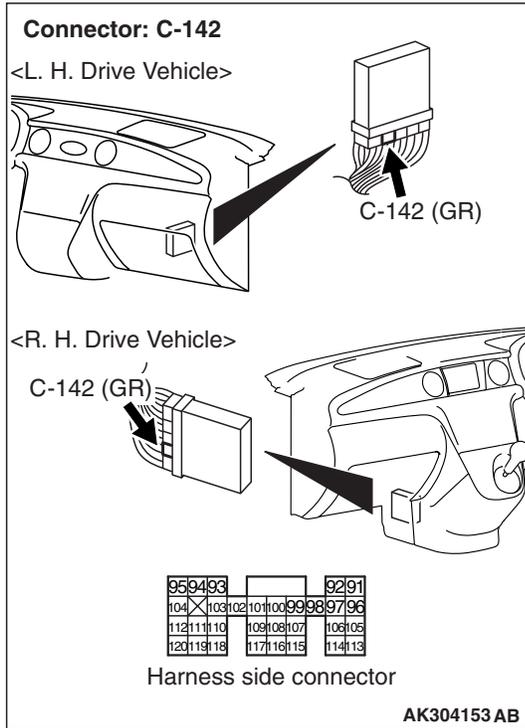
OK: System voltage

Q: Is the check result normal?

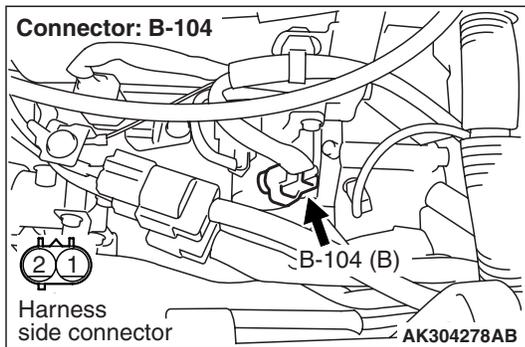
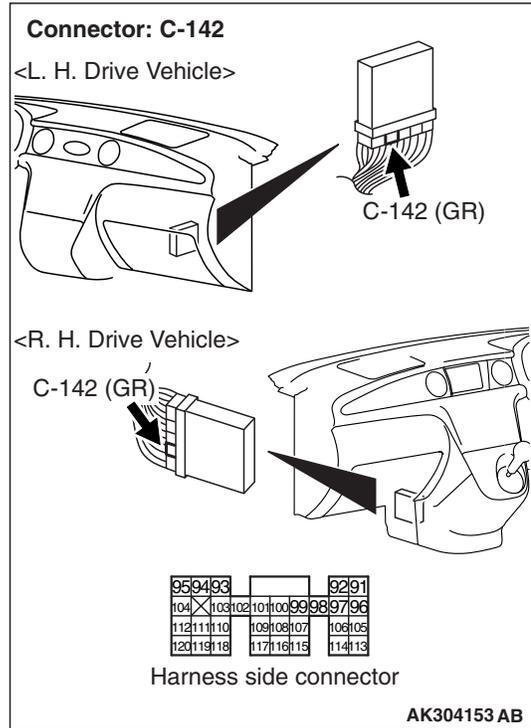
YES : Go to Step 7 .

NO : Go to Step 6 .

STEP 6. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 7. Connector check: C-142 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.

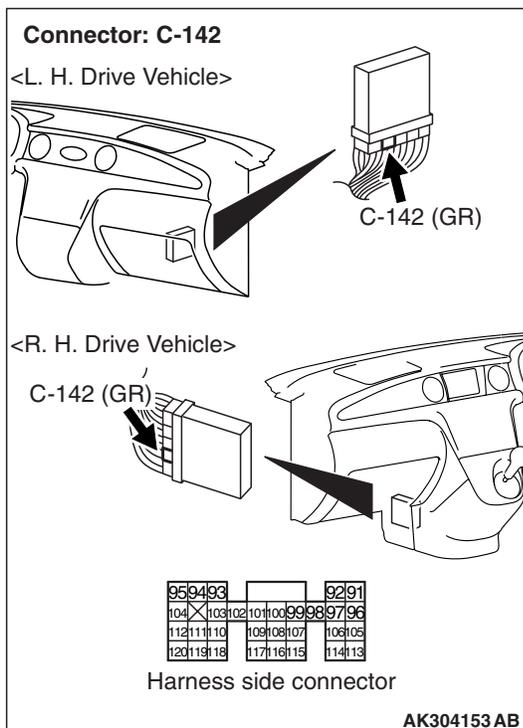
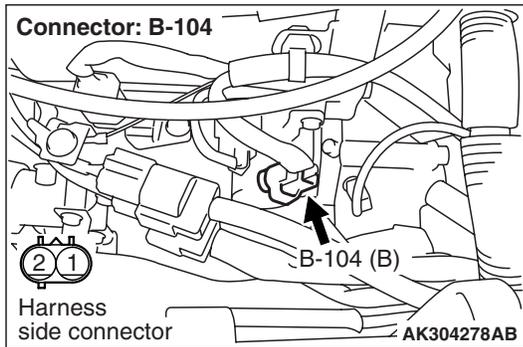
Q: Is the check result normal?

YES : Check and repair harness between B-104 (terminal No. 2) oil control valve connector and C-142 (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.

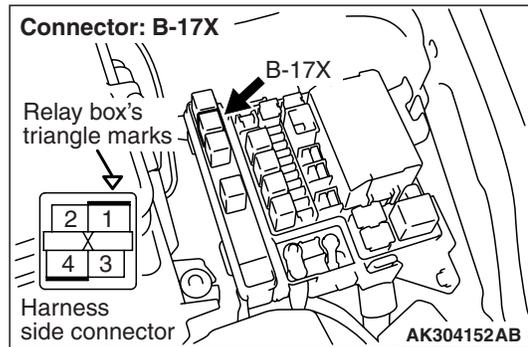
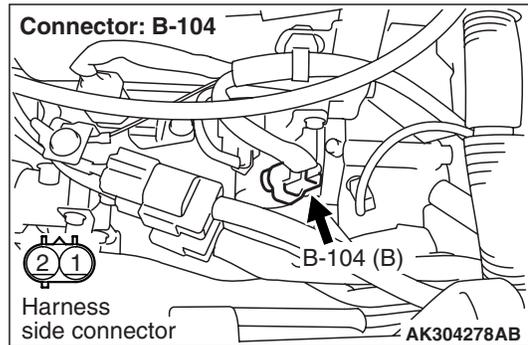
STEP 8. Check harness between B-104 (terminal No. 2) oil control valve connector and C-142 (terminal No. 95) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for damage.

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

STEP 9. Check harness between B-104 (terminal No. 1) oil control valve connector and B-17X (terminal No. 1) engine control relay connector.



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

- Check power supply line for damage.

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

STEP 10. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

DTC P1602: Communication Malfunction (between Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Main Processor and System LSI)

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the communication status for abnormal conditions.

TROUBLE JUDGMENT**Check Conditions**

- Ignition switch is "ON" position.

Judgement Criteria

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> detects an error in communication with the throttle actuator control module for 0.07 second.

PROBALE CAUSE

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

DIAGNOSIS

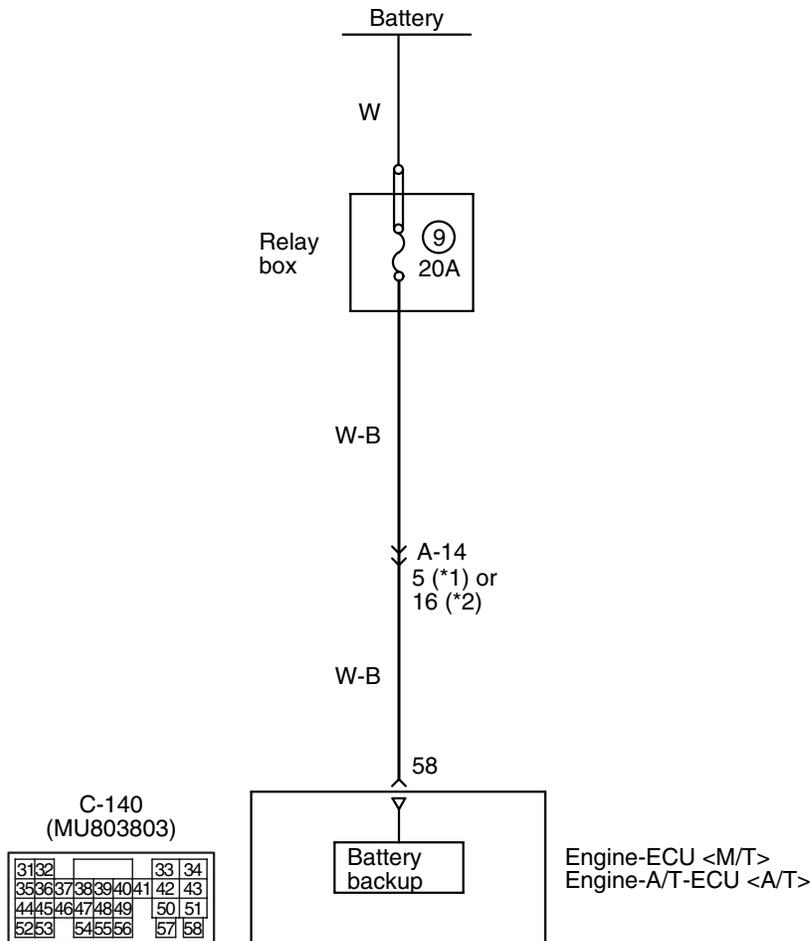
STEP 1. Check the trouble symptoms.**Q: Does trouble symptom persist?**

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

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

Code No. P1603: Battery Backup Circuit Malfunction

Battery backup circuit



NOTE

- *1: L.H. drive vehicles
- *2: R.H. drive vehicles

Wire colour code

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

AK304139AB

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

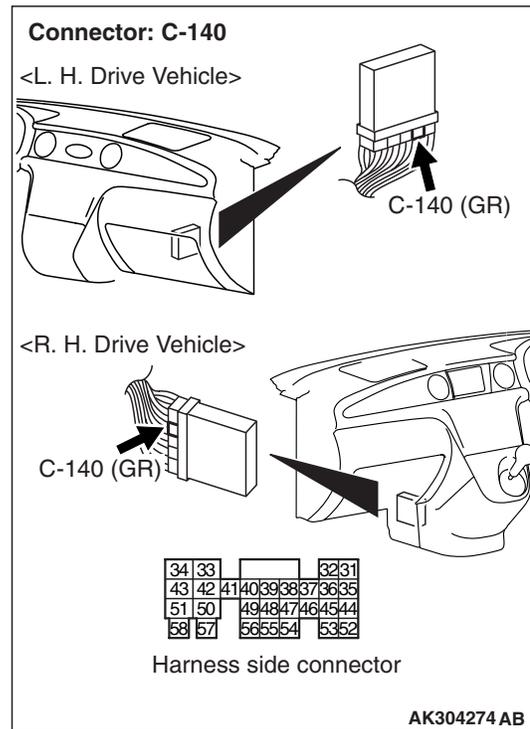
- Battery backup line voltage is 6 V or lower for 2 seconds.

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 P.00-6).**STEP 2. Perform voltage measurement at C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.**

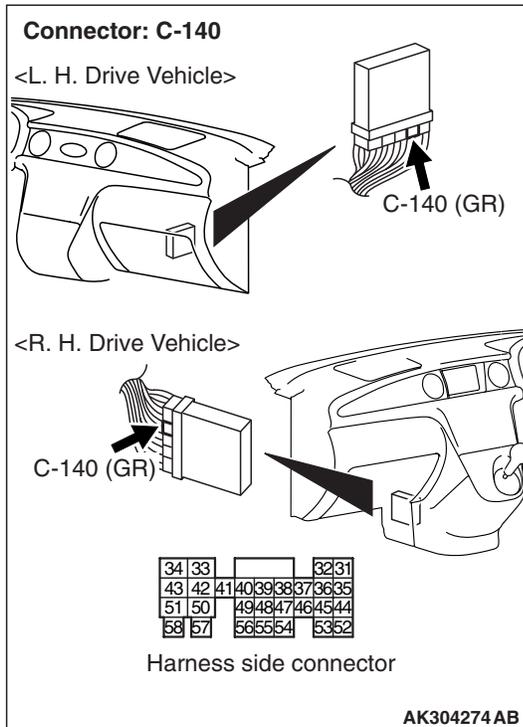
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 58 and earth.

OK: System voltage**Q: Is the check result normal?****YES** : Go to Step 3 .**NO** : Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between battery and C-140 (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-140 (terminal No. 58) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.



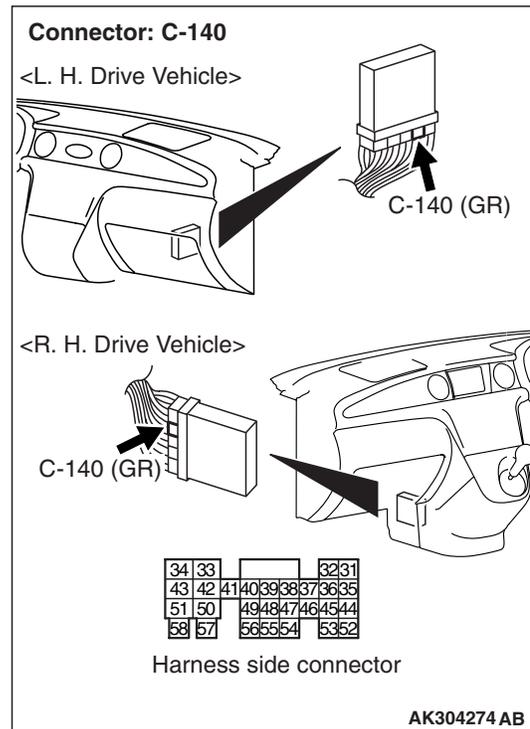
- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

STEP 4. Connector check: C-140 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.

STEP 5. Check the trouble symptoms.

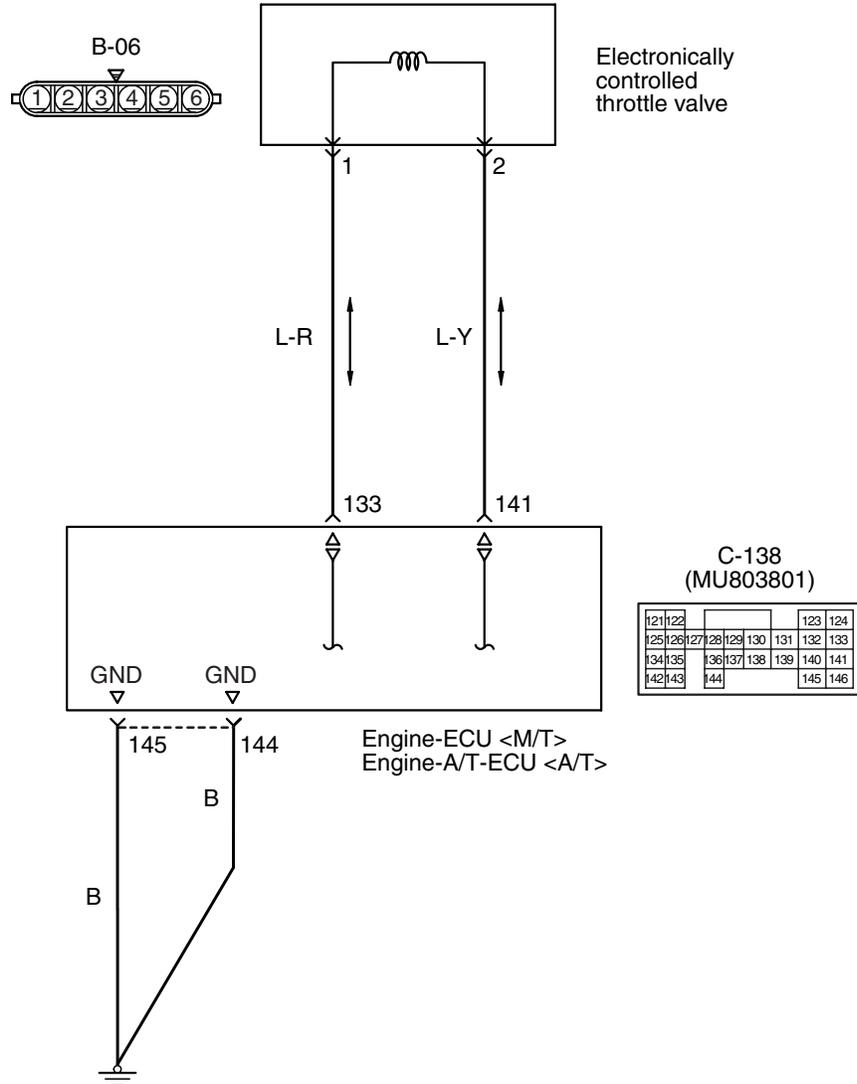
Q: Does trouble symptom persist?

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

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

DTC 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

AK401165AB

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 electronically controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> varies the direction and the amperage of the current that is applied to the throttle valve control servo in order to control the opening of the throttle valve.

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 8.3 V or higher.

Judgement Criteria

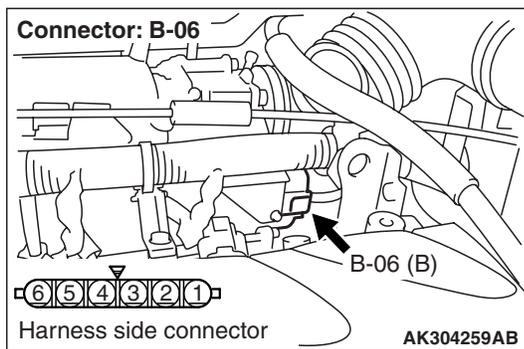
- Throttle actuator control motor current is 0.1 A or less for 0.72 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo circuit or lose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronically controlled throttle valve connector

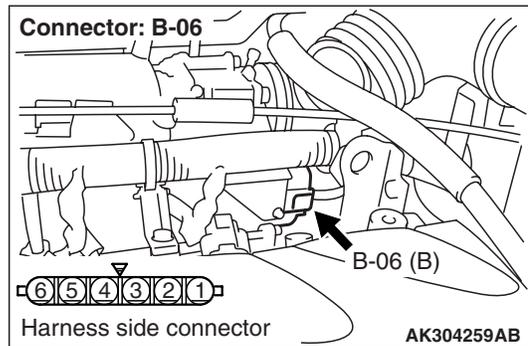


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

STEP 2. Perform resistance measurement at B-06 electronically controlled throttle valve connector.



- Disconnect connector, and measure at electronically controlled throttle valve side.

- Resistance between terminal No. 1 and No. 2.

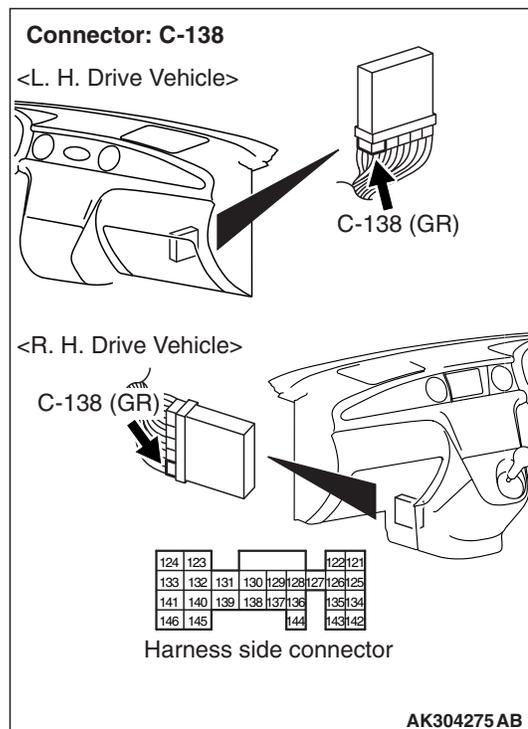
OK: 0.3 – 80 kΩ (at 20 °C)

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace throttle body assembly.

STEP 3. Connector check: C-138 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

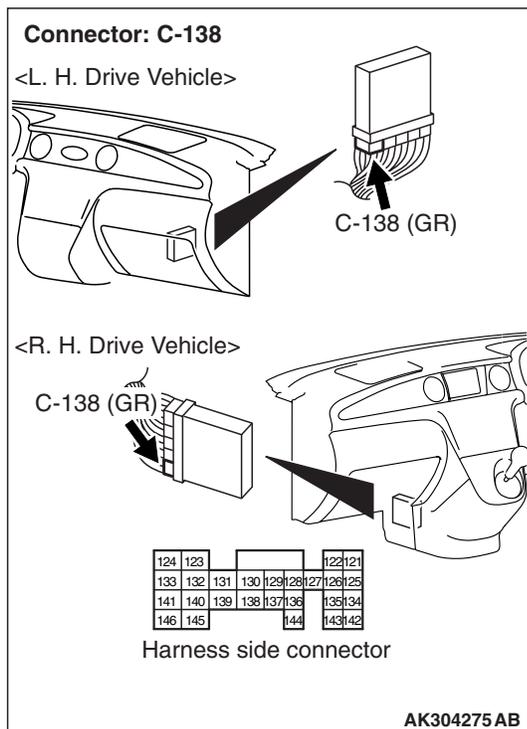


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

STEP 4. Perform resistance measurement at C-138 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.

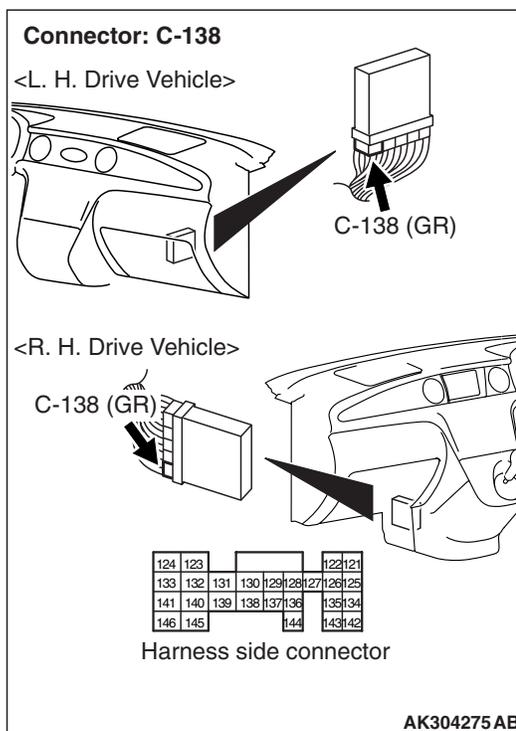
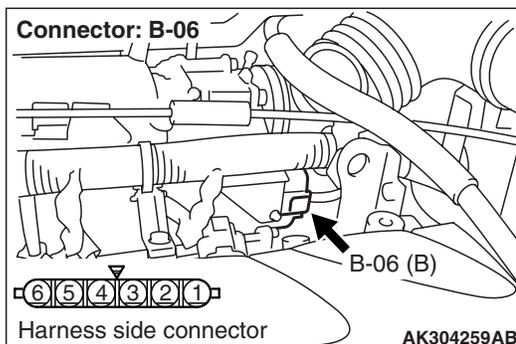
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check harness between C-138 (terminal No. 144 or No. 145) engine-ECU <M/T> or engine-A/T-ECU <A/T> and earth.

STEP 5. Check harness between B-06 (terminal No. 1) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



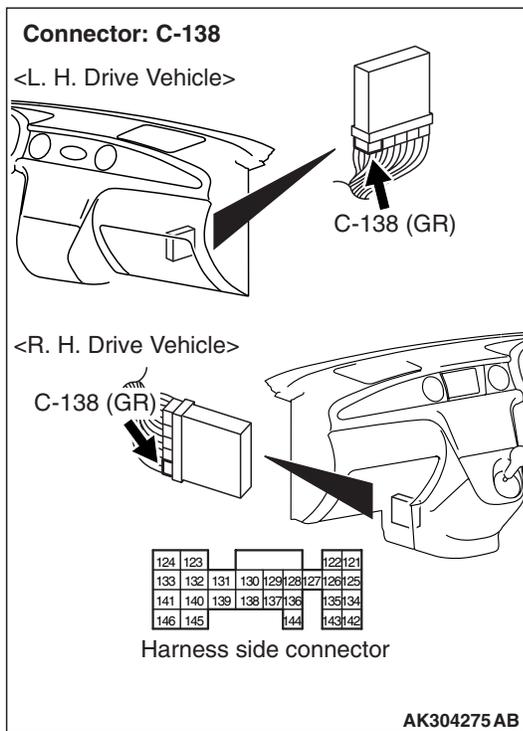
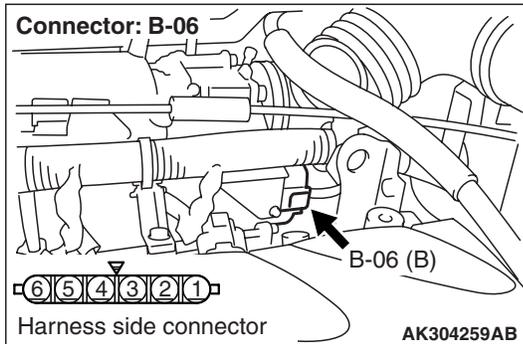
- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-138 (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.

STEP 7. Check the trouble symptoms.

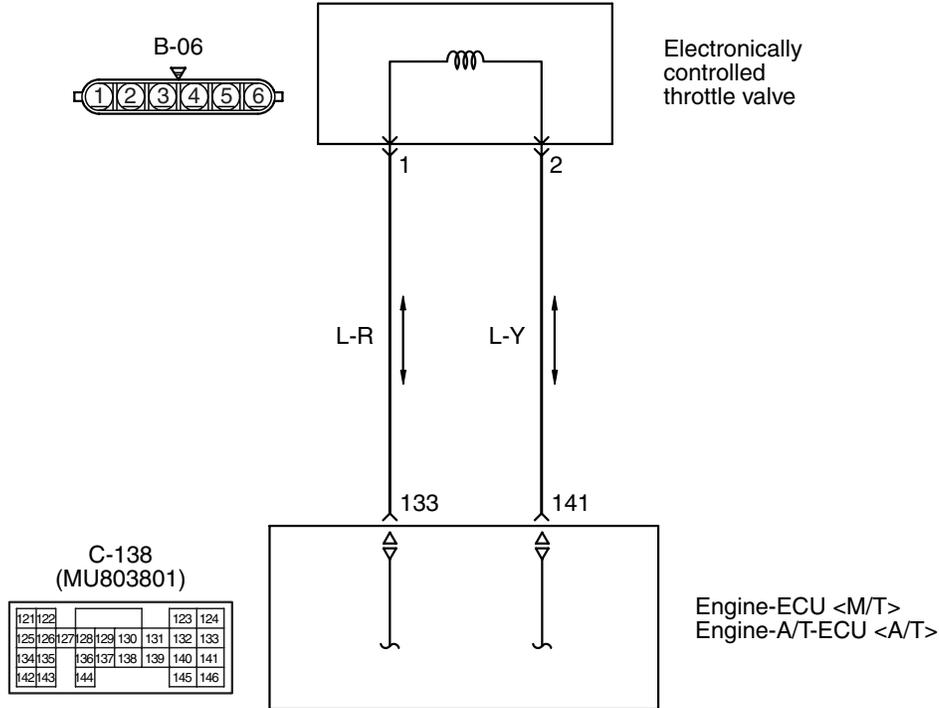
Q: Is the check result normal?

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

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

DTC P2101: Throttle Valve Control Servo Magneto Malfunction

Throttle valve control servo circuit



AK401166AB

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 electronically controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> check whether the throttle valve control servo magneto failed.

TROUBLE JUDGMENT**Check Condition**

- Battery positive voltage is 8.3 V or higher.

Judgement Criteria

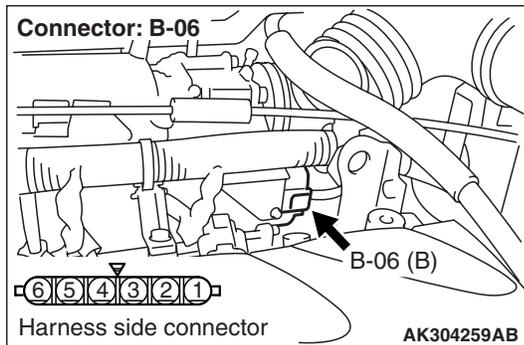
- The coil temperature of the throttle actuator control motor is 180°C or higher for 0.8 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo circuit or lose connector contact.
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

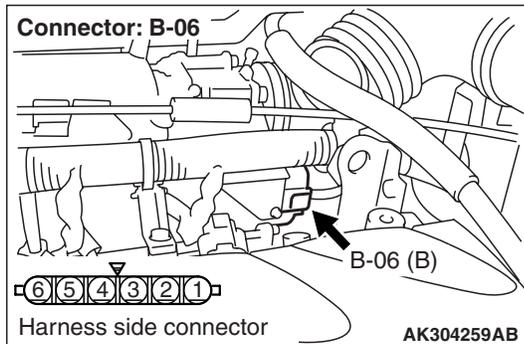
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronically controlled throttle valve connector



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

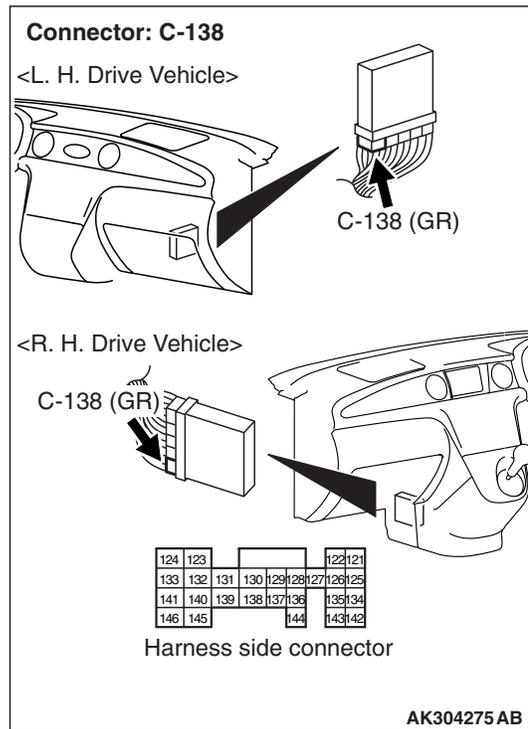
STEP 2. Perform resistance measurement at B-06 electronically controlled throttle valve connector.



- Disconnect connector, and measure at electronically controlled throttle valve side.
- Resistance between terminal No. 1 and No. 2.
OK: 0.3 – 80 kΩ (at 20 °C)

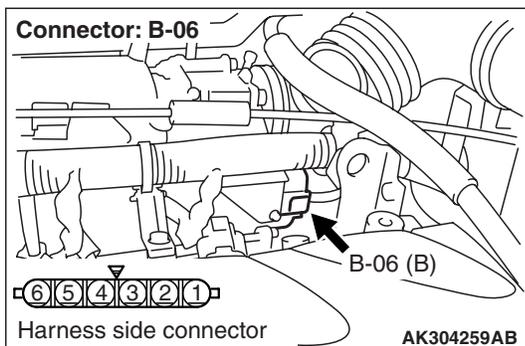
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace throttle body assembly.

STEP 3. Connector check: C-138 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

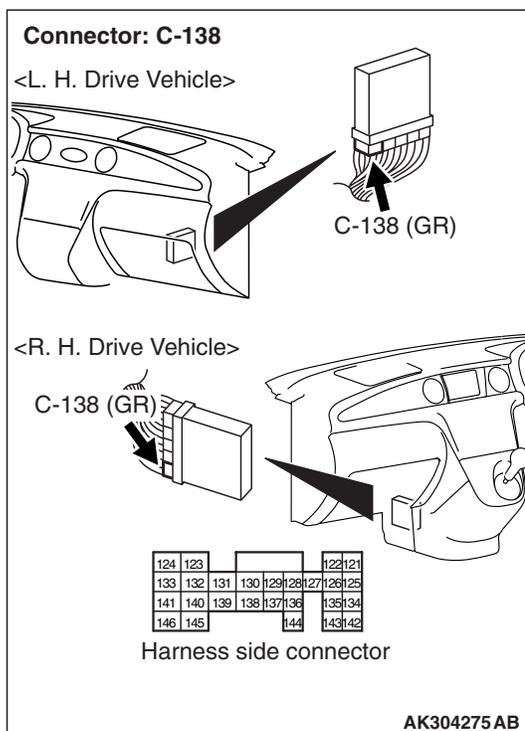
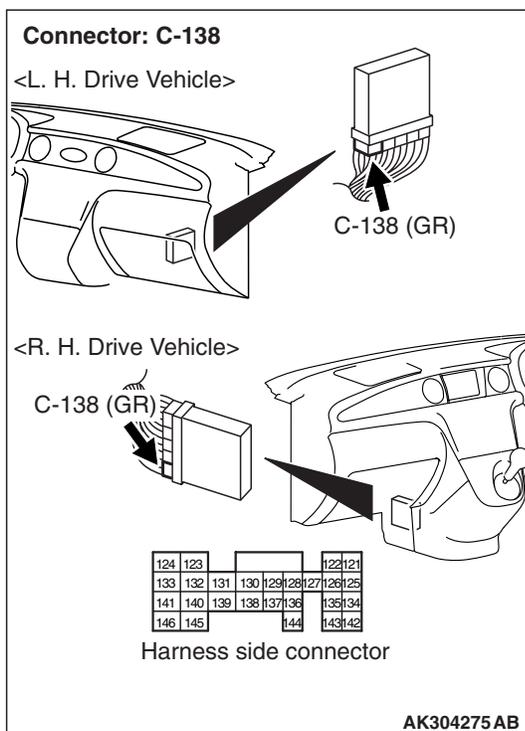
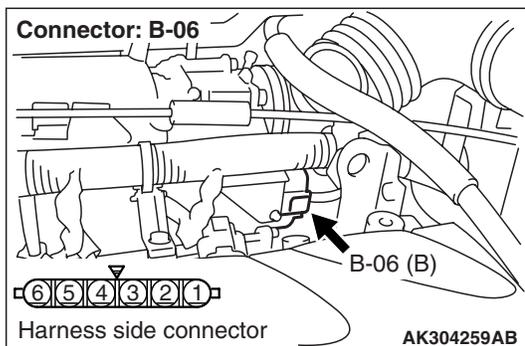


Q: Is the check result normal?
YES : Go to Step 4 .
NO : Repair.

STEP 4. Check harness between B-06 (terminal No. 1) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 5. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-138 (terminal No. 141) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for short circuit and damage.

- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check the trouble symptoms.

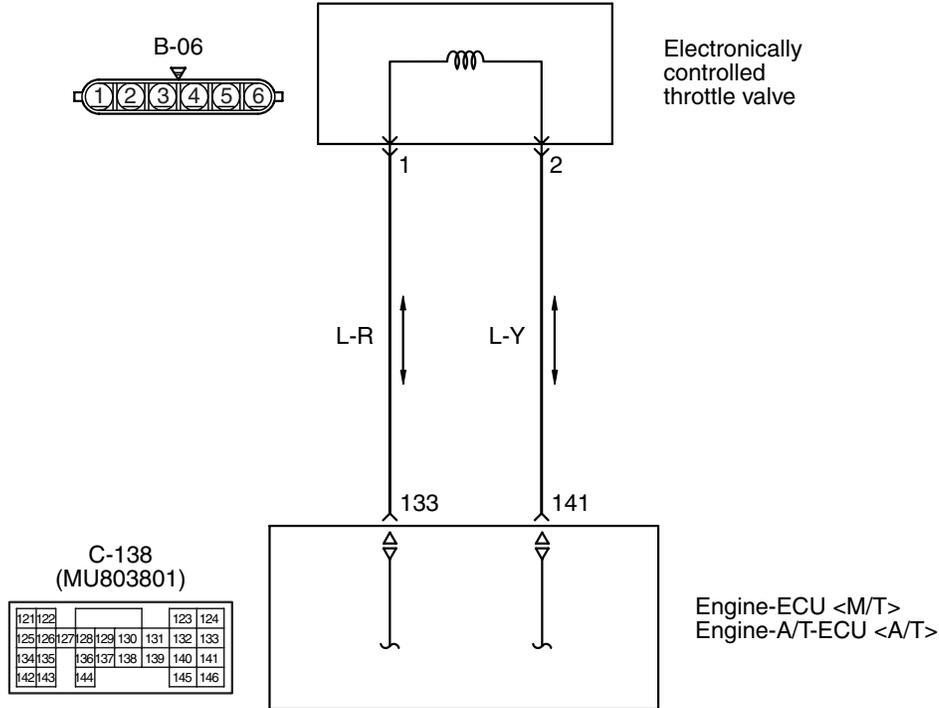
Q: Is the check result normal?

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

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

DTC 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

AK401166AB

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 electronically controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> varies the direction and the amperage of the current that is applied to the throttle valve control servo in order to control the opening of the throttle valve.

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 8.3 V or higher.

Judgement Criteria

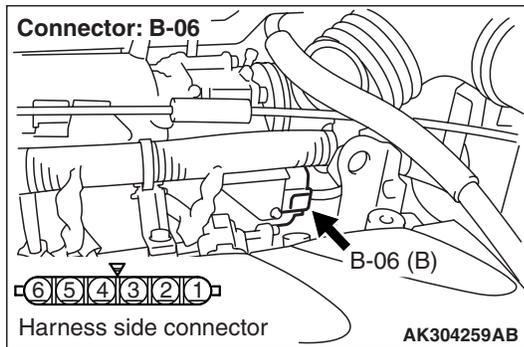
- Throttle valve control servo current is 12 A or higher for 0.8 second.

PROBABLE CAUSE

- Failed throttle valve control servo
- Short circuit in throttle valve control servo circuit or lose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

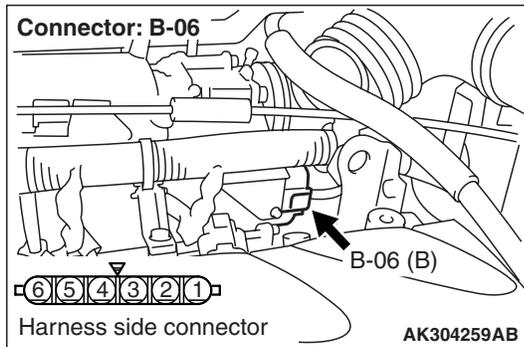
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronically controlled throttle valve connector



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

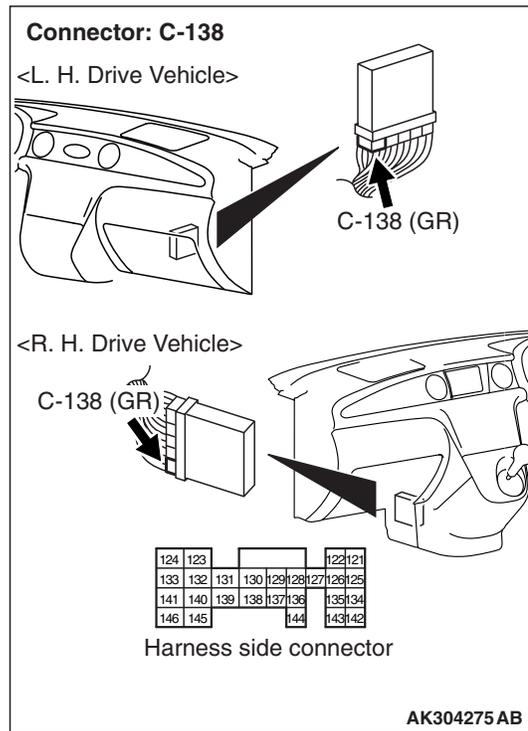
STEP 2. Perform resistance measurement at B-06 electronically controlled throttle valve connector.



- Disconnect connector, and measure at electronically controlled throttle valve side.
- Resistance between terminal No. 1 and No. 2.
OK: 0.3 – 80 Ω (at 20 °C)

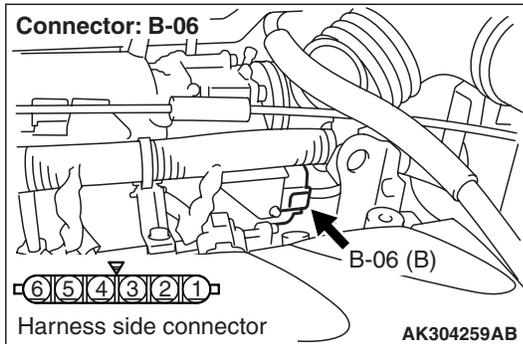
Q: Is the check result normal?
 YES : Go to Step 3 .
 NO : Replace throttle body assembly.

STEP 3. Connector check: C-138 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

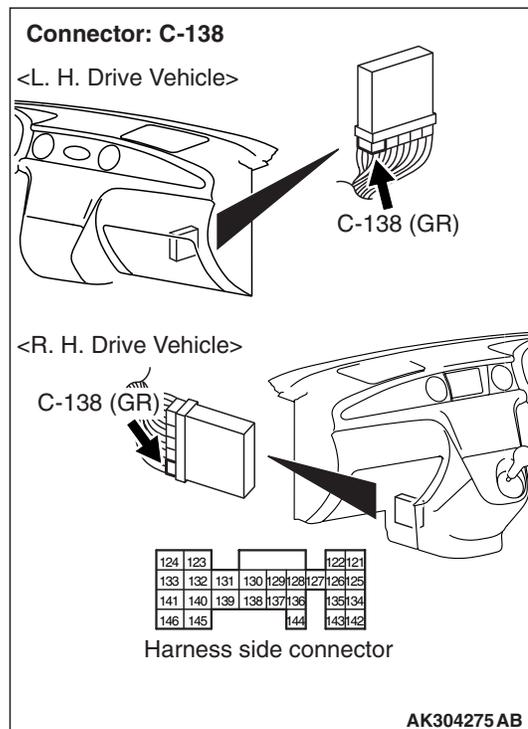
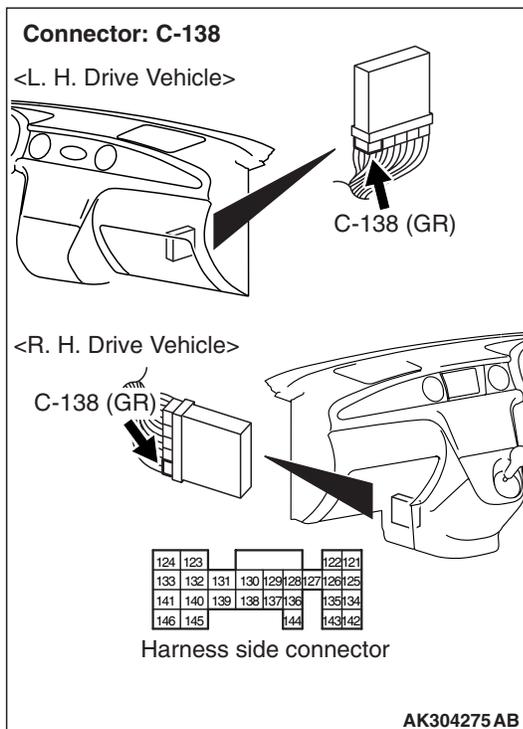
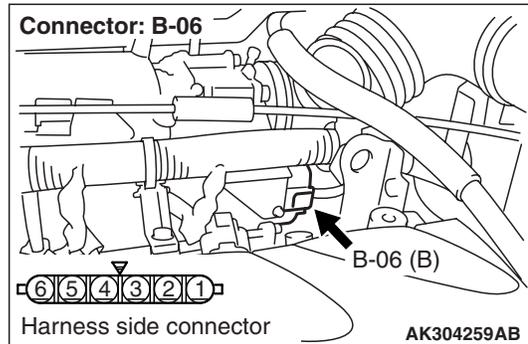


Q: Is the check result normal?
 YES : Go to Step 4 .
 NO : Repair.

STEP 4. Check harness between B-06 (terminal No. 1) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 5. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-138 (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 5 .
NO : Repair.

- Check output line for short circuit.

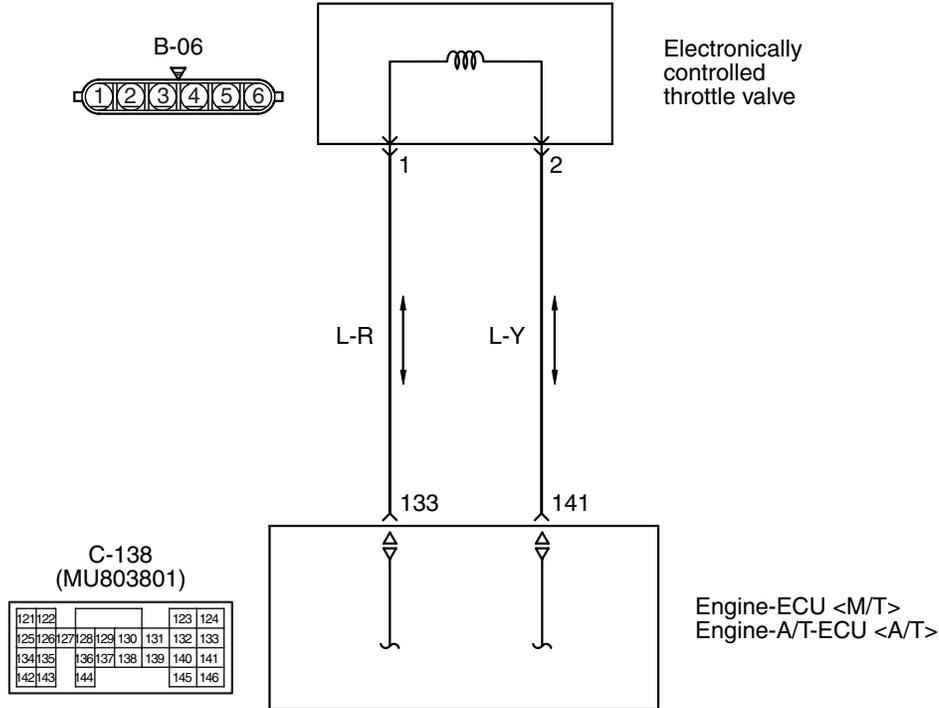
Q: Is the check result normal?
YES : Go to Step 6 .
NO : Repair.

STEP 6. Check the trouble symptoms.

Q: Is the check result normal?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

DTC P2103: Throttle Valve Control Servo Circuit (Shorted High)

Throttle valve control servo circuit



Wire colour code

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

AK401166AB

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 electronically controlled throttle valve (terminals No. 1, No. 2).

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> varies the direction and the amperage of the current that is applied to the throttle valve control servo in order to control the opening of the throttle valve.

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 8.3 V or higher.

Judgement Criteria

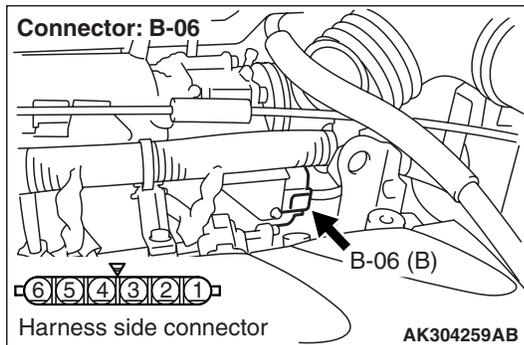
- Throttle actuator control motor current is 8 A or higher for 0.8 second.

PROBABLE CAUSE

- Failed throttle valve control servo
- Short circuit in throttle valve control servo circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

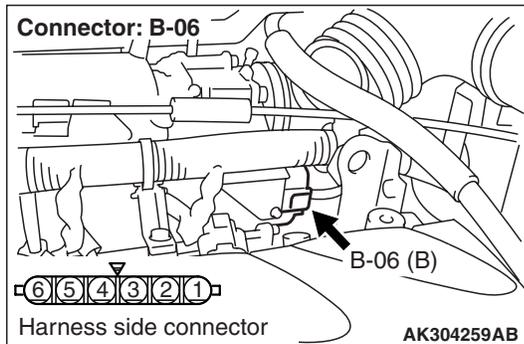
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronically controlled throttle valve connector



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

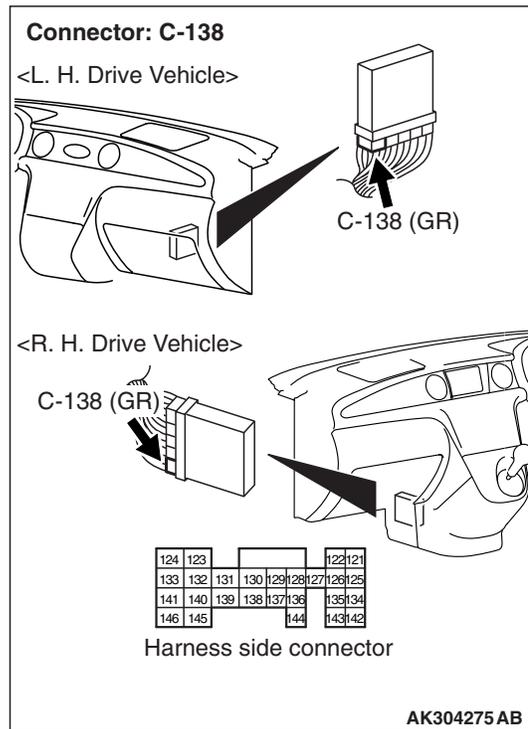
STEP 2. Perform resistance measurement at B-06 electronically controlled throttle valve connector.



- Disconnect connector, and measure at electronically controlled throttle valve side.
- Resistance between terminal No. 1 and No. 2.
OK: 0.3 – 80 Ω (at 20 °C)

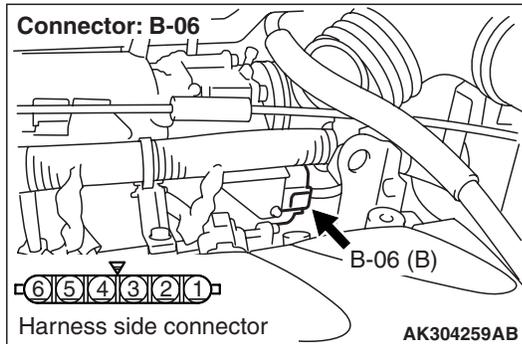
Q: Is the check result normal?
YES : Go to Step 3 .
NO : Replace the throttle body assembly.

STEP 3. Connector check: C-138 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

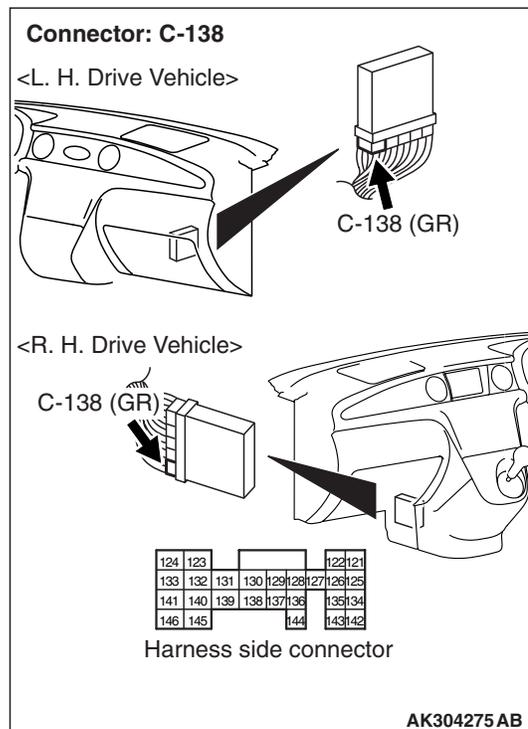
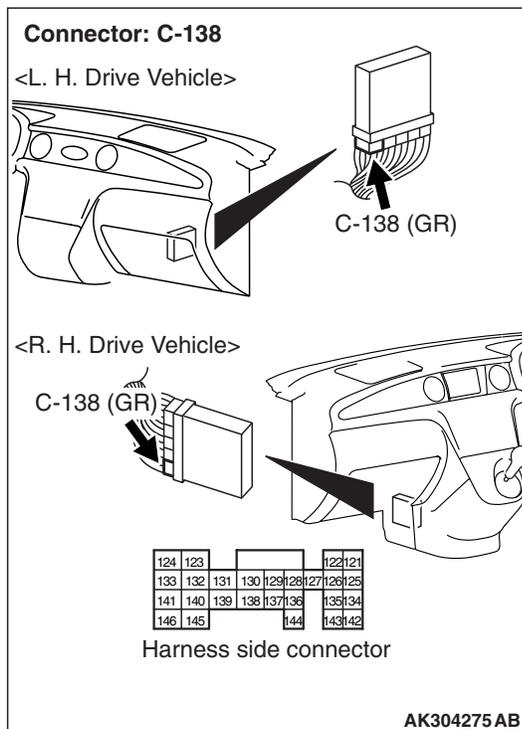
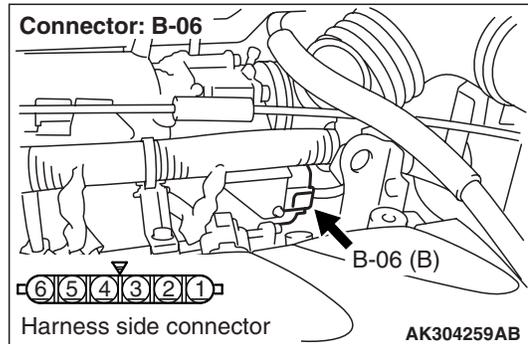


Q: Is the check result normal?
YES : Go to Step 4 .
NO : Repair.

STEP 4. Check harness between B-06 (terminal No. 1) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 5. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-138 (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 5 .
NO : Repair.

- Check output line for short circuit.

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

STEP 6. Check the trouble symptoms.

Q: Is the check result normal?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

Code No. P2121: Accelerator Pedal Position Sensor (Main) Circuit Range/Performance Problem

OPERATION

- Refer to P2122 accelerator pedal position sensor (main) circuit [P.13C-395](#).
- Refer to inspection procedure 32 accelerator pedal position switch circuit [P.13C-395](#).

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 Condition

- Ignition switch is in "ON" position
- Closed throttle position switch: ON
- Accelerator pedal position sensor (sub) output voltage is 1.88 V or less.

Judgment Criteria

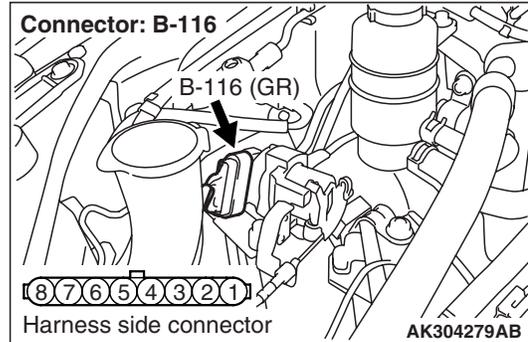
- Accelerator pedal position sensor (main) output voltage is 1.88 V or higher for 1 second.

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>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-116 accelerator pedal position sensor connector



Q: Is the check result normal?

- YES :** Go to Step 2 .
- NO :** Repair.

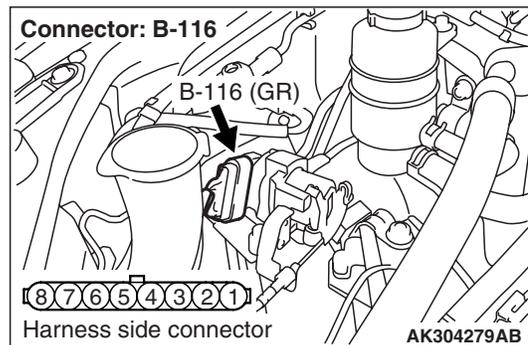
STEP 2. Check accelerator pedal position sensor itself.

- Check accelerator pedal position sensor itself (Refer to [P.13C-431](#)).

Q: Is the check result normal?

- YES :** Go to Step 3 .
- NO :** Replace accelerator pedal position sensor.

STEP 3. Perform resistance measurement at B-116 accelerator pedal position sensor connector.



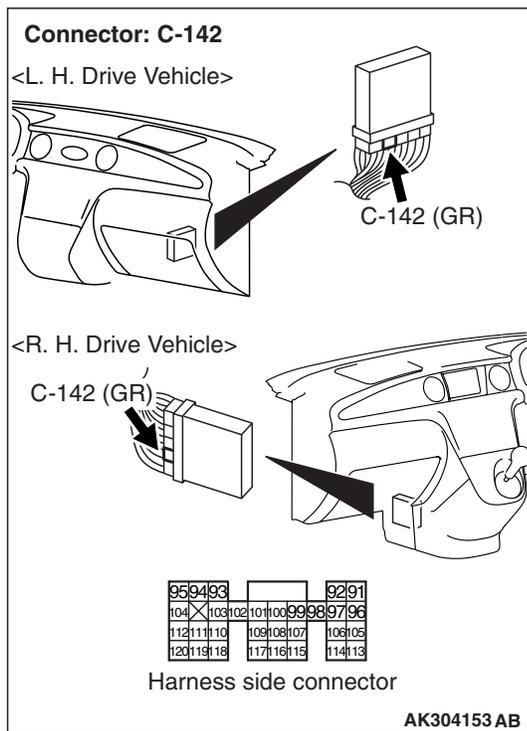
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

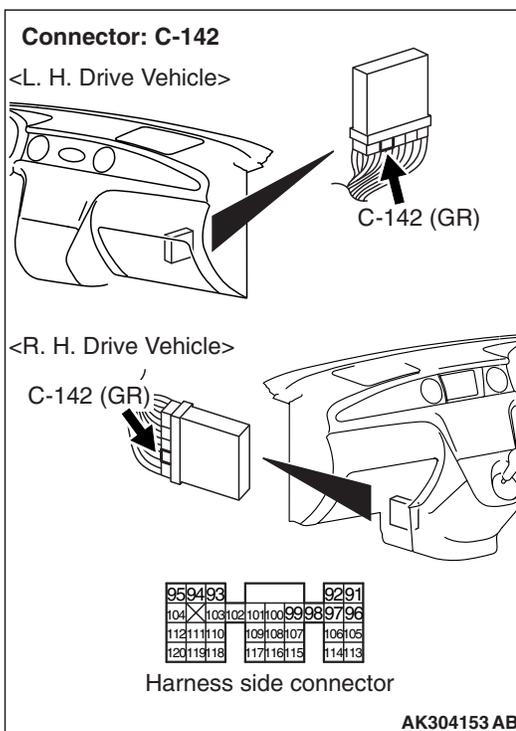
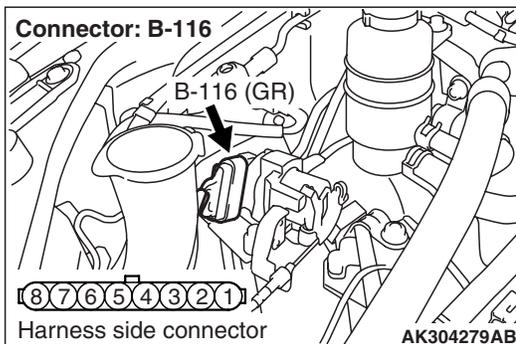
- YES :** Go to Step 7 .
- NO :** Go to Step 4 .

STEP 4. Connector check: C-142 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.

STEP 5. Check harness between B-116 (terminal No. 1) accelerator pedal position sensor connector and C-142 (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.

STEP 6. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Trouble shooting/Inspection Service Points P.00-6).

STEP 7. Check accelerator pedal position switch itself.

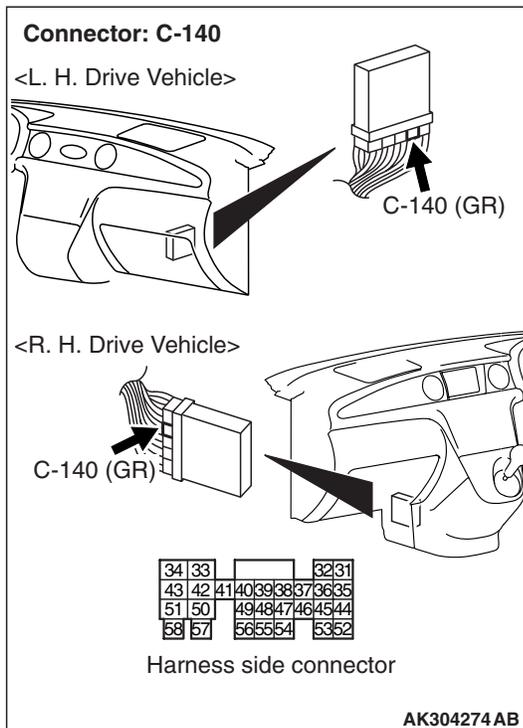
- Check accelerator pedal position switch itself (Refer to P.13C-432).

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Replace accelerator pedal position sensor.

STEP 8. Connector check: C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

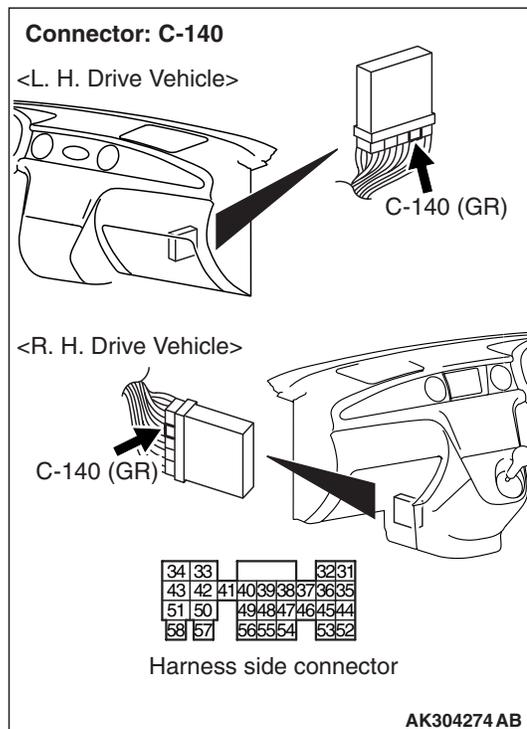
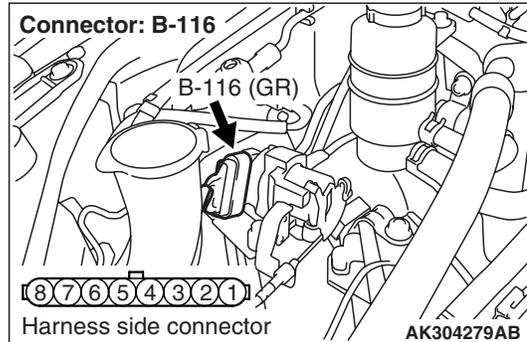


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for short circuit.

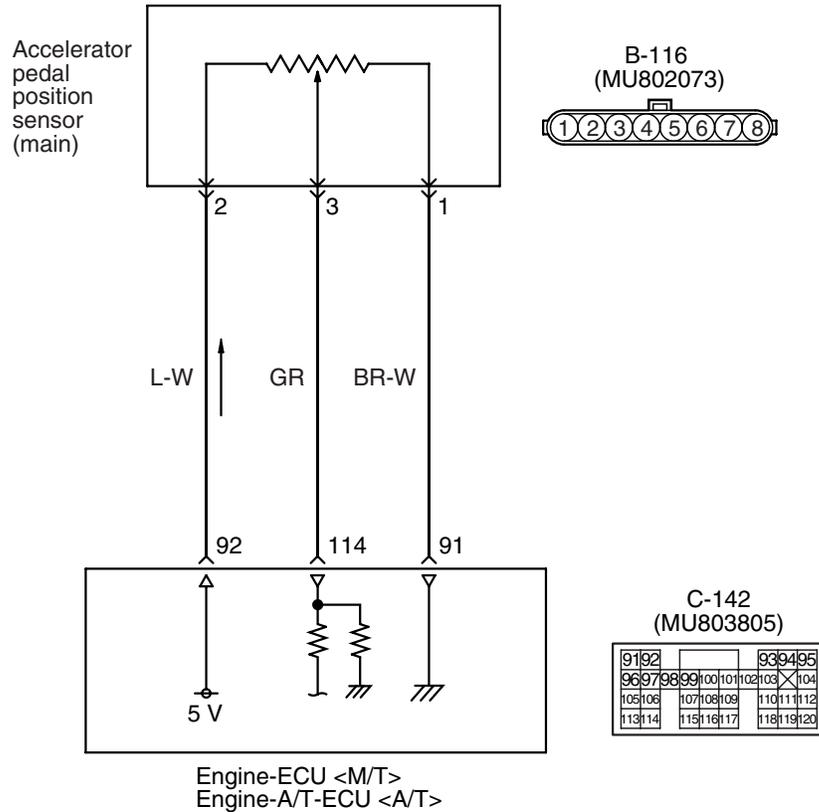
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

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

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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 Criteria

- 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

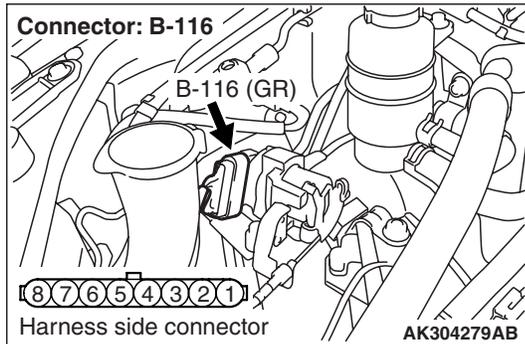
- Refer to Data List Reference Table [P.13C-402](#).
 - Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-116 accelerator pedal position sensor connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check accelerator pedal position sensor itself.

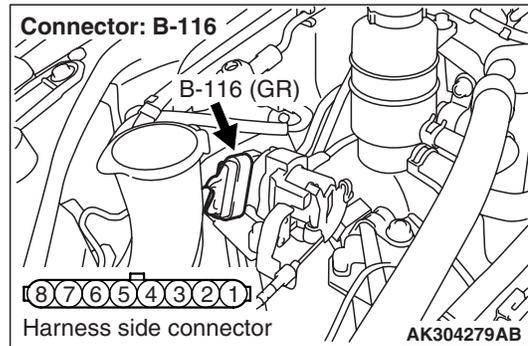
- Check accelerator pedal position sensor itself (Refer to [P.13C-431](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace accelerator pedal position sensor.

STEP 4. Perform voltage measurement at B-116 accelerator pedal position sensor connector.



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

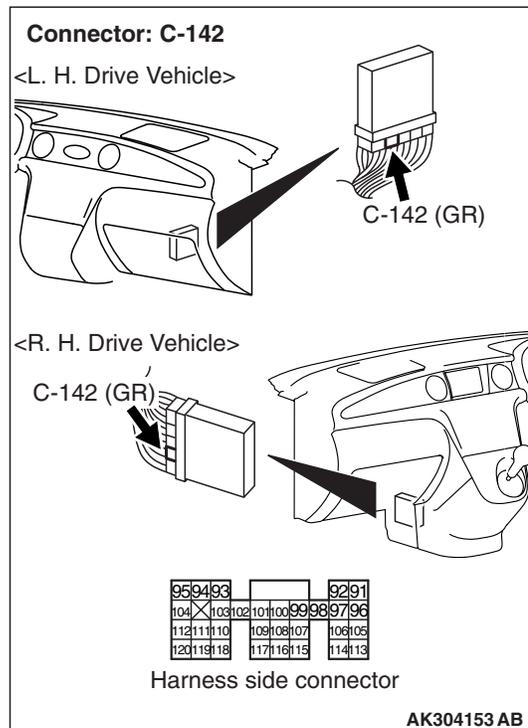
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 5 .

STEP 5. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

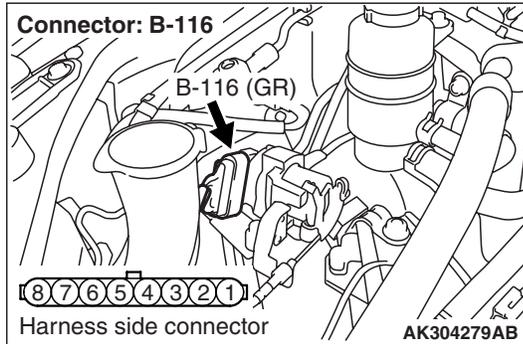


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-116 (terminal No. 2) accelerator pedal position sensor connector and C-142 (terminal No. 92) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



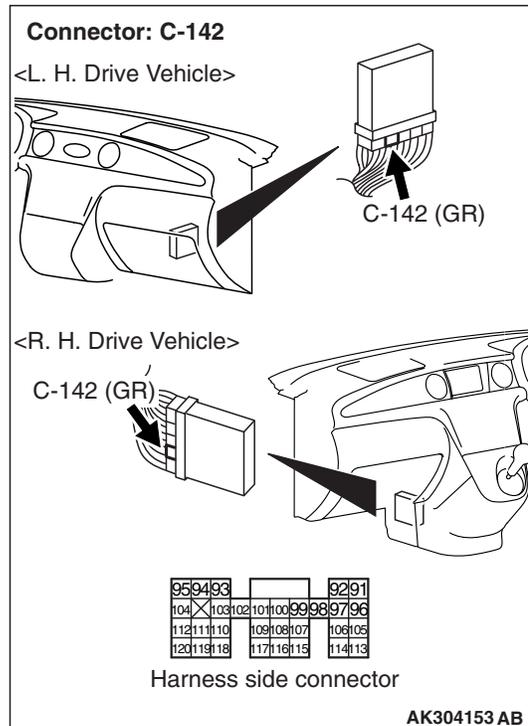
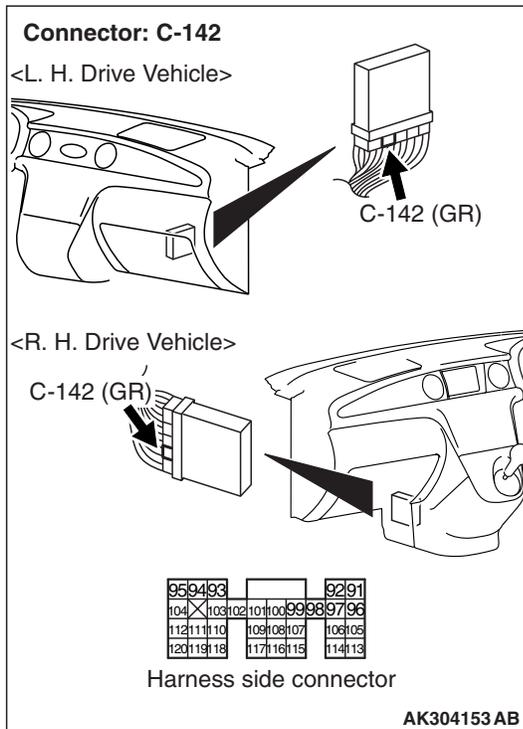
STEP 7. M.U.T.-II/III data list

- Refer to Data List Reference Table P.13C-402.
 - a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

- YES :** Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).
- NO :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 8. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

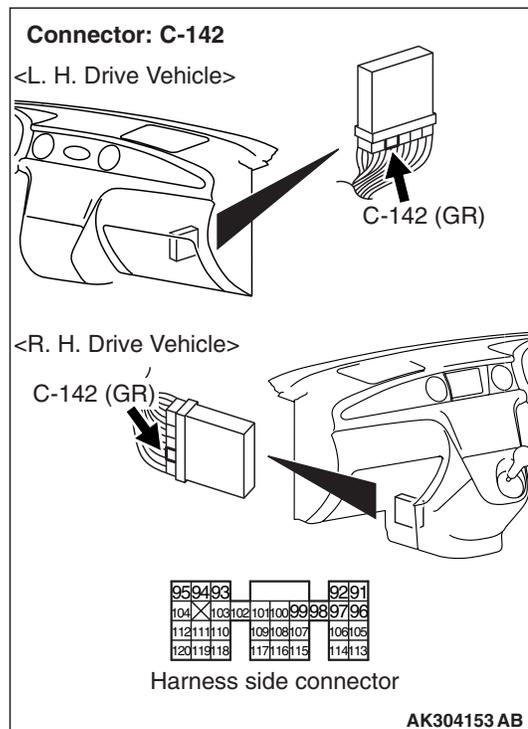
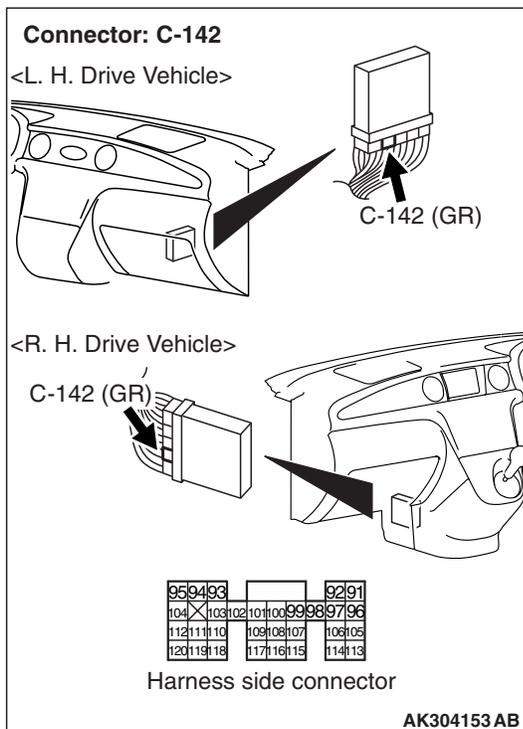
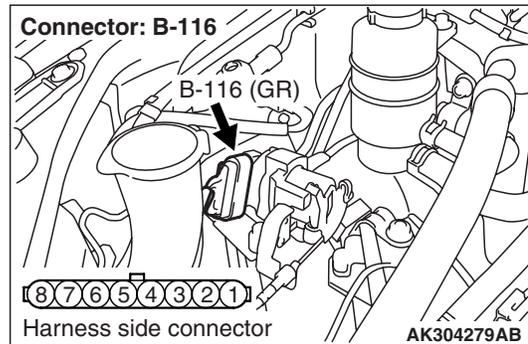
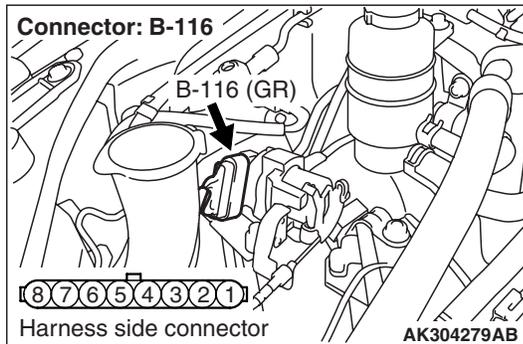
- YES :** Go to Step 7 .
- NO :** Repair.

Q: Is the check result normal?

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

STEP 9. Check harness between B-116 (terminal No. 2) accelerator pedal position sensor connector and C-142 (terminal No. 92) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

STEP 10. Check harness between B-116 (terminal No. 3) accelerator pedal position sensor connector and C-142 (terminal No. 114) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for damage.

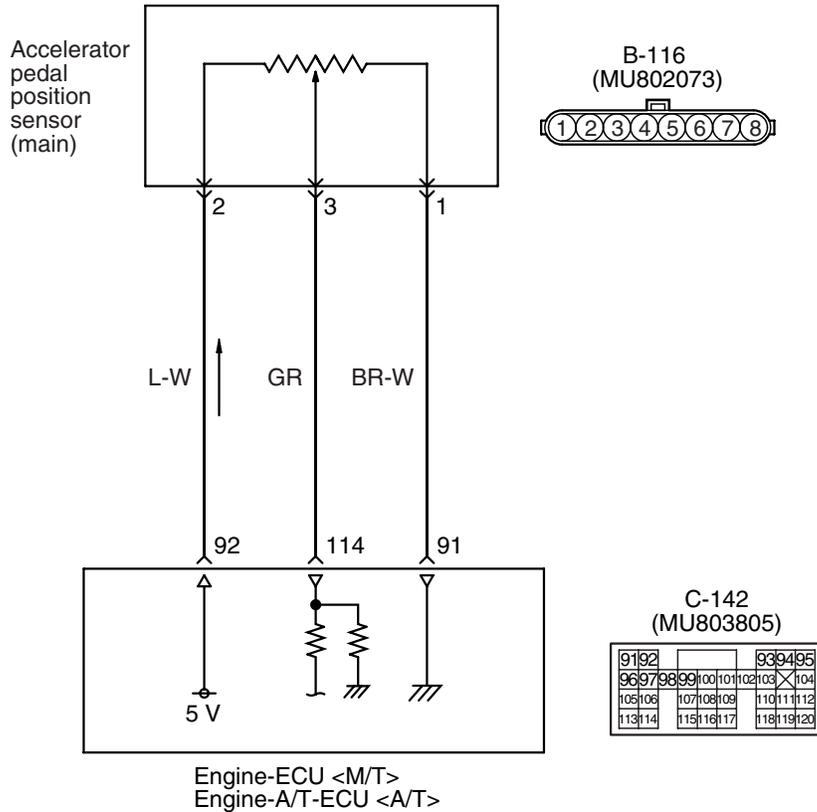
- Check earthing line for damage.

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

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

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

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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.
- Accelerator pedal position sensor (sub) output voltage is 0.2 - 2.5 V.

Judgment Criteria

- 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

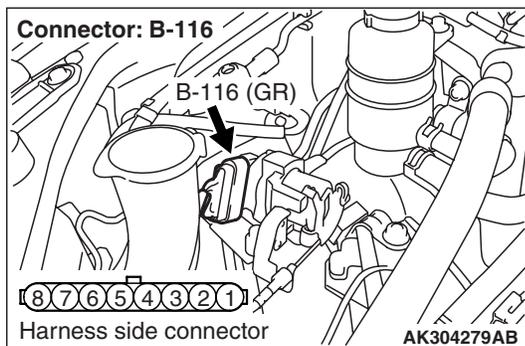
- Refer to Data List Reference Table [P.13C-402](#).
 - Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-116 accelerator pedal position sensor connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check accelerator pedal position sensor itself.

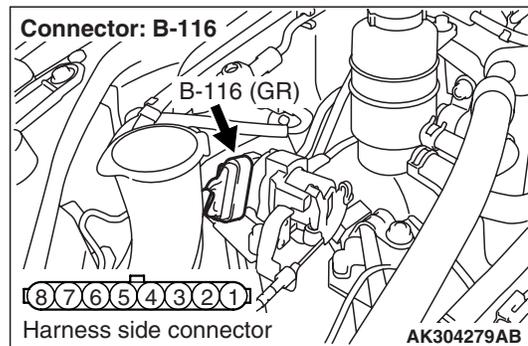
- Check accelerator pedal position sensor itself (Refer to [P.13C-431](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace accelerator pedal position sensor.

STEP 4. Perform resistance measurement at B-116 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.

- Resistance between terminal No. 1 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .

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

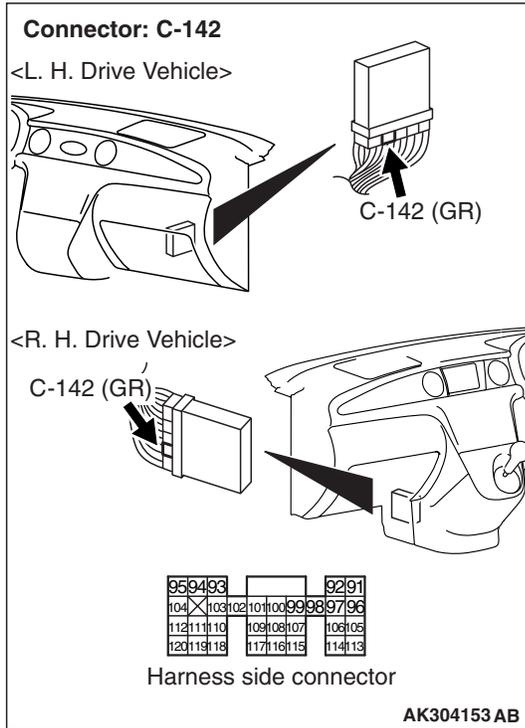
- Refer to Data list reference table [P.13C-402](#).
 - Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

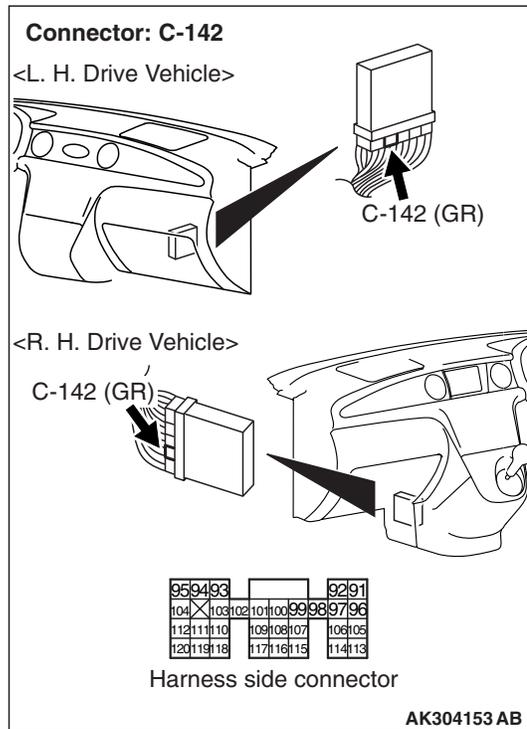
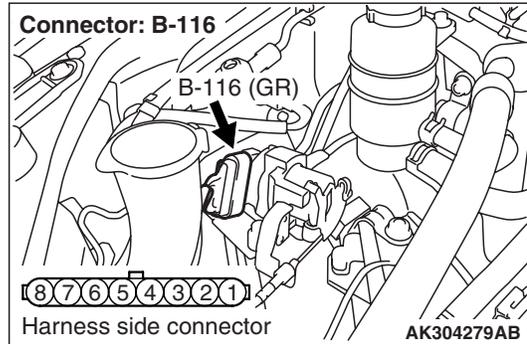
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 6. Connector check: C-142 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.

STEP 7. Check harness between B-116 (terminal No. 1) accelerator pedal position sensor connector and C-142 (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.

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.13C-262](#).
- Refer to Inspection Procedure 32: Accelerator Pedal Position Switch Circuit [P.13C-395](#).

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 Condition

- Ignition switch is in "ON" position
- Closed throttle position switch: ON
- Accelerator pedal position sensor (main) failure is detected.

Judgment Criteria

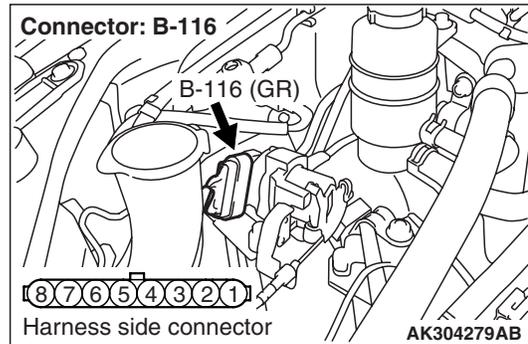
- Accelerator pedal position sensor (sub) output voltage is 2.5 V or higher for 1 second.

PROBABLE CAUSE

- Failed accelerator pedal position sensor
- Open/short circuit in accelerator pedal position sensor circuit or loose connector contact
- Failed 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: B-116 accelerator pedal position sensor connector



Q: Is the check result normal?

- YES :** Go to Step 2 .
- NO :** Repair.

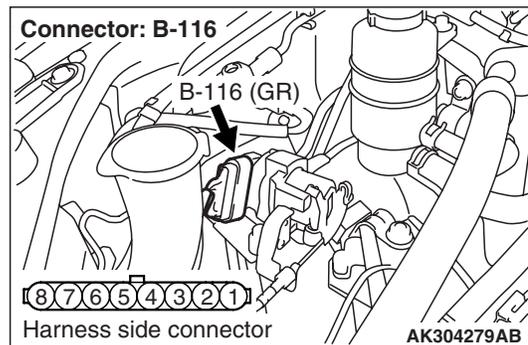
STEP 2. Check accelerator pedal position sensor itself.

- Check accelerator pedal position sensor itself (Refer to [P.13C-431](#)).

Q: Is the check result normal?

- YES :** Go to Step 3 .
- NO :** Replace accelerator pedal position sensor.

STEP 3. Perform resistance measurement at B-116 accelerator pedal position sensor connector.



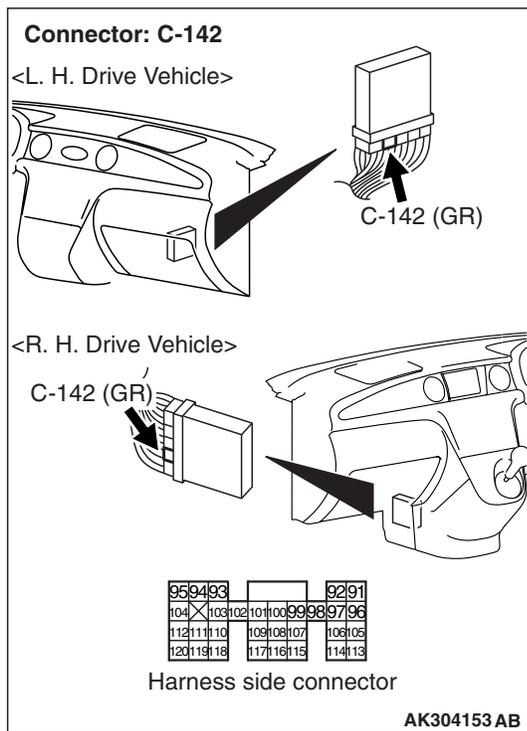
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 7 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

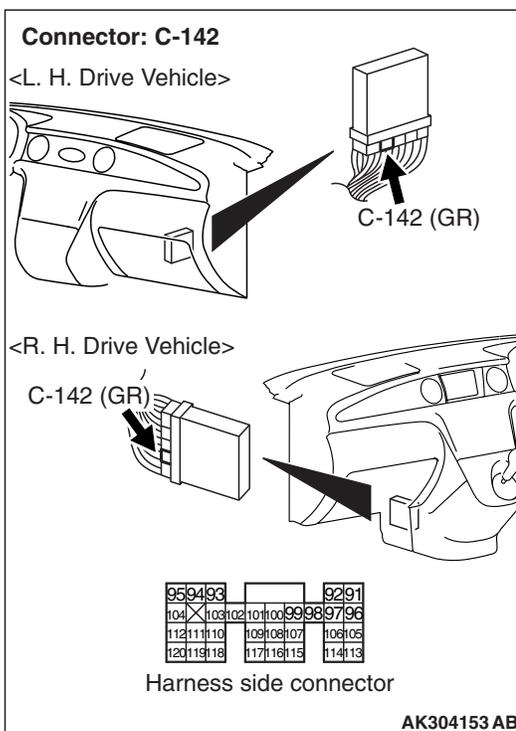
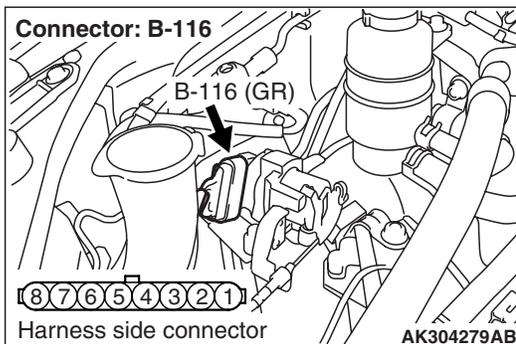
- YES :** Go to Step 7 .
- NO :** Go to Step 4 .

STEP 4. Connector check: C-142 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.

STEP 5. Check harness between B-116 (terminal No. 7) accelerator pedal position sensor connector and C-142 (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.

STEP 6. Check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Trouble shooting/Inspection Service Points P.00-6).

STEP 7. Check accelerator pedal position switch itself.

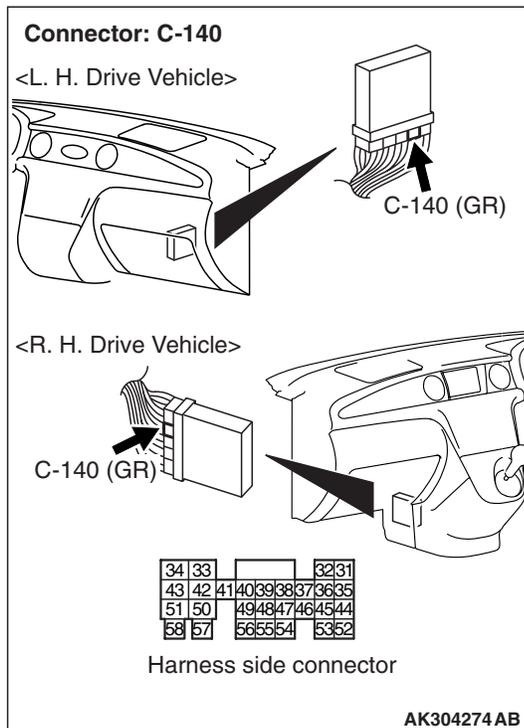
- Check accelerator pedal position switch itself (Refer to P.13C-432).

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Replace accelerator pedal position sensor.

STEP 8. Connector check: C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

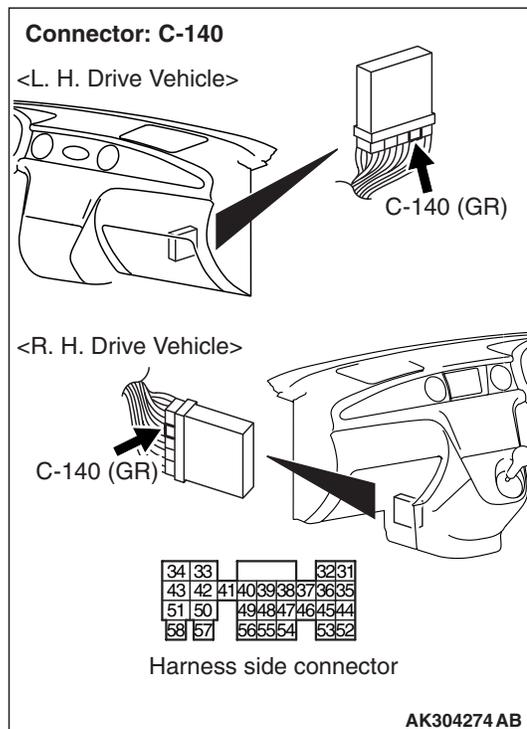
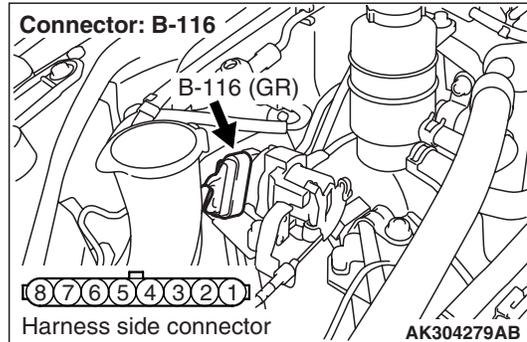


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for short circuit.

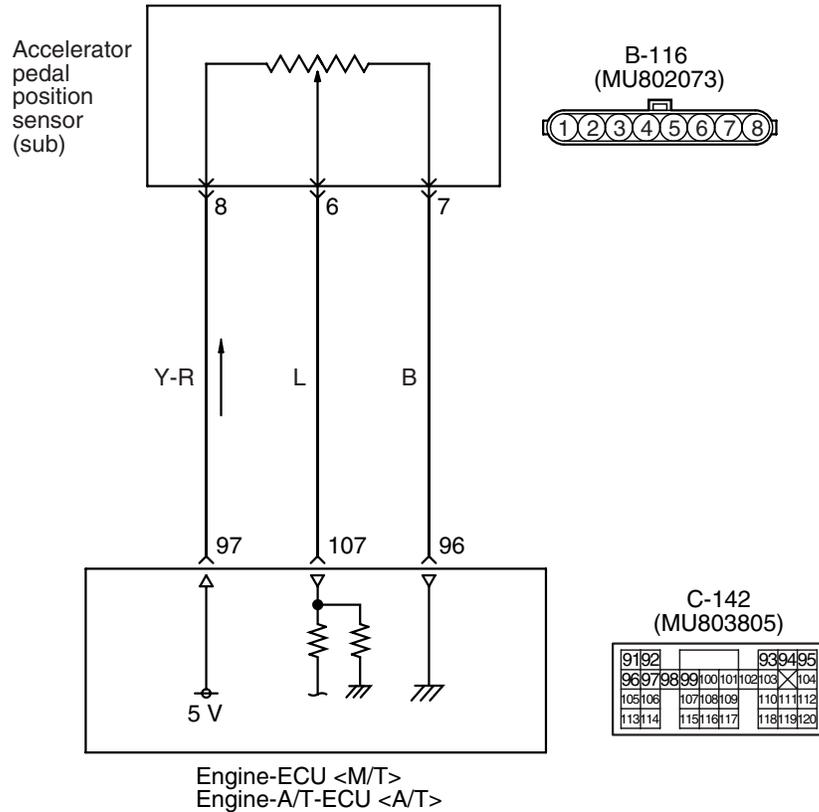
Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

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

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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 Criteria

- Accelerator pedal position sensor (sub) output voltage is 0.2 volt or less for 1 second.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

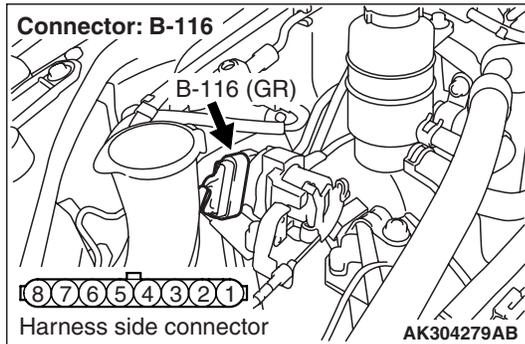
- Refer to Data List Reference Table [P.13C-402](#).
 - Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-116 accelerator pedal position sensor connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check accelerator pedal position sensor itself.

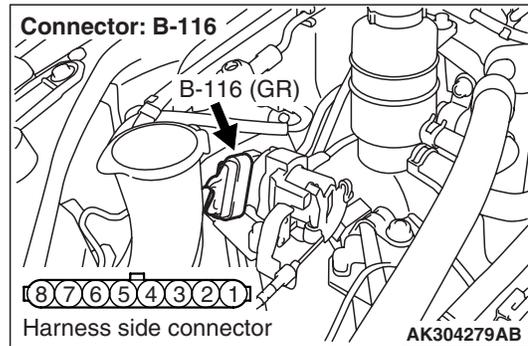
- Check accelerator pedal position sensor itself (Refer to [P.13C-431](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace accelerator pedal position sensor.

STEP 4. Perform voltage measurement at B-116 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.

- Ignition switch: ON

- Voltage between terminal No. 8 and earth.

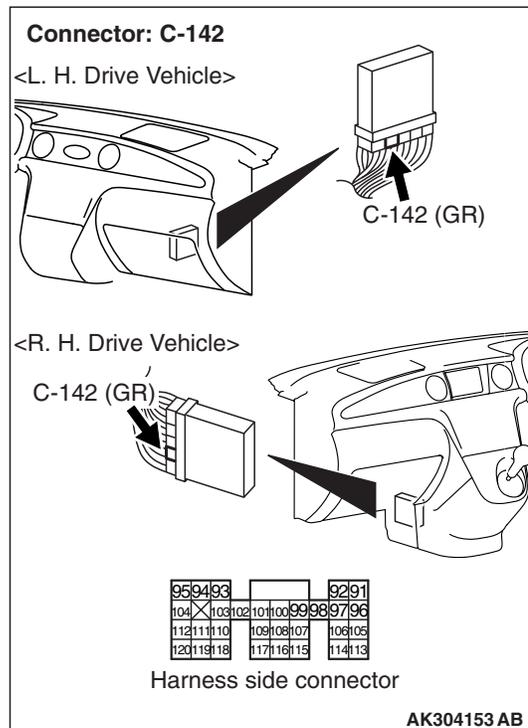
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 5 .

STEP 5. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

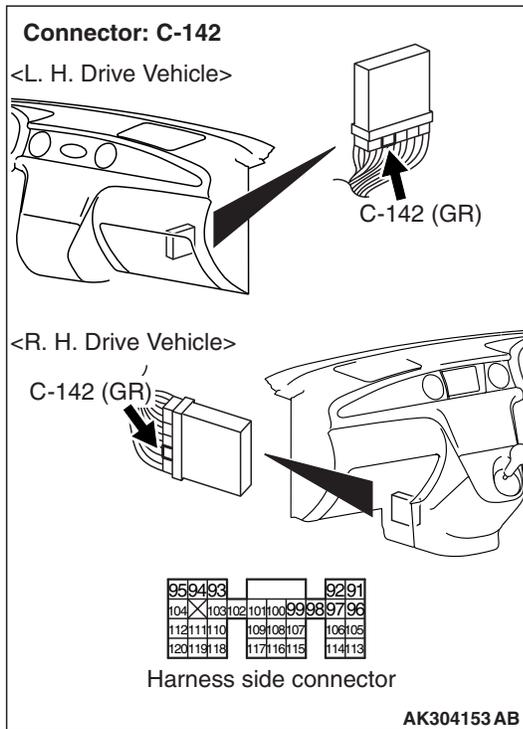
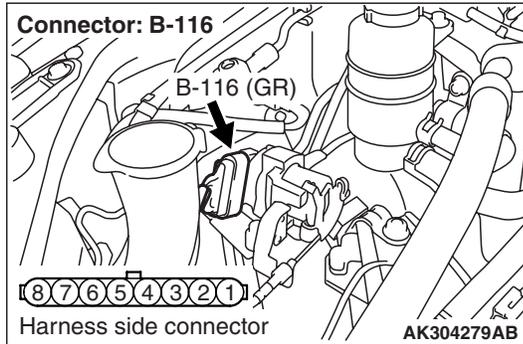


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-116 (terminal No. 8) accelerator pedal position sensor connector and C-142 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for open/short circuit.

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

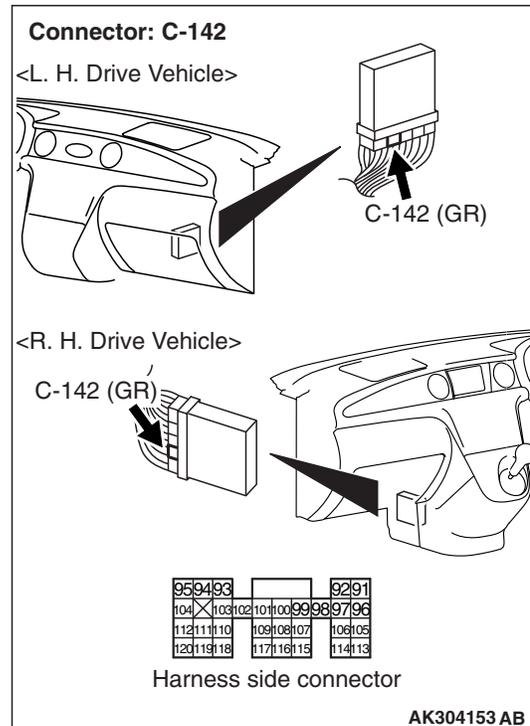
STEP 7. M.U.T.-II/III data list

- Refer to Data List Reference Table P.13C-402.
 - Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

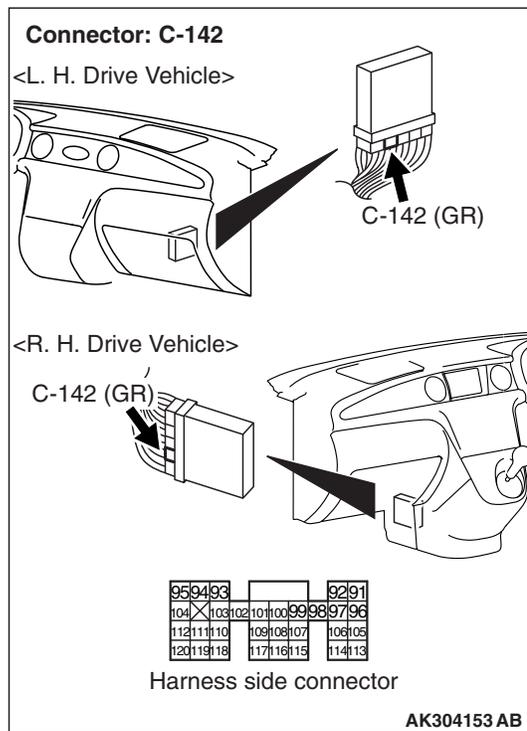
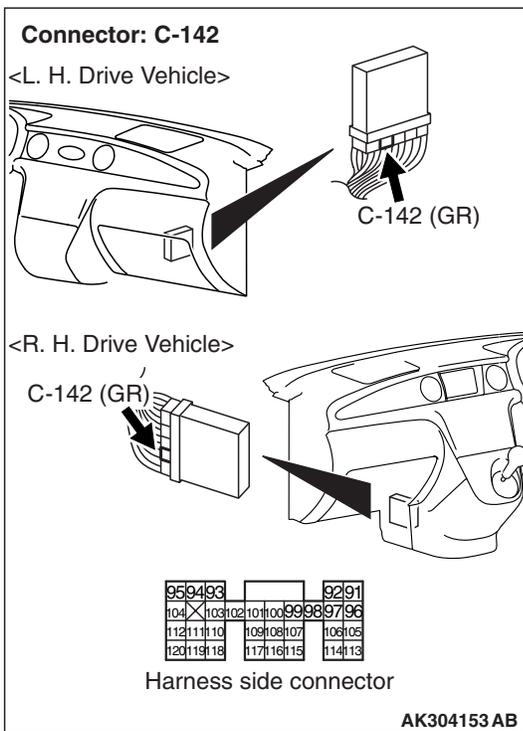
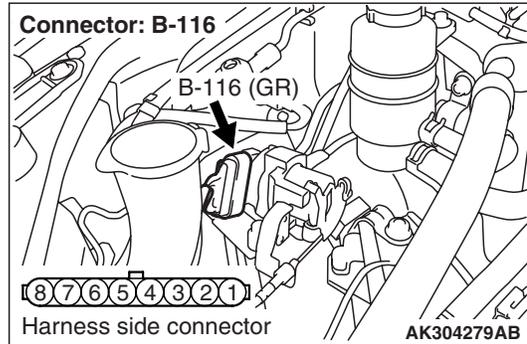
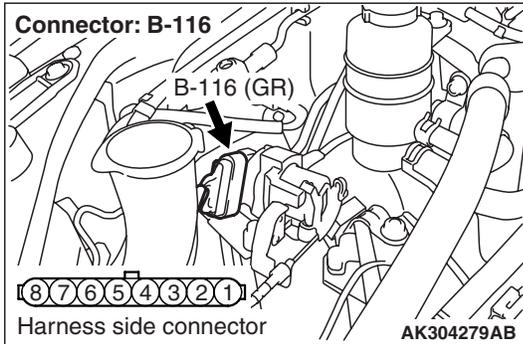
STEP 8. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 9. Check harness between B-116 (terminal No. 8) accelerator pedal position sensor connector and C-142 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

STEP 10. Check harness between B-116 (terminal No. 6) accelerator pedal position sensor connector and C-142 (terminal No. 107) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check power supply line for damage.

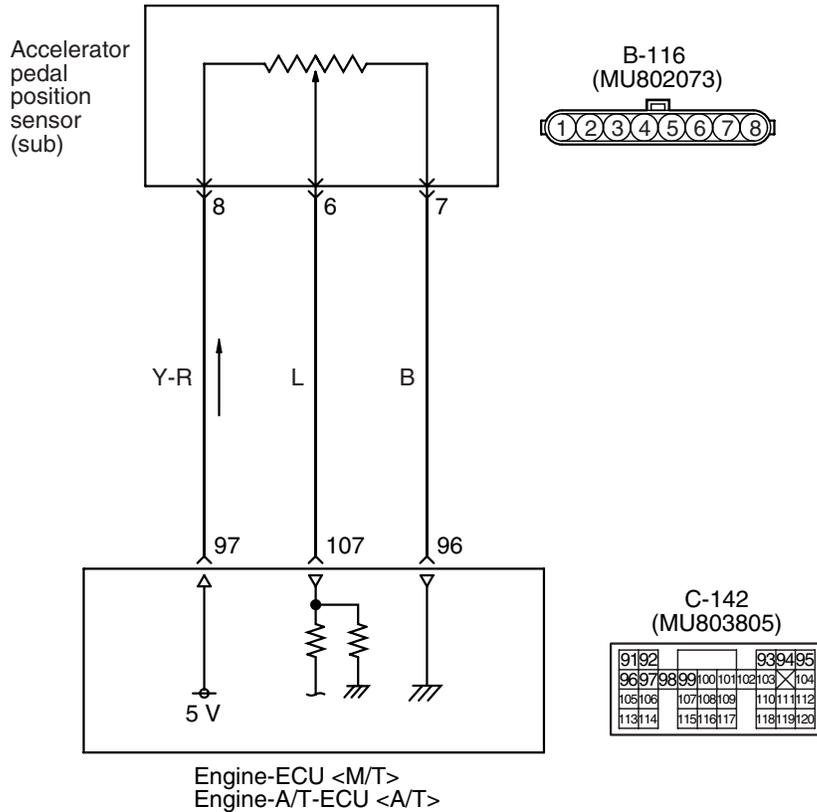
- Check earthing line for damage.

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

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

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

AK304133AC

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.
- Accelerator pedal position sensor (main) output voltage is 0.2 – 2.5 V.

Judgment Criteria

- 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

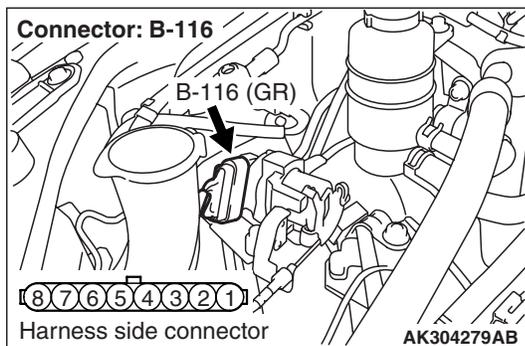
- Refer to Data List Reference Table P.13C-402.
 - a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-116 accelerator pedal position sensor connector



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check accelerator pedal position sensor itself.

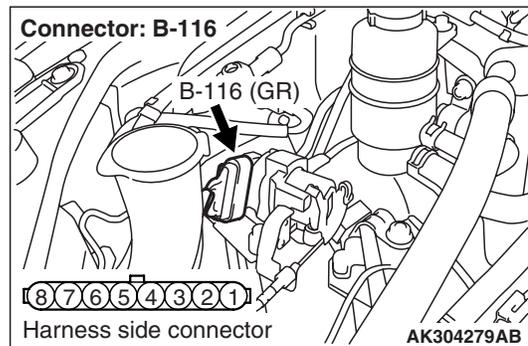
- Check accelerator pedal position sensor itself (Refer to P.13C-431).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace accelerator pedal position sensor.

STEP 4. Perform resistance measurement at B-116 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.

- Resistance between terminal No. 7 and earth.

OK: Continuity (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

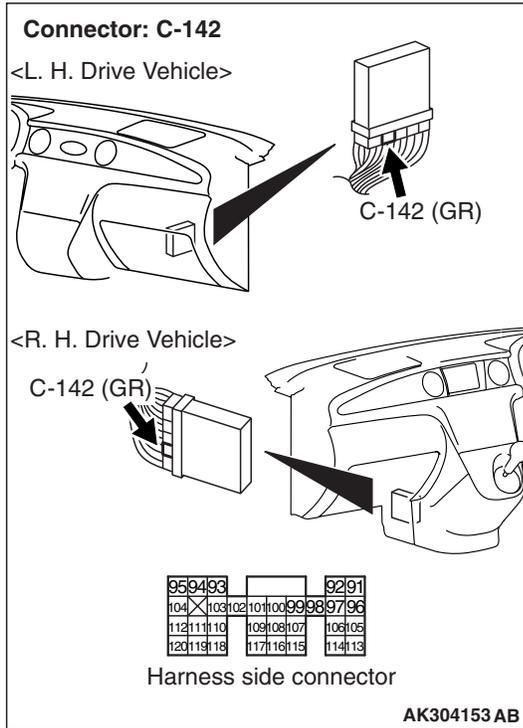
- Refer to Data list reference table P.13C-402.
 - a. Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

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

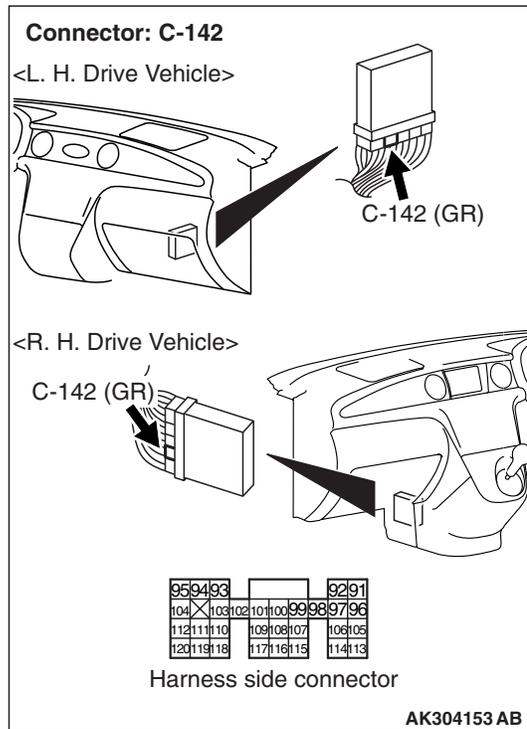
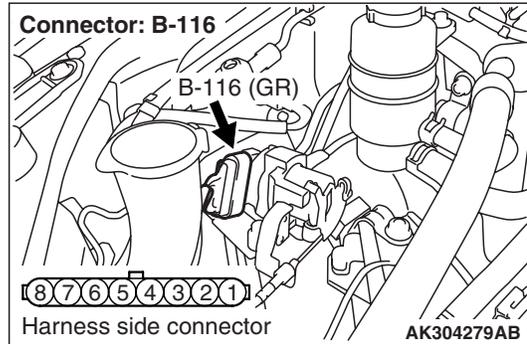
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 6. Connector check: C-142 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.

STEP 7. Check harness between B-116 (terminal No. 7) accelerator pedal position sensor connector and C-142 (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.

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.13C-54.
- Refer to Code No. P0222: Throttle Position Sensor (sub) Circuit Low Input P.13C-146.

FUNCTION

- Engine-ECU <M/T> or engine-A/T-ECU <A/T> checks the throttle position sensor output signal characteristics for abnormal conditions.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.
- Throttle position sensor (main) output voltage is 0.35 – 2.5 V.
- Throttle position sensor (sub) output voltage is 2.25 – 4.8 V

Judgment Criteria

- Using the formula given below, the voltage of 0.3 V or higher is obtained for 0.5 second: $V^* - V^{**} - 2V$

V^* : throttle position sensor (main) output voltage

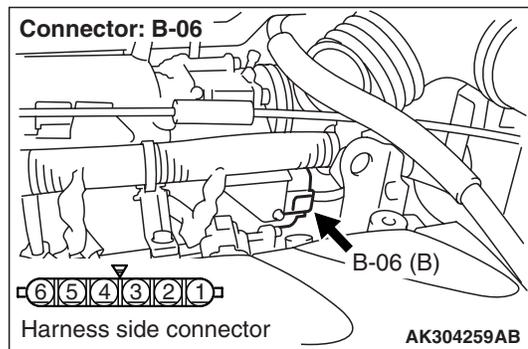
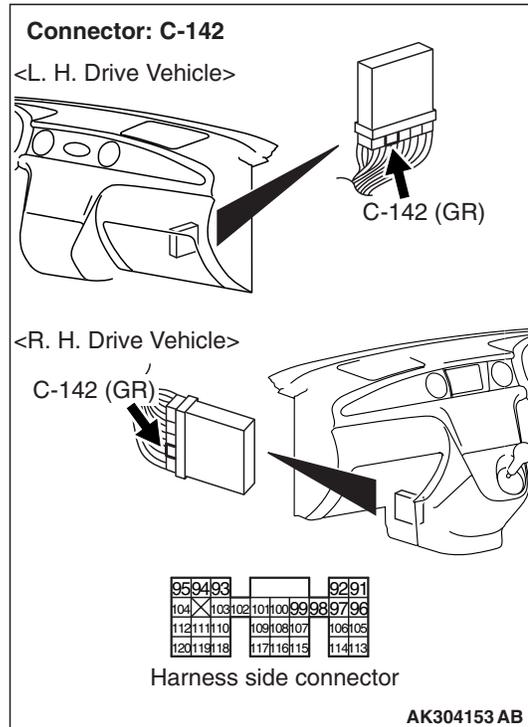
V^{**} : throttle position sensor (sub) output voltage.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-06 electronically controlled throttle valve connector

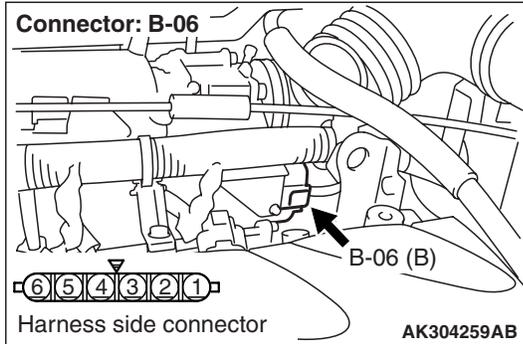


Q: Is the check result normal?

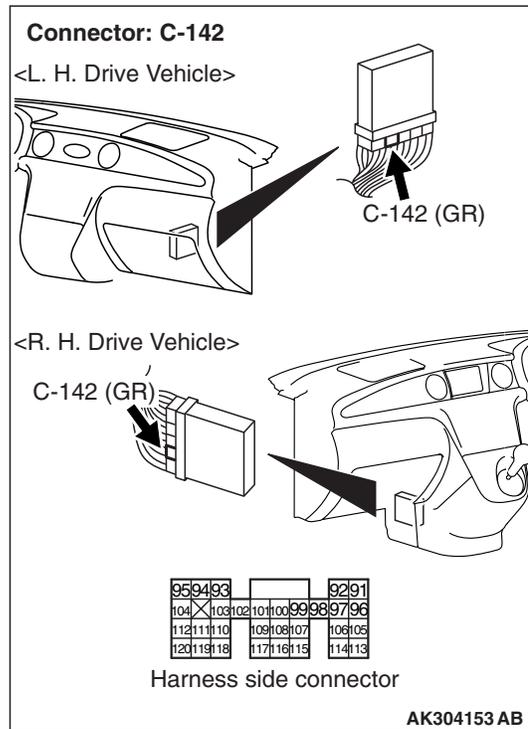
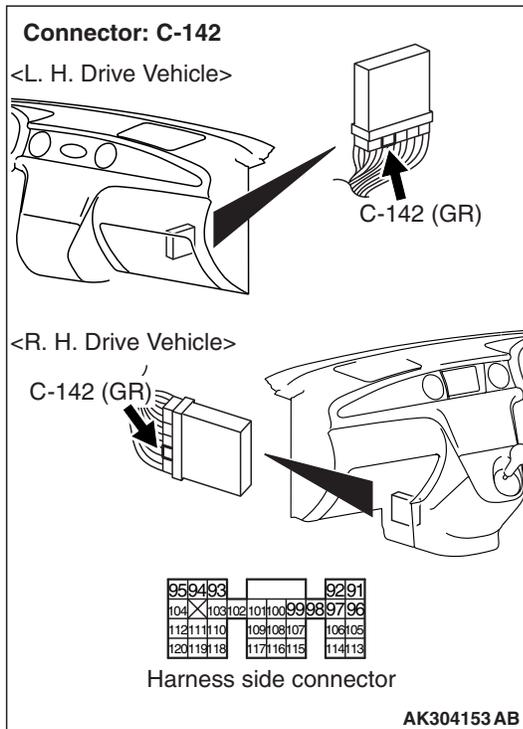
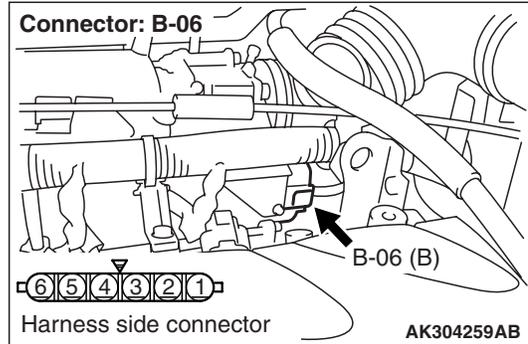
YES : Go to Step 2 .

NO : Repair.

STEP 2. Check harness between B-06 (terminal No. 4) electronically controlled throttle valve connector and C-142 (terminal No. 115) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 3. Check harness between B-06 (terminal No. 6) electronically controlled throttle valve connector and C-142 (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 3 .
NO : Repair.

- Check output line for short circuit.

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

STEP 4. Replace throttle body assembly.

- After throttle body assembly is replaced, re-check for trouble symptom.

Q: Does trouble system persist?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Check end.

Code No. P2138: Accelerator Pedal Position Sensor (Main and Sub) Range/Performance Problem

OPERATION

- Refer to Code No. P2122: Accelerator Pedal Position Sensor (main) Circuit Low Input
[P.13C-252.](#)
- Refer to Code No. P2127: Accelerator Pedal Position Sensor (sub) Circuit Low Input
[P.13C-262.](#)

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 Condition

- Ignition switch is in "ON" position
- Accelerator pedal position sensor (main) output voltage is 0.2 – 4.5 V.
- Accelerator pedal position sensor (sub) output voltage is 0.2 – 4.5 V.

Judgment Criteria

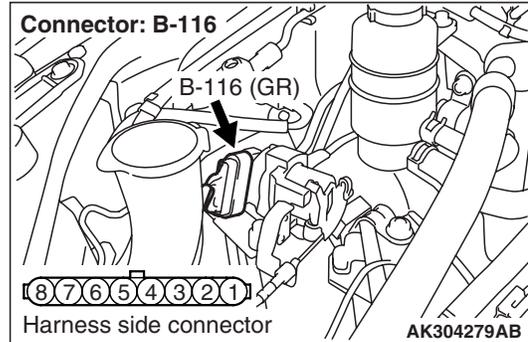
- Accelerator pedal position sensor (sub) output voltage minus Accelerator pedal position sensor (main) output voltage is 1 volt or higher for 1 second.
- Accelerator pedal position sensor (main) output voltage minus Accelerator pedal position sensor (sub) output voltage is 1 volt or higher for 0.2 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-116 accelerator pedal position connector



Q: Is the check result normal?

- YES :** Go to Step 2 .
- NO :** Repair.

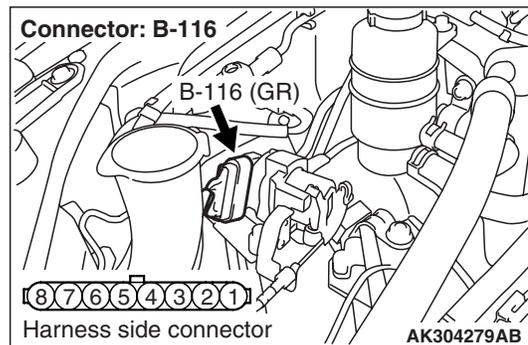
STEP 2. Check accelerator pedal position sensor itself.

- Check accelerator pedal position sensor itself (Refer to [P.13C-431](#)).

Q: Is the check result normal?

- YES :** Go to Step 3 .
- NO :** Replace accelerator pedal position sensor.

STEP 3. Perform resistance measurement at B-116 accelerator pedal position sensor connector.



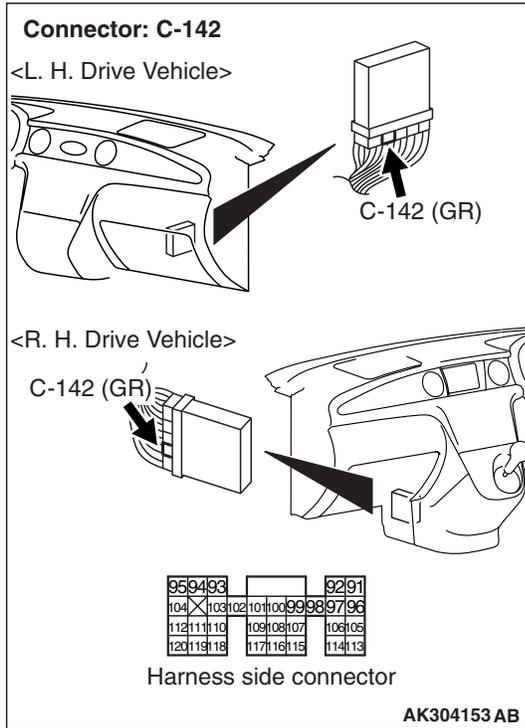
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

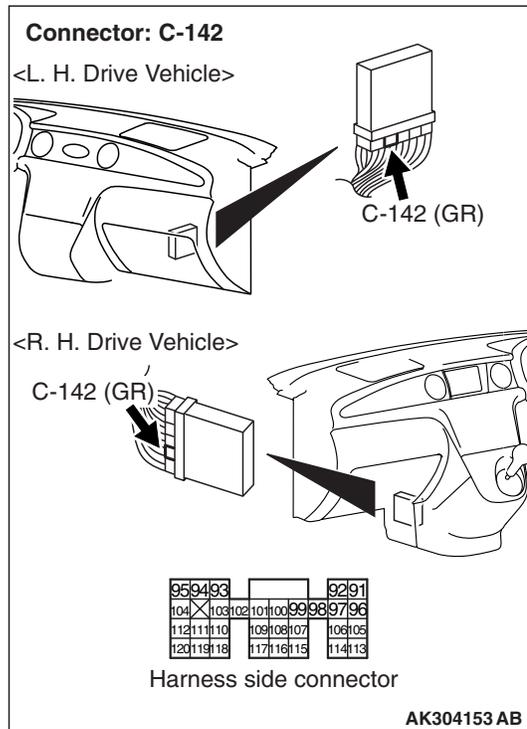
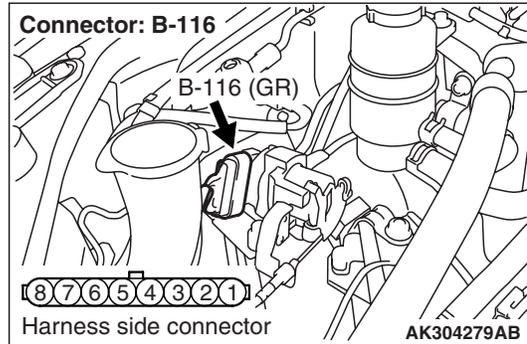
- YES :** Go to Step 7 .
- NO :** Go to Step 4 .

STEP 4. Connector check: C-142 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.

STEP 5. Check harness between B-116 (terminal No. 1) accelerator pedal position sensor connector and C-142 (terminal No. 91) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



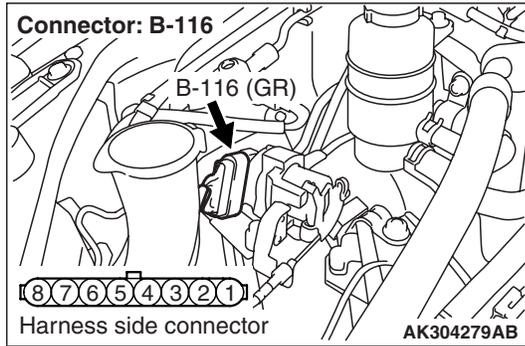
- Check earthing line for damage.

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

STEP 6. Check the trouble symptoms

Q: Does trouble symptom persist?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 7. Perform resistance measurement at B-116 accelerator pedal position sensor connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 7 and earth.

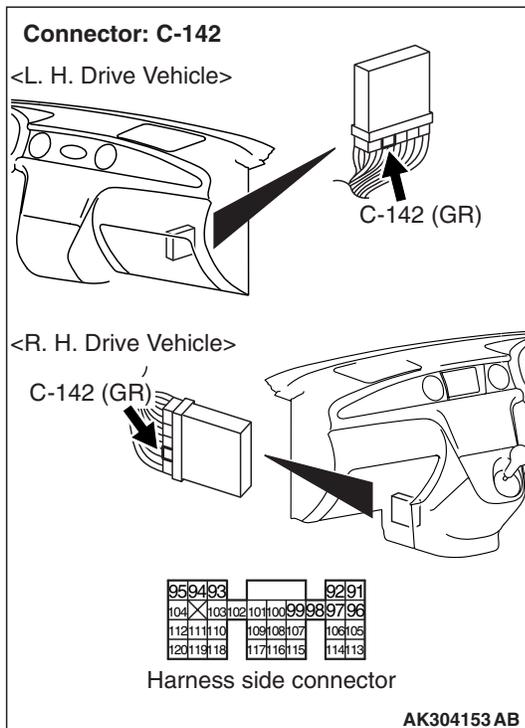
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 8 .

STEP 8. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

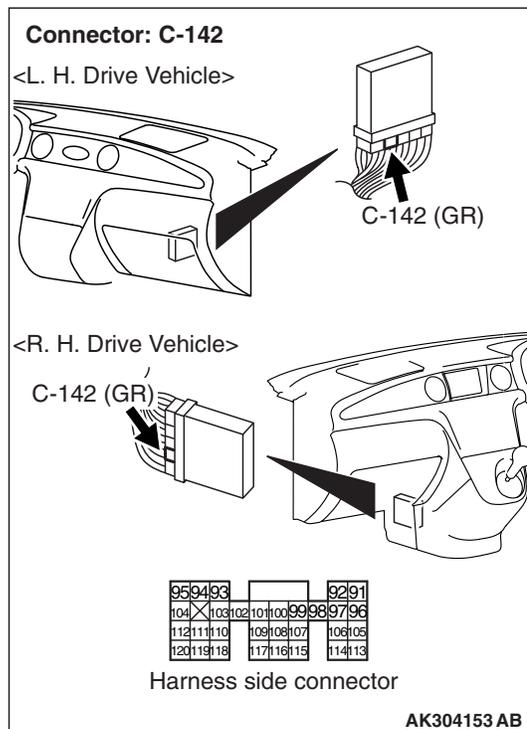
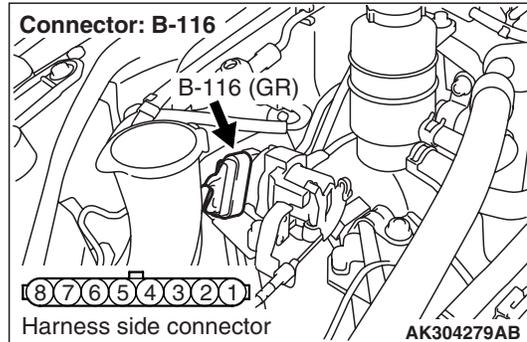


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check harness between B-116 (terminal No. 7) accelerator pedal position sensor connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



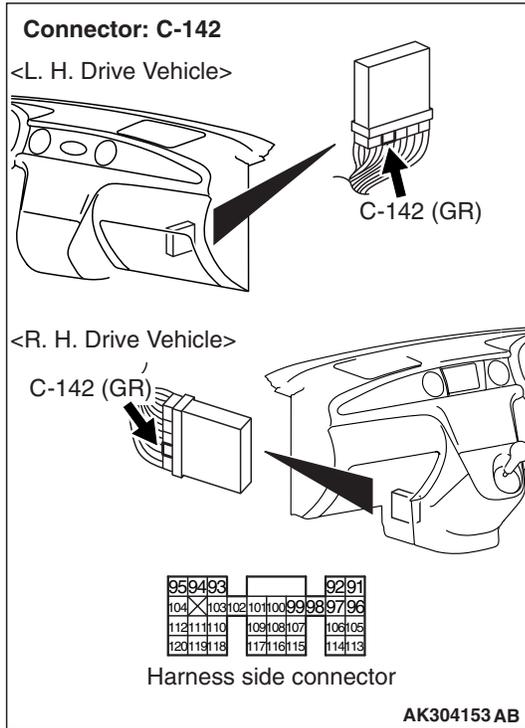
- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 6 .

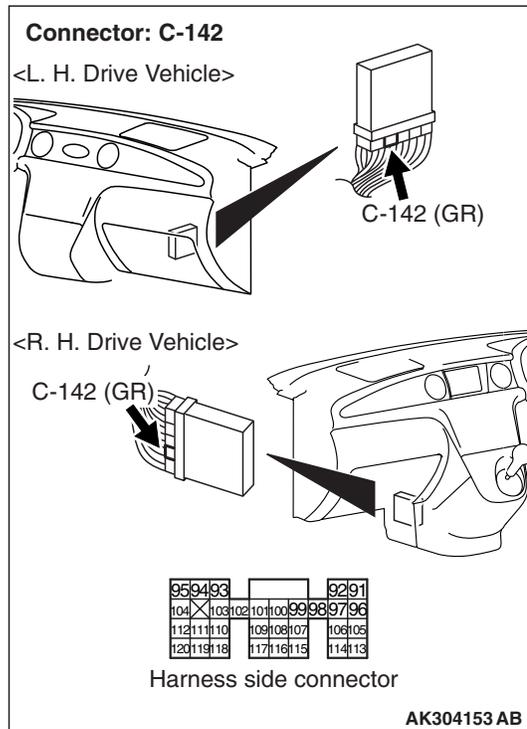
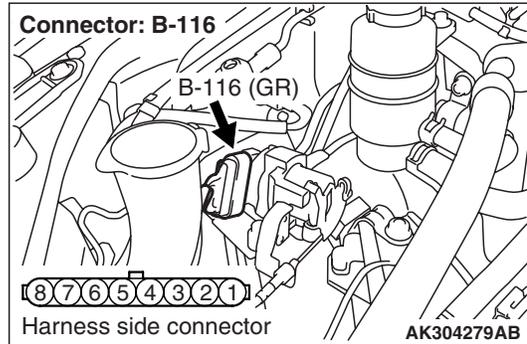
NO : Repair.

STEP 10. Connector check: C-142 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.

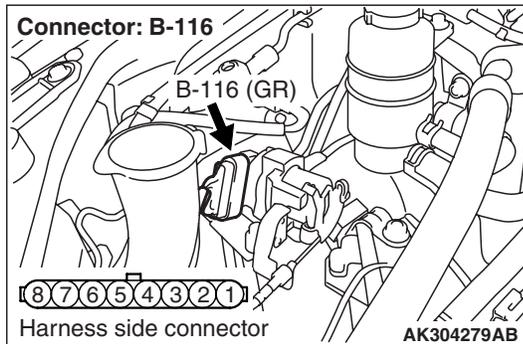
STEP 11. Check harness between B-116 (terminal No. 2) accelerator pedal position sensor connector and C-142 (terminal No. 92) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



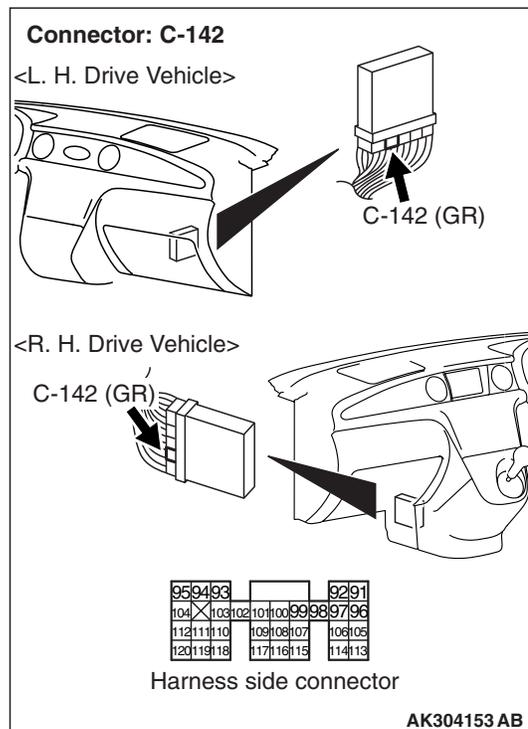
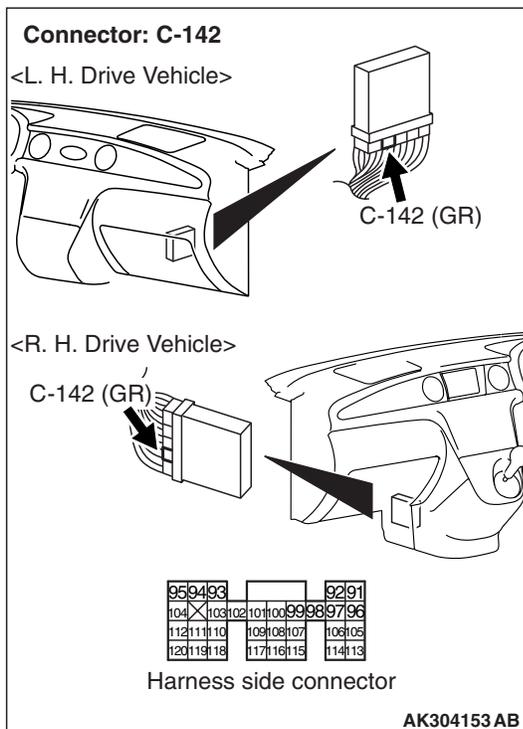
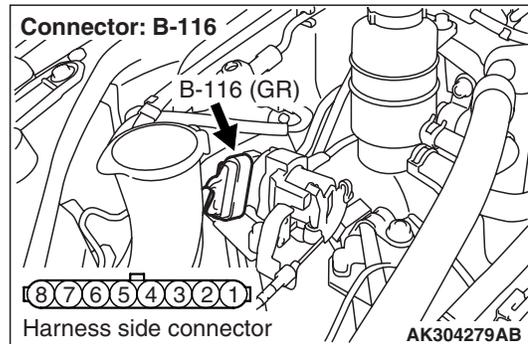
- Check power supply line for damage.

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

STEP 12. Check harness between B-116 (terminal No. 8) accelerator pedal position sensor connector and C-142 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 13. Check harness between B-116 (terminal No. 3) accelerator pedal position sensor connector and C-142 (terminal No. 114) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



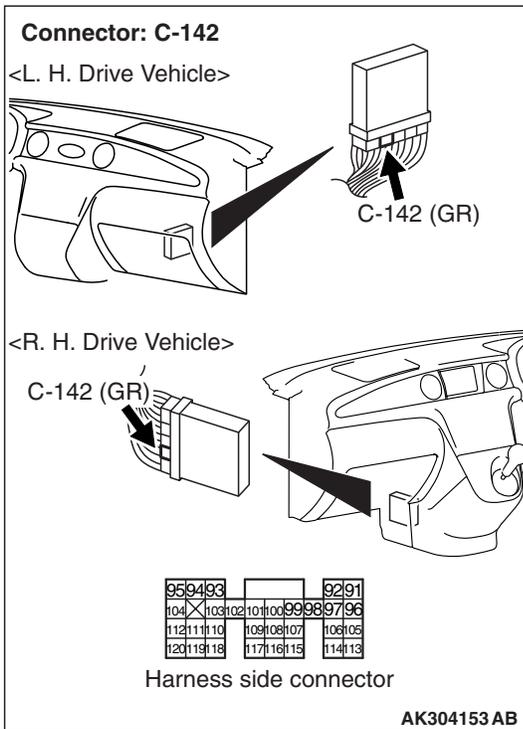
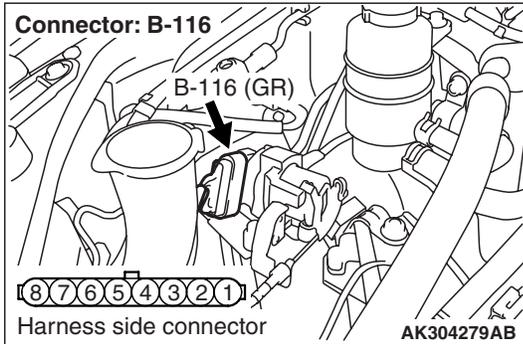
- Check power supply line for damage.

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

- Check output line for damage.

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

STEP 14. Check harness between B-116 (terminal No. 6) accelerator pedal position sensor connector and C-142 (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.

DTC 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 Conditions

- While engine is running.

Judgment Criteria

- The actual intake air amount is more than the allowable intake air amount for 1.5 seconds.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Failed air flow sensor.
- Throttle valve faulty operation.
- Failed throttle position sensor
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13C-21).

NO : Go to Step 2 .

STEP 2. Replace the air flow sensor.

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

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check end.

STEP 3. Replace the throttle body assembly.

- After replacing the throttle body assembly, re-check the trouble symptoms.

Q: Is the check result normal?

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

NO : Check end.

Code No. 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.

or

- The sensor output voltage is 0.2 V or less (Barometric pressure of below 53 kPa or equivalent) for 4 seconds.

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 4 seconds.

PROBABLE CAUSE

- Failed barometric pressure sensor

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

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

NO : Inspection chart for diagnosis code (Refer to P.13C-21).

INSPECTION CHART FOR TROUBLE SYMPTOMS

M1131151501150

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, shift 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

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.	
	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

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

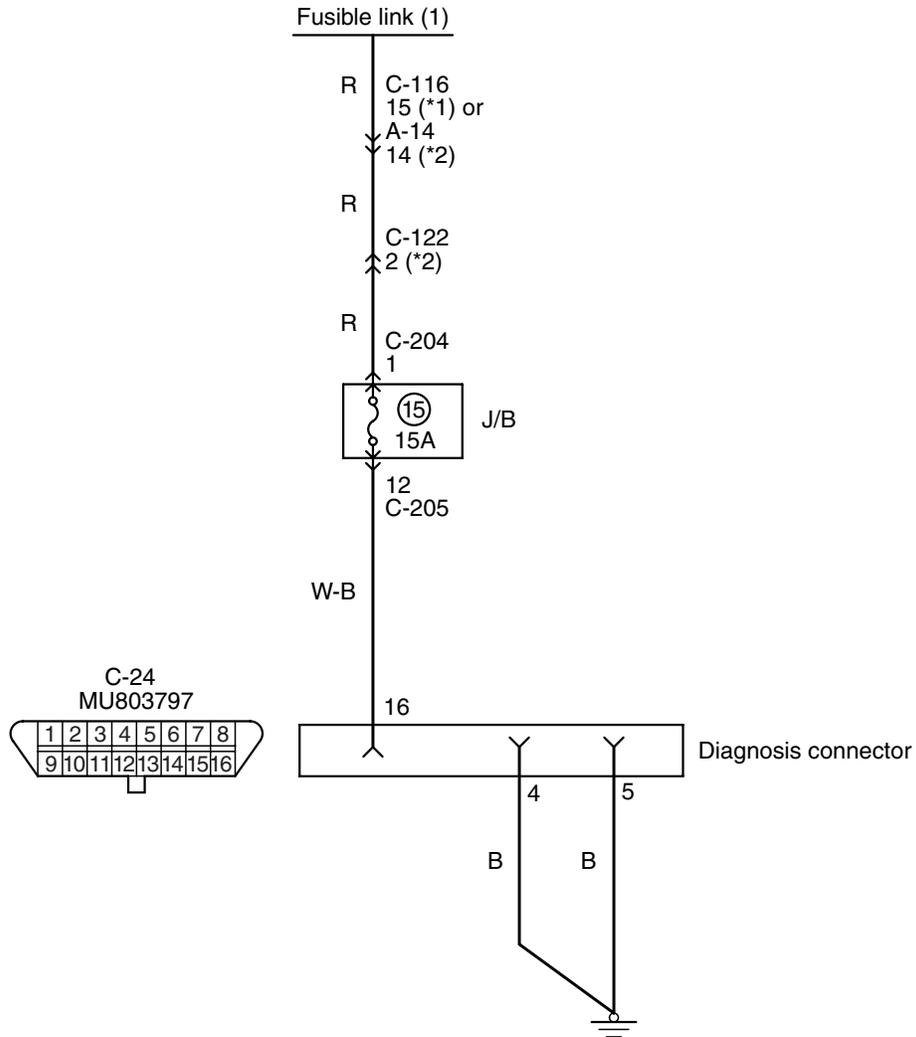
Inspection procedure No.	Trouble symptom	Reference page
1	Communication with all system is not possible	P.13C-282
2	Communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> only is not possible	P.13C-285
3	The engine warning lamp does not illuminate right after the ignition switch is turned the "ON" position	P.13C-288
4	The engine warning lamp remains illuminating and never goes out	P.13C-295
5	Starting impossible (No initial combustion) <M/T>	P.13C-298
6	Starting impossible (No initial combustion) <A/T>	P.13C-303
7	Starting impossible (Starter operative but no initial combustion)	P.13C-309
8	Starting impossible (Initial combustion but no complete combustion)	P.13C-312
	Starting impossible (Long time to start)	
9	Unstable idling (Rough idling, hunting)	P.13C-314
	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.13C-318
11	The engine stalls when decelerating	P.13C-319
12	Engine does not revolve up	P.13C-320
13	Hesitation, sag	P.13C-321
	Poor acceleration	
	Stumble	
	Surge	
14	The feeling of impact or vibration when accelerating	P.13C-323
15	The feeling of impact or vibration when decelerating	P.13C-324
16	Knocking	P.13C-324
17	Ignition timing offset	P.13C-325
18	Run on (Dieseling)	P.13C-326

Inspection procedure No.	Trouble symptom	Reference page
19	Odor, white smoke, black smoke, high-concentration CO/HC during idling	P.13C-327
20	Battery rundown	P.13C-329
21	Overheating	P.13C-333
22	Abnormal rotation of fan motor	P.13C-334
23	Poor A/C performance	P.13C-337
24	Engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply, engine control relay, ignition switch-IG1 system	P.13C-339
25	Fuel pump system	P.13C-345
26	Fan control relay system	P.13C-354
27	A/C switch system	P.13C-361
28	A/C compressor relay system	P.13C-366
29	A/C load signal system	P.13C-373
30	A/C pressure sensor system	P.13C-378
31	Ignition circuit system	P.13C-388
32	Accelerator pedal position switch circuit system	P.13C-395

SYMPTOM PROCEDURES

Inspection Procedure 1: Communication with All System is Not Possible

Diagnosis connector circuit



NOTE

*1: L.H. drive vehicles

*2: R.H. drive vehicles

Wire colour code

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

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OPERATION

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

COMMENT ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

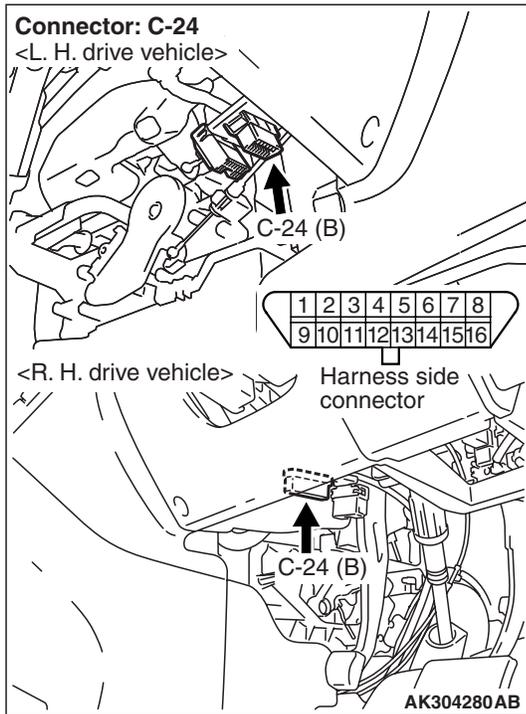
- Failed diagnosis connector
- Open/short circuit in diagnosis connector circuit
- Failed M.U.T.-II/III

DIAGNOSIS PROCEDURE

NOTE:

- *1: L.H. drive vehicles
- *2: R.H. drive vehicles

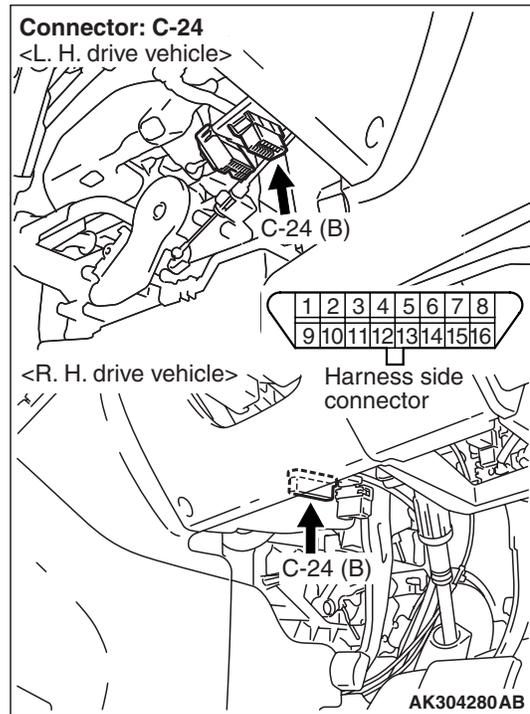
STEP 1: Check connector: C-24 diagnosis connector



Q: Is the check result normal?

- YES :** Go to Step 2 .
- NO :** Repair.

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

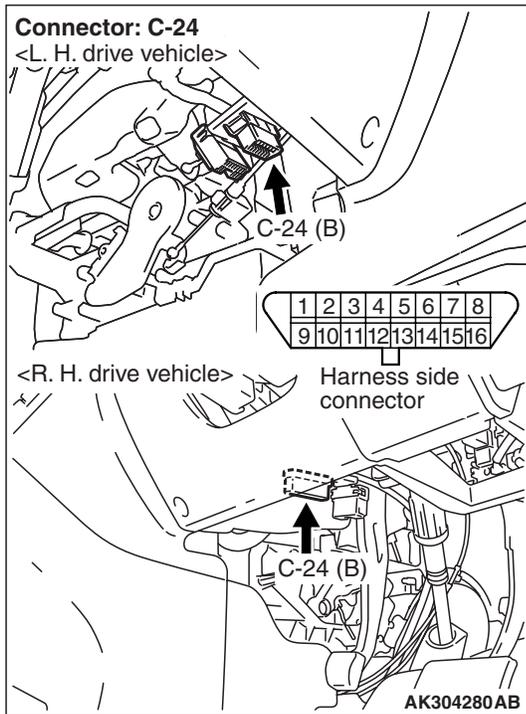


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 4 and earth, also between terminal No. 5 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

- YES :** Go to Step 3 .
- NO :** Check and repair harness between C-24 (terminal No. 4) diagnosis connector and body earth, also between C-24 (terminal No. 5) diagnosis connector and body earth.
 - Check earthing line for open circuit and damage.

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

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

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check intermediate connectors C-116^{*1}, A-14^{*2}, C-122^{*2}, C-204 and C-205 and repair if necessary. If connectors are normal, check and repair harness between C-24 (terminal No. 16) diagnosis connector and battery.

- Check power supply line for open/short circuit.

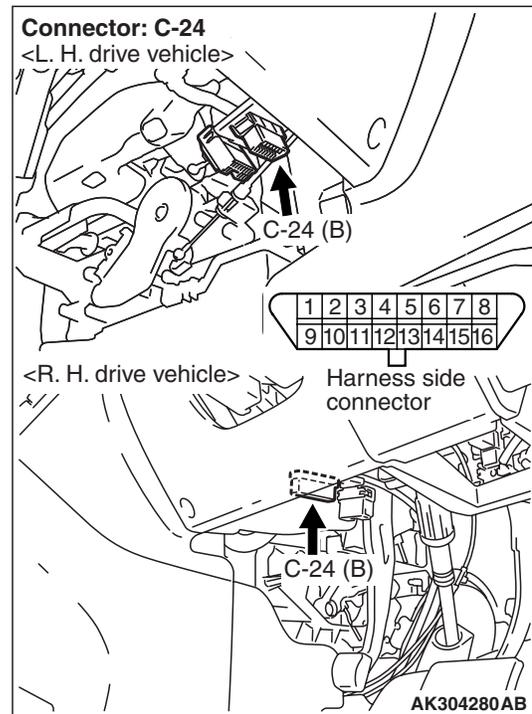
STEP 4: Replace M.U.T.-II/III

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

Q: Does trouble symptom persist?

YES : Go to Step 5 .

NO : Check end

STEP 5: Check harness between C-24 (terminal No. 16) diagnosis connector and battery.

NOTE: Before checking harness, check intermediate connectors C116^{*1}, A-14^{*2}, C-122^{*2}, C-204 and C-205, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

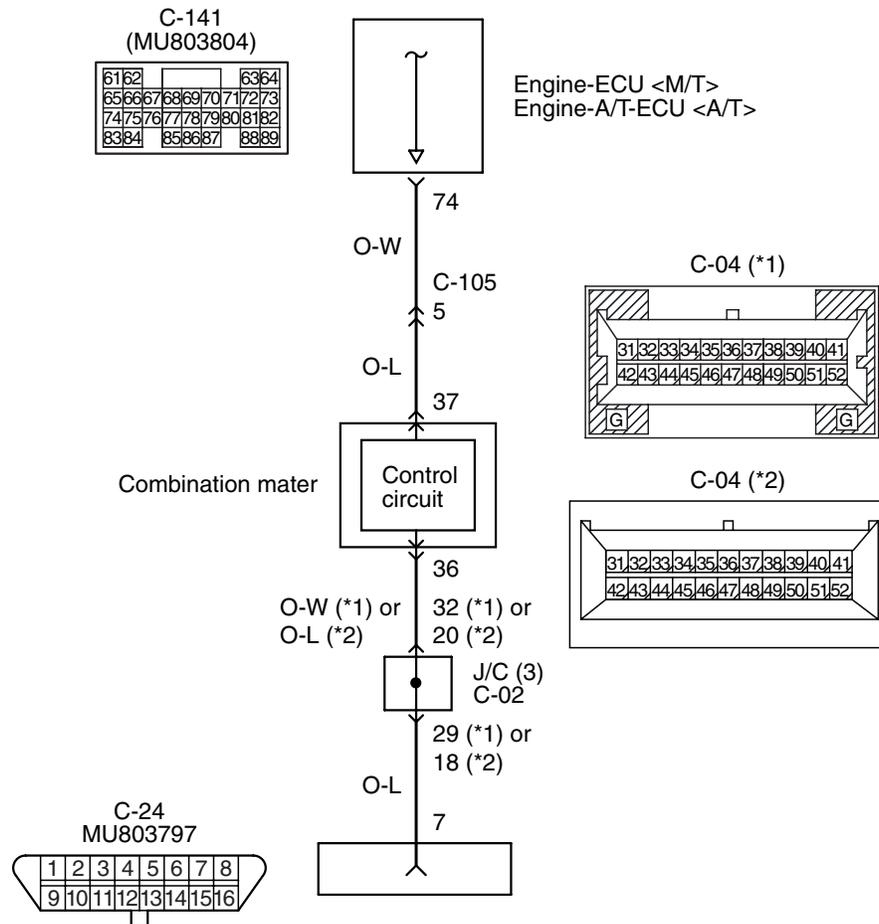
YES : Check and repair harness between C-24 (terminal No. 4 and No. 5) diagnosis connector and body earth.

- Check earthing line for damage.

NO : Repair.

Inspection Procedure 2: Communication with Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Only is Not Possible.

Diagnosis connector circuit



NOTE

- *1: L.H. drive vehicles
- *2: R.H. drive vehicles

Wire colour code

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

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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>

DIAGNOSIS PROCEDURE

STEP 1: Check engine warning lamp.

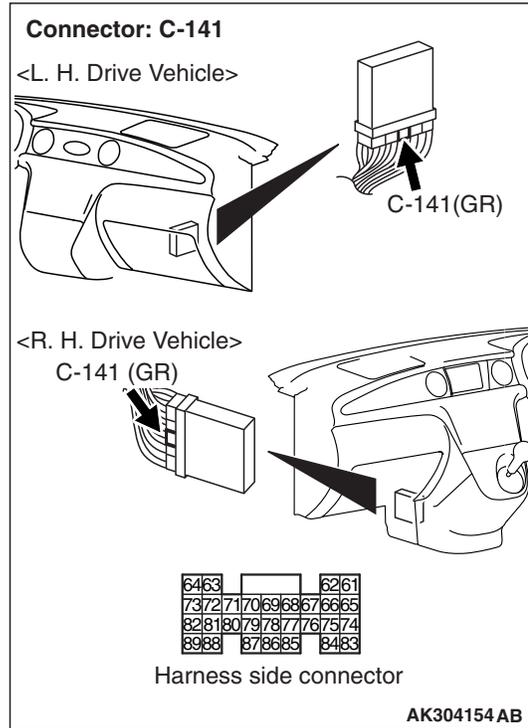
- Ignition switch: OFF → ON

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.13C-339).

STEP 2: Connector check: C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

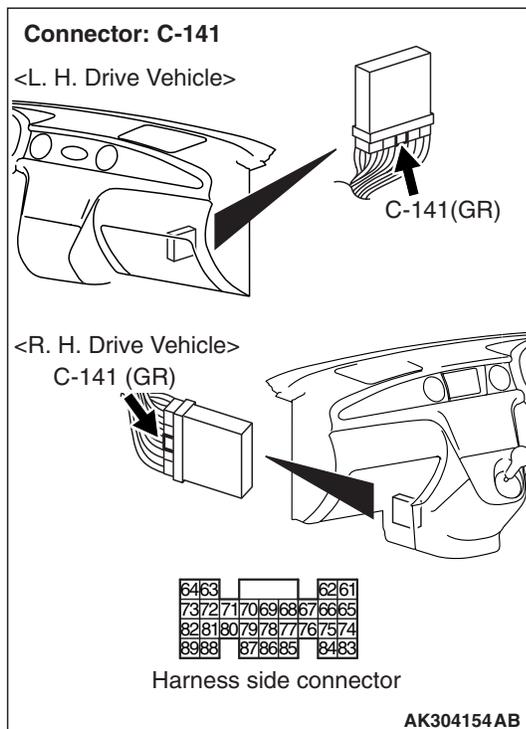
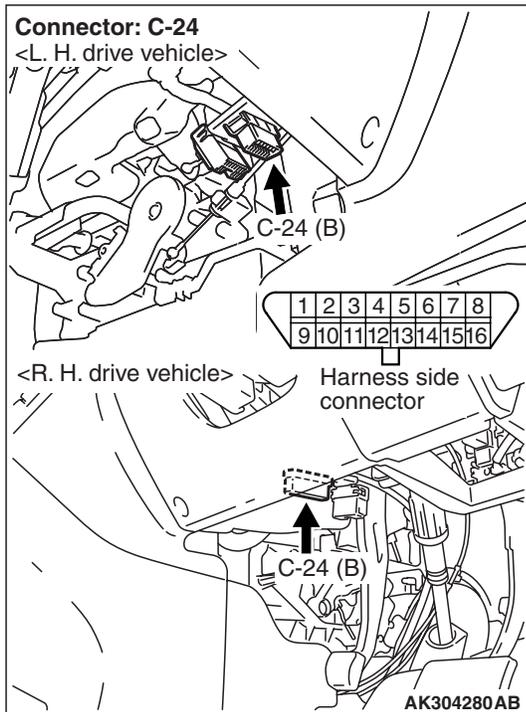


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3: Check harness between C-24 (terminal No. 7) diagnosis connector and C-141 (terminal No. 74) 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.

STEP 4: Replace the combination meter

- After replacing the combination meter, re-check the trouble symptoms.

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

STEP 5: Check the trouble symptom.

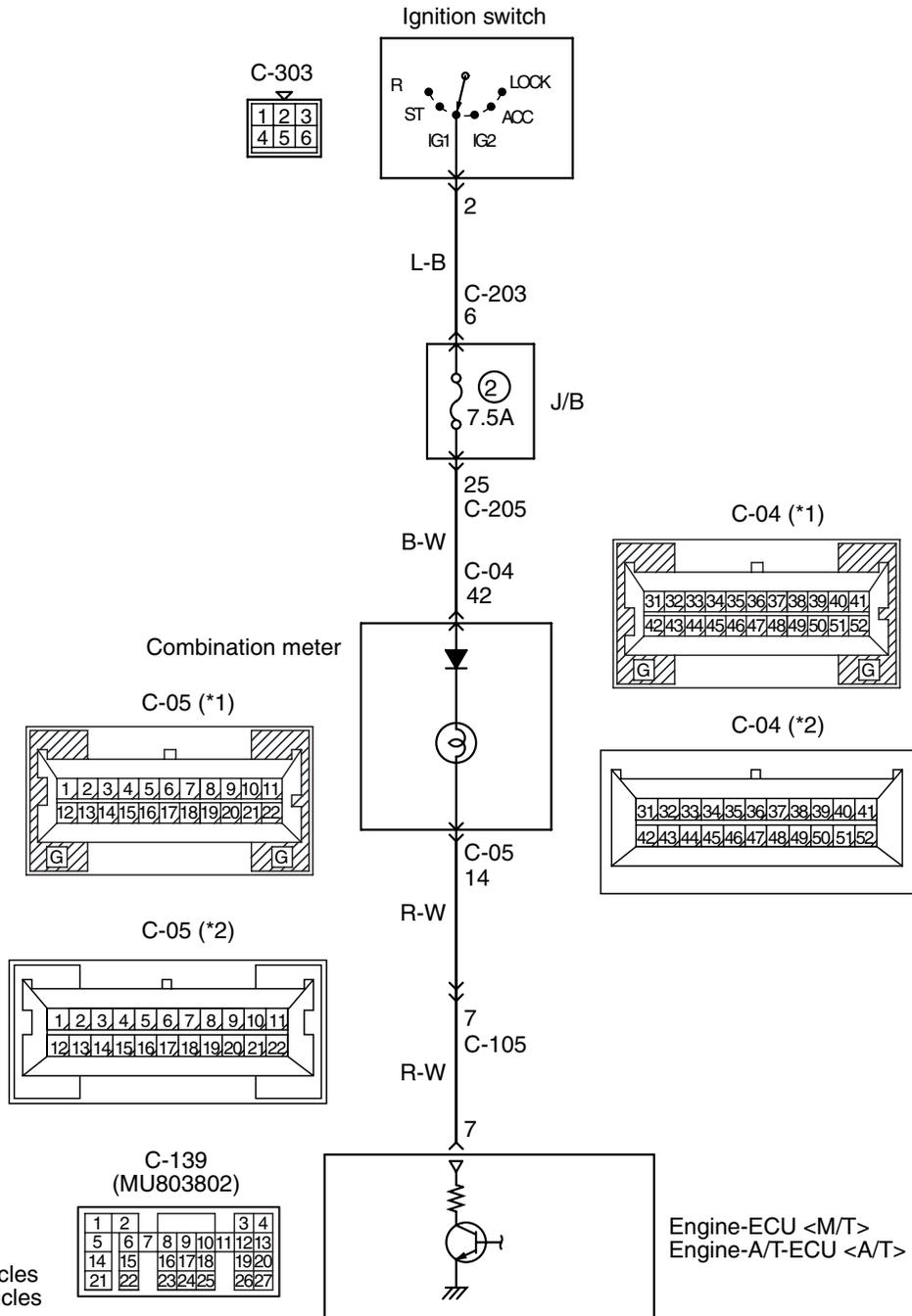
Q: Does trouble symptom persist?
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

NOTE: Before Checking harness, check intermediate connectors C-02, C-04 and C-105 and repair if necessary.

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

Inspection Procedure 3: The Engine Warning Lamp Does Not Illuminate Right after the Ignition Switch is Turned the "ON" Position

Combination meter circuit



NOTE
*1: L.H. drive vehicles
*2: R.H. drive vehicles

C-139 (MU803802)

1	2		3	4
5	6	7	8	9
10	11	12	13	
14	15	16	17	18
19	20	21	22	
23	24	25	26	27

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

OPERATION

- Battery voltage is applied to engine warning lamp of combination meter connector (terminal No. 42) 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. 14).

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 burnt-out bulb, open/short circuit or other faults.

PROBABLE CAUSE

- Engine warning lamp bulb burnt out
- Failed ignition switch
- Open/short circuit in engine warning lamp circuit for or loose connector contact
- Failed engine-ECU <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.13C-339).

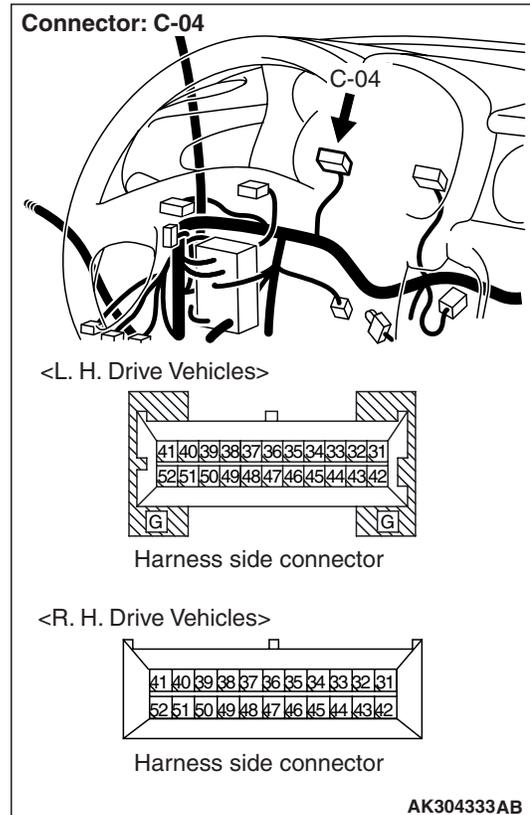
STEP 2: Check engine warning lamp for burnt-out bulb.

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace engine warning lamp.

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

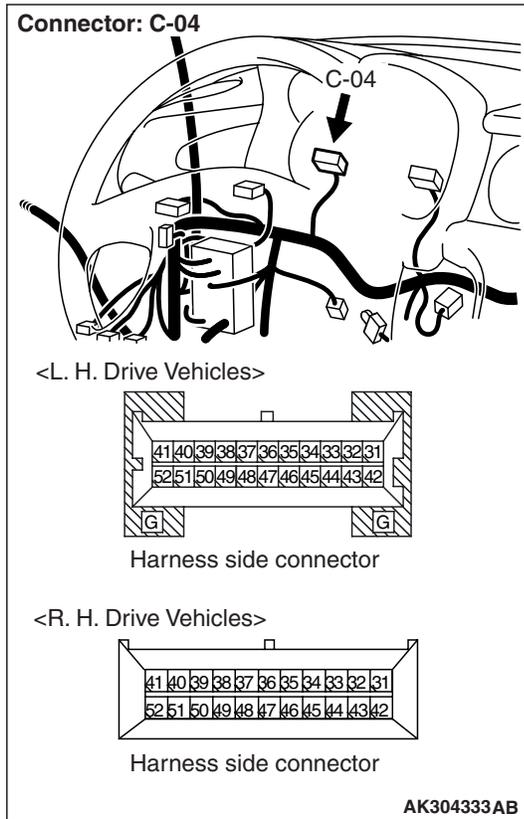


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

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



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

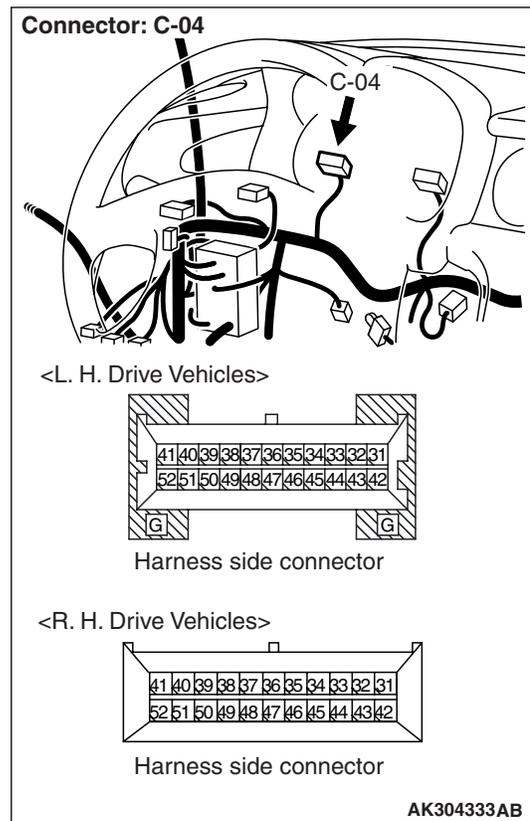
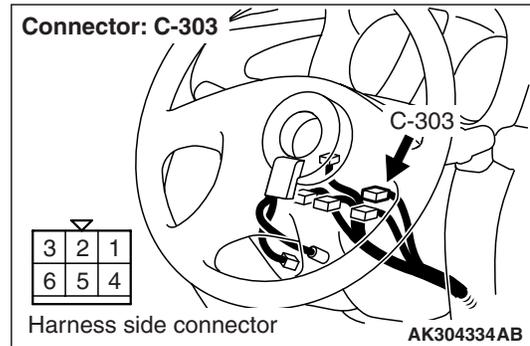
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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



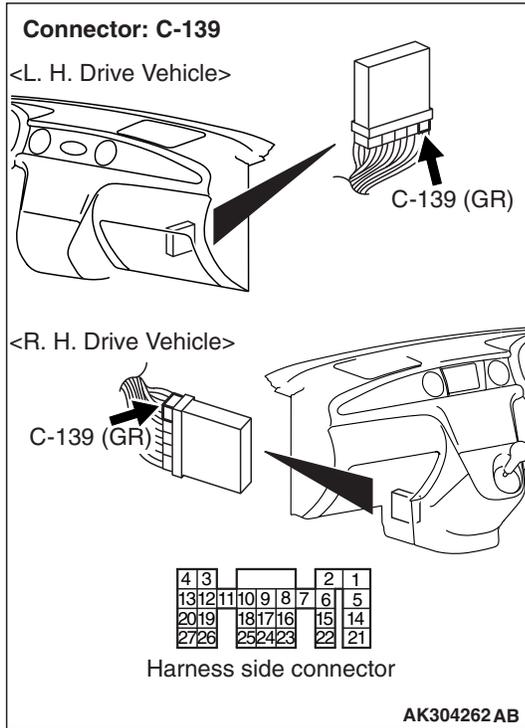
Q: Is the check result normal?

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

- Check power supply line for open/short circuit.

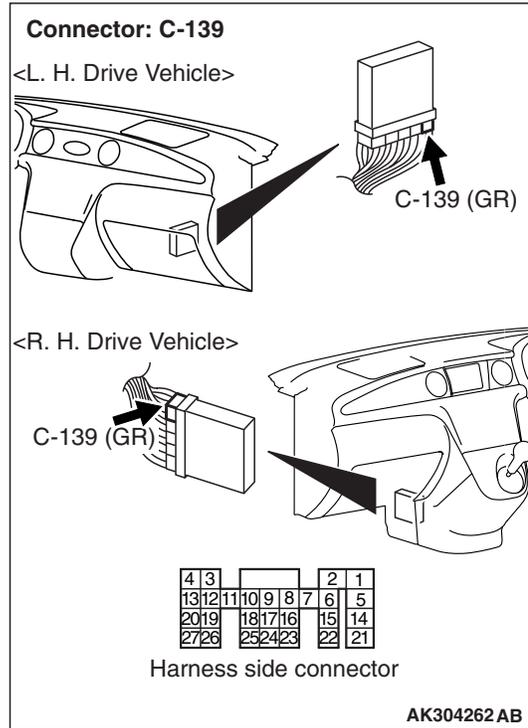
NO : Repair

STEP 6: Connector check: C-139 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.

STEP 7: Perform voltage measurement at C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

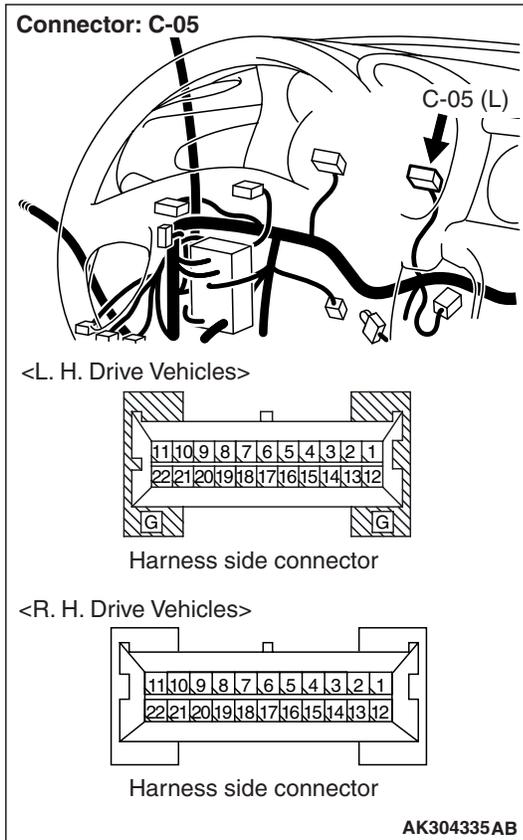


- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 7 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 8 .

STEP 8: Check connector: C-05 combination meter connector



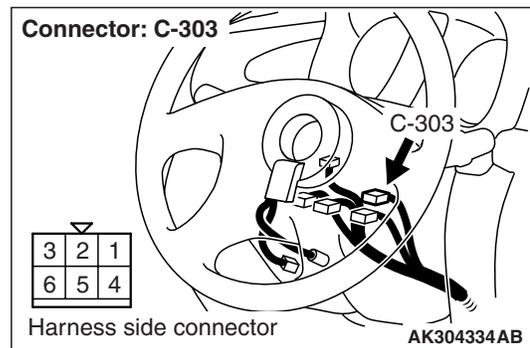
Q: Is the check result normal?

YES : Check intermediate connector C-105, and repair if necessary. If intermediate connector is normal, check and repair harness between C-05 (terminal No. 14) combination meter connector and C-139 (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

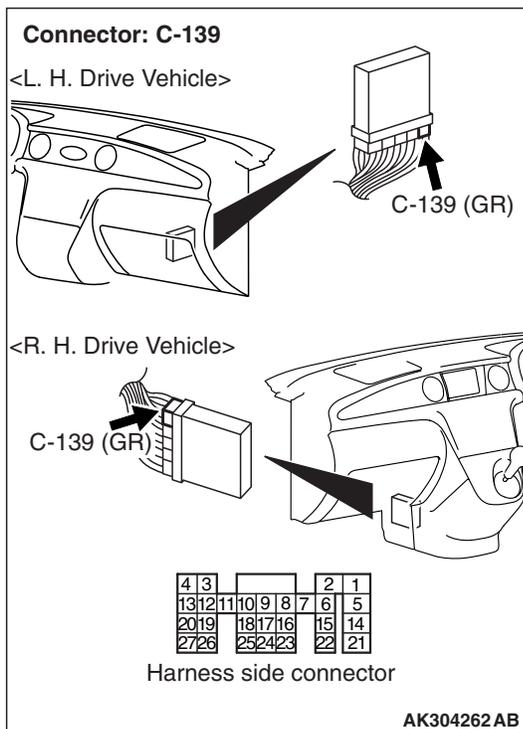
STEP 9: Connector check: C-303 ignition switch connector



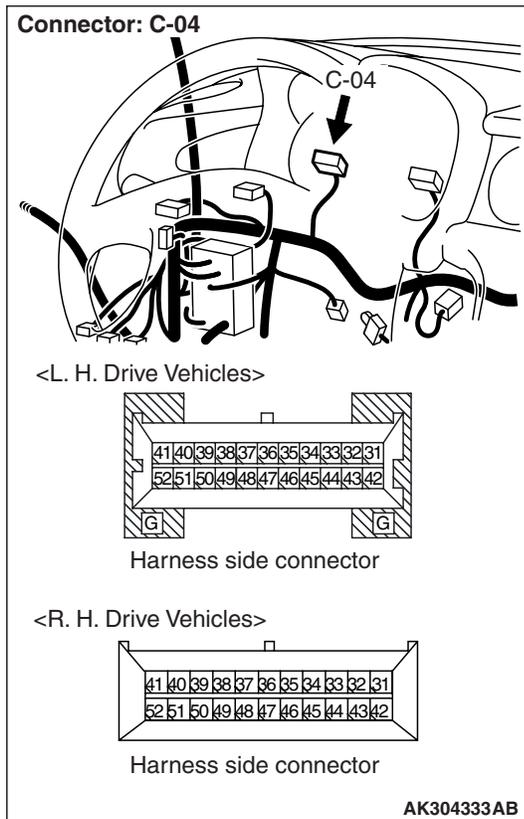
Q: Is the check result normal?

YES : Go to Step 10 .

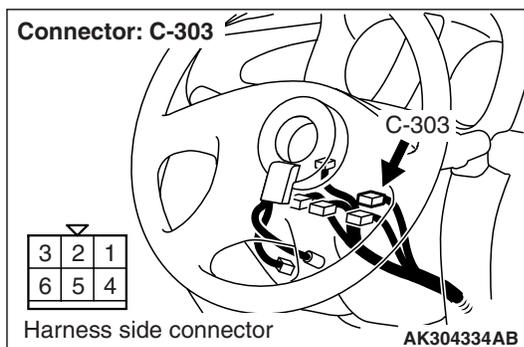
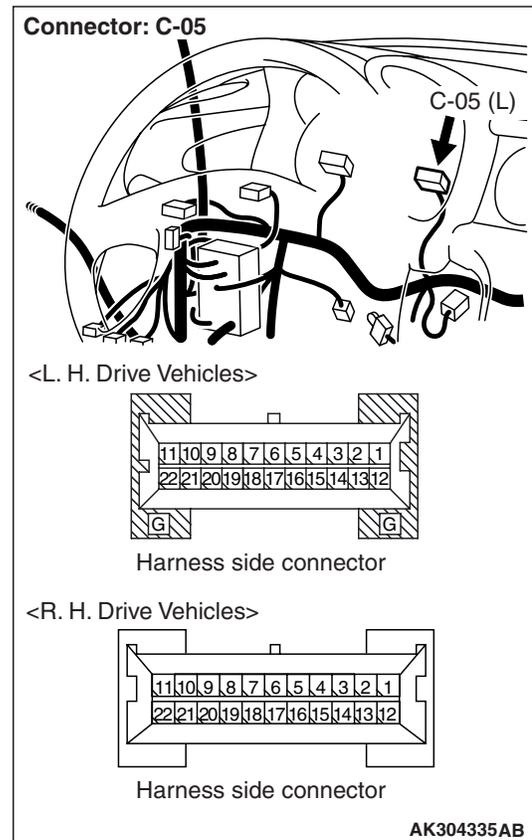
NO : Repair.



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



STEP 11: Connector check: C-05 ignition switch connector



Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

NOTE: Before checking harness, check intermediate connectors C-203 and C-205, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 12: Check harness between C-05 (terminal No. 14) combination meter connector and C-139 (terminal No. 7) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

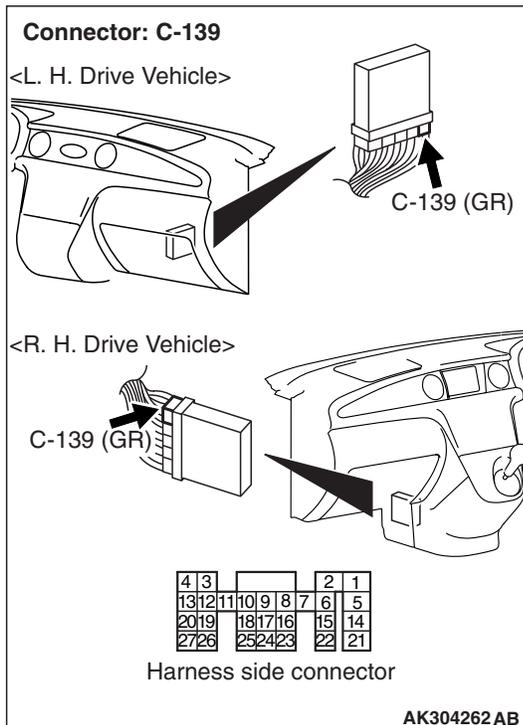
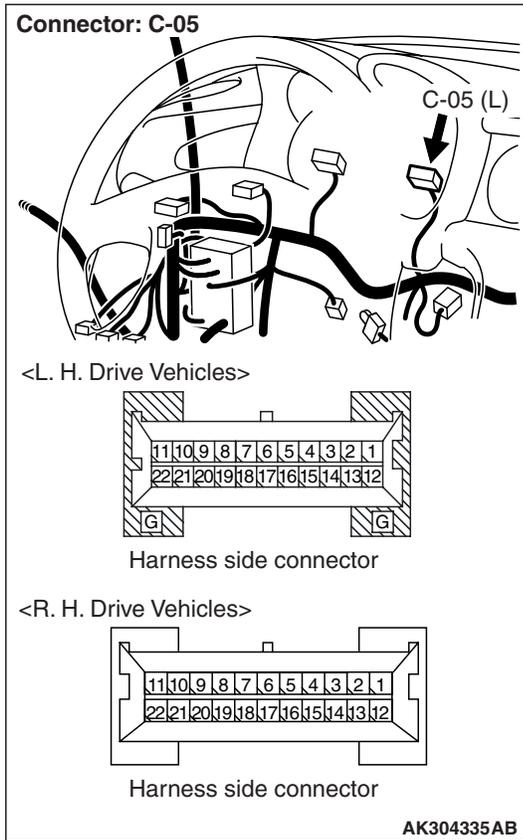
Q: Is the check result normal?

- YES : Go to Step 13 .
- NO : Repair.

STEP 13: Check the trouble symptoms.

Q: Does trouble symptom persist?

- YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

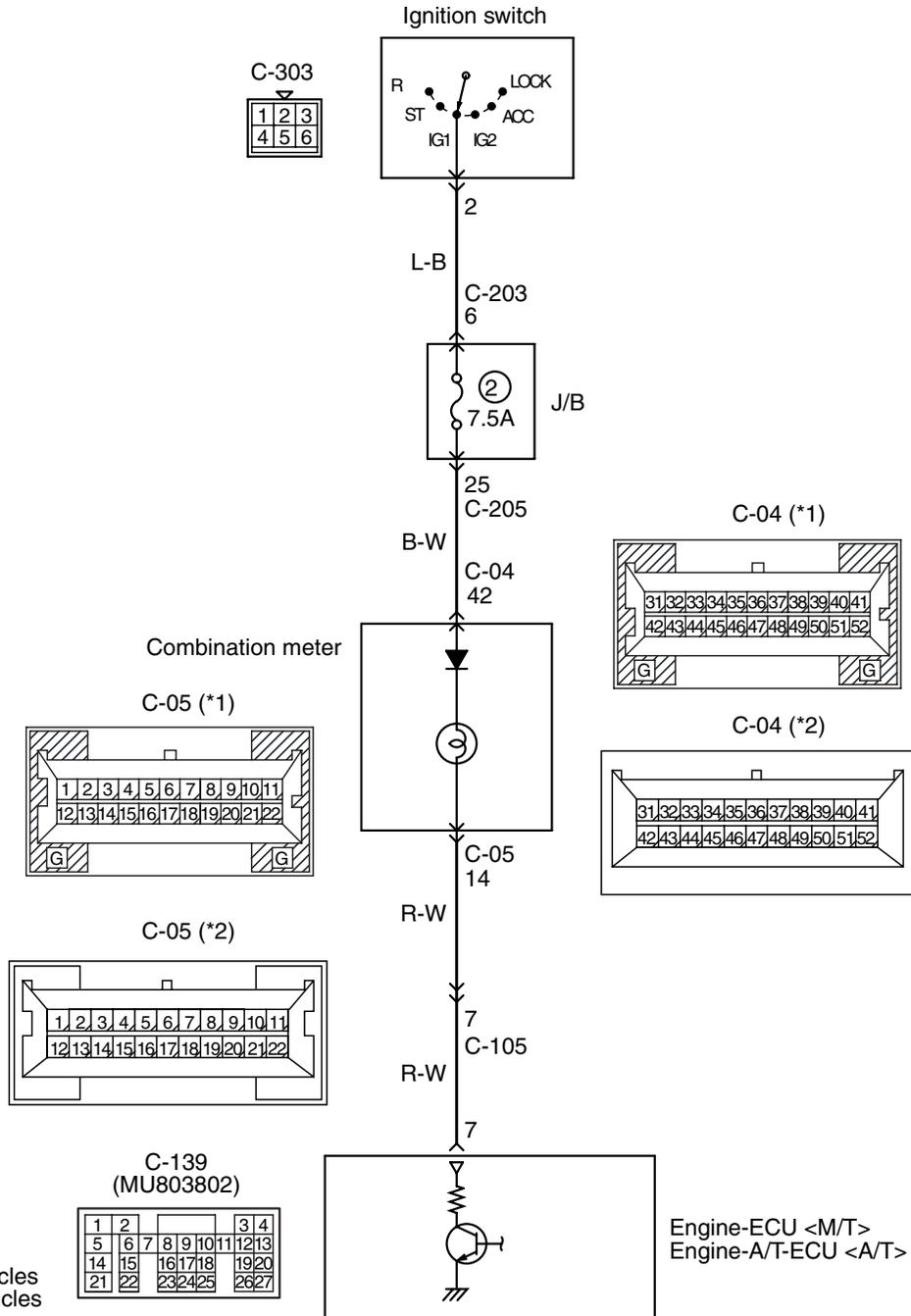


NOTE: Before checking harness, check intermediate connector C-105, and repair if necessary.

- Check output line for damage.

Inspection Procedure 4: The Engine Warning Lamp Remains Illuminating and Never Goes Out

Combination meter circuit



NOTE
*1: L.H. drive vehicles
*2: R.H. drive vehicles

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

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OPERATION

- Battery voltage is applied to engine warning lamp of combination meter connector (terminal No. 42) 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. 14).

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

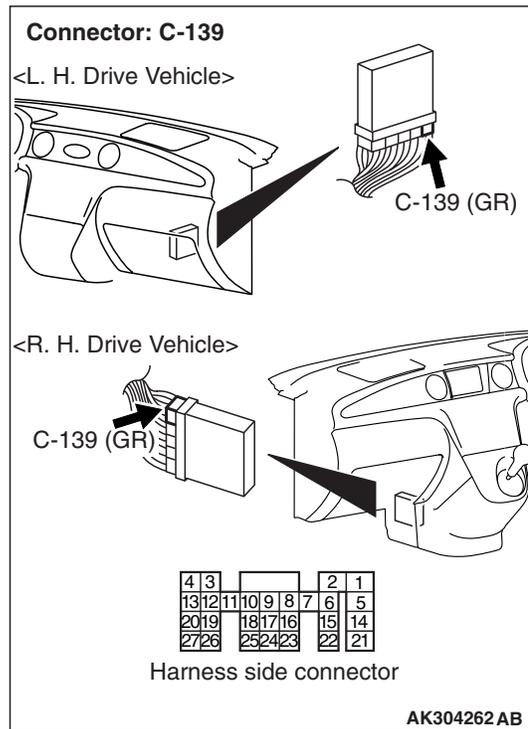
STEP 1: M.U.T.-II/III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13C-21.](#))

NO : Go to Step 2 .

STEP 2: Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

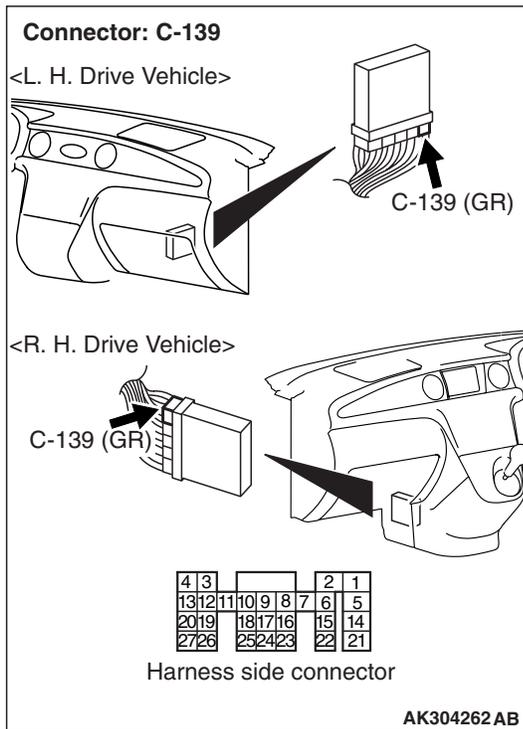


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair

STEP 3: Perform voltage measurement at C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- 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-105, and repair if necessary. If intermediate connector is normal, check and repair harness between C-05 (terminal No. 14) combination meter connector and C-139 (terminal No. 7) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

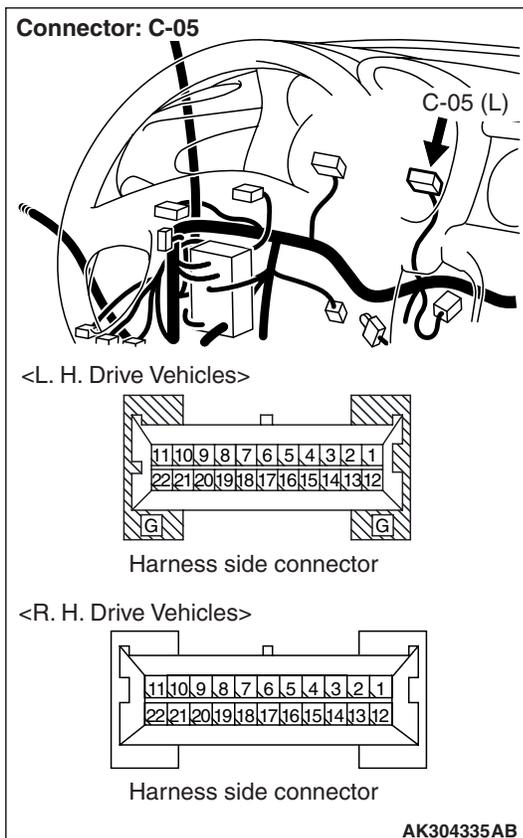
- Check output line for short circuit.

STEP 4: Check the trouble symptoms.

Q: Does trouble symptom persist?

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

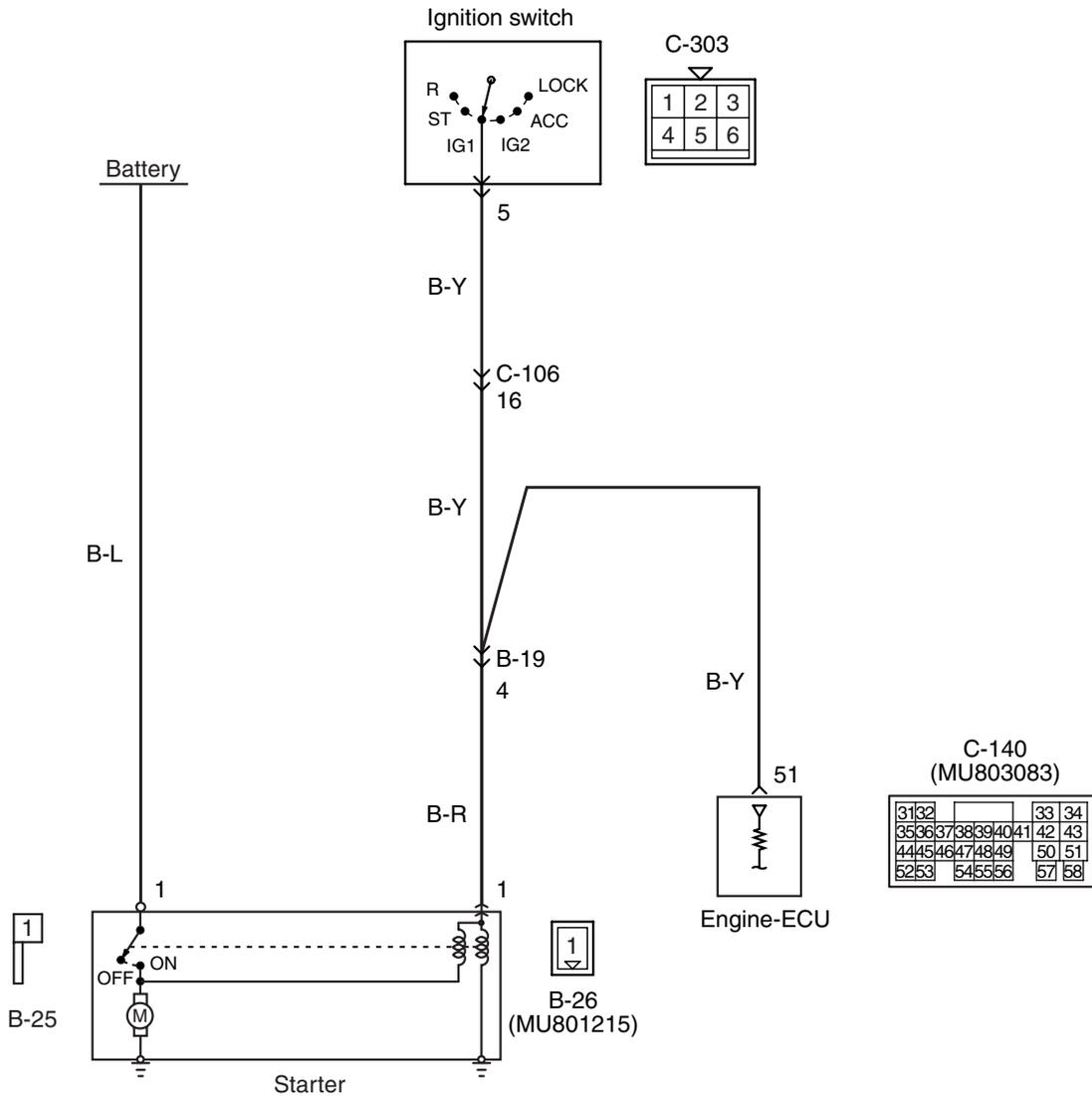
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).



- Disconnect connector, and measure at the harness side.
- Ignition switch: ON

Inspection Procedure 5: Starting Impossible (No Initial Combustion) <M/T>

Starting impossible (no initial combustion) <M/T>



Wire colour code

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

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COMMENT ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1: Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery Test P.54A-7).

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

- Item 18: Cranking signal

OK:

ON (Ignition switch: ST)

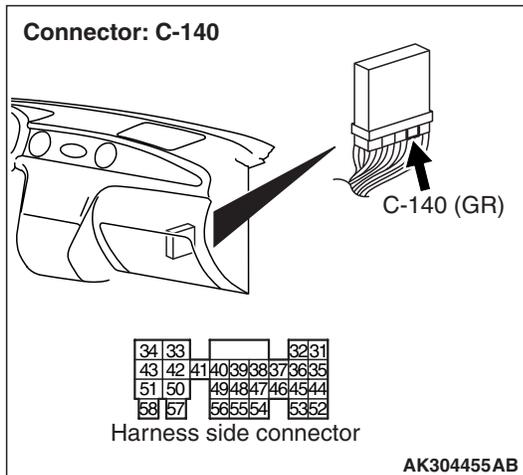
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 3 .

STEP 3: Connector check: C-140 engine-ECU connector

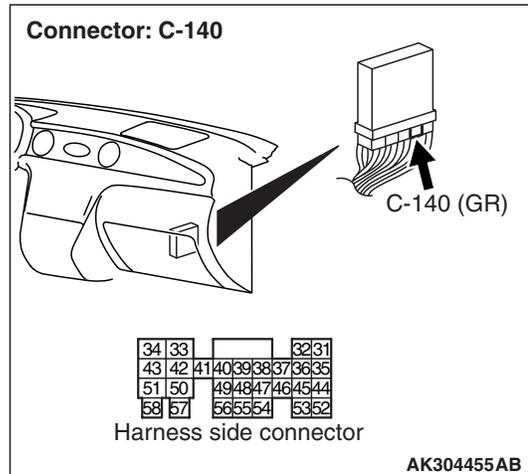


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

STEP 4: Perform voltage measurement at C-140 engine-ECU connector.



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

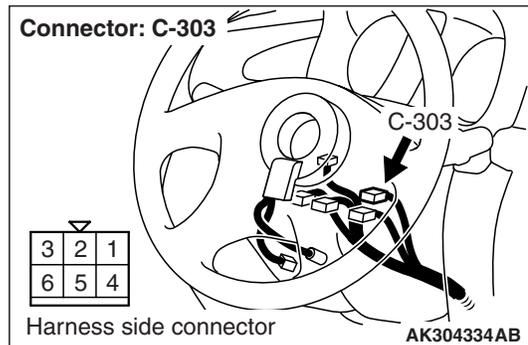
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 5 .

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

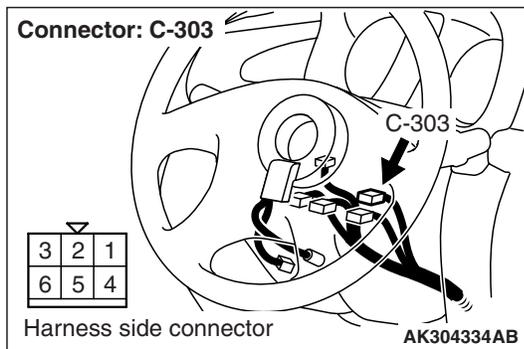
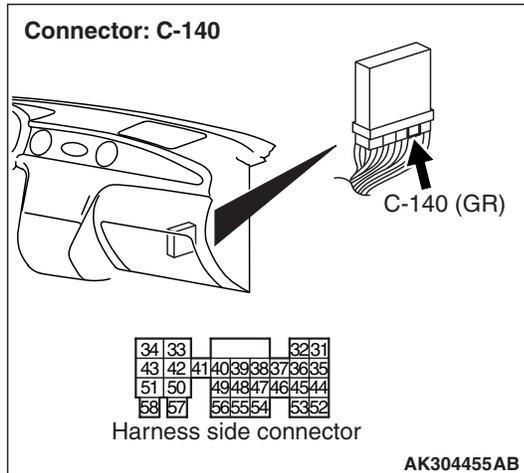


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6: Check ignition switch.



- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Ignition Switch – Inspection P.54A-30).

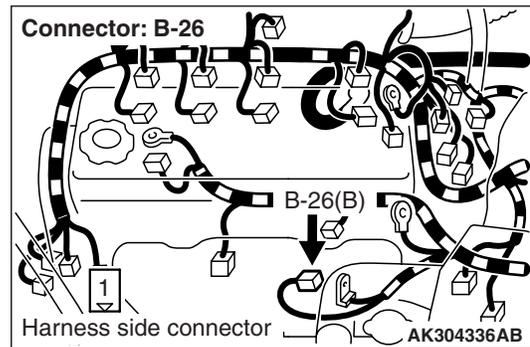
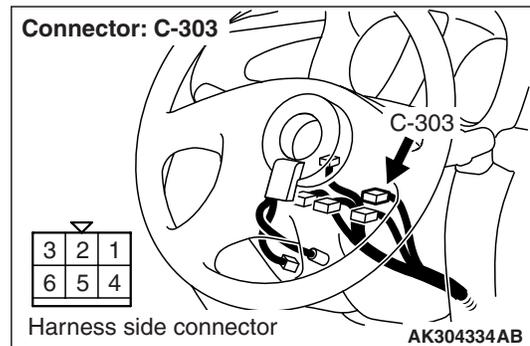
Q: Is the check result normal?

YES : Check intermediate connectors C-106 and B-19, and repair if necessary. If intermediate connector are normal, check and repair harness between C-140 (terminal No. 51) engine-ECU connector and C-303 (terminal No. 5) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 7: Connector check: C-303 ignition switch connector and B-26 starter connector



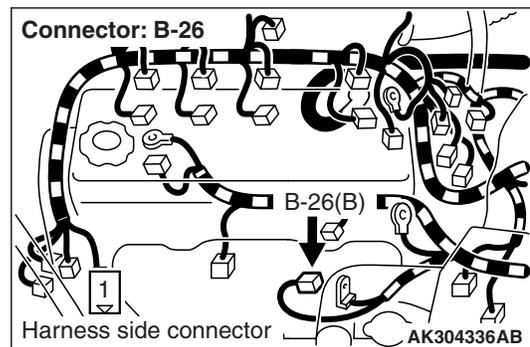
Q: Is the check result normal?

YES : Check intermediate connectors C-106 and B-19, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-303 (terminal No. 5) ignition switch connector and B-26 (terminal No. 1) starter connector.

- Check output line for short circuit.

NO : Repair.

STEP 8: Check connector: B-26 starter connector

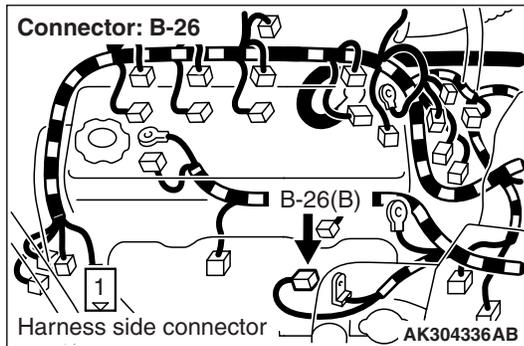


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9: Perform voltage measurement at B-26 starter connector.



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

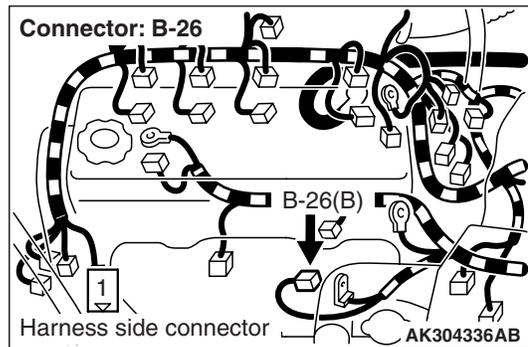
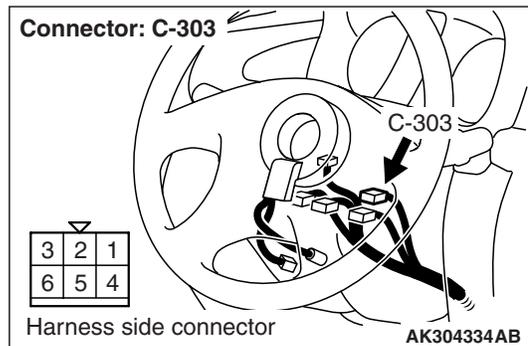
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 10 .

STEP 10: Connector check: C-303 ignition switch connector



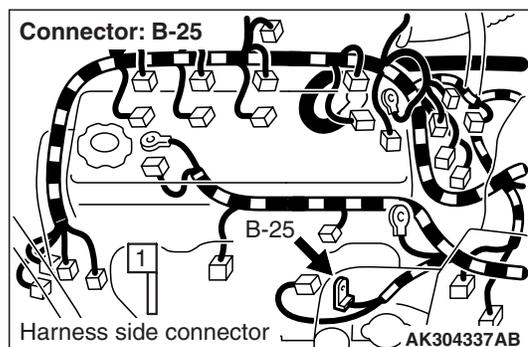
Q: Is the check result normal?

YES : Check intermediate connectors B-19 and C-106, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-303 (terminal No. 5) ignition switch connector and B-26 (terminal No. 1) starter connector.

- Check output line for open circuit and damage.

NO : Repair.

STEP 11: Connector check: B-25 starter connector

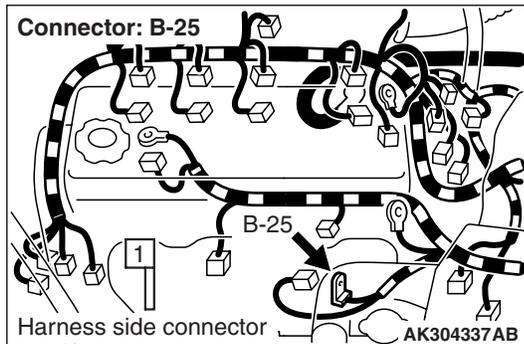


Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

STEP 12: Perform voltage measurement at B-25 starter connector.



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

OK: System voltage

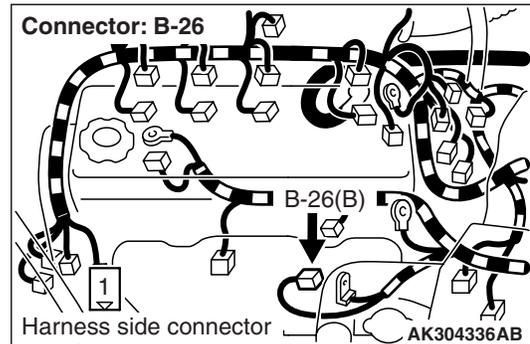
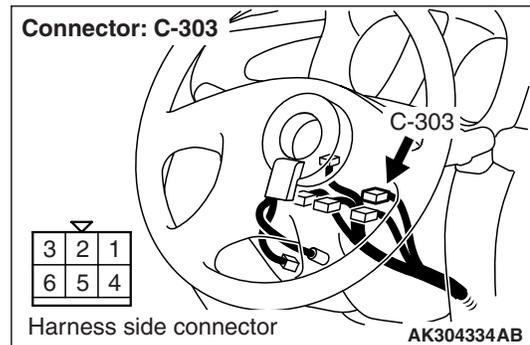
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Check and repair harness between B-25 (terminal No. 1) starter connector and battery.

- Check power supply line for open/short circuit.

STEP 13: Check harness between C-303 (terminal No. 5) ignition switch connector and B-26 (terminal No. 1) starter connector.



NOTE: Before checking harness, check intermediate connectors B-19 and C-106, and repair if necessary.

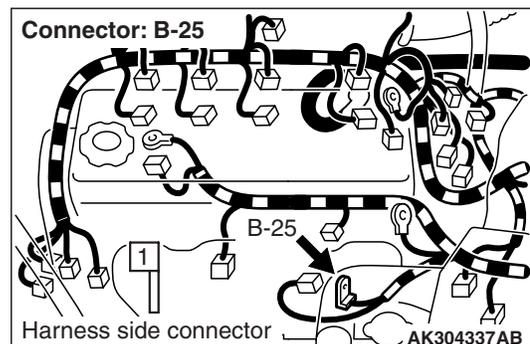
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14: Check harness between B-25 (terminal No. 1) starter connector and battery.



- Check power supply line for damage.

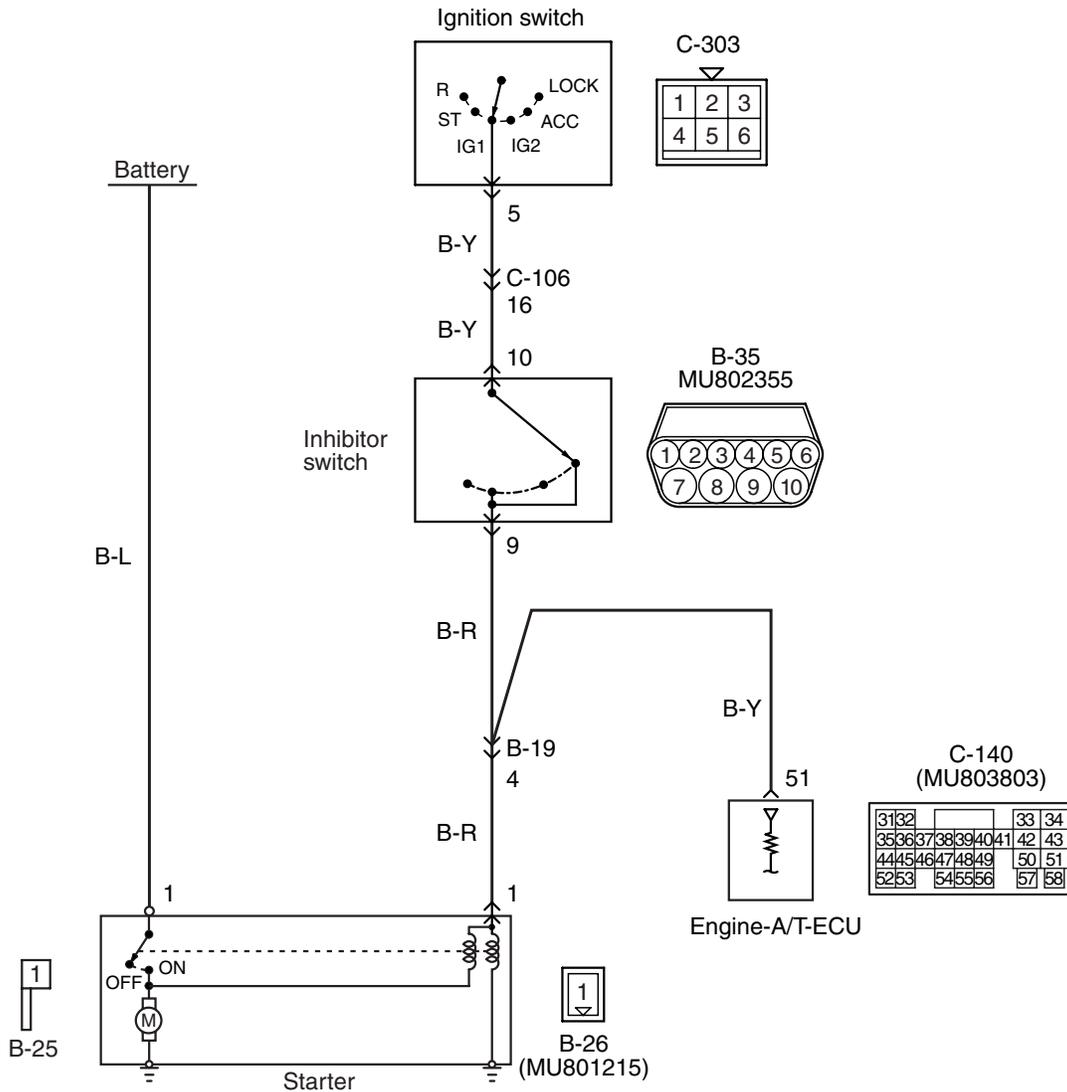
Q: Is the check result normal?

YES : Replace starter.

NO : Repair.

Inspection Procedure 6: Starting Impossible (No Initial Combustion) <A/T>

Starting impossible (no initial combustion) <A/T>



Wire colour code

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

AK401208AB

COMMENT ON TROUBLE SYMPTOM

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1: Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 54A – Battery-On-vehicle Service – Battery Test P.54A-7).

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

- Item 18: Cranking signal

OK:

ON (Ignition switch: ST)

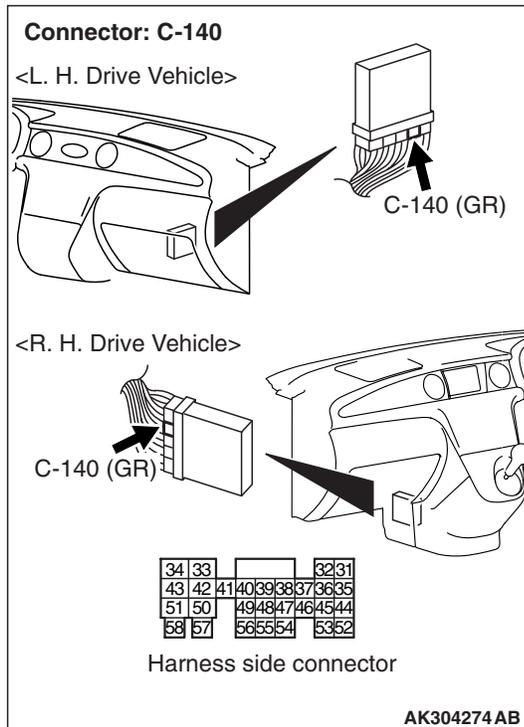
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 3 .

STEP 3: Connector check: C-140 engine-A/T-ECU connector

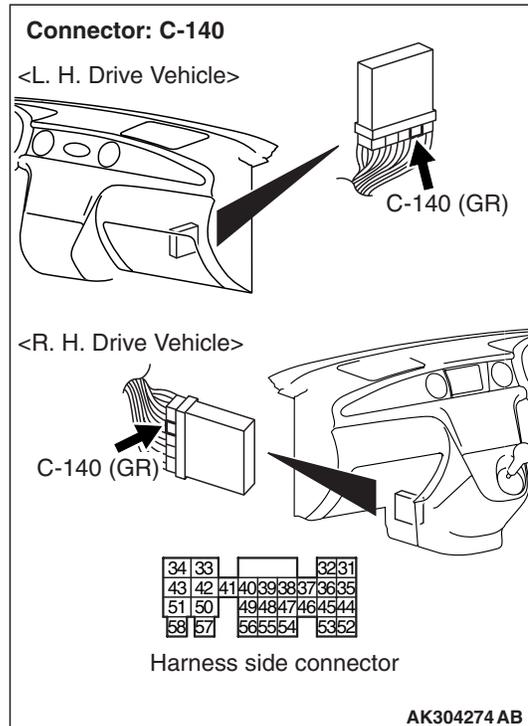


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

STEP 4: Perform voltage measurement at C-140 engine-A/T-ECU connector.



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

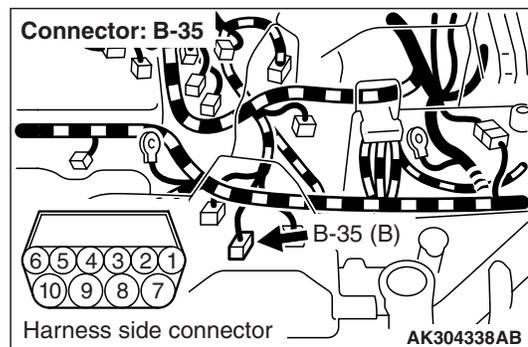
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 5 .

STEP 5: Connector check: B-35 inhibitor switch connector

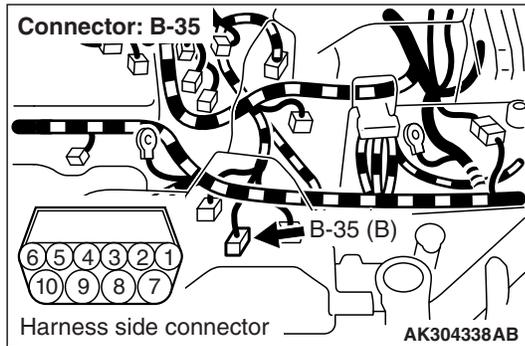


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6: Perform voltage measurement at B-35 inhibitor switch connector



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

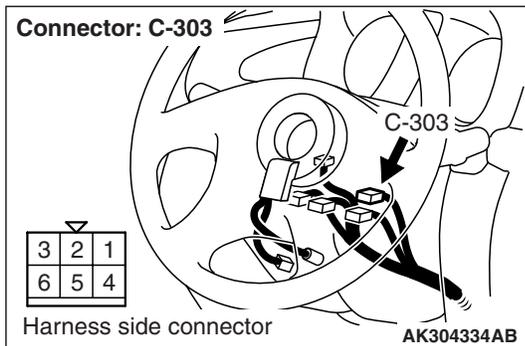
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 7 .

STEP 7: Connector check: C-303 ignition switch connector

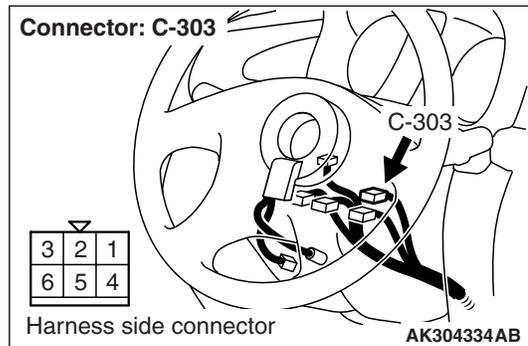
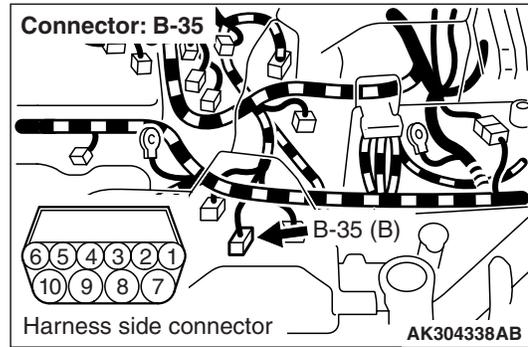


Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8: Check ignition switch



- Check ignition switch (Refer to GROUP 54A – Ignition switch – Ignition Switch – Inspection P.54A-30).

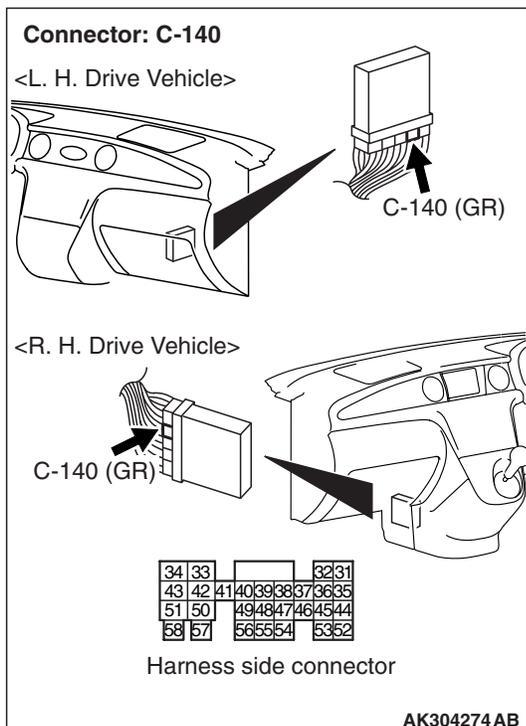
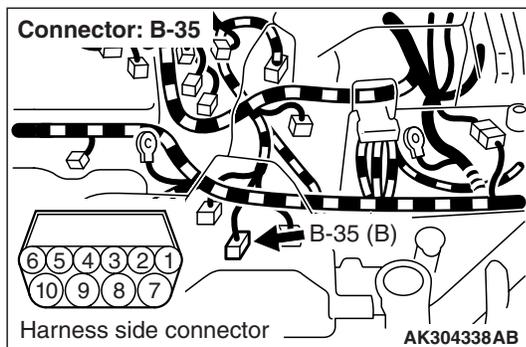
Q: Is the check result normal?

YES : Check intermediate connector C-106 and repair if necessary. If intermediate connector is normal, check and repair harness between B-35 (terminal No. 10) inhibitor switch connector and C-303 (terminal No. 5) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 9: Check inhibitor switch.



- Check ignition switch (Refer to GROUP 23A – On – vehicle Service – A/T Control Component Check – Inhibitor Switch Check P.23A-126).

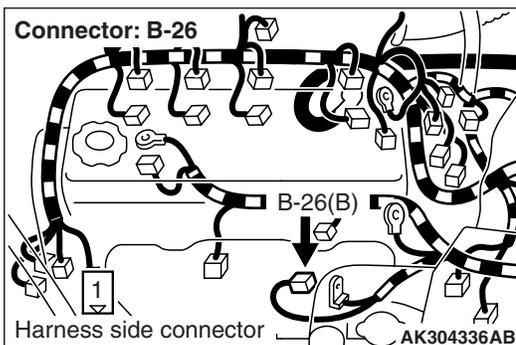
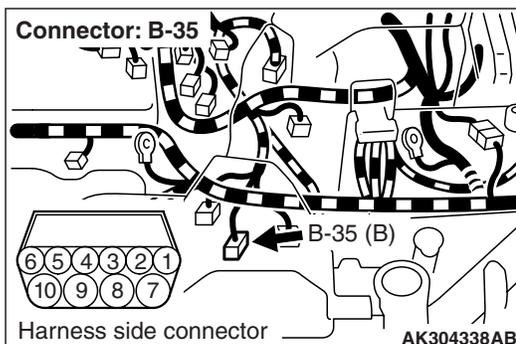
Q: Is the check result normal?

YES : Check intermediate connectors B-19, and repair if necessary. If intermediate connector are normal, check and repair harness between B-35 (terminal No. 9) inhibitor switch connector and C-140 (terminal No. 51) engine-A/T-ECU connector.

- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 10: Connector check: B-35 inhibitor switch connector and B-26 starter connector



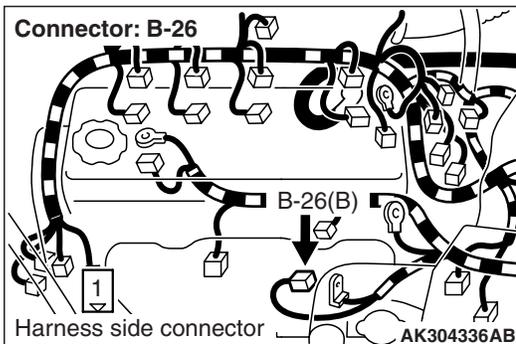
Q: Is the check result normal?

YES : Check intermediate connectors B-19, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-35 (terminal No. 9) inhibitor switch connector and B-26 (terminal No. 1) starter connector.

- Check output line for short circuit.

NO : Repair.

STEP 11: Check connector: B-26 starter connector

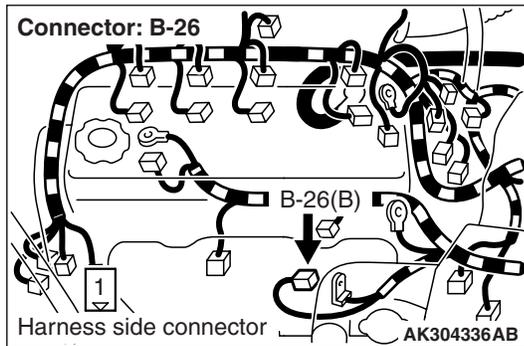


Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

STEP 12: Perform voltage measurement at B-26 starter connector.



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

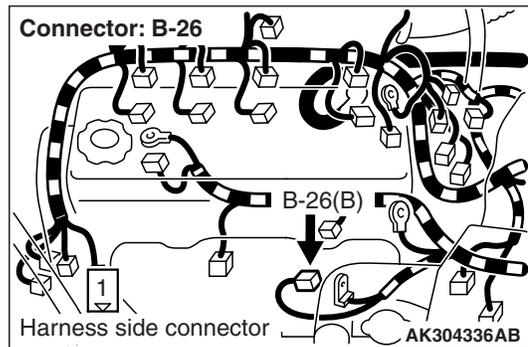
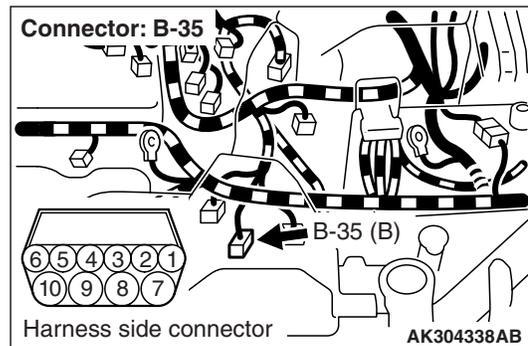
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Go to Step 13 .

STEP 13: Connector check: B-35 inhibitor switch connector



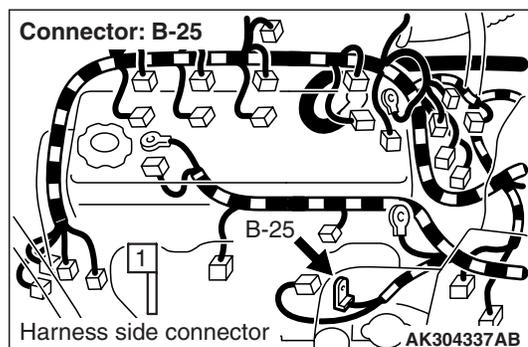
Q: Is the check result normal?

YES : Check intermediate connectors B-19, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-35 (terminal No. 9) inhibitor switch connector and B-26 (terminal No. 1) starter connector.

- Check output line for open circuit and damage.

NO : Repair.

STEP 14: Connector check: B-25 starter connector

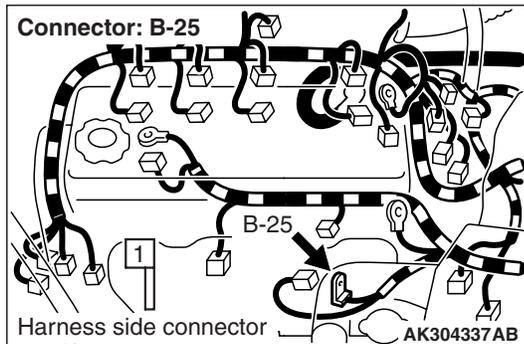


Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

STEP 15: Perform voltage measurement at B-25 starter connector.



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

OK: System voltage

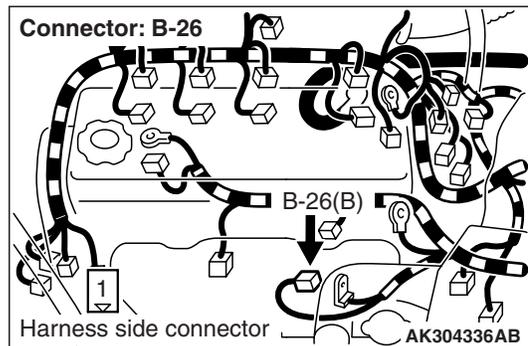
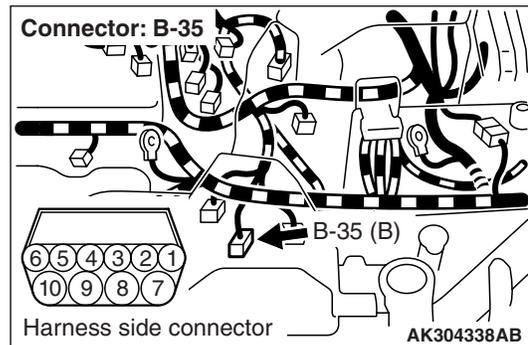
Q: Is the check result normal?

YES : Go to Step 16 .

NO : Check and repair harness between B-25 (terminal No. 1) starter connector and battery.

- Check power supply line for open/short circuit.

STEP 16: Check harness between B-35 (terminal No. 9) inhibitor switch connector and B-26 (terminal No. 1) starter connector.



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

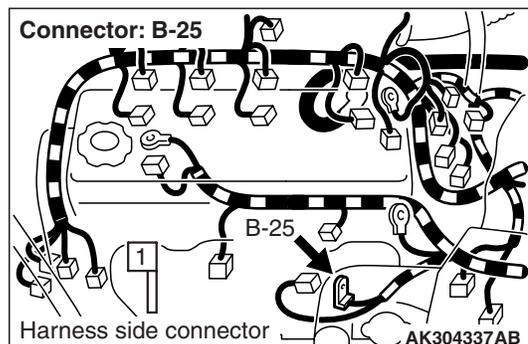
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17: Check harness between B-25 (terminal No. 1) starter connector and battery.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Replace starter.

NO : Repair.

Inspection Procedure 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

NOTE:

*1: L.H. drive vehicles

*2: R.H. drive vehicles

STEP 1: Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?

YES : Go to STEP 2 .

NO : Check battery (Refer to GROUP 54 – Battery – On-vehicle Service – Battery Test P.54A-7).

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

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check engine-ECU <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.13C-339).

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis codes (Refer to P.13C-21)

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.13C-345)

STEP 5. Check timing belt for breakage.

- Engine: Cranking

OK: Camshaft rotates.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace timing belt.

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

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Clean throttle body (throttle valve portion) (Refer to P.13C-425).

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

- Item 18: Cranking signal

OK:

ON (Ignition switch: ST)

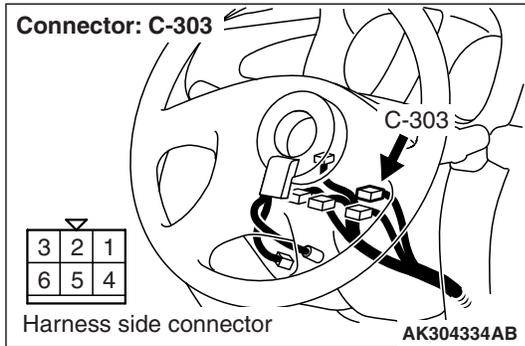
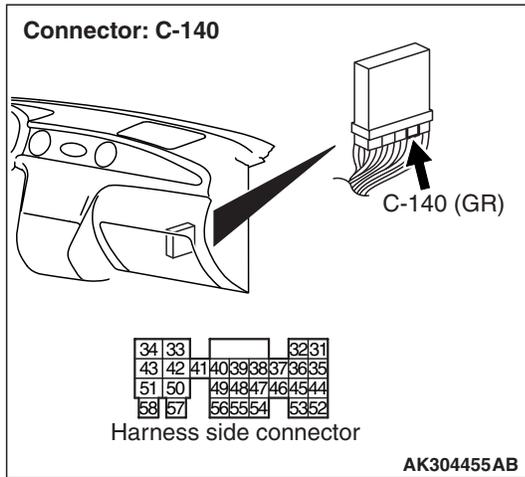
OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 <M/T> , Go to Step 9 <A/T> .

STEP 8: Connector check: C-140 engine-ECU connector



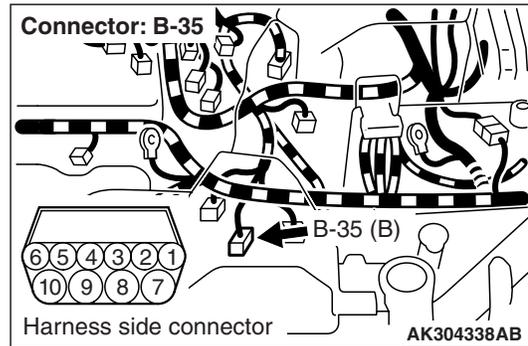
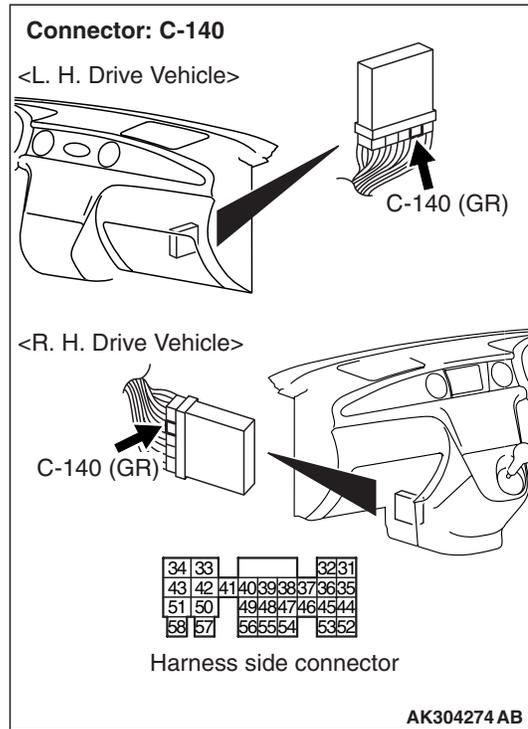
Q: Is the check result normal?

YES : Check intermediate connectors B-19 and C-106, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-303 (terminal No. 5) ignition switch connector and C-140 (terminal No. 51) engine-ECU connector.

- Check output line for open/short circuit.

NO : Repair.

STEP 9: Connector check: C-140 engine-A/T-ECU connector



Q: Is the check result normal?

YES : Check intermediate connectors B-19, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-35 (terminal No. 9) inhibitor switch connector and C-140 (terminal No. 51) engine-A/T-ECU connector.

- Check output line for open/short circuit.

NO : Repair.

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

- Refer to Data list reference table [P.13C-402](#).
 - 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.13C-170](#)).

STEP 11: Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13C-435](#)).

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.13C-126](#).)

(Refer to Code No. P0202: No. 2 injector system [P.13C-131](#).)

(Refer to Code No. P0203: No. 3 injector system [P.13C-136](#).)

(Refer to Code No. P0204: No. 4 injector system [P.13C-141](#).)

STEP 12. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Go to Step 13 .

STEP 13. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).

NO : Replace the spark plug.

STEP 14: Fuel pressure measurement.

- Fuel pressure measurement (Refer to [P.13C-425](#)).

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

STEP 15: Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>

- After replacing the engine-ECU <M/T> or engine-A/T-ECU <A/T>, re-check the trouble symptoms.

Q: Does trouble symptom persist?

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

NO : Check end.

Inspection Procedure 8: 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-7).

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis codes (Refer to P.13C-21).

NO : Go to Step 4 .

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

- Refer to Data list reference table P.13C-402.
 - Item 12: Air flow sensor
 - Item 13: Intake air temperature sensor
 - Item 21: Engine coolant temperature sensor
 - 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.13C-21).

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

- Refer to Data list reference table P.13C-402.
 - Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 6 .

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

STEP 6: Check throttle body (throttle valve) contamination.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Clean throttle body (throttle valve portion) (Refer to P.13C-425).

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.13C-345).

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.13C-435](#)).

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.13C-126](#)).

(Refer to Code No. P0202: No.2 Injector System [P.13C-131](#)).

(Refer to Code No. P0203: No.3 Injector System [P.13C-136](#)).

(Refer to Code No. P0204: No.4 Injector System [P.13C-141](#)).

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. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 12 .

STEP 12. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).

NO : Replace the spark plug.

STEP 13: Check spray condition of injector.

- Check each injector for spray condition (Refer to [P.13C-435](#)).

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Replace injector.

STEP 14: Check compression pressure.

- Check compression pressure (Refer to GROUP 11E – On-vehicle Service – Compression Pressure Check [P.11E-15](#)).

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

STEP 15: 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 <4G69>[P.17-72](#)].

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Replace EGR valve (stepper motor).

STEP 16: Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

- After replacing the engine-ECU <M/T> or engine-A/T-ECU <A/T>, re-check the trouble symptoms.

Q: Does trouble symptom persist?

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

NO : Check end.

Inspection Procedure 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.13C-21](#)).

NO : Go to Step 3 .

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

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 12: Air flow sensor
 - Item 13: Intake air temperature sensor
 - Item 14: Throttle position sensor (sub)
 - Item 21: Engine coolant temperature sensor
 - Item 77: Accelerator pedal position sensor (sub)
 - Item 78: Accelerator pedal position sensor (main)
 - Item 79: Throttle position sensor (main)
 - 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.13C-21](#)).

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

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 5 .

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

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

- Refer to Data List Reference Table [P.13C-402](#).
 - 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.13C-206](#)).

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.13C-425](#)).

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.13C-435).

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.13C-126).

(Refer to Code No. P0202: No. 2 Injector System P.13C-131).

(Refer to Code No. P0203: No. 3 Injector System P.13C-136).

(Refer to Code No. P0204: No. 4 Injector System P.13C-141).

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

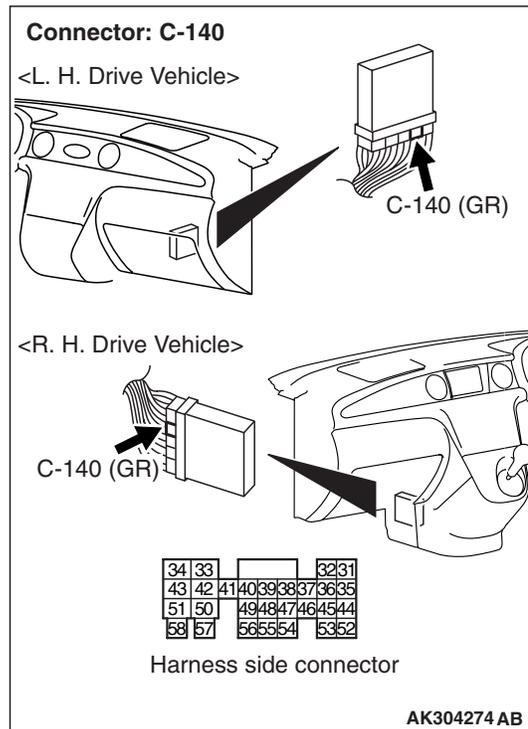
- Refer to Data List Reference Table P.13C-402.
 - Item 11: Cylinder 1, 4 oxygen sensor (front)
 - Item 39: Cylinder 2, 3 oxygen sensor (front)
 - Item 59: Cylinder 1, 4 oxygen sensor (rear)
 - Item 69: Cylinder 2, 3 oxygen sensor (rear)

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.13C-21).

STEP 11. Perform voltage measurement at C-140 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.

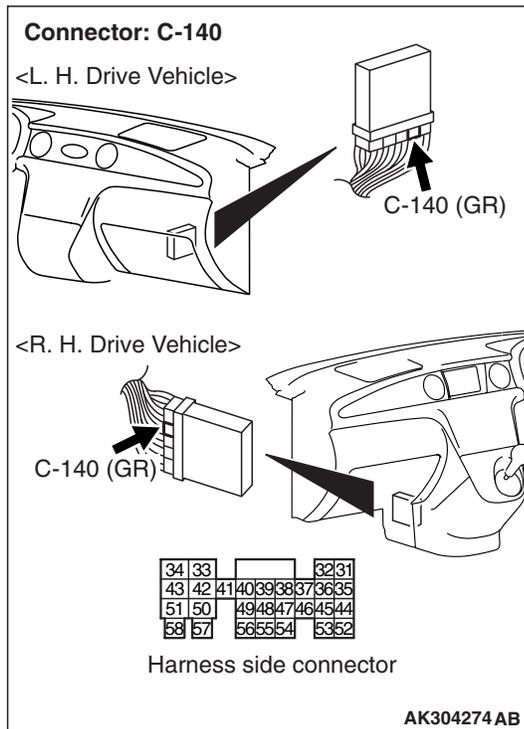
OK: Switching the headlamps to ON from OFF causes the voltage to increase.

Q: Is the check result normal?

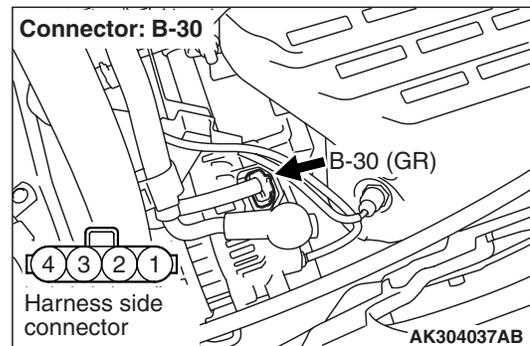
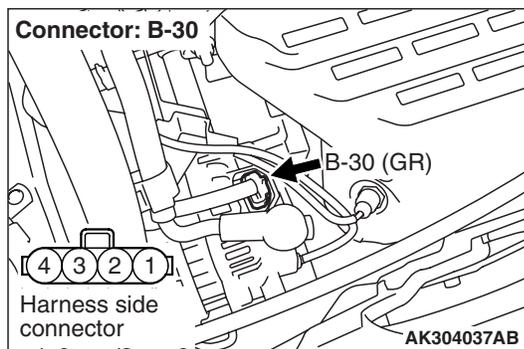
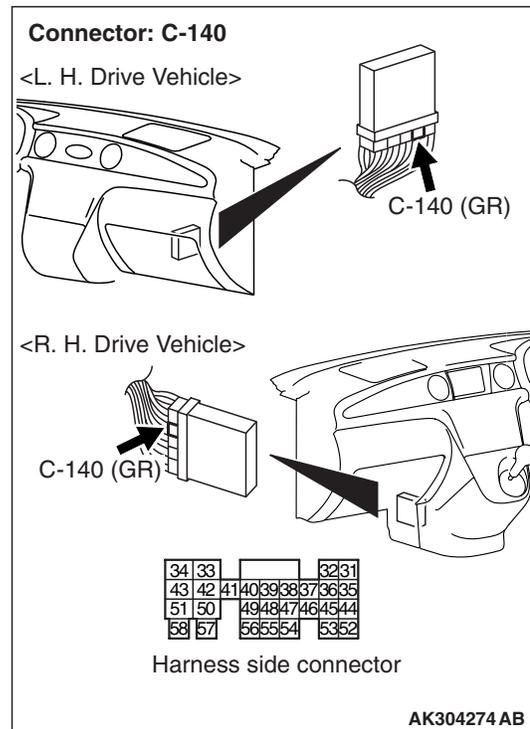
YES : Go to Step 15 .

NO : Go to Step 12 .

STEP 12. Connector check: C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-30 alternator connector



STEP 13. Check harness between C-140 (terminal No. 45) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-30 (terminal No. 1) alternator connector.



Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

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

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

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14. Replace alternator

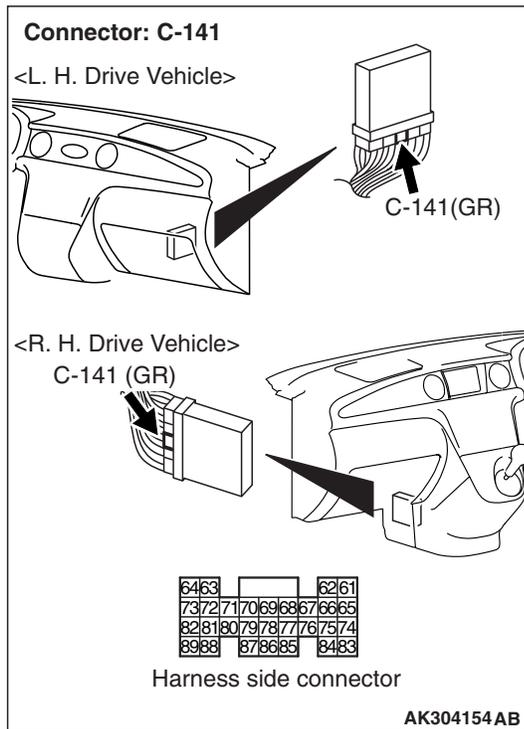
- After alternator is replaced, re-check for trouble symptom.

Q: Does trouble symptom persist?

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

NO : Check end.

STEP 15. Perform voltage measurement at C-141 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.13C-373](#)).

STEP 16. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 18 .

NO : Go to Step 17 .

STEP 17. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).

NO : Replace the spark plug.

STEP 18. Check injector for spray condition.

- Check each injector for spray condition (Refer to [P.13C-435](#)).

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Replace injector.

STEP 19. Check compression pressure.

- Check compression pressure (Refer to GROUP 11E – On-vehicle Service – Compression Pressure Check [P.11E-15](#)).

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair.

STEP 20. 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.17-65](#)).

Q: Is the check result normal?

YES : Go to Step 21 .

NO : Replace purge control solenoid valve.

STEP 21. 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 <4G69>[P.17-72](#)].

Q: Is the check result normal?

YES : Go to Step 22 .

NO : Replace EGR valve (stepper motor).

STEP 22. 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 23 .

NO : Check fuel pump system (Refer to inspection Procedure 25 [P.13C-345](#)).

STEP 23. Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

- After engine-ECU <M/T> or engine-A/T-ECU <A/T> is replaced, re-check for trouble symptom.

Q: Does trouble system persist?

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

NO : Check end.

Inspection Procedure 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.13C-21](#)).

NO : Go to Step 2 .

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

- Refer to Data list reference table [P.13C-402](#).
 - Item 14: Throttle position sensor (sub)
 - Item 77: Accelerator pedal position sensor (sub)
 - Item 78: Accelerator pedal position sensor (main)
 - Item 79: Throttle position sensor (main)

Q: Are the check results normal?

YES : Go to Step 3 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Code [P.13C-21](#)).

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 <4G69> [P.17-72](#)].

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace EGR valve (stepper motor).

STEP 4. Check air intake from intake hose and inlet manifold.**Q: Is the check result normal?**

YES : Go to Step 5 .

NO : Repair.

STEP 5. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

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

NO : Go to Step 6 .

STEP 6. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).

NO : Replace the spark plug.

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.13C-21](#)).
- NO :** Go to Step 2 .

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

- Refer to Data list reference table [P.13C-402](#).
 - 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.13C-21](#)).

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 <4G69> [P.17-72](#)].

Q: Is the check result normal?

- YES :** Go to Step 4 .
- NO :** Replace EGR valve (stepper motor).

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

Q: Is the check result normal?

- YES :** Go to Step 5 .
- NO :** Clean throttle body (throttle valve portion) (Refer to [P.13C-425](#)).

STEP 5. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

- YES :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- NO :** Go to Step 6 .

STEP 6. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

- YES :** Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).
- NO :** Replace the spark plug.

Inspection Procedure 12: Engine Does Not Revolve Up

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed fuel system, throttle valve opening control system ignition system or other faults.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

YES : Inspection chart for diagnosis code (Refer to [P.13C-21](#)).

NO : Go to Step 2 .

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

- Refer to Data list reference table [P.13C-402](#).
 - 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.13C-21](#)).

STEP 3. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).

NO : Replace the spark plug.

STEP 5. Fuel pressure measurement.

- Fuel pressure measurement [P.13C-425](#)).

Q: Is the check result normal?

YES : Replace 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.13C-21](#)).

NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13C-435](#)).

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.13C-126](#)).

(Refer to Code No. P0202: No. 2 Injector System [P.13C-131](#)).

(Refer to Code No. P0203: No. 3 Injector System [P.13C-136](#)).

(Refer to Code No. P0204: No. 4 Injector System [P.13C-141](#)).

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

- Refer to Data list reference table [P.13C-402](#).
 - a. Item 13: Intake air temperature sensor
 - b. Item 14: Throttle position sensor (sub)
 - c. Item 21: Engine coolant temperature sensor
 - d. Item 77: Accelerator pedal position sensor (sub)
 - e. Item 78: Accelerator pedal position sensor (main)
 - f. Item 79: Throttle position sensor (main)
 - 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.13C-21](#)).

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

- Refer to Data List Reference Table [P.13C-402](#).
 - a. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 5 .

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

STEP 5. Check purge control solenoid valve itself.

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

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace purge control solenoid valve.

STEP 6. Check EGR valve (stepper motor) itself.

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check <4G69>[P.17-72](#)].

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Replace EGR valve (stepper motor).

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

- Refer to Data List Reference Table [P.13C-402](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor (front)
 - b. Item 39: Cylinder 2, 3 oxygen sensor (front)
 - c. Item 59: Cylinder 1, 4 oxygen sensor (rear)
 - d. Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Is the check result 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.13C-21](#)).

STEP 8. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?**YES** : Go to Step 10 .**NO** : Go to Step 9 .

STEP 9. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?**YES** : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).**NO** : Replace the spark plug.

STEP 10. Check throttle body (throttle valve portion) for contamination.**Q: Is the check result normal?****YES** : Go to Step 11 .**NO** : Clean throttle body (throttle valve portion) (Refer to [P.13C-425](#)).

STEP 11. Measure fuel pressure.

- Measure fuel pressure (Refer to [P.13C-425](#)).

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

STEP 12. Check compression pressure.

- Check compression pressure (Refer to GROUP 11E – On-vehicle Service – Compression Pressure Check [P.11E-15](#)).

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

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.13C-21](#)).

NO : Go to Step 2 .

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

- Refer to Data List Reference Table [P.13C-402](#).
 - 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.13C-21](#)).

STEP 3. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

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

NO : Go to Step 4 .

STEP 4. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).

NO : Replace the spark plug.

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.13C-21](#)).

NO : Go to Step 2 .

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

- Refer to Data List Reference Table [P.13C-402](#).
 - Item 14: Throttle position sensor (sub)
 - Item 77: Accelerator pedal position sensor (sub)
 - Item 78: Accelerator pedal position sensor (main)
 - Item 79: Throttle position sensor (main)

Q: 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.13C-21](#)).

STEP 3. Check throttle body (throttle valve) contamination.**Q: Is the check result normal?**

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

NO : Clean throttle body (throttle valve portion) (Refer to [P.13C-425](#)).

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.13C-21](#)).

NO : Go to Step 2 .

STEP 2. Visual check of ignition spark.

- Remove the spark plug and install it to the ignition coil.
- Connect the ignition coil connector.
- Remove all injector connectors.
- At the engine start, check each spark plug produces a spark.

Q: Is the check result normal?

YES : Check detonation sensor system (Refer to Code No. P0325 [P.13C-167](#)).

NO : Go to Step 3 .

STEP 3. Check spark plug.

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

YES : Check ignition circuit system (Refer to Inspection Procedure 31 [P.13C-388](#)).

NO : Replace the spark plug.

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

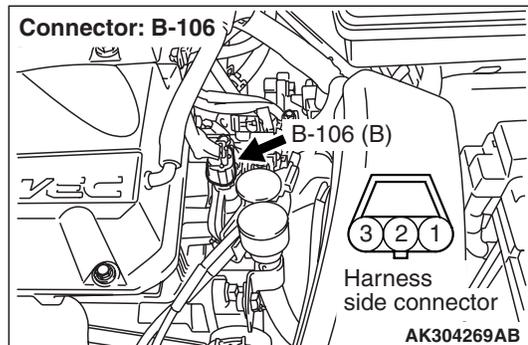
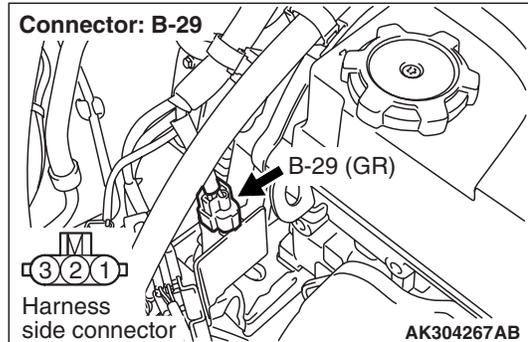
STEP 1. M.U.T.-II/III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to [P.13C-21](#)).

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-29 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-106 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.13C-419](#)) using an oscilloscope.

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Go to Step 4 .

STEP 3. Check the trouble symptoms.**Q: Does trouble symptom persist?**

- YES** : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- NO** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 4. Check crank angle sensor and camshaft position sensor mounted conditions.**Q: Is the check result normal?**

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

STEP 5. Check timing marks of timing belt.**Q: Is the check result normal?**

- YES** : Go to Step 6 .
- NO** : Align timing marks.

STEP 6. Check crank shaft sensing bleed.**Q: Is the check result normal?**

- YES** : Go to Step 7 .
- NO** : Replace crank shaft sensing bleed.

STEP 7. Check camshaft position sensing cylinder.**Q: Is the check result normal?**

- YES** : Go to Step 8 .
- NO** : Replace camshaft position sensing cylinder.

STEP 8. Replace crank angle sensor.

- After replacing the crank angle sensor, re-check the trouble symptoms.

Q: Does trouble symptom persist?

- YES** : Go to Step 9 .
- NO** : Check end.

STEP 9. Replace camshaft position sensor.

- After replacing the camshaft position sensor, re-check the trouble symptoms.

Q: Does trouble symptom persist?

- YES** : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
- NO** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

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.13C-435).

Q: Does trouble symptom persist?

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

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.13C-21](#)).

NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13C-435](#)).

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.13C-126](#)).

(Refer to, Code No. P0202: No. 2 injector system [P.13C-131](#)).

(Refer to, Code No. P0203: No. 3 injector system [P.13C-136](#)).

(Refer to, Code No. P0204: No. 4 injector system [P.13C-141](#)).

STEP 3. Check ignition timing.

- Check ignition timing. (Refer to GROUP 11E – On-vehicle Service – Ignition Timing Check [P.11E-12](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check for offset ignition timing (Refer to Inspection Procedure 17 [P.13C-325](#)).

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

- Refer to Data List Reference Table [P.13C-402](#).
 - 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.13C-21](#)).

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

- Refer to Data List Reference Table [P.13C-402](#).
 - a. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 6 .

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

STEP 6. Check air intake from intake hose and inlet manifold.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Check for emission leakage from exhaust manifold.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Check throttle body (throttle valve portion) for contamination.**Q: Is the check result normal?****YES :** Go to Step 9 .**NO :** Clean throttle body (throttle valve portion)
(Refer to [P.13C-425](#)).**STEP 9. M.U.T.-II/III data list**

- Refer to Data list reference table [P.13C-402](#).
 - a. Item 11: Cylinder 1, 4 oxygen sensor (front)
 - b. Item 39: Cylinder 2, 3 oxygen sensor (front)
 - c. Item 59: Cylinder 1, 4 oxygen sensor (rear)
 - d. Item 69: Cylinder 2, 3 oxygen sensor (rear)

Q: Is the check result 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.13C-21](#)).**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.17-65](#)).

Q: Is the check result normal?**YES :** Go to Step 11 .**NO :** Replace purge control solenoid valve.**STEP 11. Check EGR valve (stepper motor) itself.**

- Check EGR valve (stepper motor) itself [Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve (Stepper Motor) Check <4G69>[P.17-72](#)].

Q: Is the check result normal?**YES :** Go to Step 12 .**NO :** Replace EGR valve (stepper motor).**STEP 12. Measure fuel pressure.**

- Measure fuel pressure (Refer to [P.13C-425](#)).

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.17-60](#)).

Q: Is the check result normal?**YES :** Go to Step 14 .**NO :** Replace positive crankcase ventilation valve.**STEP 14. Check spark plug.**

- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?**YES :** Go to Step 15 .**NO :** Replace spark plug.**STEP 15. Check ignition coil itself.**

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service – Ignition Coil Check <4G69>[P.16-39](#)).

Q: Is the check result normal?**YES :** Go to Step 16 .**NO :** Replace ignition coil.**STEP 16. Check compression pressure.**

- Check compression pressure (Refer to GROUP 11E – On-vehicle Service – Compression Pressure Check [P.11E-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.13C-435](#)).

Q: Does trouble symptom persist?**YES :** Go to Step 18 .**NO :** Replace injector.**STEP 18. Replace catalytic converter.**

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

Q: Does trouble symptom persist?**YES :** Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.**NO :** Check end.

Inspection Procedure 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.

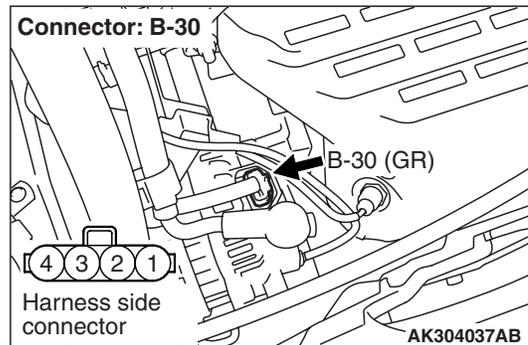
- Measure battery voltage during cranking.
OK: 8 V or more

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-7](#)).

STEP 2. Connector check: B-30 alternator connector

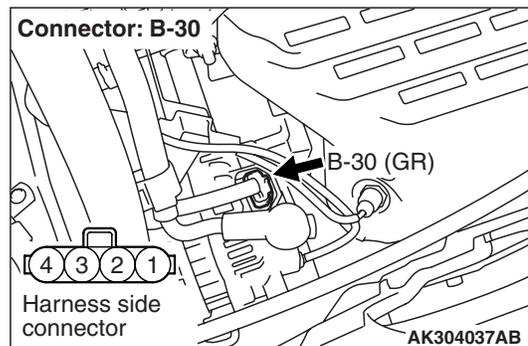


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Perform voltage measurement at B-30 alternator connector.



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

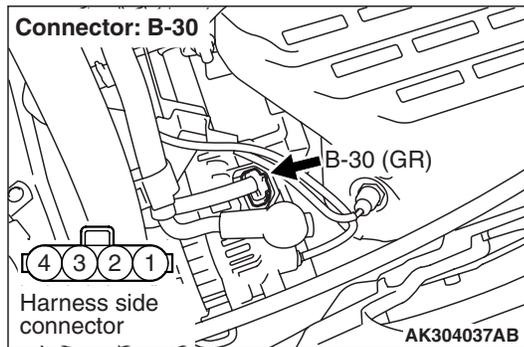
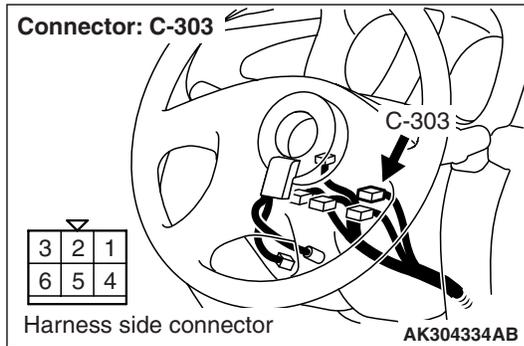
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: C-303 ignition switch connector



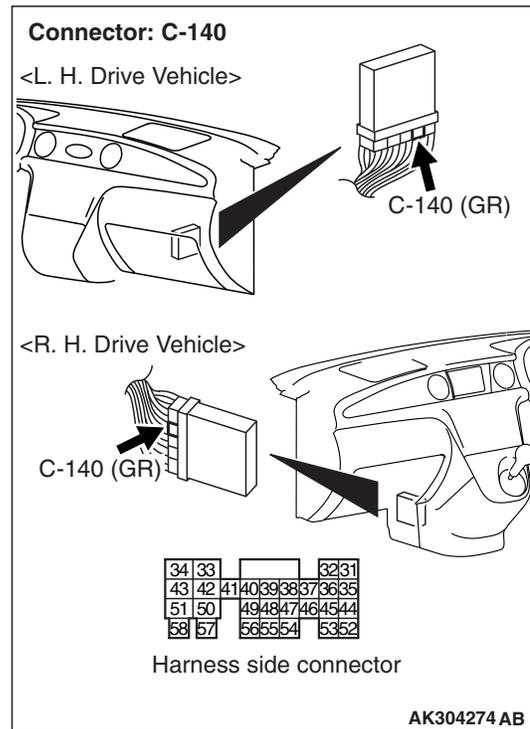
Q: Is the check result normal?

YES : Check intermediate connectors B-19, C-04, C-05, C-105, C-203 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-30 (terminal No. 3) alternator connector and C-303 (terminal No. 2) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair.

STEP 5. Connector check: C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

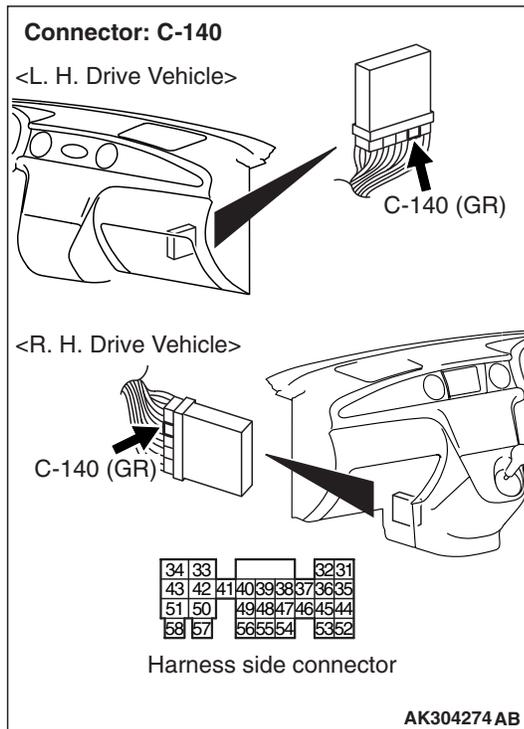


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Perform voltage measurement at C-140 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.

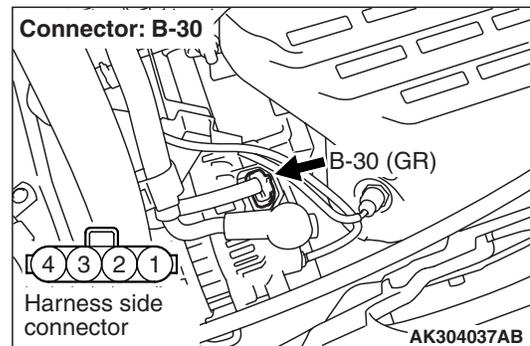
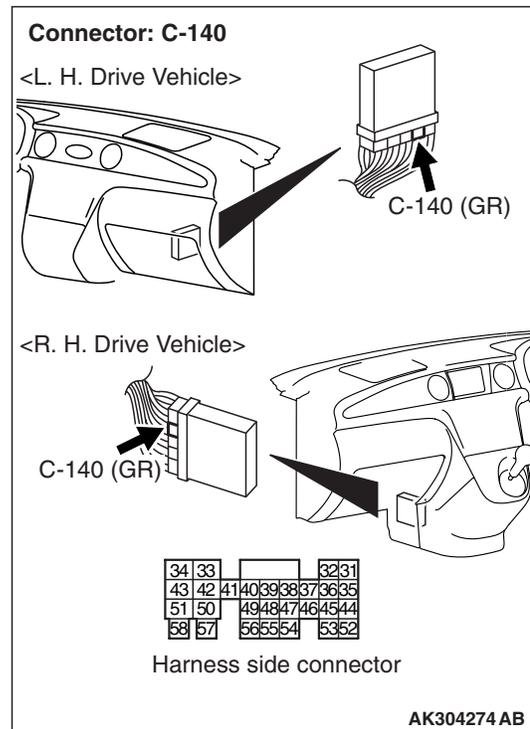
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Check harness between C-140 (terminal No. 45) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and B-30 (terminal No. 1) alternator connector.



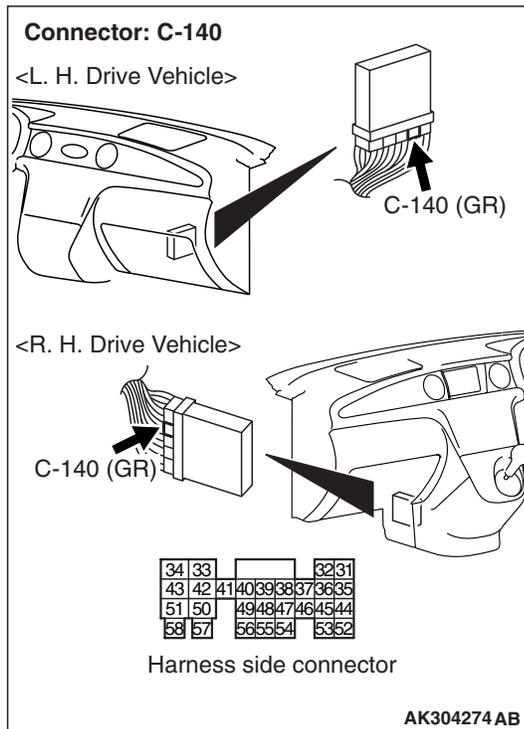
- Check output line for open/short circuit.

Q: Is the check result normal?

YES : replace alternator.

NO : Repair.

STEP 8. Perform voltage measurement at C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral <M/T> or P range <A/T>
- Radiator fan: Inactive
- Voltage between terminal No. 45 and earth.

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

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace alternator.

STEP 9. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

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

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.13C-21](#)).

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.14-17](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace or add engine coolant.

STEP 3. M.U.T.-II/III actuator test

- Item 21: Fan controller

OK: Fan motor rotating

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check fan control relay system (Refer to Inspection Procedure 26 [P.13C-354](#)).

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.13C-47](#)).

STEP 5. Check thermostat.

- Check thermostat (Refer to GROUP 14 – Thermostat – Thermostat Inspection [P.14-24](#)).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace thermostat.

STEP 6. Check water pump.

- Check water pump.

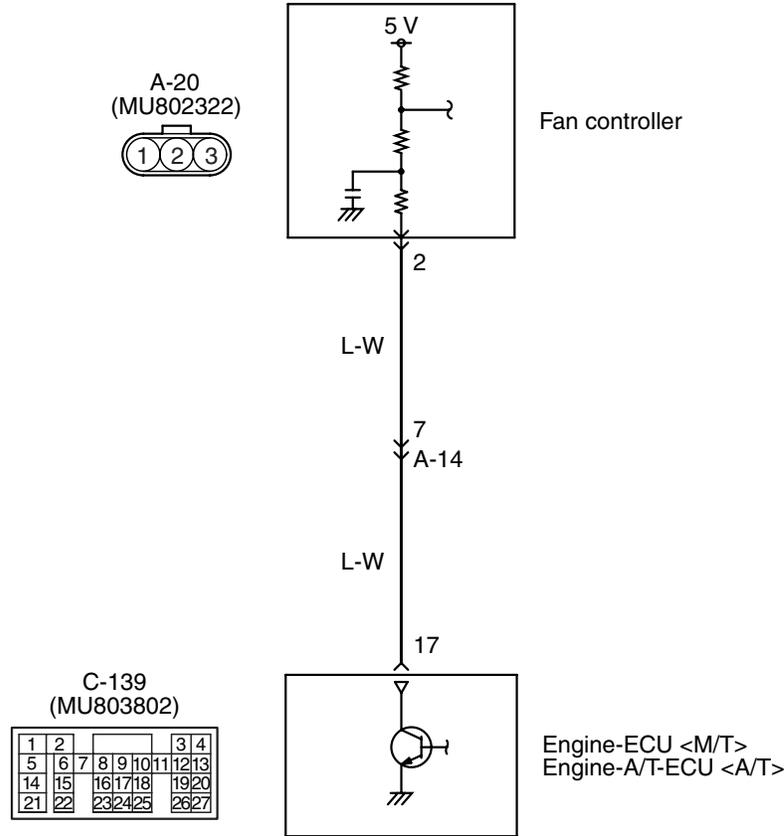
Q: Is the check result normal?

YES : Replace radiator.

NO : Replace water pump.

Inspection Procedure 22: Abnormal Rotation of Fan Motor

Fan controller (Radiator fan, A/C condenser 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

AK401090 AC

OPERATION

- The control (duty) signal is inputted to the fan controller (terminal No. 2) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 17).

FUNCTION

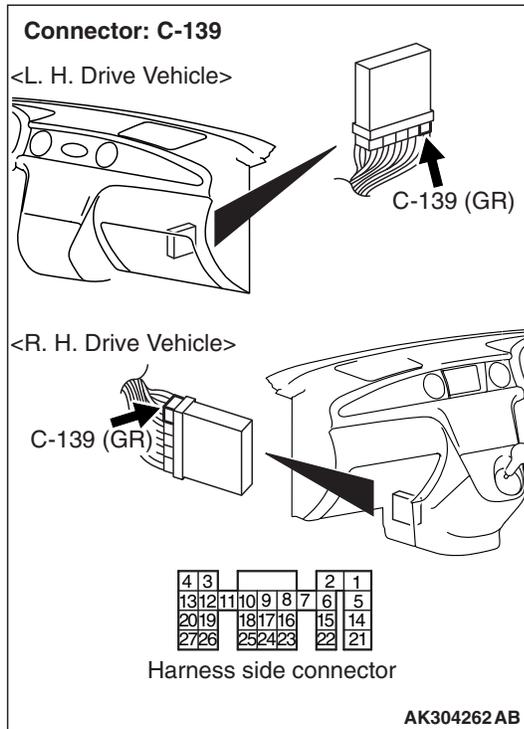
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> inputs a duty signal suitable for the engine coolant temperature, vehicle speed and A/C switch position to the fan controller. In response to the signal, the fan controller controls the rotating speeds of the radiator fan and A/C condenser fan (The fan speed becomes higher as the average voltage of the terminal comes nearer to 5V).

PROBABLE CAUSE

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

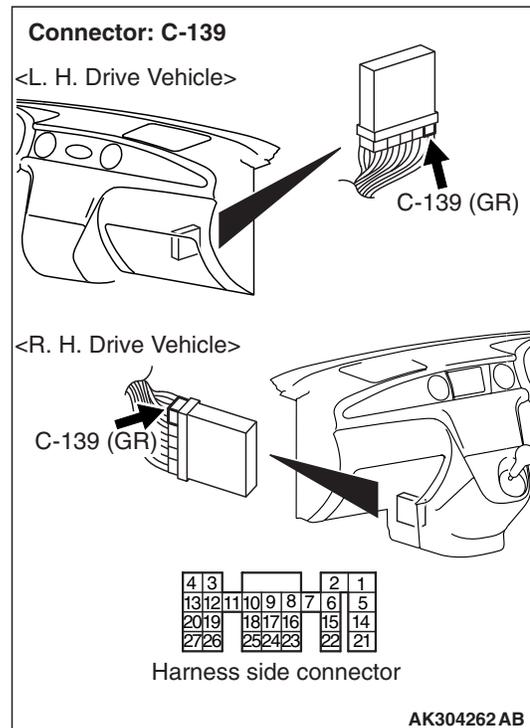
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-139 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.

STEP 2. Check at C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Short-circuit terminal No. 17 to earth.

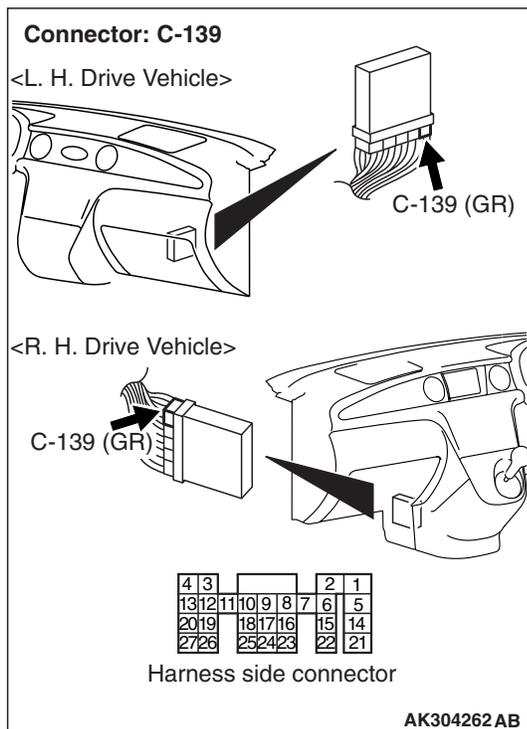
OK: Fan motor stops rotating.

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

STEP 3. Check the trouble symptoms.

- Q: Does trouble symptom persist?**
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 4. Perform voltage measurement at C-139 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.

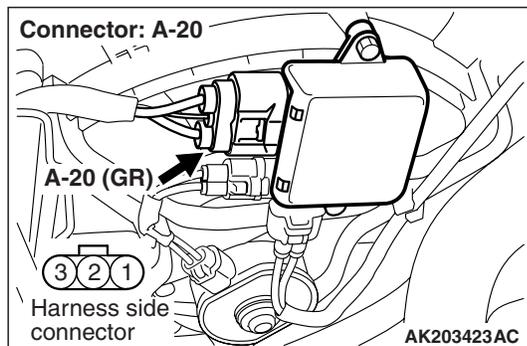
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Replace fan controller.

NO : Go to Step 5 .

STEP 5. Connector check: A-20 fan controller connector

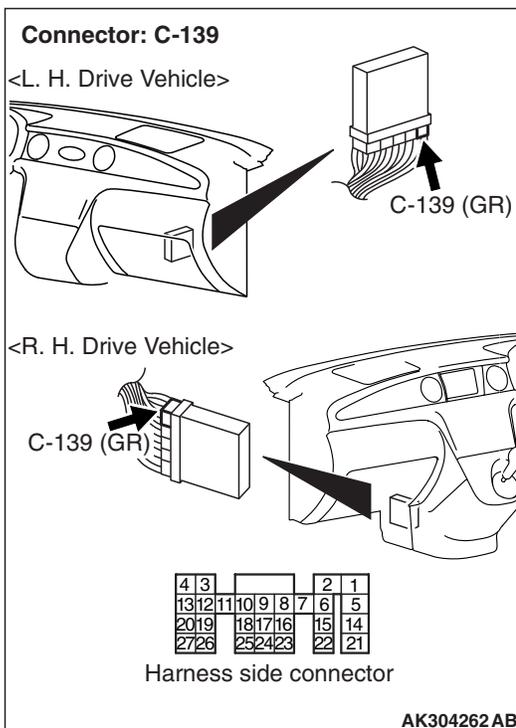
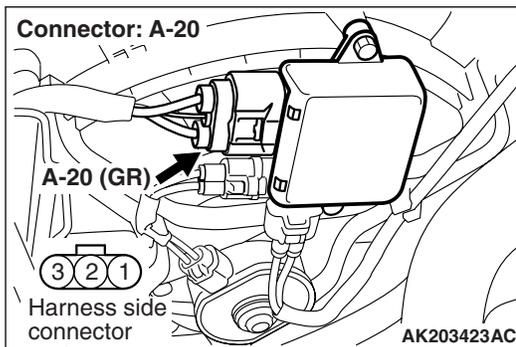


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between A-20 (terminal No. 2) fan controller connector and C-139 (terminal No. 17) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check output line for open circuit.

Q: Is the check result normal?

YES : Replace fan controller.

NO : Repair.

Inspection Procedure 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.13C-21](#)).

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.13C-361](#)).

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.13C-366](#)).

STEP 5. Check charged amount of A/C refrigerant.

- Check charged amount of A/C refrigerant (Refer to GROUP 55A – On-vehicle Service – Sight Glass Refrigerant Level Test [P.55A-49](#)).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Adjust charged amount of A/C refrigerant.

STEP 6. M.U.T.-II/III actuator test

- Item 21: Fan controller

OK: Fan motor rotates.

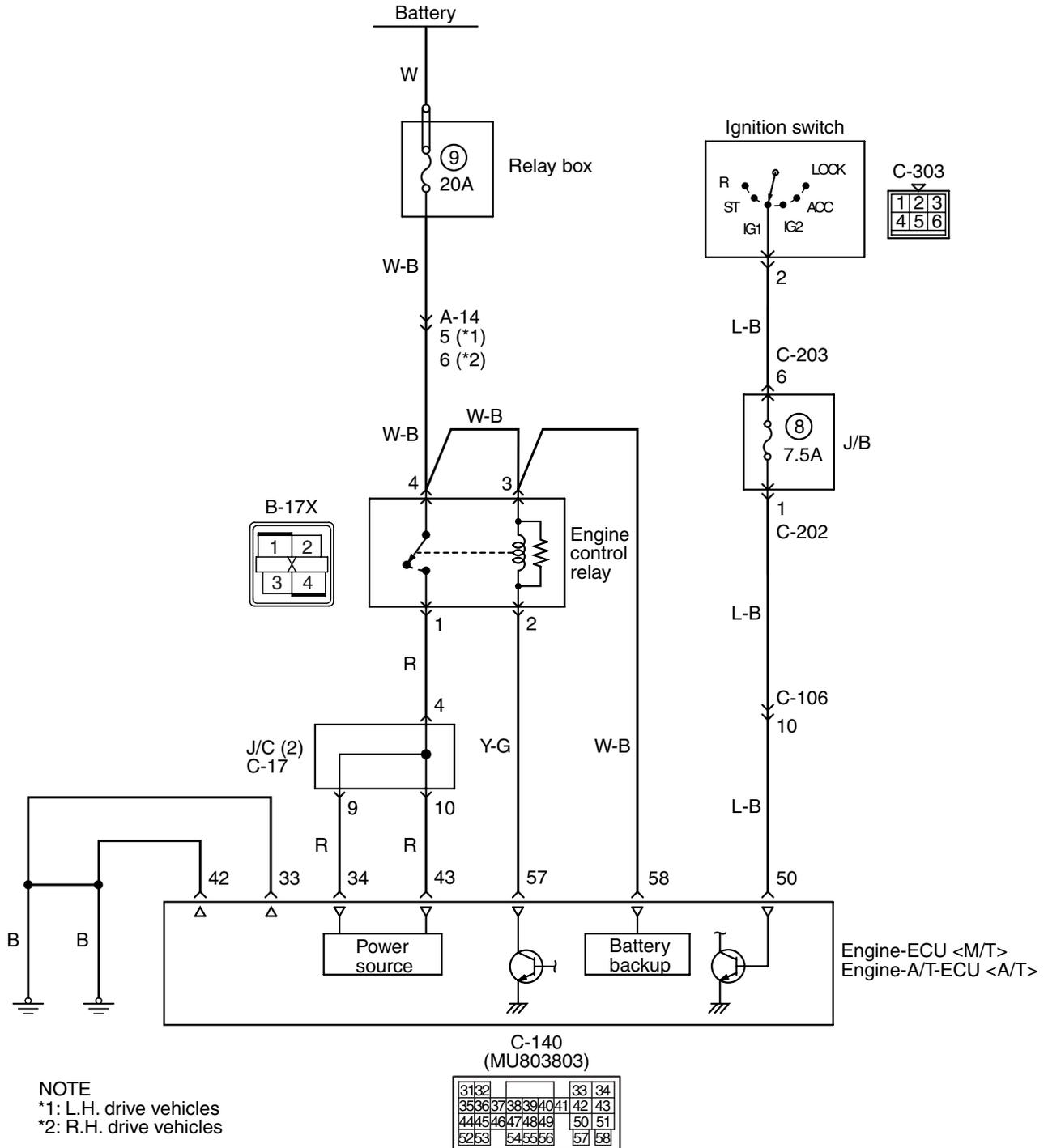
Q: Is the check result normal?

YES : Check A/C load signal system (Refer to Inspection Procedure 29 [P.13C-373](#)).

NO : Check fan control relay system (Refer to Inspection Procedure 26 [P.13C-354](#)).

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



NOTE
*1: L.H. drive vehicles
*2: R.H. drive vehicles

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

OPERATION

- The battery voltage is applied to the engine control relay (terminal No. 3 and 4).
- The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 57) makes the power transistor in the unit be in "ON" position and makes currents go on the engine control relay coil, and that makes the relay be in "ON" position.
- When the engine control relay is in "ON" position, the battery voltage is supplied to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 34 and No. 43), the sensor and the actuator from the engine control relay (terminal No. 1).

FUNCTION

- When the ignition switch ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> places the engine control relay in the ON position. Accordingly, the battery voltage is supplied to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, sensor and actuator.

PROBABLE CAUSE

- Failed engine control relay
- 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.**

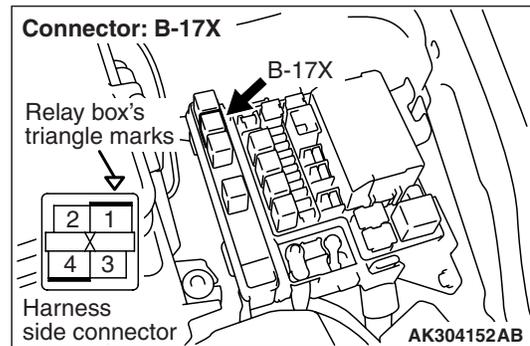
- Measure battery voltage during cranking.

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-7).

STEP 2. Connector check: B-17X engine control relay connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair.

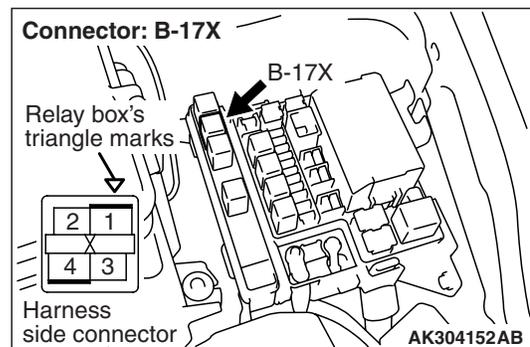
STEP 3. Check engine control relay.

- Check engine control relay (Refer to P.13C-429).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace engine control relay.

STEP 4. Perform voltage measurement at B-17X engine control relay connector.

- Remove relay, and measure at relay box side.
- Voltage between terminal No. 3 and earth, also between terminal No. 4 and earth.

OK: System voltage

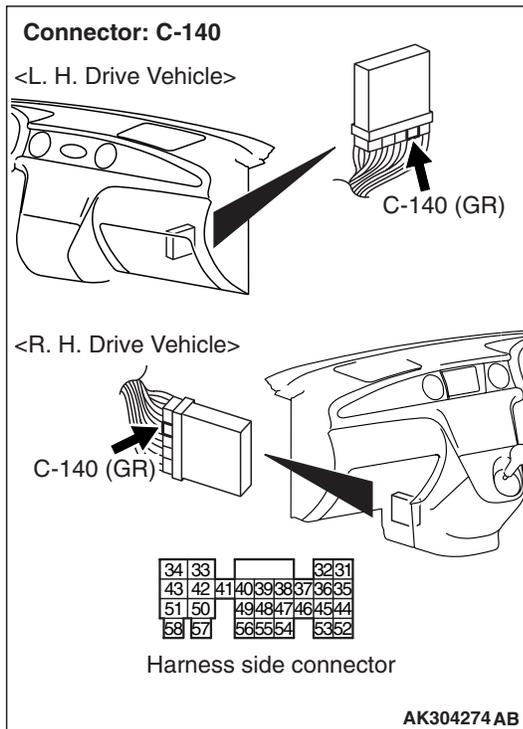
Q: Is the check result normal?

YES : Go to Step 5 .

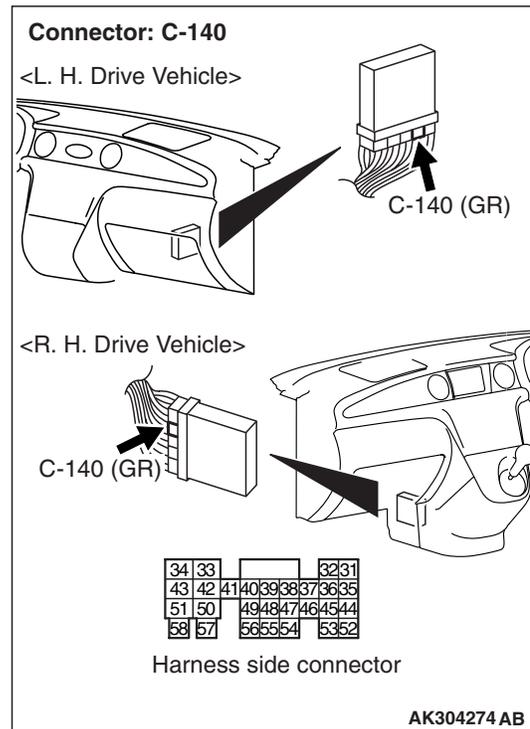
NO : Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between B-17X (terminal No. 3 and terminal No. 4) engine control relay connector and battery.

- Check power supply line for open/short circuit.

STEP 5. Perform voltage measurement at C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 6. Connector check: C-140 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-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

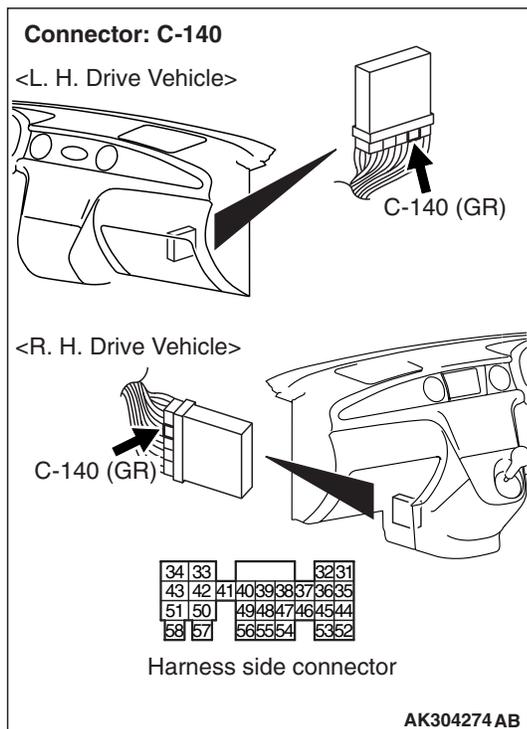
NO : Go to Step 6 .

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Perform voltage measurement at C-140 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.

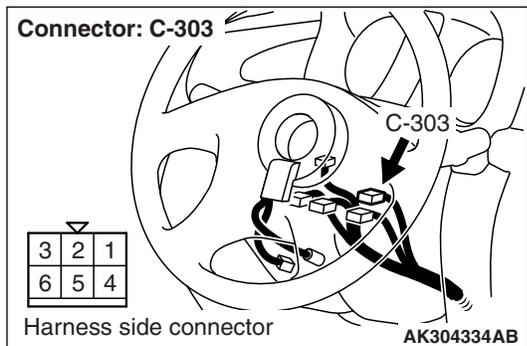
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 .

STEP 8. Connector check: C-303 ignition switch connector

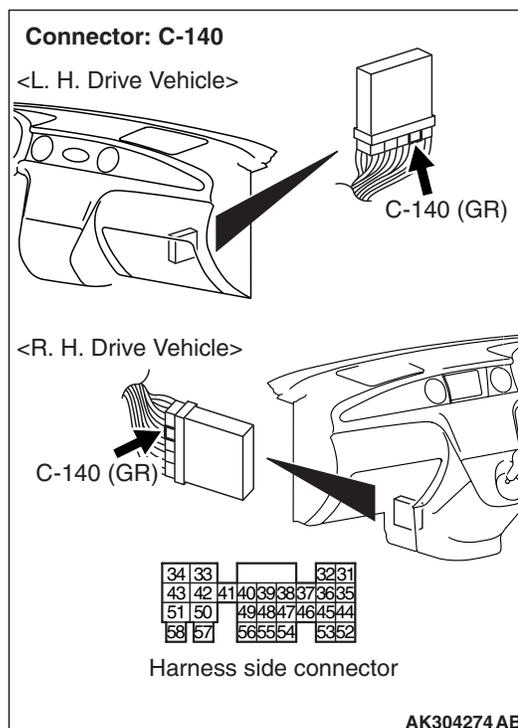
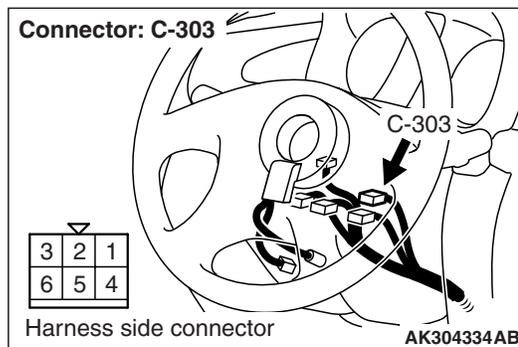


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Check ignition switch.



- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Ignition Switch – Inspection P.54A-30).

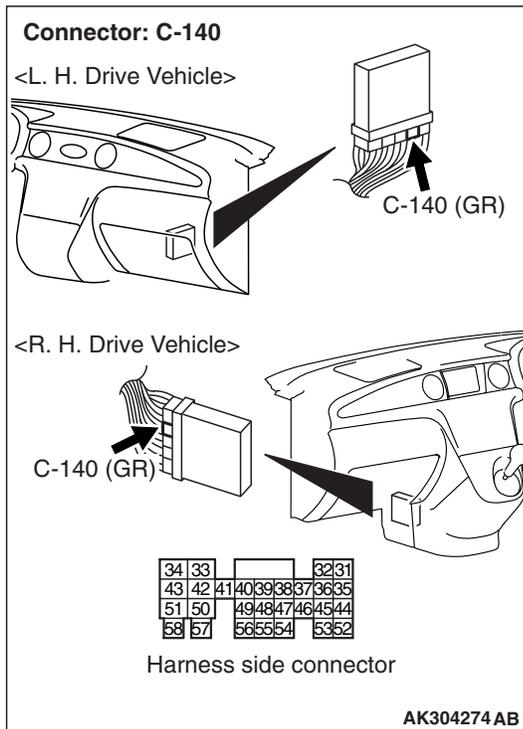
Q: Is the check result normal?

YES : Check intermediate connector C-106, C-202 and C-203, and repair if necessary. If intermediate connector is normal, check and repair harness between C-303 (terminal No. 2) ignition switch connector and C-140 (terminal No. 50) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

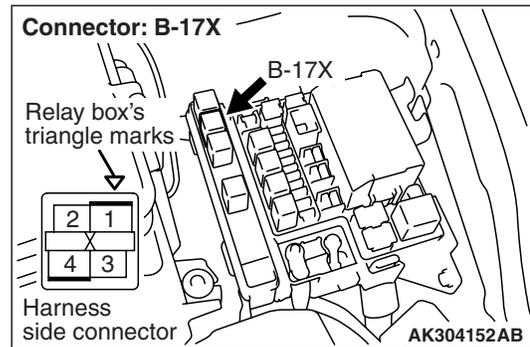
- Check output line for open/short circuit and damage.

NO : Replace ignition switch.

STEP 10. Perform voltage measurement at C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 11. Check harness between B-17X (terminal No. 3 and No. 4) engine control relay connector and battery.



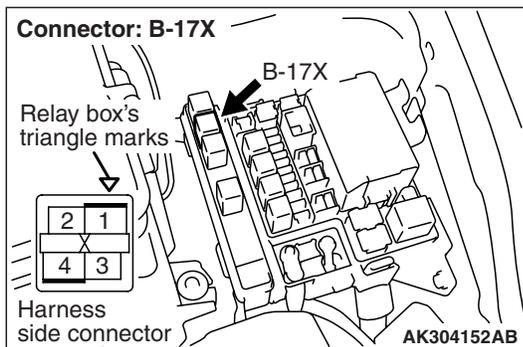
NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.



- 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

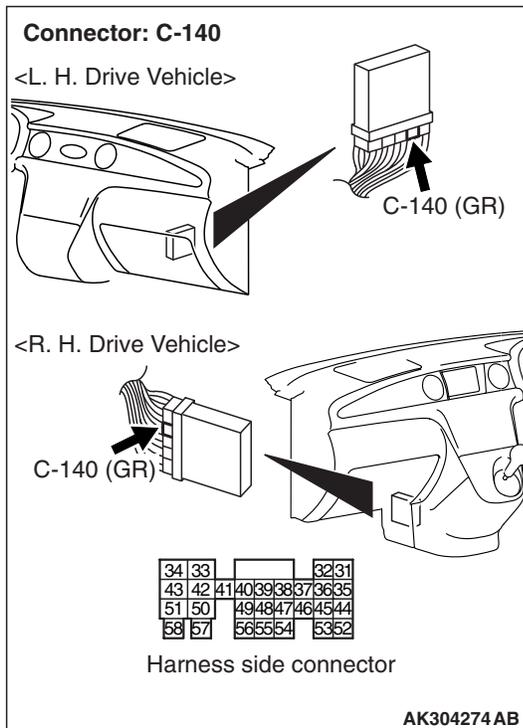
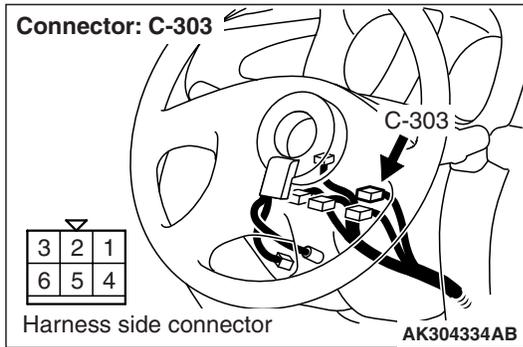
Q: Is the check result normal?

YES : Go to Step 11 .

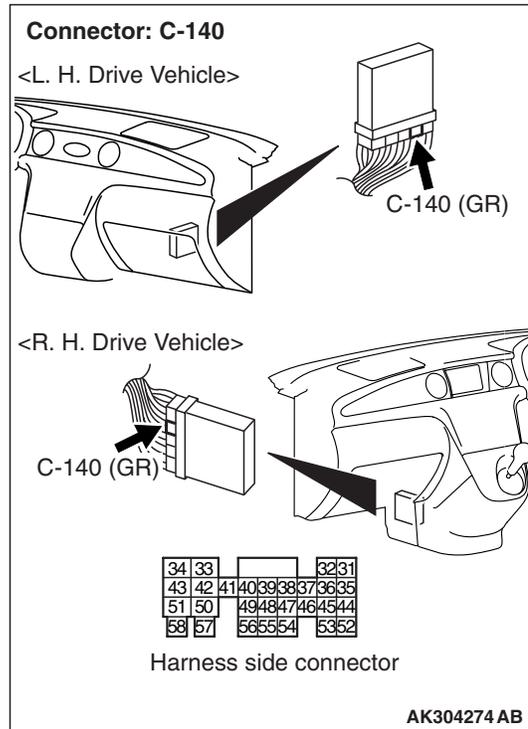
NO : Check and repair harness between B-17X (terminal No. 2) engine control relay connector and C-140 (terminal No. 57) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

STEP 12. Check harness between C-303 (terminal No. 2) ignition switch connector and C-140 (terminal No. 50) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 13. Check harness between C-140 (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 engine-ECU <M/T> or engine-A/T-ECU <A/T>

NO : Repair.

NOTE: Before checking harness, check intermediate connectors C-106, C-202 and C-203 and repair if necessary.

- Check output line for damage.

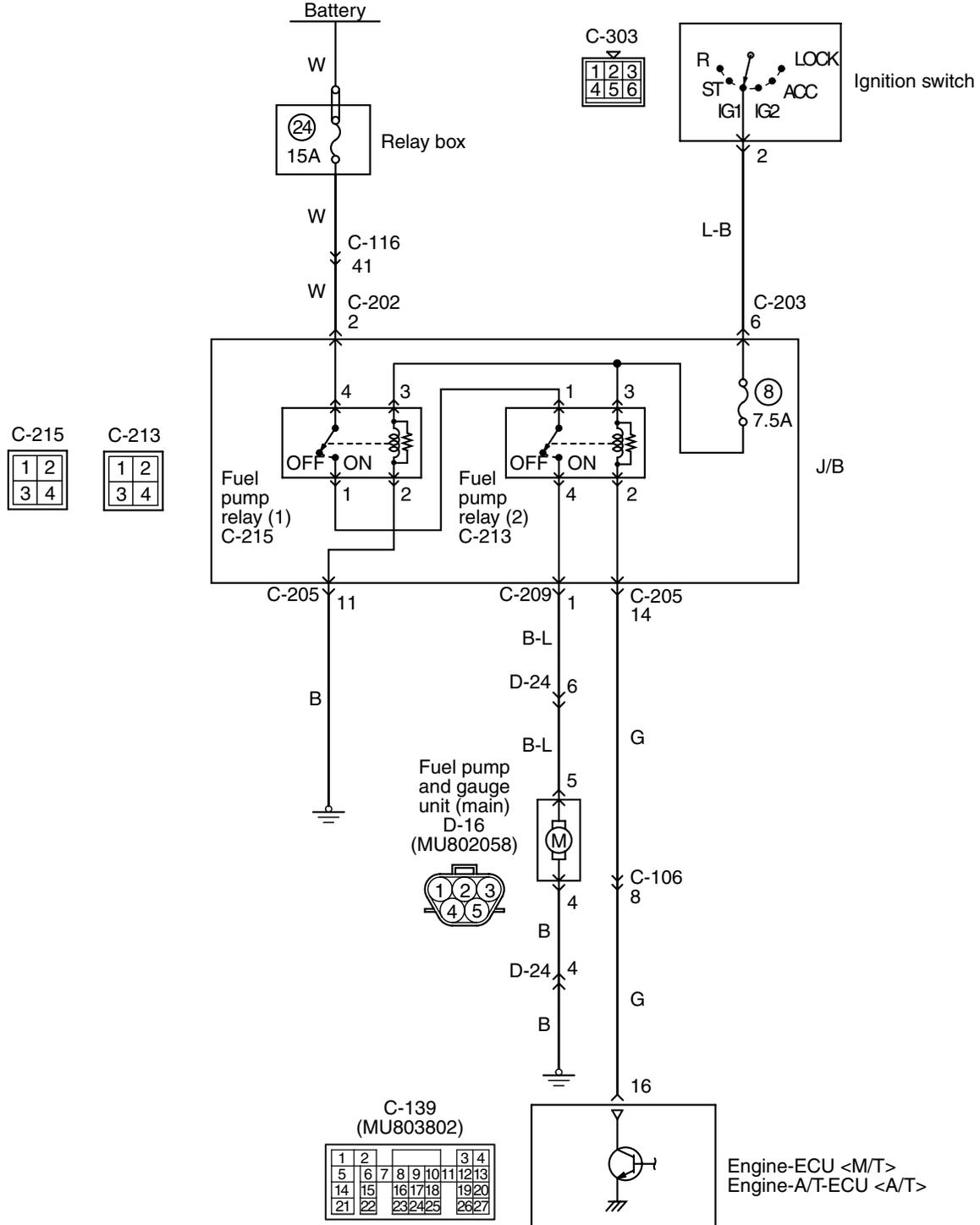
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

Inspection Procedure 25: Fuel Pump System

Fuel pump and gauge unit (main) circuit



OPERATION

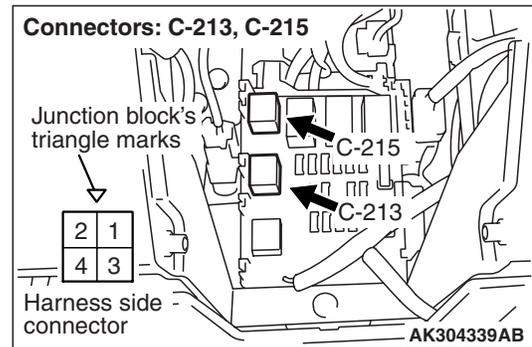
- The battery voltage is applied to the fuel pump relay (1) (terminal No. 3) from the ignition switch and is earthed to the vehicle body from the fuel pump relay (1) (terminal No. 2).
- The battery voltage is applied to the fuel pump relay (1) (terminal No. 4) and to the fuel pump relay (2) (terminal No. 1) from the fuel pump relay (1) (terminal No. 1).
- The battery voltage is applied to the fuel pump relay (2) (terminal No. 3) from the ignition switch. The engine-ECU <M/T> or engine-A/T-ECU <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. 4).

FUNCTION

- When the ignition switch ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> places the fuel pump relay in the "ON" position. Accordingly, the battery voltage is supplied to the fuel pump.

PROBABLE CAUSE

- Failed fuel pump relay
- Failed fuel pump
- Open/short circuit in fuel pump drive circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

DIAGNOSIS PROCEDURE**STEP 1. Connector check: C-215 fuel pump relay (1) connector and C-213 fuel pump relay (2) connector****Q: Is the check result normal?**

- YES** : Go to Step 2 .
- NO** : Repair.

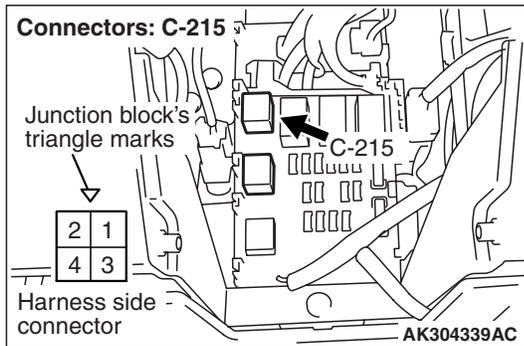
STEP 2. Check fuel pump relay.

- Fuel pump relay, continuity check (Refer to P.13C-430).

Q: Is the check result normal?

- YES** : Go to Step 3 .
- NO** : Replace fuel pump relay.

STEP 3. Perform resistance measurement at C-215 fuel pump relay (1) connector.



- Remove relay, and measure at junction block side.
- Resistance between terminal No. 2 and earth.
OK: Continuity (2 Ω or less)

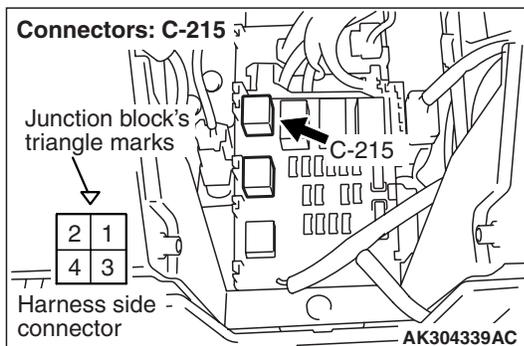
Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check intermediate connector C-205, and repair if necessary. If intermediate connector is normal, check and repair harness between C-215 (terminal No. 2) fuel pump relay (1) connector and body earth.

- Check earthing line for open circuit and damage.

STEP 4. Perform voltage measurement at C-215 fuel pump relay (1) connector.



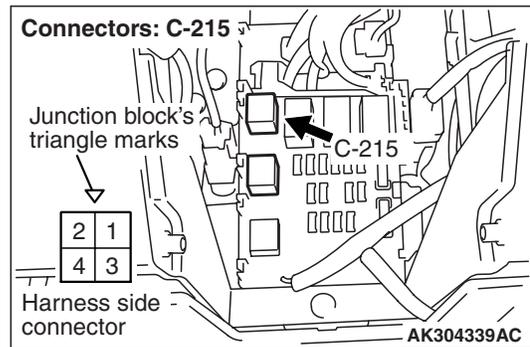
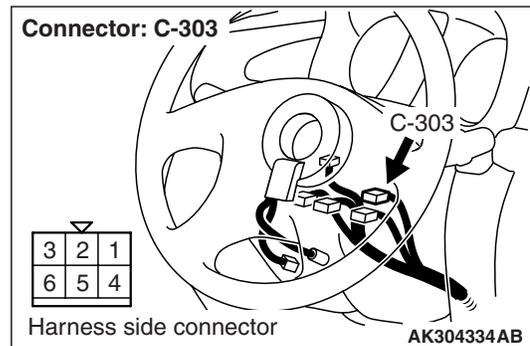
- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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

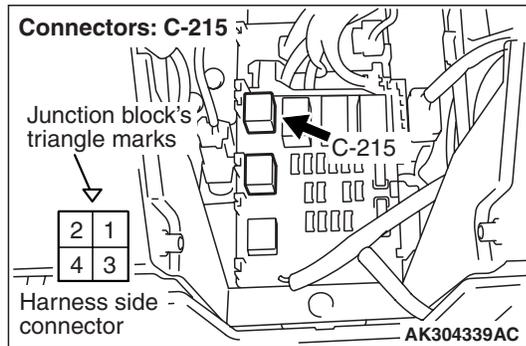


Q: Is the check result normal?

YES : Check intermediate connector C-203, and repair if necessary. If intermediate connector is normal, check and repair harness between C-215 (terminal No. 3) fuel pump relay (1) connector and C-303 (terminal No. 2) ignition switch connector.

- Check power supply line for open circuit and damage.

NO : Repair.

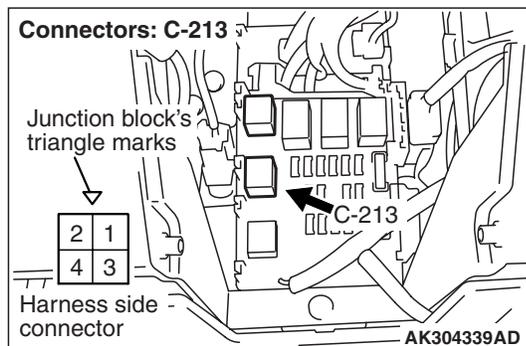
STEP 6. Perform voltage measurement at C-215 fuel pump relay (1) connector.

- Remove relay, and measure at junction block side.
- Voltage between terminal No. 4 and earth.

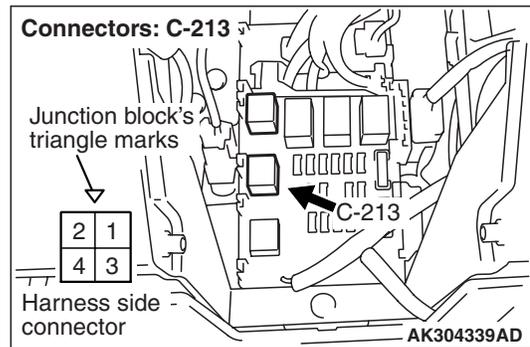
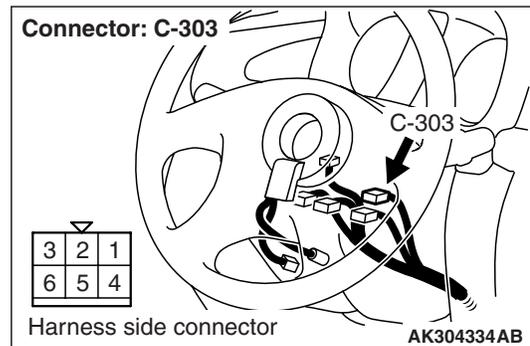
OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 7 .

NO : Check intermediate connectors C-116 and C-202, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-215 (terminal No. 4) fuel pump relay (1) connector and battery.

- Check power supply line for open/short circuit.

STEP 7. Perform voltage measurement at C-213 fuel pump relay (2) connector.

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

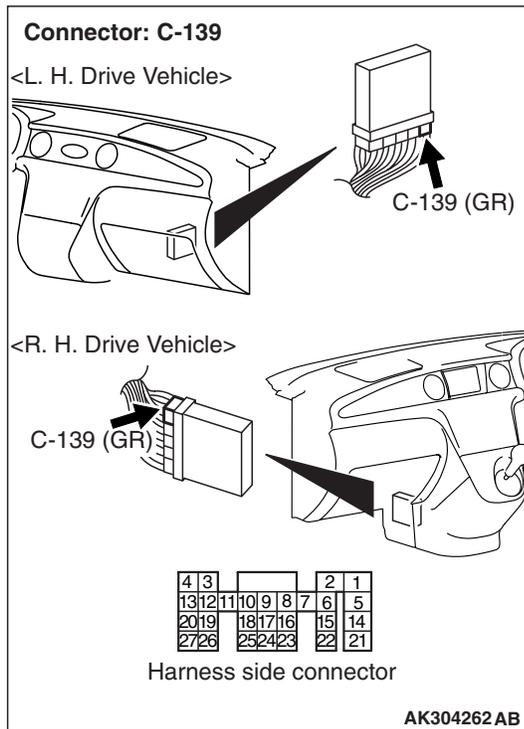
OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 9 .**NO :** Go to Step 8 .**STEP 8. Connector check: C-303 ignition switch connector****Q: Is the check result normal?**

YES : Check intermediate connector C-203, and repair if necessary. If intermediate connector is normal, check and repair harness between C-303 (terminal No. 2) ignition switch connector and C-213 (terminal No. 3) fuel pump relay (2) connector.

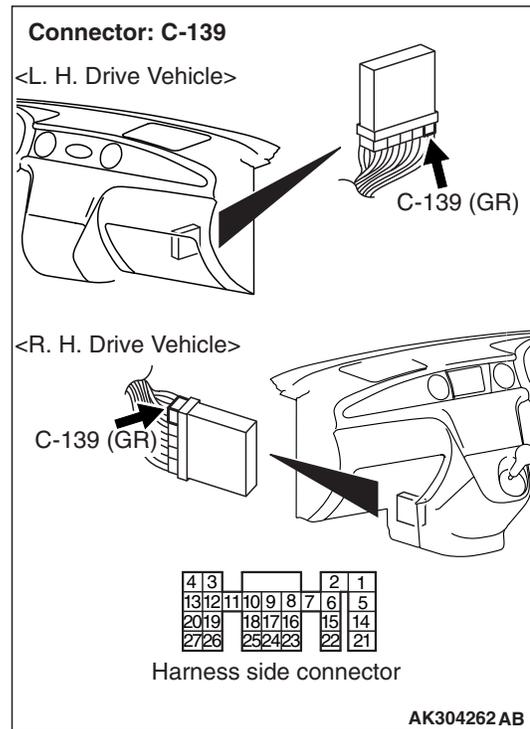
- Check power supply line for open circuit.

NO : Repair.

STEP 9. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



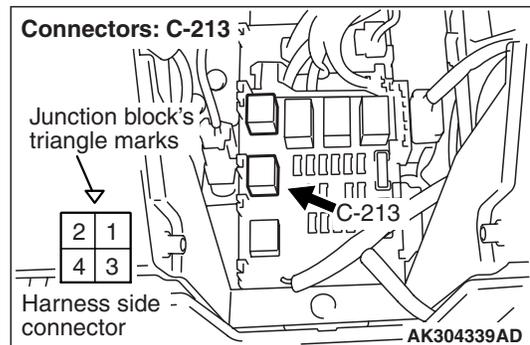
STEP 10. Perform voltage measurement at C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 16 and earth.

OK: System voltage

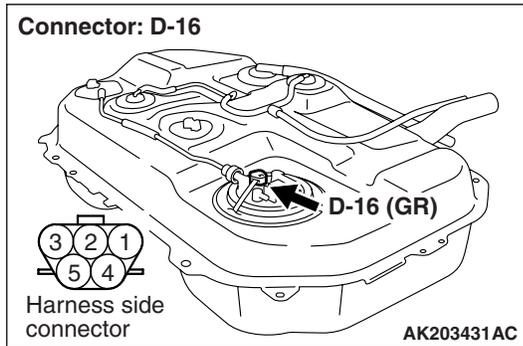
Q: Is the check result normal?

YES : Go to Step 11 .

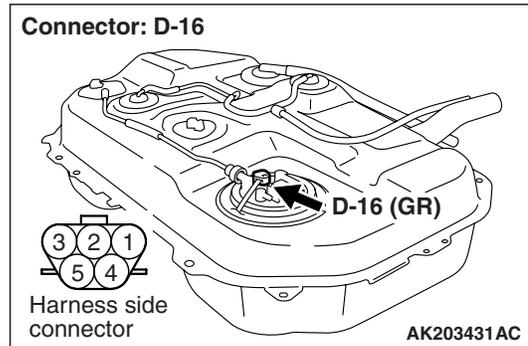
NO : Check intermediate connectors C-106 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-213 (terminal No. 2) fuel pump relay (2) connector and C-139 (terminal No. 16) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for open/short circuit.

STEP 11. Connector check: D-16 fuel pump connector



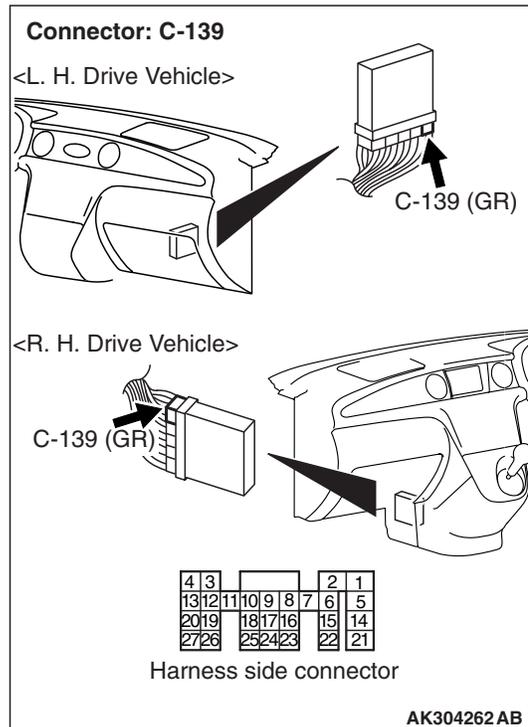
STEP 12. Perform voltage measurement at D-16 fuel pump connector.



Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Using a jumper wire, connect C-139 (terminal No. 16) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector and earth.
- Voltage between terminal No. 5 and earth.

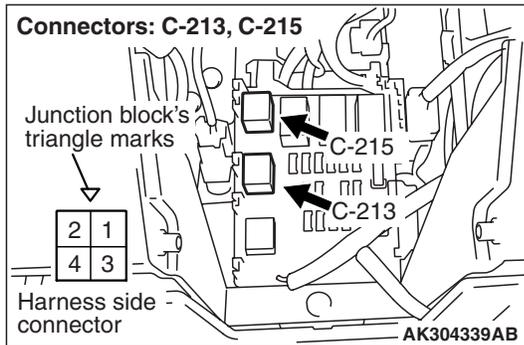
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Go to Step 13 .

STEP 13. Check harness between C-215 (terminal No. 1) fuel pump relay (1) connector and C-213 (terminal No. 1) fuel pump relay (2) connector.



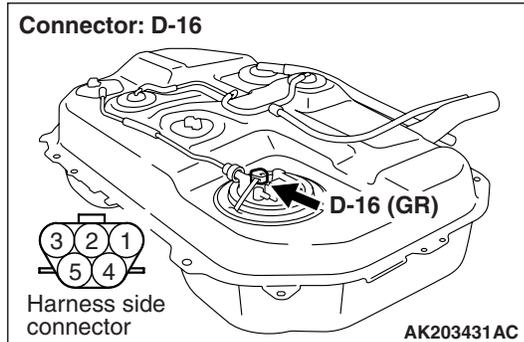
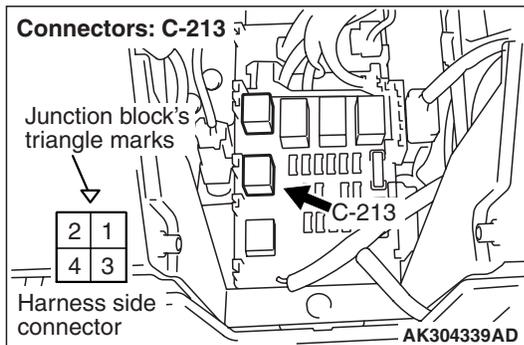
- Check power supply line for open/short circuit.

Q: Is the check result normal?

YES : Go to Step 14

NO : Repair.

STEP 14. Check harness between C-213 (terminal No. 4) fuel pump relay (2) connector and D-16 (terminal No. 5) fuel pump connector.



NOTE: Before checking harness, check intermediate connectors D-209 and D-24, and repair if necessary.

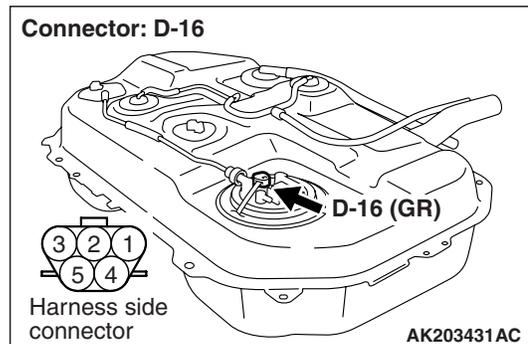
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

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

NO : Repair.

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: Continuity (2 Ω or less)

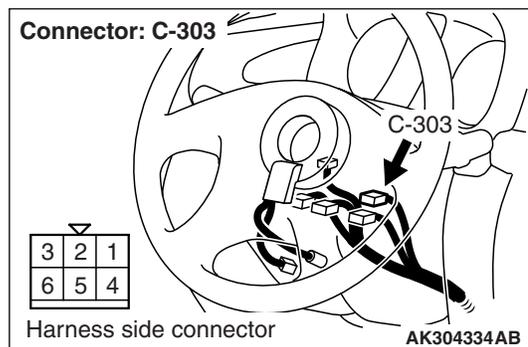
Q: Is the check result normal?

YES : Go to Step 16 .

NO : Check intermediate connector D-24, and repair if necessary. If intermediate connector is normal, check and repair harness between D-16 (terminal No. 4) fuel pump connector and body earth.

- Check earthing line for open circuit and damage.

STEP 16. Connector check: C-303 ignition switch connector

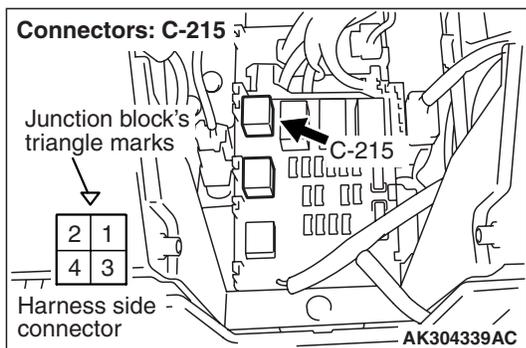
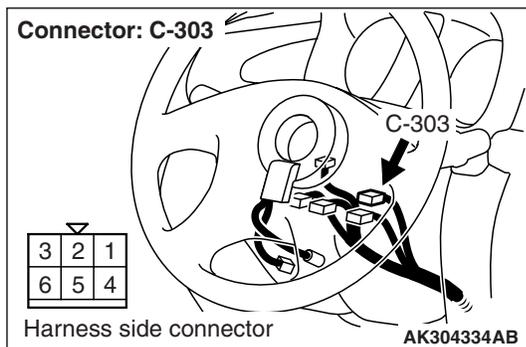


Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Check harness between C-303 (terminal No. 2) ignition switch connector and C-215 (terminal No. 3) fuel pump relay (1) connector.



NOTE: Before checking harness, check intermediate connector C-203, and repair if necessary.

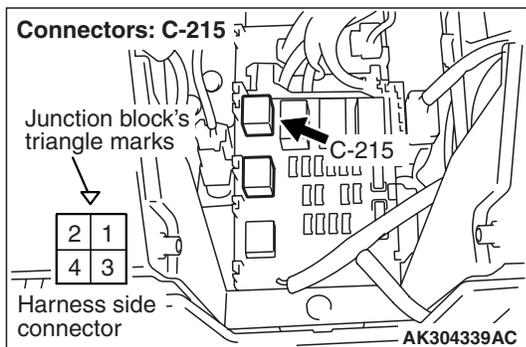
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair.

STEP 18. Check harness between battery and C-215 (terminal No. 4) fuel pump relay (1) connector.



NOTE: Before checking harness, check intermediate connectors C-116 and C-202, and repair if necessary.

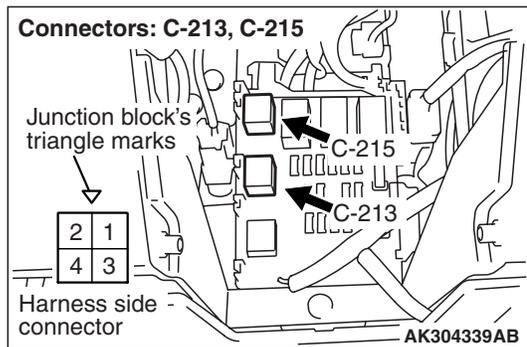
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Repair.

STEP 19. Check harness between C-215 (terminal No. 1) fuel pump relay (1) connector and C-213 (terminal No. 1) fuel pump relay (2) connector.



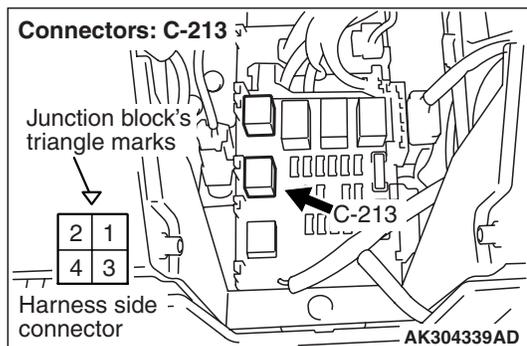
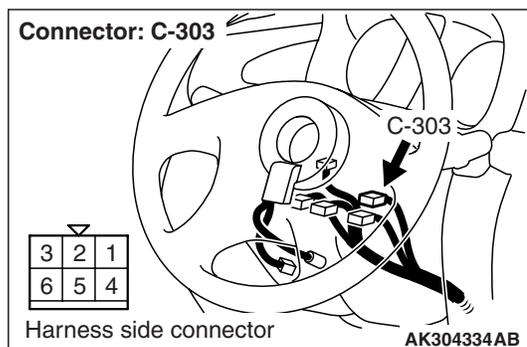
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair.

STEP 20. Check harness between C-303 (terminal No. 2) ignition switch connector and C-213 (terminal No. 3) fuel pump relay (2) connector.



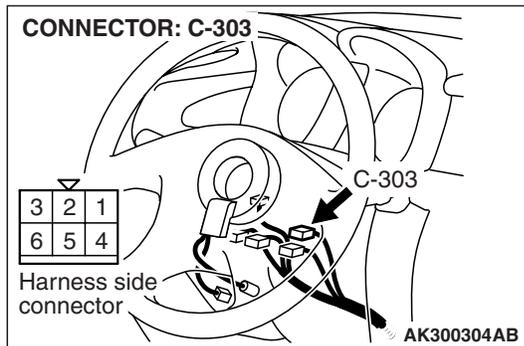
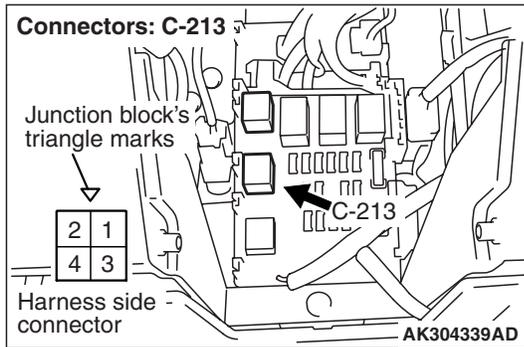
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 21 .

NO : Repair.

STEP 21. Check harness between C-213 (terminal No. 4) fuel pump relay (2) connector and D-16 (terminal No. 5) fuel pump connector.



NOTE: Before checking harness, check intermediate connectors D-24 and C-209, and repair if necessary.

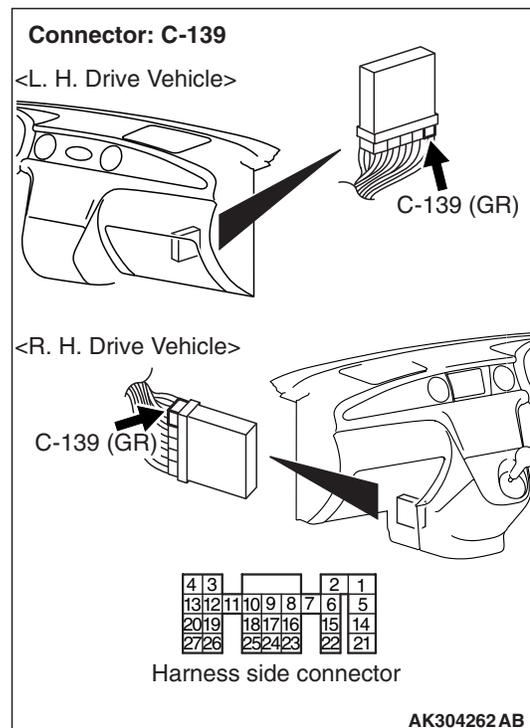
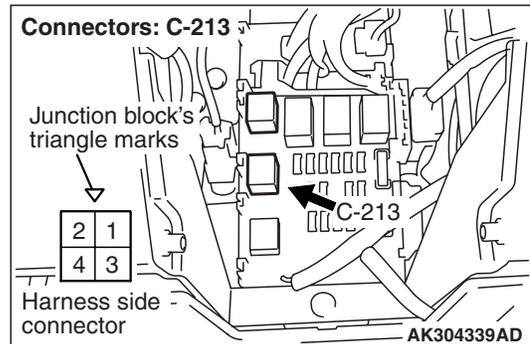
- Check earthing line for damage.

Q: Is the check result normal?

YES : Replace fuel pump.

NO : Repair.

STEP 22. Check harness between C-213 (terminal No. 2) fuel pump relay (2) connector and C-139 (terminal No. 16) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connectors C-106 and C-205, and repair if necessary.

- Check output line for damage.

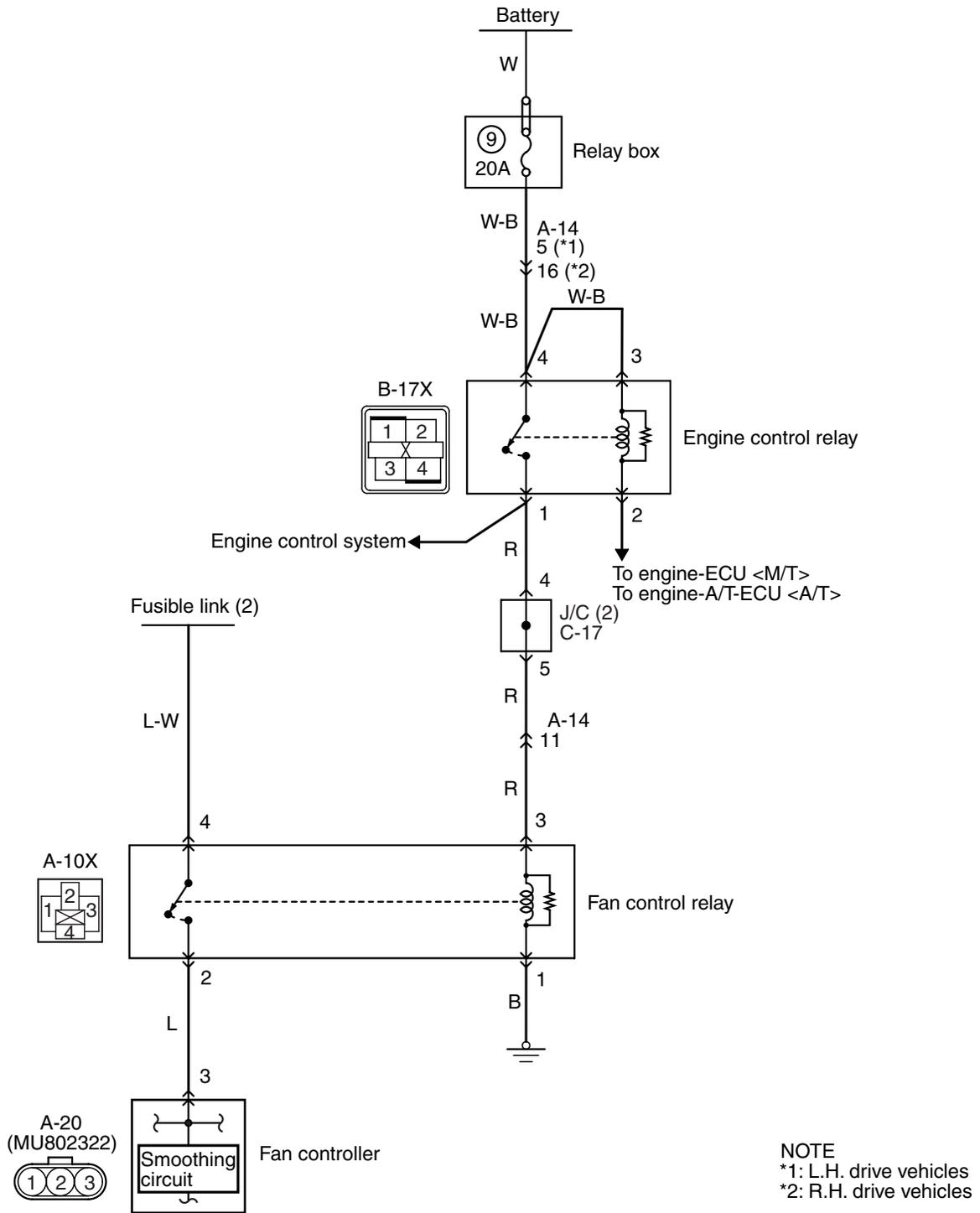
Q: Is the check result normal?

YES : Replace fuel pump

NO : Repair.

Inspection Procedure 26: Fan Control Relay System

Fan control relay Circuit



NOTE
*1: L.H. drive vehicles
*2: R.H. drive vehicles

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

OPERATION

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

FUNCTION

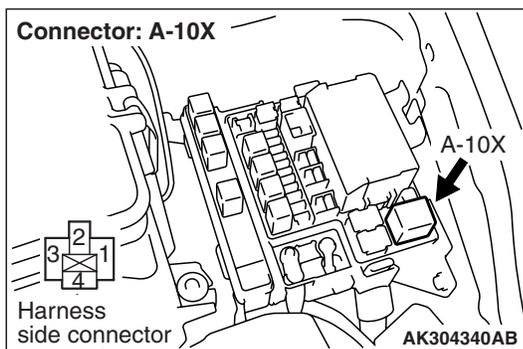
- When the engine control relay is in "ON" position, the fan control relay is also simultaneously placed in "ON" position. Accordingly, the battery voltage is supplied to the fan controller.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-10X fan control relay connector



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

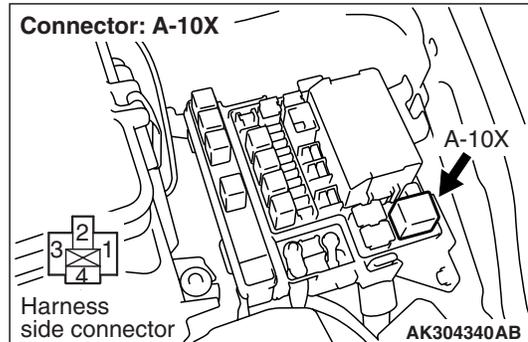
STEP 2. Check fan control relay.

- Check fan control relay (Refer to GROUP 14 – On-vehicle Service – Fan Control Relay Continuity Check P.14-19).

Q: Is the check result normal?

- YES :** Go to Step 3 .
NO : Replace fan control relay.

STEP 3. Perform resistance measurement at A-10X fan control relay connector.



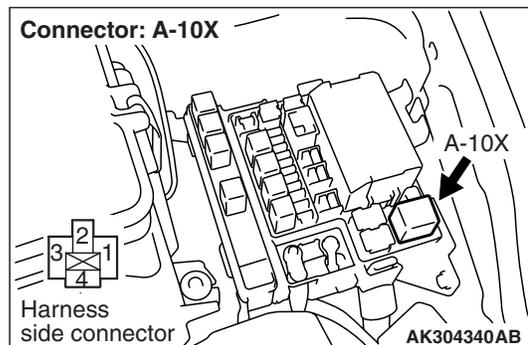
- Remove relay and measure at relay box side.
- Resistance between terminal No. 1 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

- YES :** Go to Step 4 .
NO : Check and repair harness between A-10X (terminal No. 1) fan control relay connector and body earth.
- Check earthing line for open circuit and damage.

STEP 4. Perform voltage measurement at A-10X fan control relay connector.



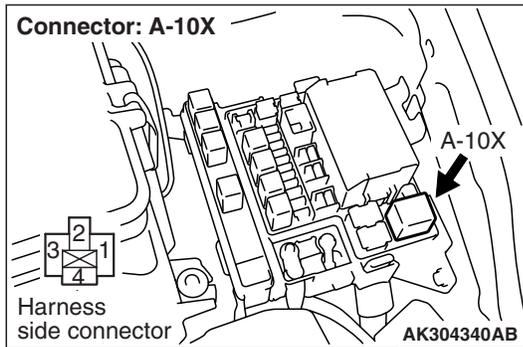
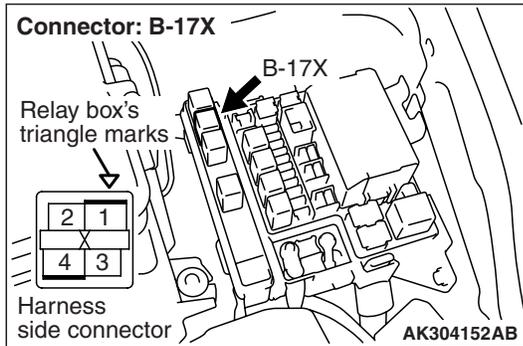
- Remove relay and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?

- YES :** Go to Step 6 .
NO : Go to Step 5 .

STEP 5. Connector check: B-17X engine control relay connector



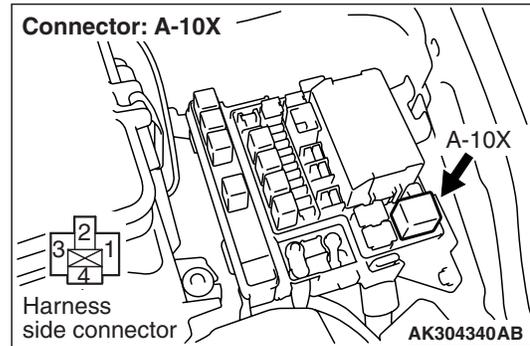
Q: Is the check result normal?

YES : Check intermediate connectors A-14 and C-17, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-17X (terminal No. 1) engine control relay connector and A-10X (terminal No. 3) fan control relay connector.

- Check power supply line for open/short circuit.

NO : Repair.

STEP 6. Perform voltage measurement at A-10X fan control relay connector.



- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth

OK: System voltage

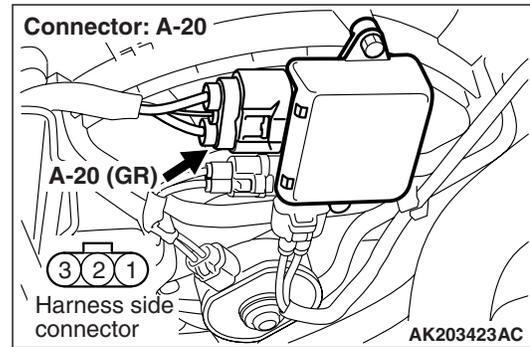
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Check and repair harness between battery and A-10X (terminal No. 4) fan control relay connector.

- Check power supply line for open/short circuit.

STEP 7. Connector check: A-20 fan controller connector

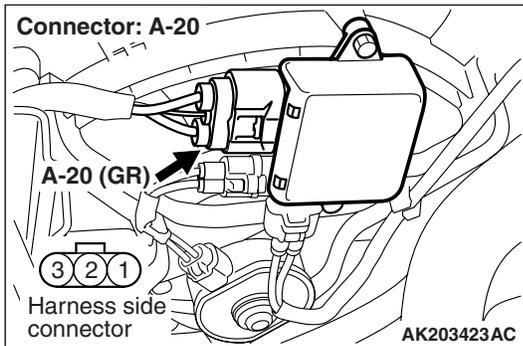


Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Perform voltage measurement at A-20 fan controller connector.

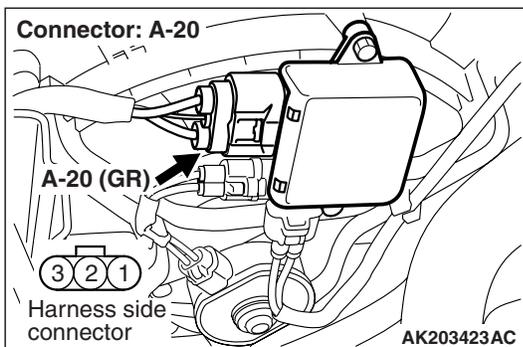
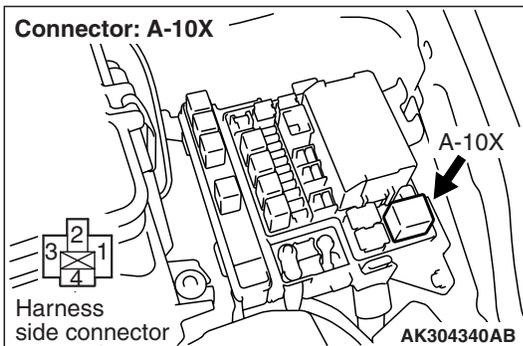


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 12 .
NO : Go to Step 9 .

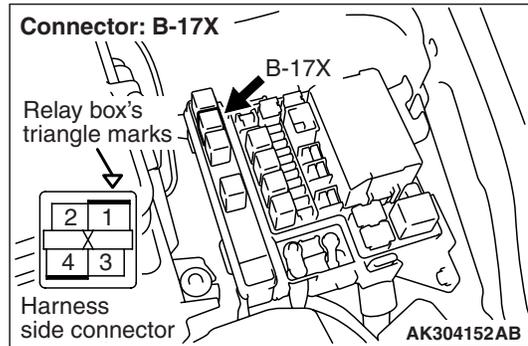
STEP 9. Check harness between A-10X (terminal No. 2) fan control relay connector and A-20 (terminal No. 3) fan controller connector.



- Check output line for open/short circuit.

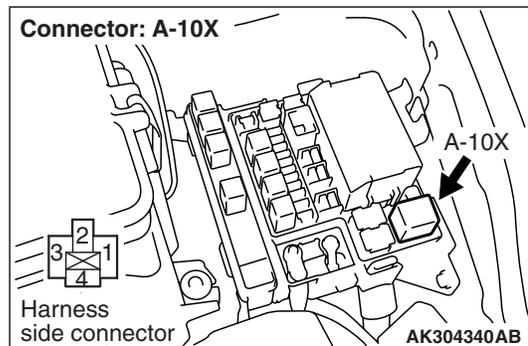
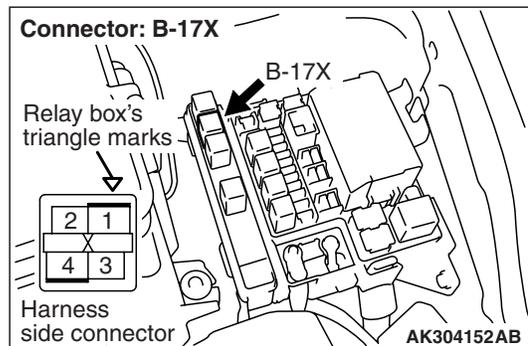
Q: Is the check result normal?
YES : Go to Step 10 .
NO : Repair.

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



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

STEP 11. Check harness between B-17X (terminal No. 1) engine control relay connector and A-10X (terminal No. 3) fan control relay connector.

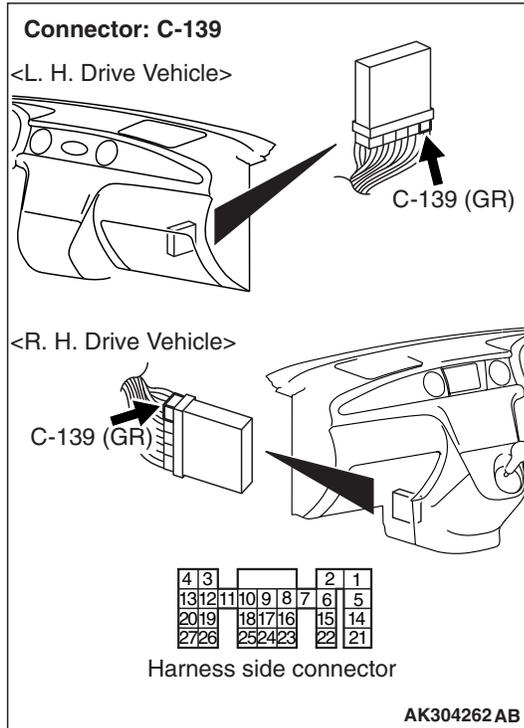


NOTE: Before checking harness, check intermediate connectors A-14 and C-17, and repair if necessary.

- Check power supply line for damage.

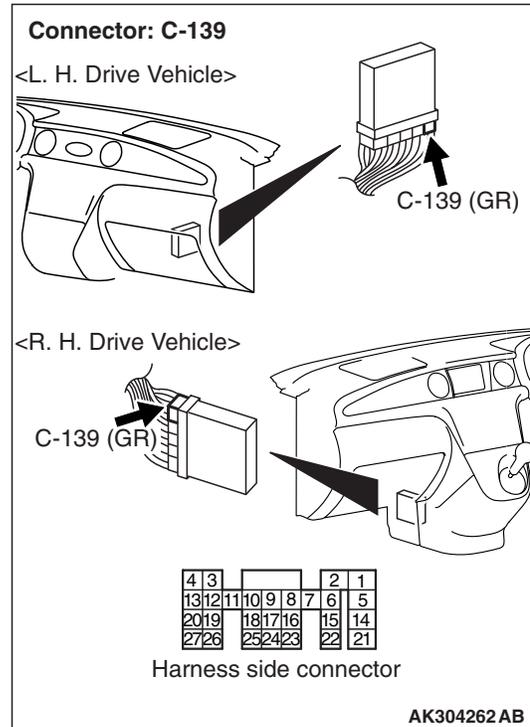
Q: Is the check result normal?
YES : Check and repair harness between A-10X (terminal No. 1) fan control relay connector and body earth.
 • Check earthing line for damage.
NO : Repair.

STEP 12. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

STEP 13. Fan motor drive test.



- Disconnect C-139 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 .

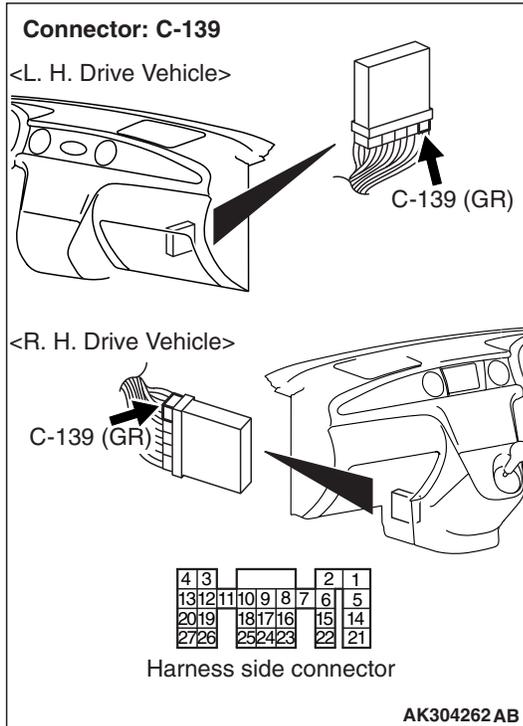
STEP 14. M.U.T.-II/III actuator test

- 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 [P.00-6](#)).
NO : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.

STEP 15. Perform voltage measurement at C-139 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.

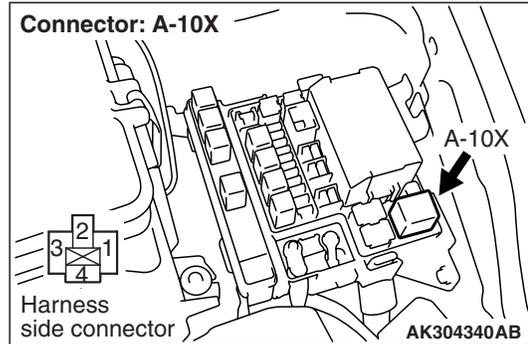
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Go to Step 18 .

STEP 16. Check harness between A-10X (terminal No. 4) fan control relay connector and battery.



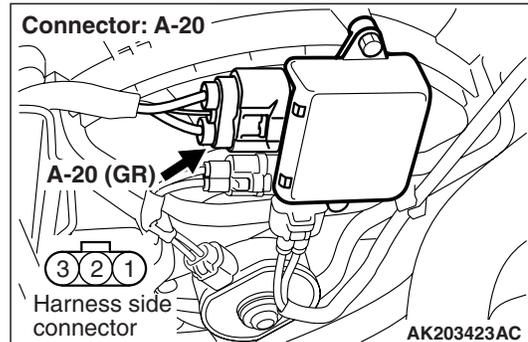
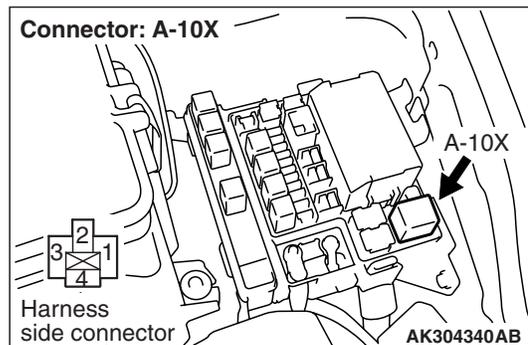
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Check harness between A-10X (terminal No. 2) fan control relay connector and A-20 (terminal No. 3) fan controller connector.



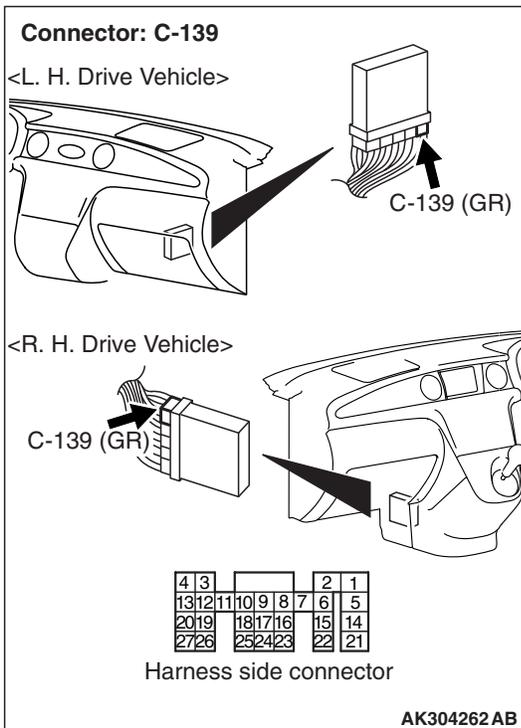
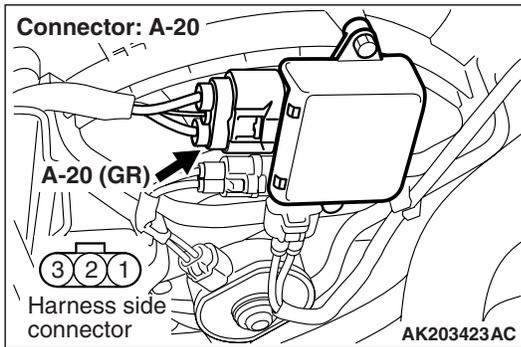
- Check output line for damage.

Q: Is the check result normal?

YES : Replace fan motor and fan controller.

NO : Repair.

STEP 18. Check harness between A-20 (terminal No. 2) fan controller connector and C-139 (terminal No. 17) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check output line for short circuit.

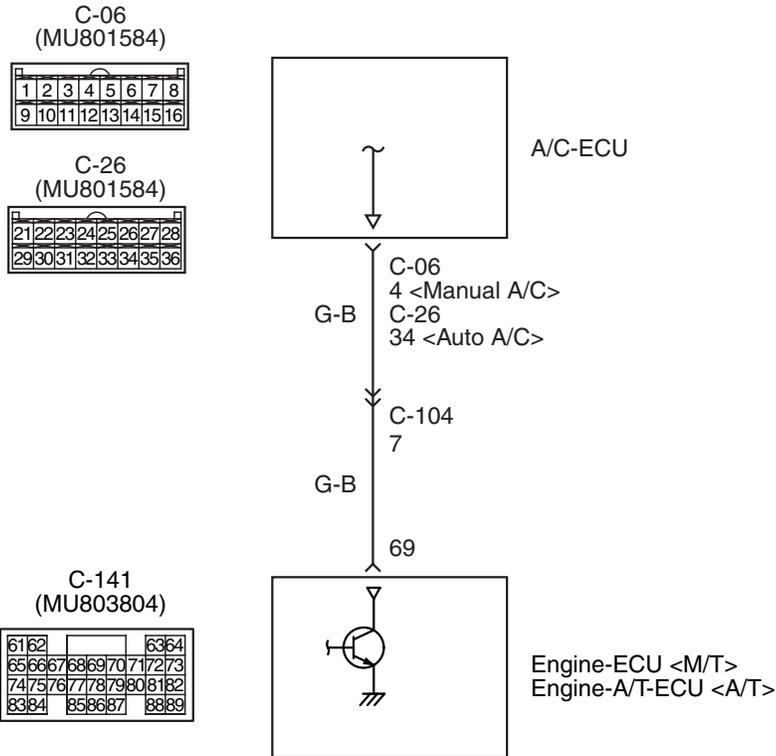
Q: Is the check result normal?

YES : Replace fan motor and fan controller.

NO : Repair.

Inspection Procedure 27: A/C Switch System

A/C 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

AK401088 AB

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 (terminal No. 4) <Manual A/C> or A/C-ECU (terminal No. 34) <Auto A/C>.

FUNCTION

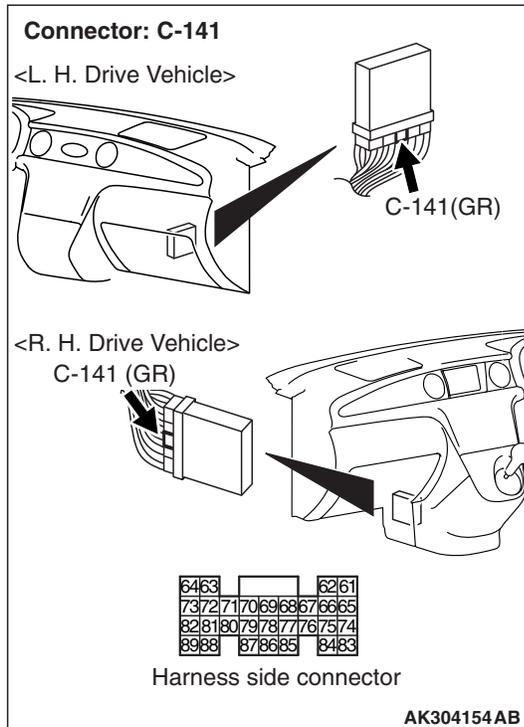
- When the A/C switch is in "ON" position, A/C switch ON signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> from the A/C-ECU. In response to the signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the A/C compressor relay.

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. Perform voltage measurement at C-141 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: Running at idle
- A/C set temperature:
Maximum Cool when temperature in cabin is 25°C or more
Maximum Hot when temperature in cabin is 25°C or less
- Voltage between terminal No. 69 and earth.

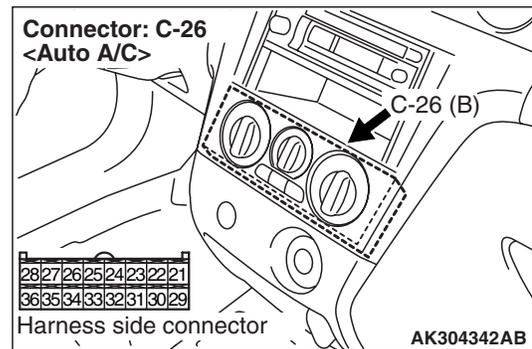
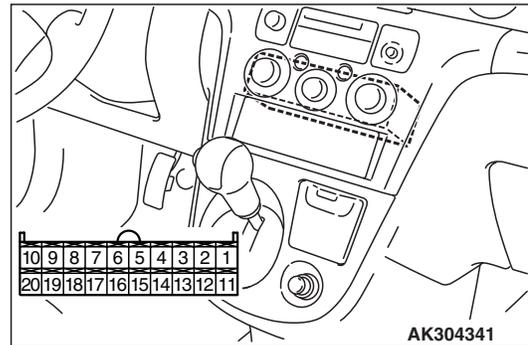
OK:

**System voltage (when A/C is ON)
0.5 V or less (when A/C is OFF)**

Q: Is the check result normal?

- YES :** Go to Step 6 .
NO : Go to Step 2 .

STEP 2. Perform voltage measurement at C-06 A/C-ECU <Manual A/C> connector or C-26 A/C-ECU <Auto A/C> connector.



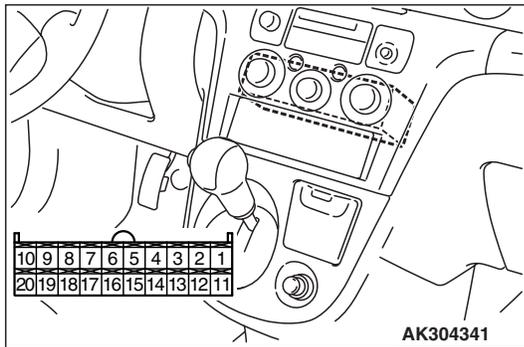
- Measure A/C-ECU terminal voltage.
- Engine: Idling
- A/C set temperature:
Maximum Cool when temperature in cabin is 25°C or more
Maximum Hot when temperature in cabin is 25°C or less
- Voltage between terminal No. 4 and earth <Manual A/C>
- Voltage between terminal No. 34 and earth <Auto A/C>

OK: System voltage

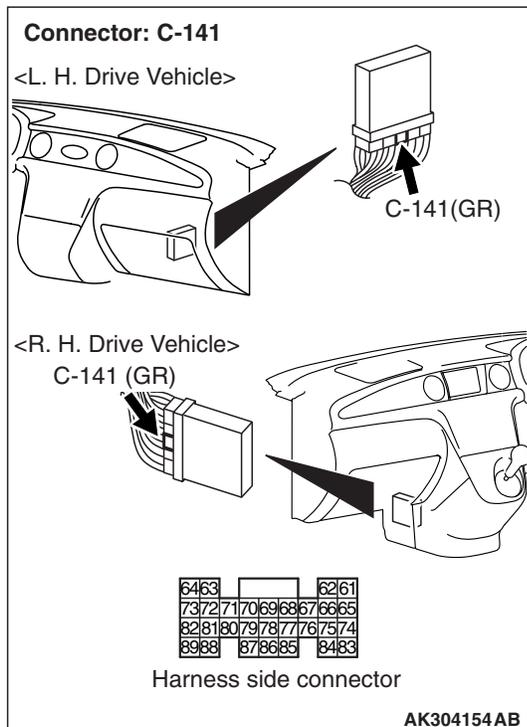
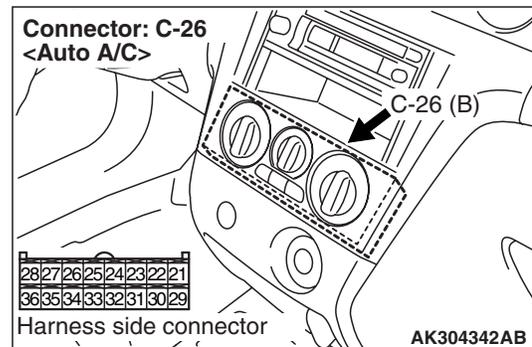
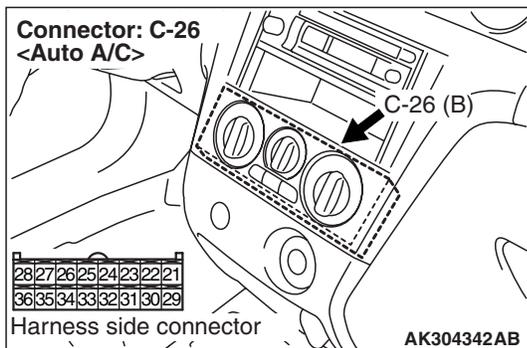
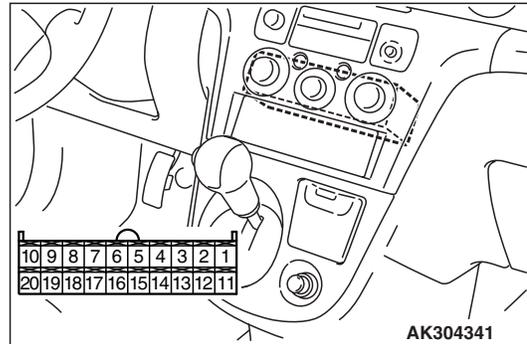
Q: Is the check result normal?

- YES :** Go to Step 5 .
NO : Go to Step 3 .

STEP 3. Connector check: C-06 A/C-ECU <Manual A/C> connector or C-26 A/C-ECU <Auto A/C> connector and C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



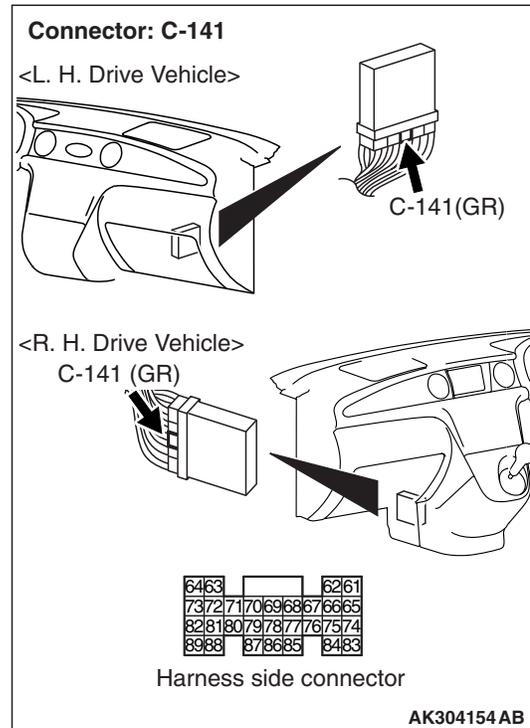
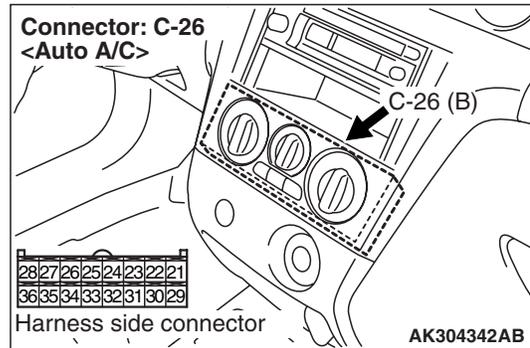
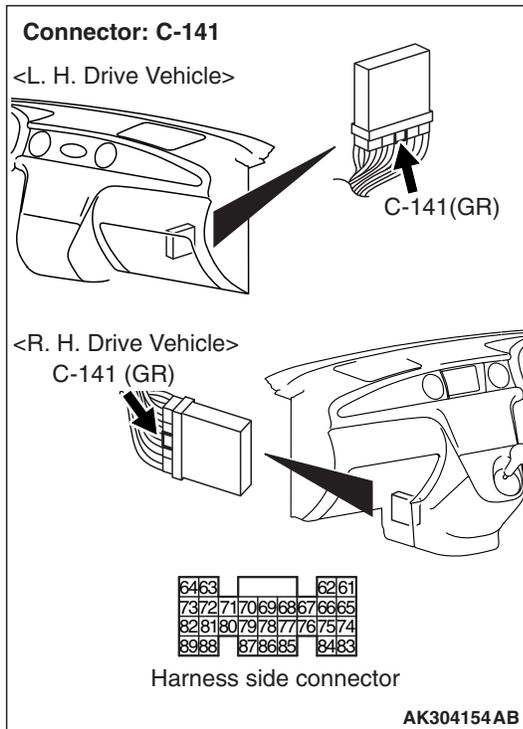
STEP 4. Check harness between C-06 (terminal No. 4) A/C-ECU <Manual A/C> connector or C-26 (terminal No. 34) A/C-ECU <Auto A/C> connector and C-141 (terminal No. 69) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.



NOTE: Before checking harness, check intermediate connector C-104, and repair if necessary.

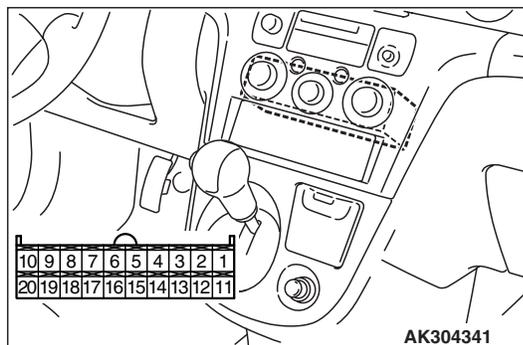
- Check output line for short circuit.

Q: Is the check result normal?

YES : Check A/C system (Refer to GROUP 55A – Troubleshooting – Check Chart for Trouble Symptoms P.55A-5).

NO : Repair.

STEP 5. Connector check: C-06 A/C-ECU <Manual A/C> connector or C-26 A/C-ECU <Auto A/C> connector and C-141 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



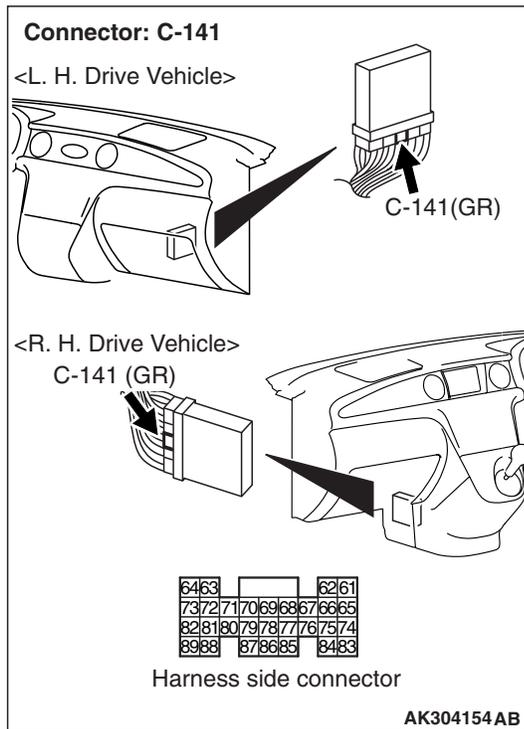
Q: Is the check result normal?

YES : Check intermediate connector C-104, and repair if necessary. If intermediate connector is normal, check and repair harness between C-06 (terminal No. 4) <Manual A/C> or C-26 (terminal No. 34) <Auto A/C> A/C-ECU connector and C-141 (terminal No. 69) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

STEP 6. Connector check: C-141 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.

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

- Item 28: A/C switch
 - a. Engine: Idling
 - b. A/C set temperature:
 - Maximum Cool when temperature in cabin is 25°C or more.
 - Maximum Hot when temperature in cabin is 25°C or less.

OK:

ON (when A/C is ON)

OFF (when A/C is OFF)

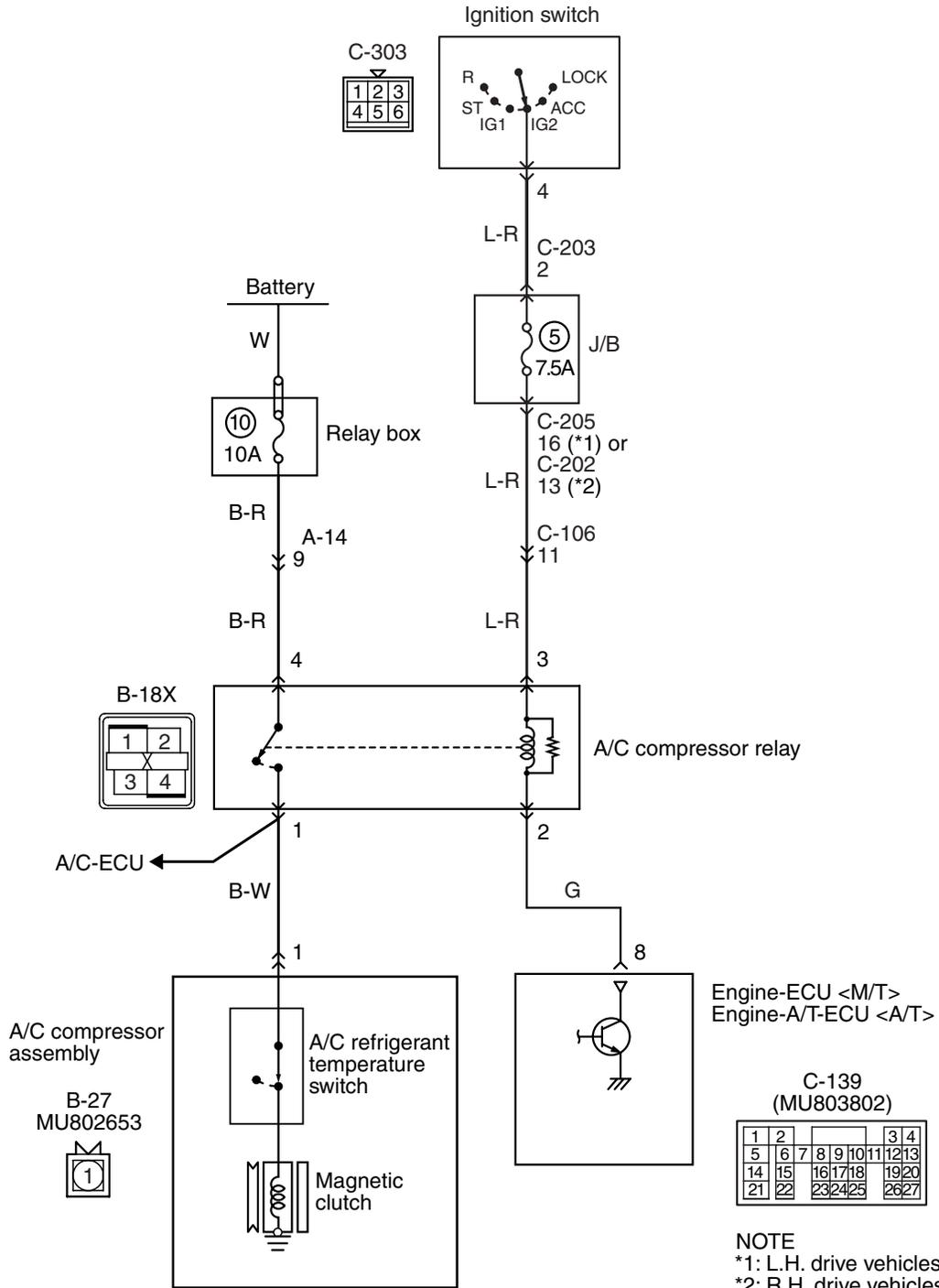
Q: Is the check result normal?

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

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

Inspection Procedure 28: A/C Compressor Relay System

A/C compressor relay Circuit



Wire colour code

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

OPERATION

- The battery voltage is applied to the A/C compressor relay (terminal No. 4).
- The battery voltage is applied to the A/C compressor relay (terminal No. 3) from the ignition switch. The engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 8) makes the power transistor in the unit be in "ON" position and makes currents go on the A/C compressor relay coil, and that makes the relay be in "ON" position.
- When the A/C compressor is in "ON" position, the battery voltage is supplied to the A/C compressor (terminal No. 1) from the A/C compressor relay assembly (terminal No. 1).

FUNCTION

- When the A/C switch "ON" signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> places the A/C compressor relay in the "ON" position. Accordingly, the battery voltage supplied to the A/C compressor operates the magnet clutch.

PROBABLE CAUSE

- Failed A/C compressor relay
- Failed A/C compressor magnet clutch
- Open/short circuit in A/C compressor relay circuit or loose connector contact
- Failed engine-ECU <M/T>
- Failed engine-A/T-ECU <A/T>

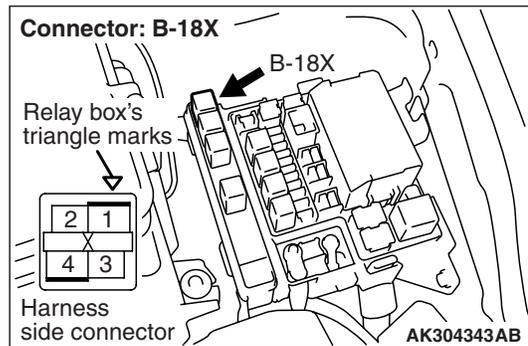
DIAGNOSIS PROCEDURE

NOTE:

*1: L.H. drive vehicles

*2: R.H. drive vehicles

STEP 1. Connector check: B-18X A/C compressor relay connector



Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

STEP 2. A/C compressor relay check.

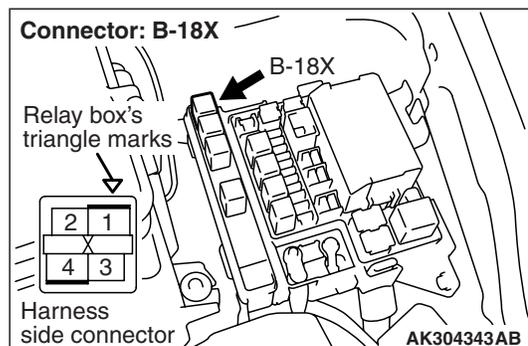
- Check A/C compressor relay (Refer to GROUP 55A – On-vehicle Service P.55A-55).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace A/C compressor relay.

STEP 3. Perform voltage measurement at B-18X A/C compressor relay connector.



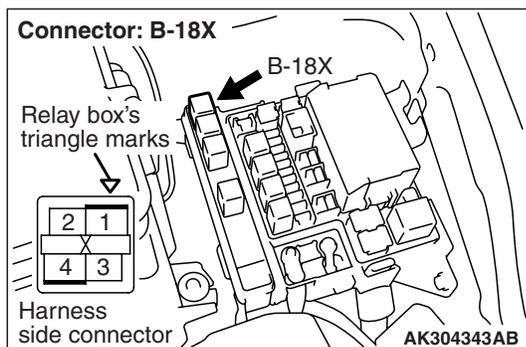
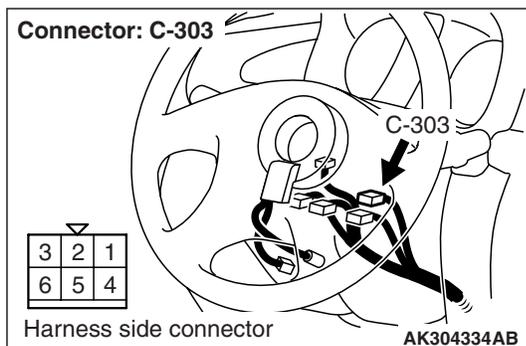
- Remove relay, and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

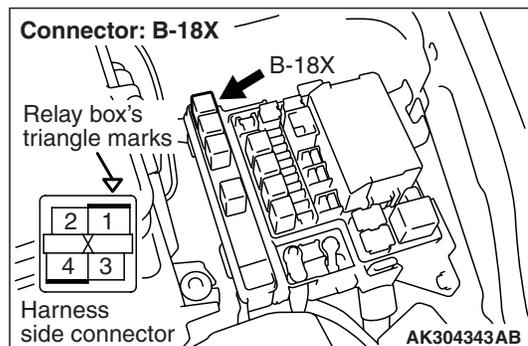
NO : Go to Step 4 .

STEP 4. Connector check: C-303 ignition switch connector**Q: Is the check result normal?**

YES : Check intermediate connectors C-106, C-202^{*2}, C-203 and C-205^{*1}, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-18X (terminal No. 3) A/C compressor relay connector and C-303 (terminal No. 4) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair.

STEP 5. Perform voltage measurement at B-18X A/C compressor relay connector.

- Remove relay, and measure at relay box side.
- Voltage between terminal No. 4 and earth.

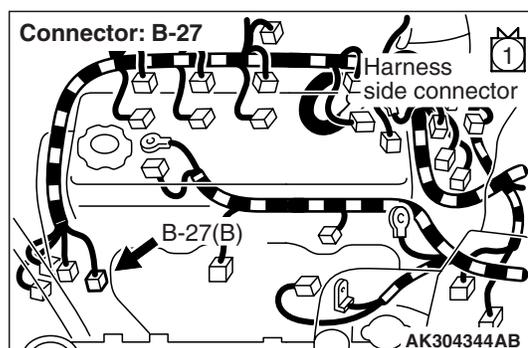
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between B-18X (terminal No. 4) A/C compressor relay connector and battery.

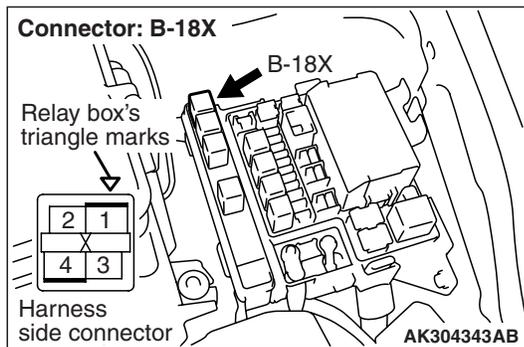
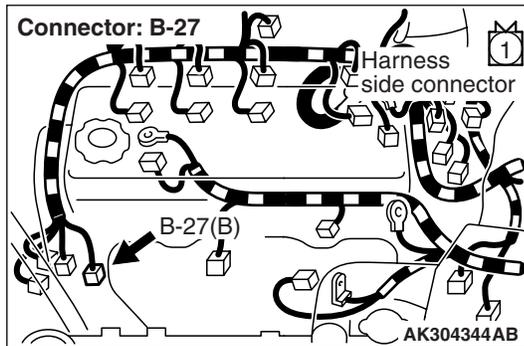
- Check power supply line for open/short circuit.

STEP 6. Connector check: B-27 A/C compressor assembly connector**Q: Is the check result normal?**

YES : Go to Step 7 .

NO : Repair.

STEP 7. Perform voltage measurement at B-27 A/C compressor assembly connector.



- Disconnect connector, and measure at harness side.
- Remove B-18X (terminal No. 1 and No. 4) A/C compressor relay and short-circuit of harness side connector.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

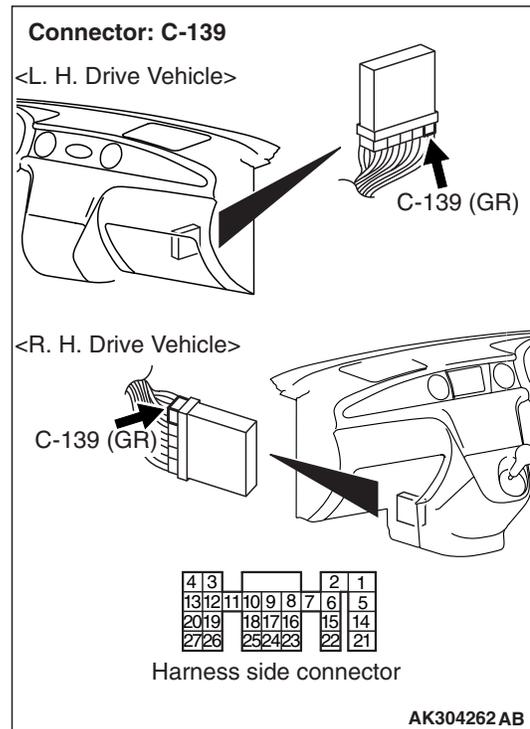
Q: Is the check result normal?

YES : Go to Step 8 .

NO : Check and repair harness between B-27 (terminal No. 1) A/C compressor assembly connector and B-18X (terminal No. 1) A/C compressor relay connector.

- Check output line for open/short circuit.

STEP 8. Perform voltage measurement at C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 8 and earth.

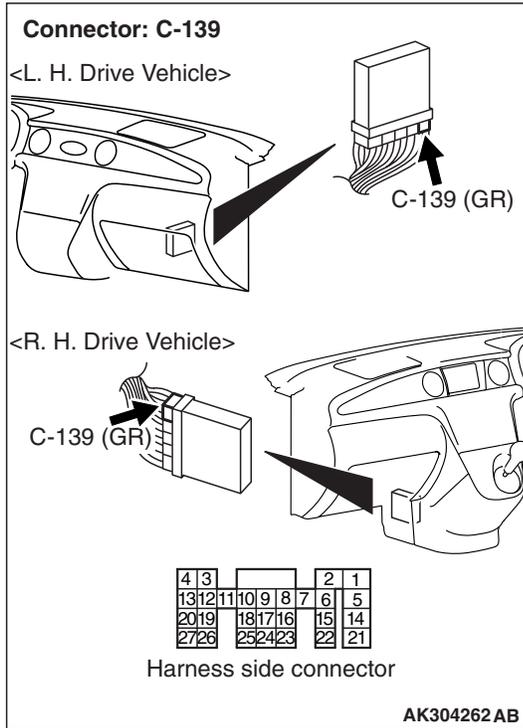
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 12 .

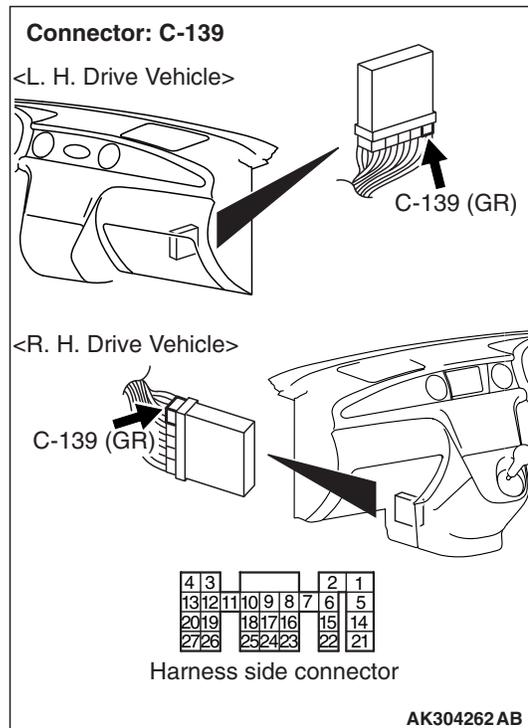
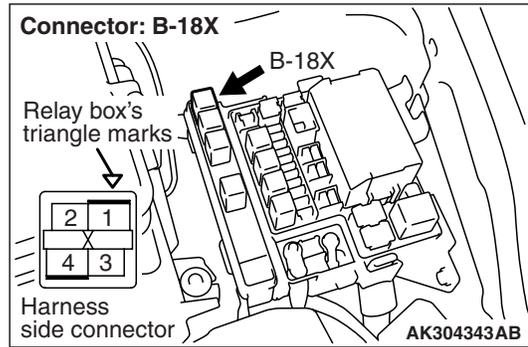
NO : Go to Step 9 .

STEP 9. Connector check: C-139 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.

STEP 10. Check harness between B-18X (terminal No. 2) A/C compressor relay connector and C-139 (terminal No. 8) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check earthing line for open/short circuit.

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

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

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

OK:

ON (when A/C is ON)

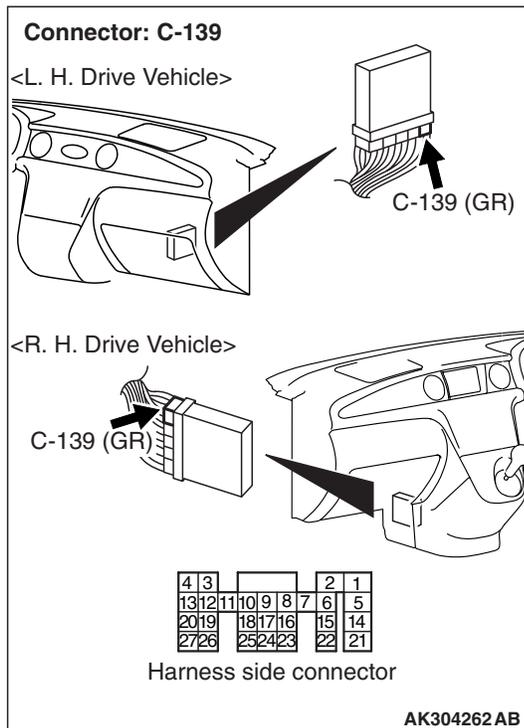
OFF (when A/C is OFF)

Q: Is the check result normal?

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

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

STEP 12. Connector check: C-139 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

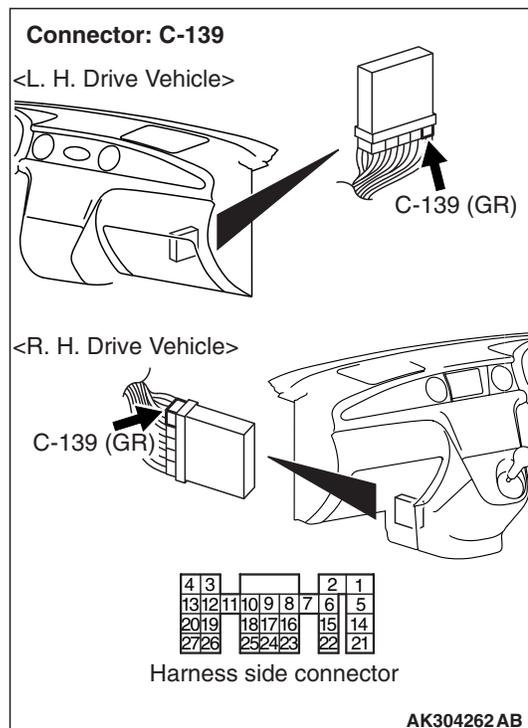
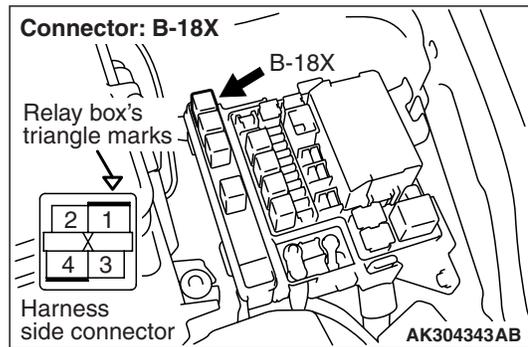


Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

STEP 13. Check harness between B-18X (terminal No. 2) A/C compressor relay connector and C-139 (terminal No. 8) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



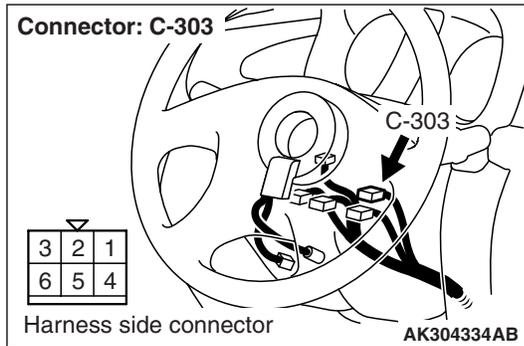
- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

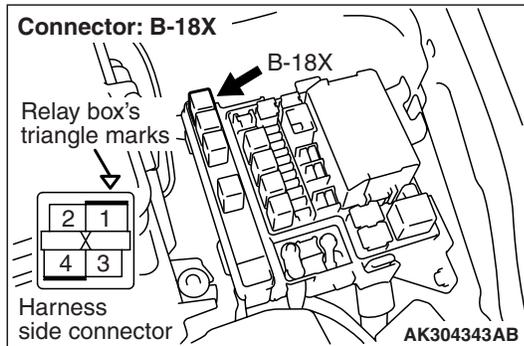
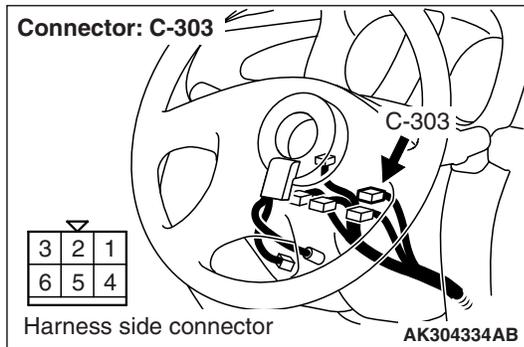
NO : Repair.

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



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

STEP 15. Check harness between C-303 (terminal No. 4) ignition switch connector and B-18X (terminal No. 3) A/C compressor relay connector.

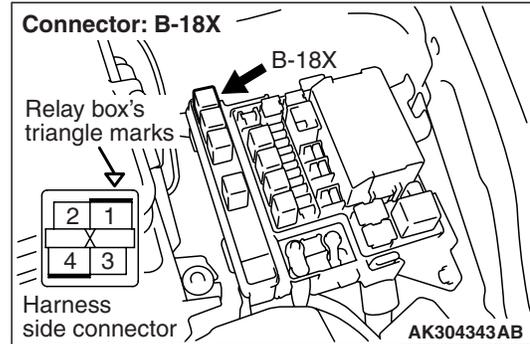


NOTE: Before checking harness, check intermediate connectors C-106, C-202*², C-203 and C-205*¹, and repair if necessary.

- Check power supply line for damage.

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

STEP 16. Check harness between battery and B-18X (terminal No. 4) A/C compressor relay connector.

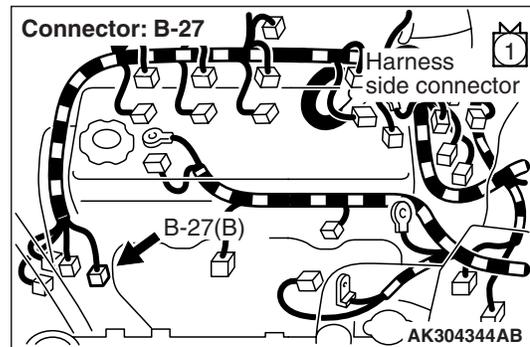
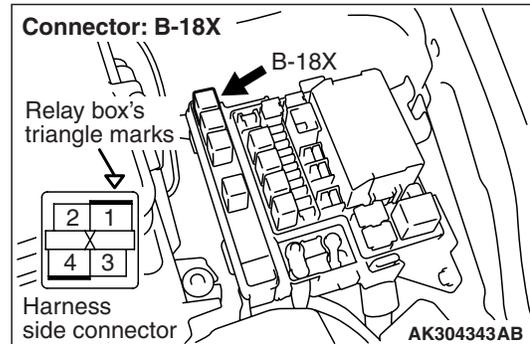


NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check power supply line for damage.

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

STEP 17. Check harness between B-18X (terminal No. 1) A/C compressor relay connector and B-27 (terminal No. 1) A/C compressor assembly connector.

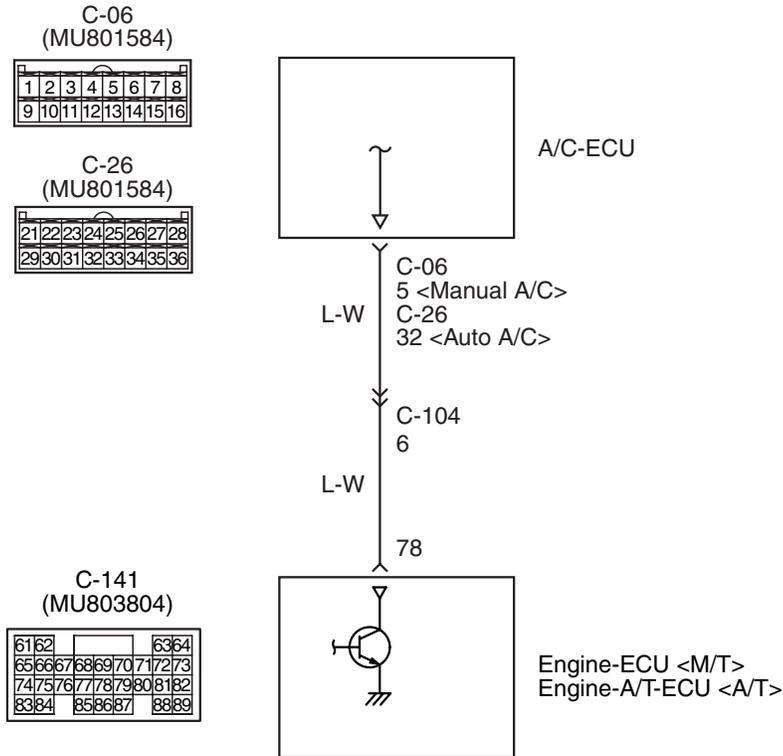


- Check output line for damage.

Q: Is the check result normal?
YES : Replace A/C compressor magnet clutch.
NO : Repair.

Inspection Procedure 29: A/C Load Signal System

A/C Load Signal System



Wire colour code

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

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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. 5). <Manual A/C> or (terminal No. 32) <Auto A/C>

FUNCTION

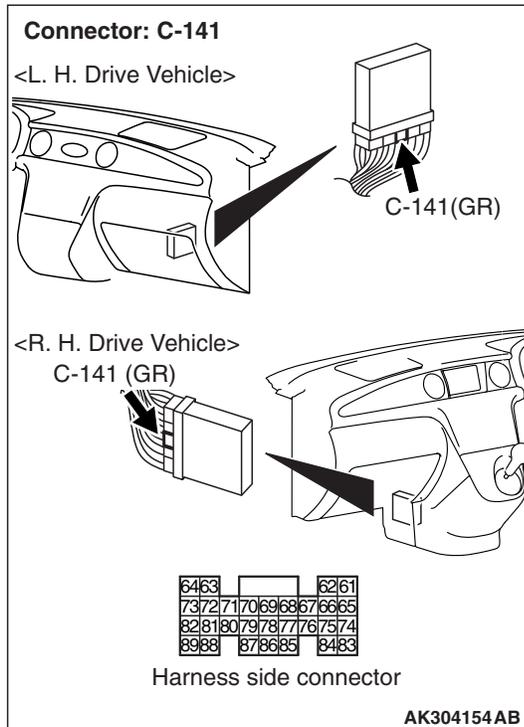
- The magnitude of the A/C compressor load is detected and input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>. The engine-ECU <M/T> or engine-A/T-ECU <A/T> provides A/C idle up control according to the A/C compressor load condition.

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-141 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:

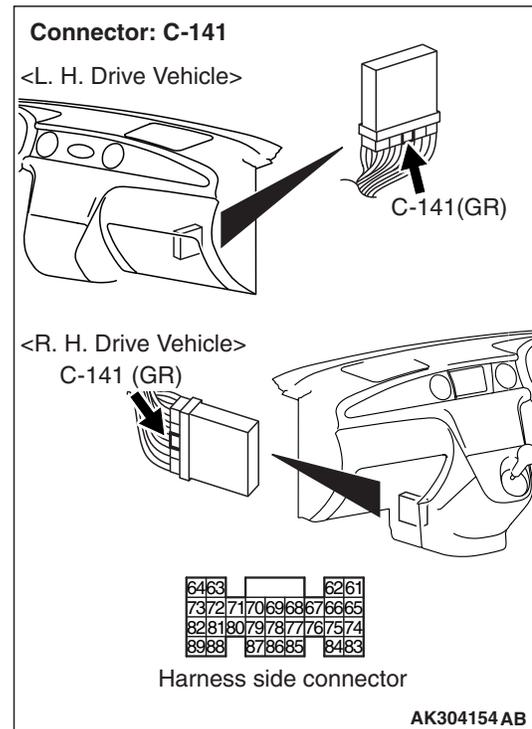
1 V or less (when the temperate around the atmospheric air temperature sensor is 18°C or more, and the A/C is set to the lowest temperature and the maximum air flow rate)
System voltage (when the A/C is set to the temperature in the cabin and the minimum air flow rate)

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Go to Step 4 .

STEP 2. Connector check: C-141 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.

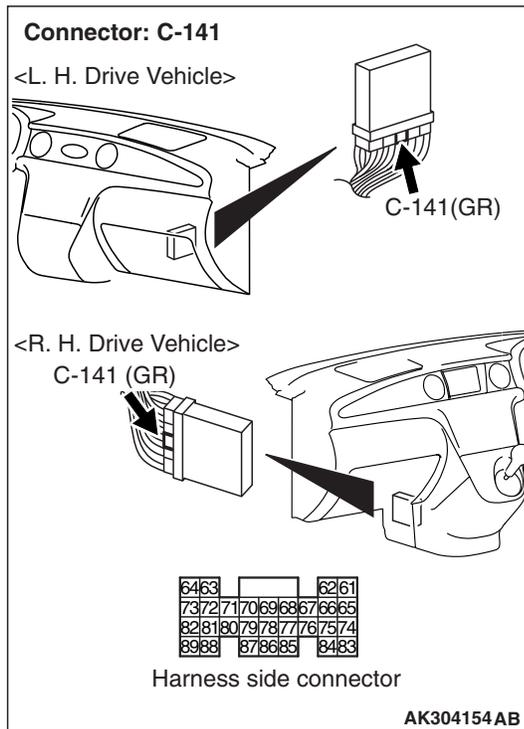
STEP 3. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

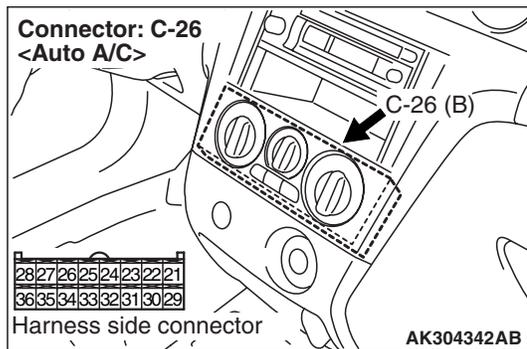
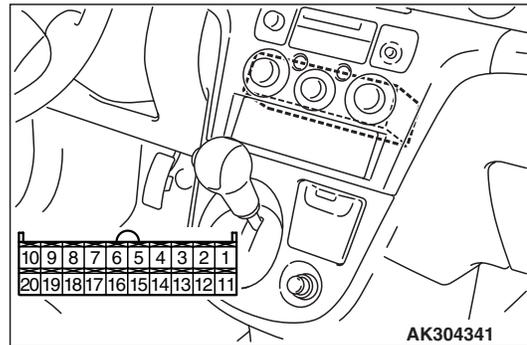
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 4. Connector check: C-141 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.

STEP 5. Perform voltage measurement at C-06 A/C-ECU <Manual A/C> connector or C-26 A/C-ECU <Auto A/C> connector.

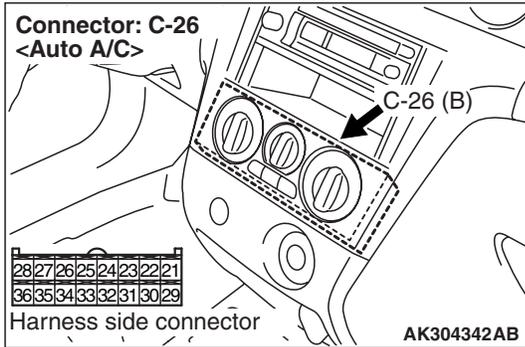
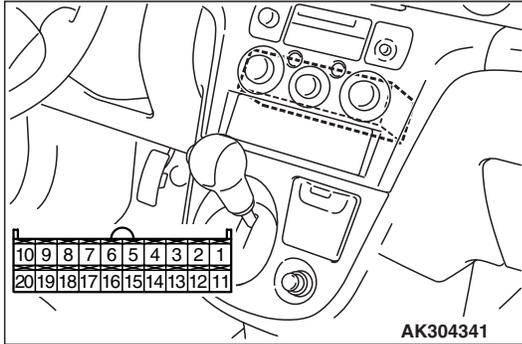


- Measure A/C-ECU terminal voltage.
- Engine: Idling
- A/C set temperature:
Maximum Cool when temperature in cabin is 25°C or more
Maximum Hot when temperature in cabin is 25°C or less
- Voltage between terminal No. 5 and earth <Manual A/C>
- Voltage between terminal No. 32 and earth <Auto A/C>

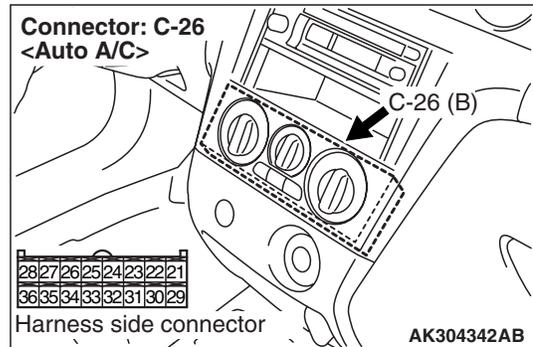
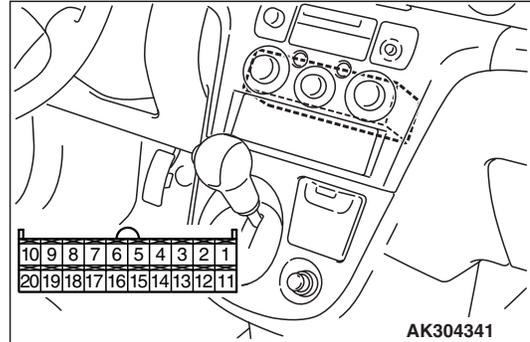
OK: System voltage

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 6 .

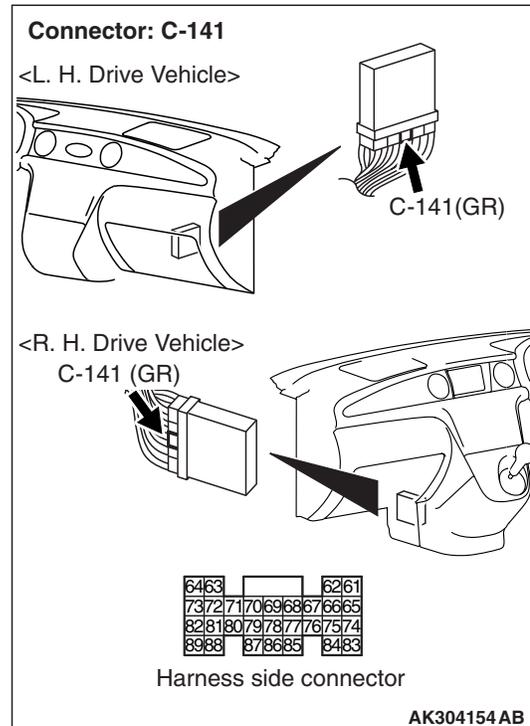
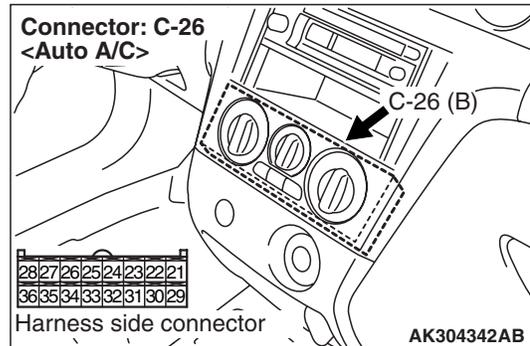
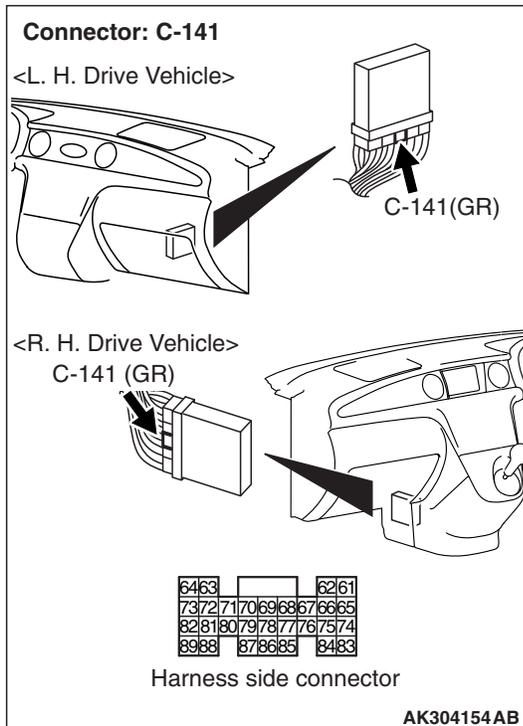
STEP 6. Connector Check: C-06 A/C-ECU <Manual A/C> connector or C-26 A/C-ECU <Auto A/C> connector



STEP 7. Check harness between C-06 (terminal No. 5) or C-26 (terminal No. 32) A/C-ECU connector and C-141 (terminal No. 78) 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.



NOTE: Before checking harness, check intermediate connector C-104, and repair if necessary.

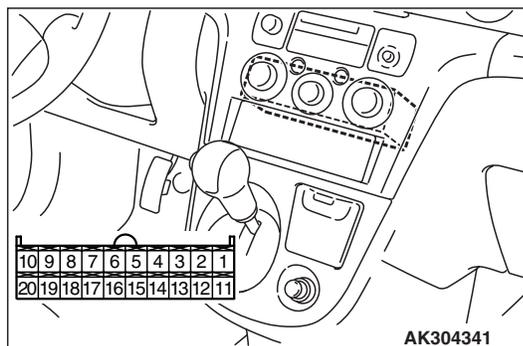
- Check output line for short circuit.

Q: Is the check result normal?

YES : Check A/C system (Refer to GROUP 55A – Troubleshooting – Check Chart for Trouble Symptoms P.55A-5).

NO : Repair.

STEP 8. Check connector: C-06 A/C-ECU connector <Manual A/C> or C-26 A/C-ECU connector <Auto A/C>



Q: Is the check result normal?

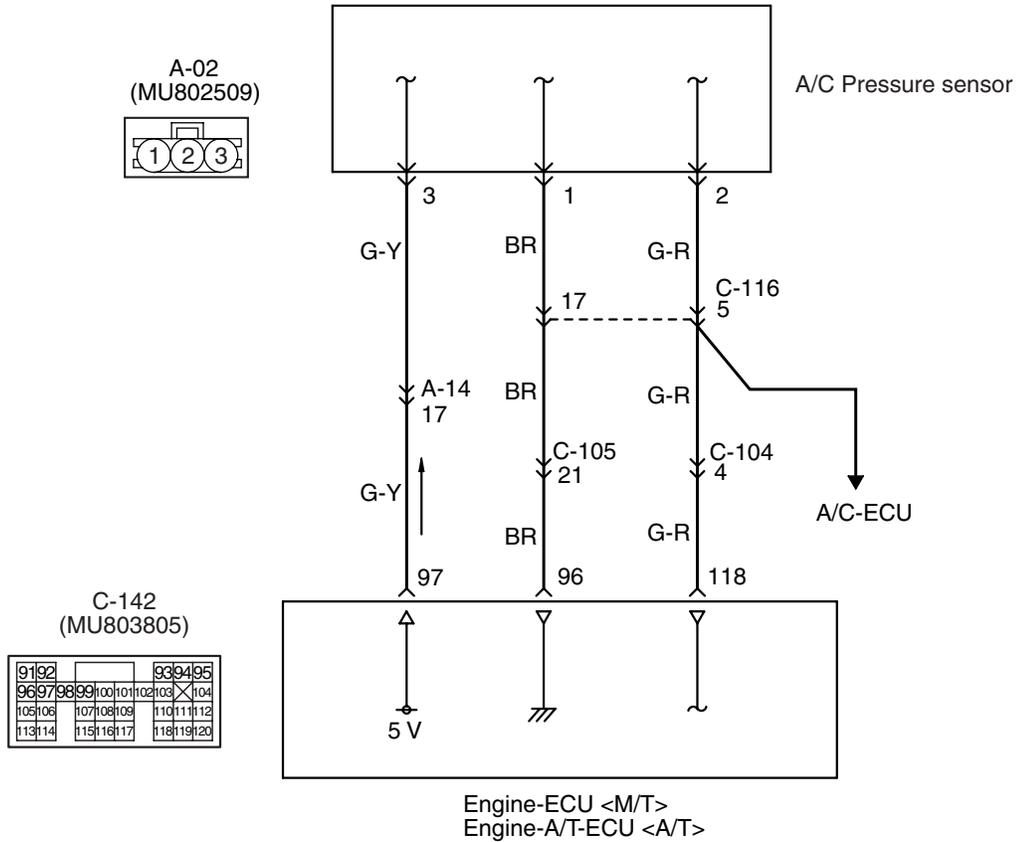
YES : Check intermediate connector C-104, and repair if necessary. If intermediate connector is normal, check and repair harness between C-06 (terminal No. 5) or C-26 (terminal No. 32) A/C-ECU connector and C-141 (terminal No. 78) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

Inspection Procedure 30: A/C Pressure Sensor System

A/C 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

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OPERATION

- A power voltage of 5 V is applied to the A/C pressure sensor power terminal (terminal No. 3) from the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 97) and is earthed to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 96) from the A/C pressure sensor (terminal No. 1).
- The sensor signal is inputted to the engine-ECU <M/T> or engine-A/T-ECU <A/T> (terminal No. 118) from the A/C pressure sensor output terminal (terminal No. 2).

FUNCTION

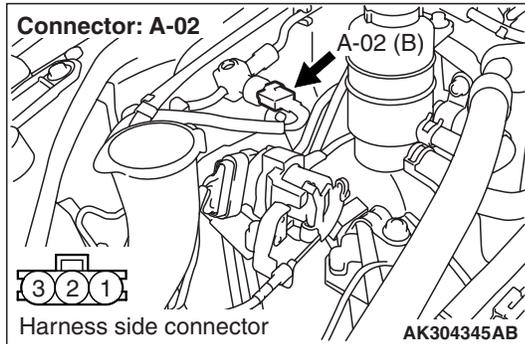
- The A/C pressure sensor detects the A/C refrigerant pressure and inputs the pressure signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>. The engine-ECU uses the signal for ON/OFF control of the magnet clutch of the A/C compressor.

PROBABLE CAUSE

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

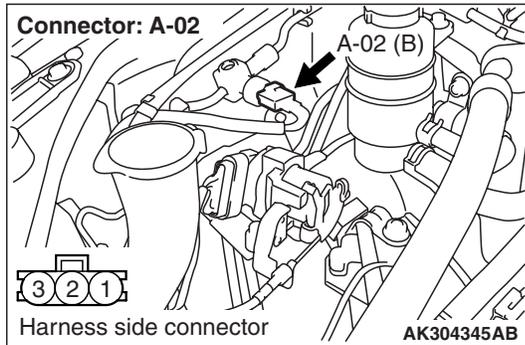
DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-02 A/C pressure sensor connector



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

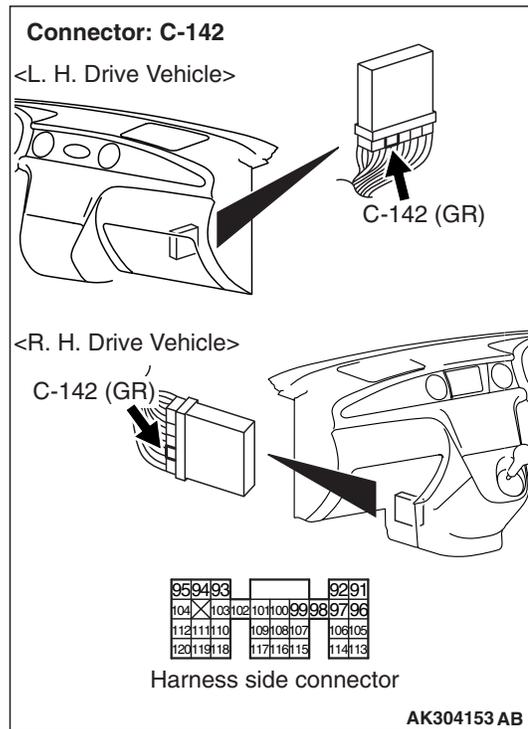
STEP 2. Perform voltage measurement at A-02 A/C pressure sensor connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.
OK: 4.9 – 5.1 V

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 3 .

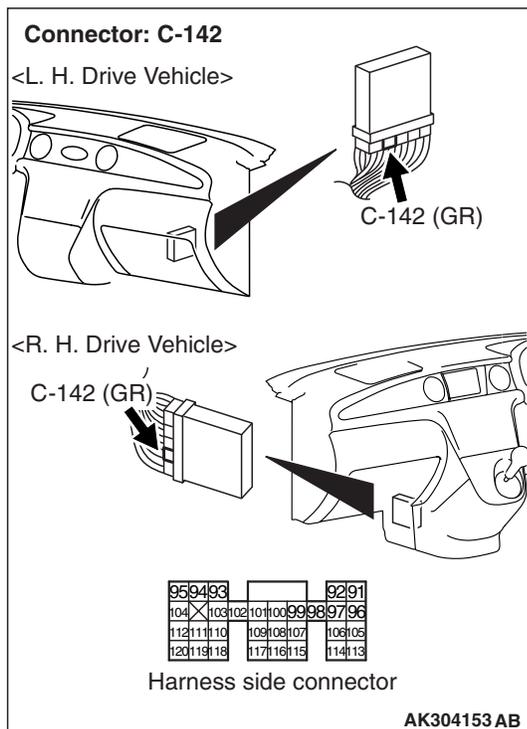
STEP 3. Perform voltage measurement at C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



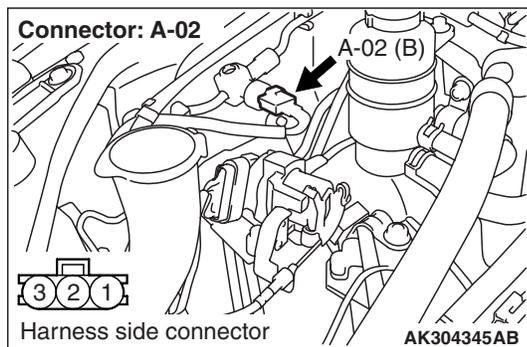
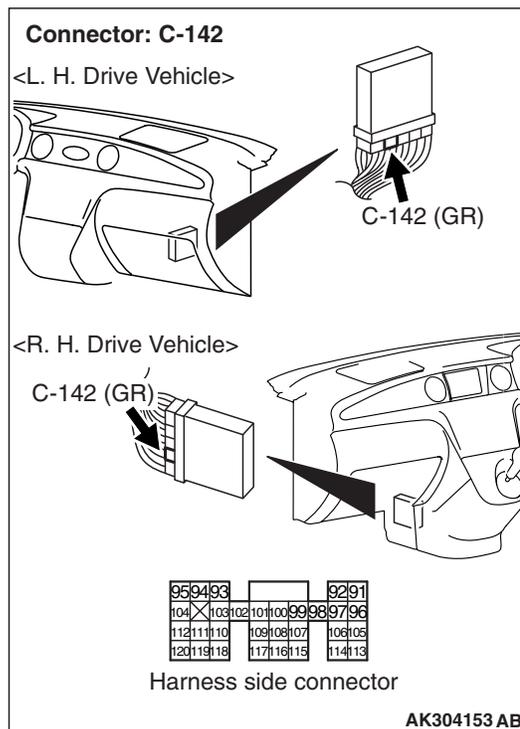
- Measure engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 97 and earth.
OK: 4.9 – 5.1 V

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

STEP 4. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 5. Connector check: C-142 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.

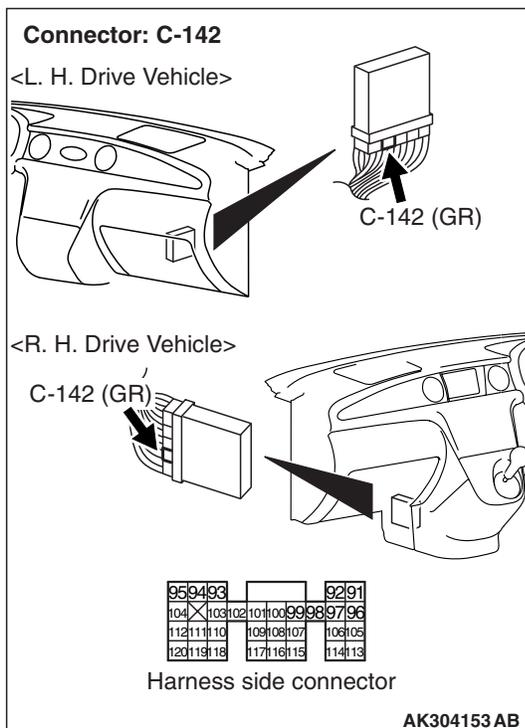
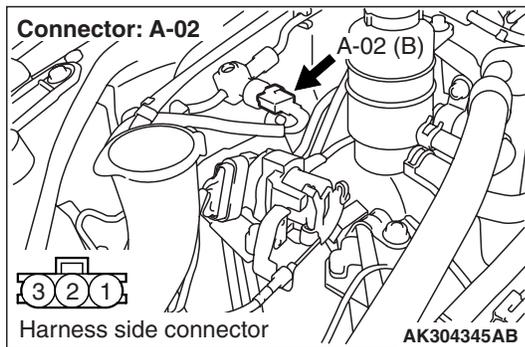
Q: Is the check result normal?

YES : Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between A-02 (terminal No. 3) A/C pressure sensor connector and C-142 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check power line for open circuit.

NO : Repair.

STEP 6. Check harness between A-02 (terminal No. 3) A/C pressure sensor connector and C-142 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check power line for short circuit.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

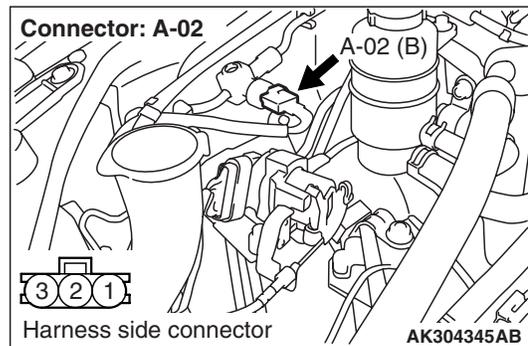
STEP 7. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

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

STEP 8. Perform resistance measurement at A-02 A/C pressure sensor connector.



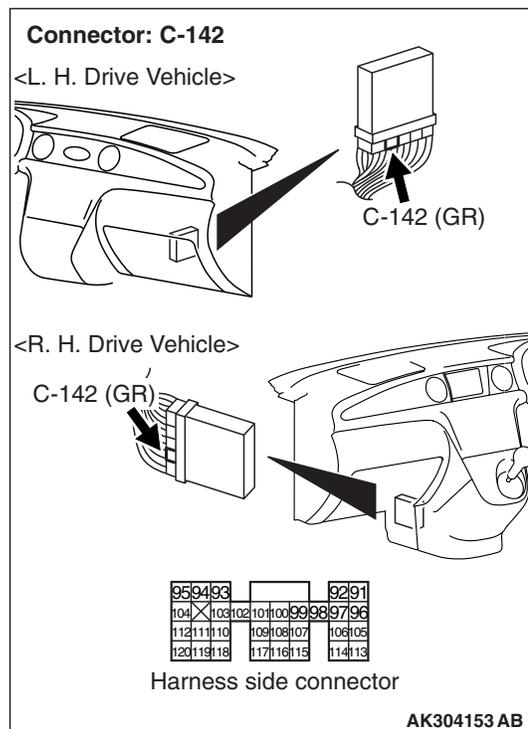
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 9 .

STEP 9. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

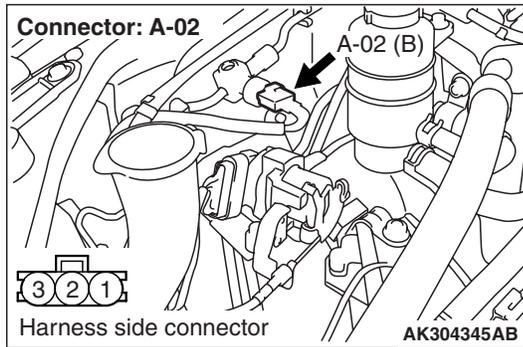


Q: Is the check result normal?

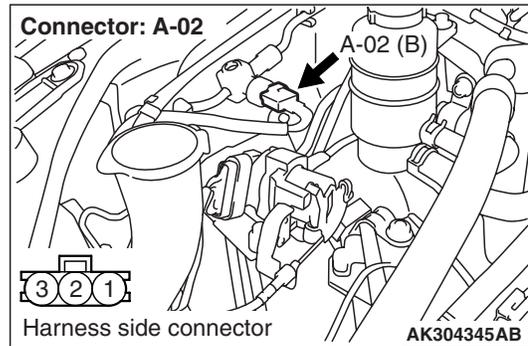
YES : Go to Step 10 .

NO : Repair.

STEP 10. Check harness between A-02 (terminal No. 1) A/C pressure sensor connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 11. Perform voltage measurement at A-02 A/C pressure sensor connector.



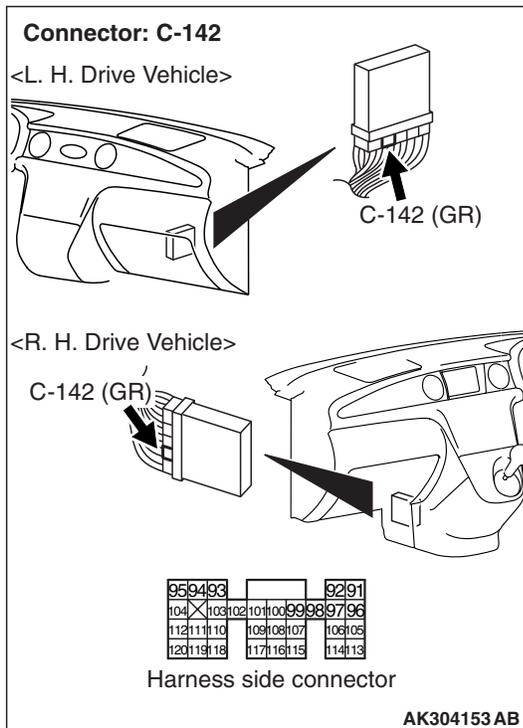
- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 12 .



NOTE: Before checking harness, check intermediate connectors C-105 and C-116, and repair if necessary.

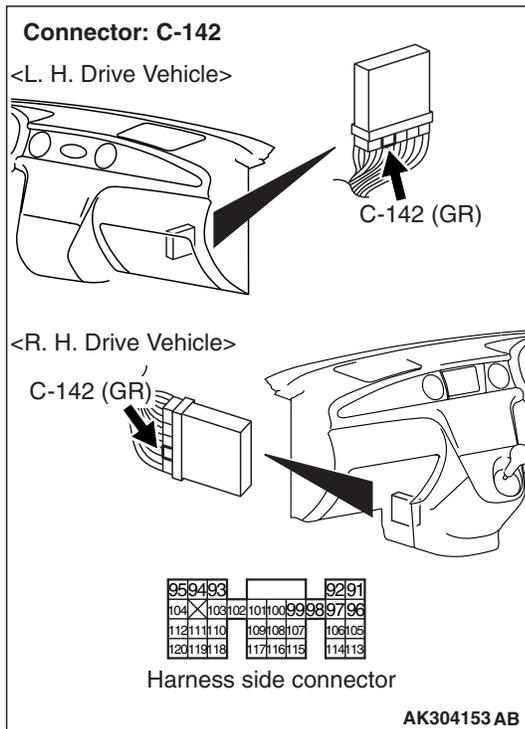
- Check earthing line for open circuit or damage.

Q: Is the check result normal?

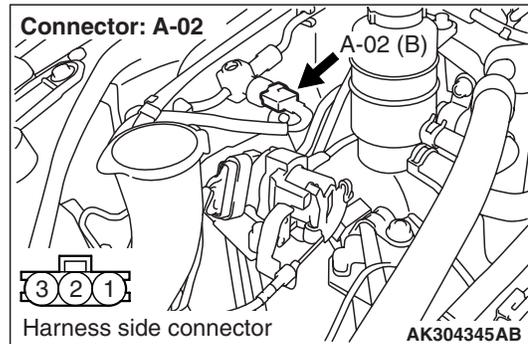
YES : Go to Step 7 .

NO : Repair.

STEP 12. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



STEP 13. Perform voltage measurement at A-02 A/C pressure sensor connector.



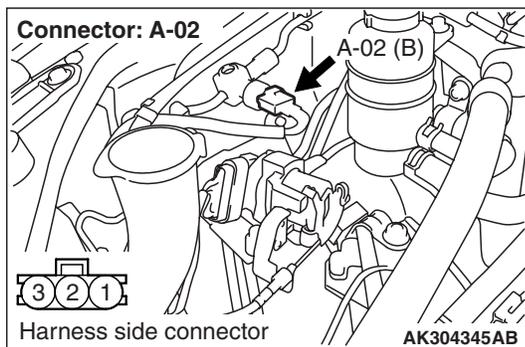
- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: 0.5 V or less

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Go to Step 14 .

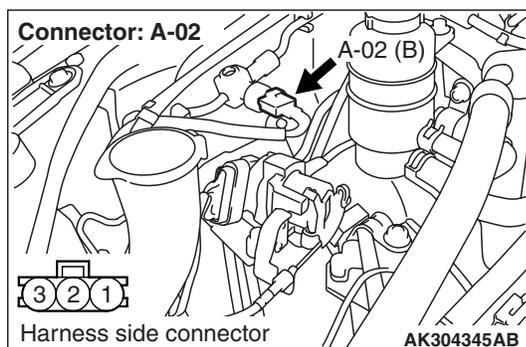
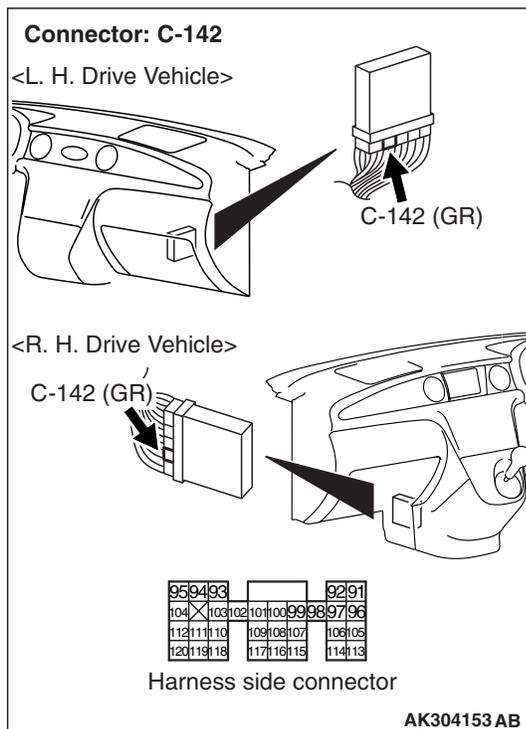


Q: Is the check result normal?

YES : Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between A-02 (terminal No. 3) A/C pressure sensor connector and C-142 (terminal No. 97) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check power line for damage.

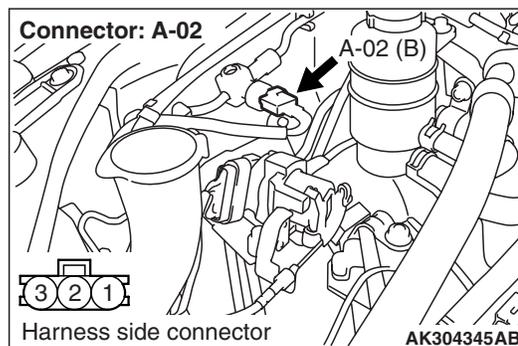
NO : Repair.

STEP 14. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector**Q: Is the check result normal?**

YES : Check intermediate connectors C-105 and C-116, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-02 (terminal No. 1) A/C pressure sensor connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for damage.

NO : Repair.

STEP 15. Perform voltage measurement at A-02 A/C pressure sensor connector.

- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Engine: Running at idle
- A/C switch: ON
- Voltage between terminal No. 2 and earth.

OK:

2.2 V or more (When A/C is "MAX, COOL" condition)

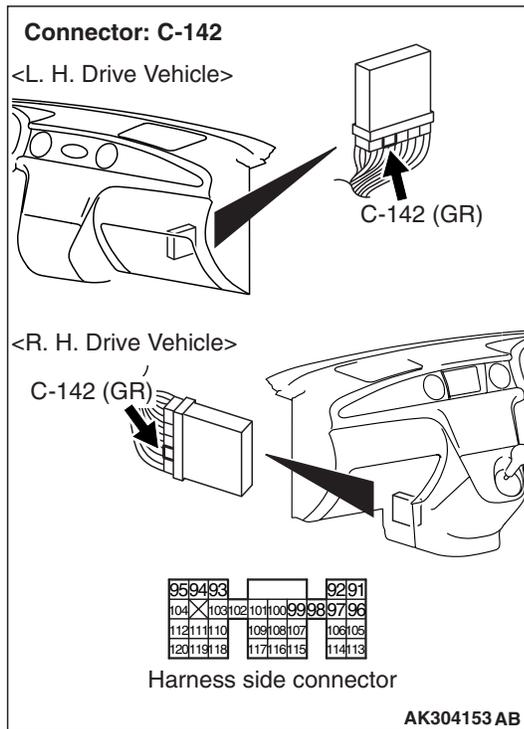
1.8 V or less (When A/C is "MAX, HOT" condition)

Q: Is the check result normal?

YES : Go to Step 18 .

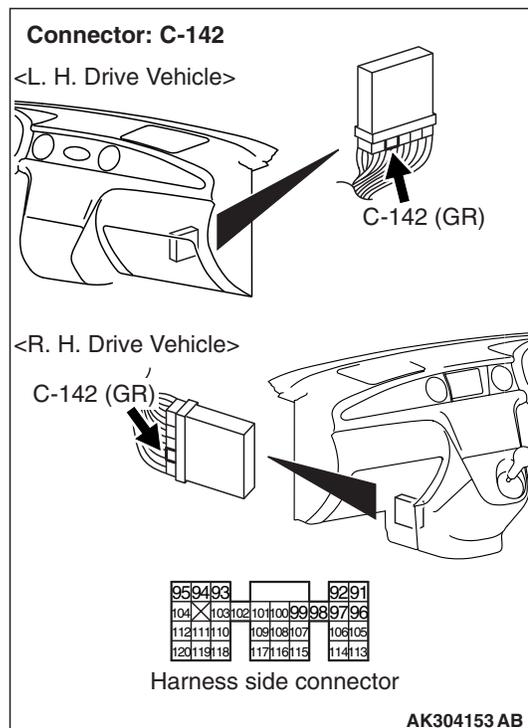
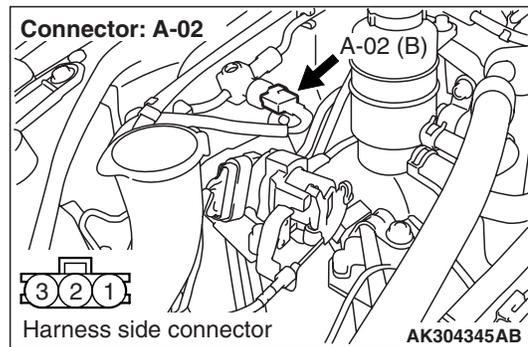
NO : Go to Step 16 .

STEP 16. Connector check: C-142 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.

STEP 17. Check harness between A-02 (terminal No. 2) A/C pressure sensor connector and C-142 (terminal No. 118) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

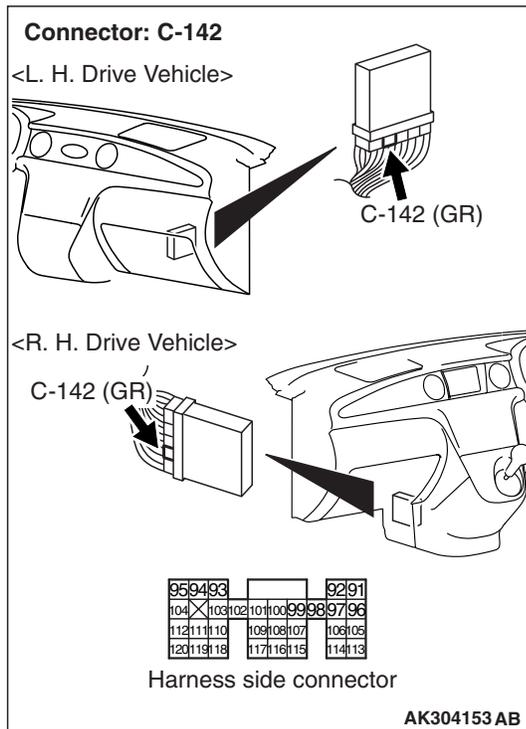


NOTE: Before checking harness, check intermediate connectors C-104 and C-116, and repair if necessary.

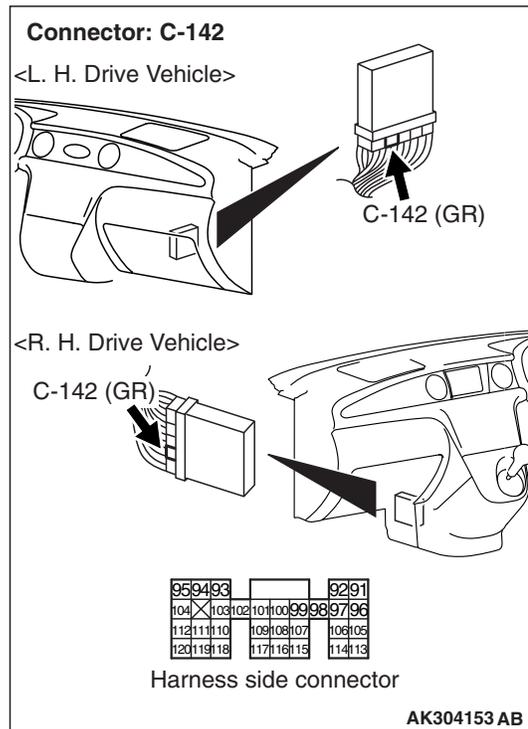
- Check output line for open circuit and damage.

Q: Is the check result normal?
YES : Replace A/C pressure sensor.
NO : Repair.

STEP 18. Perform voltage measurement at C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 19. Connector check: C-142 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: Running at idle
- A/C switch: ON
- Voltage between terminal No. 118 and earth.

OK:

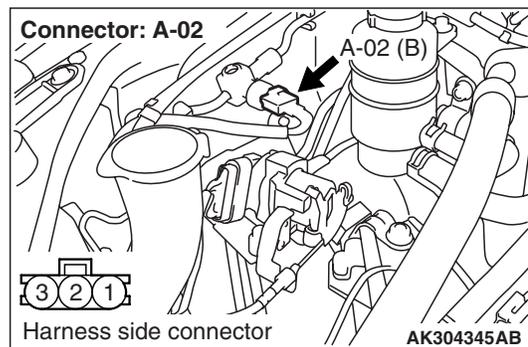
2.2 V or more (When A/C is "MAX, COOL" condition)

1.8 V or more (When A/C is "MAX, HOT" condition)

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Go to Step 19 .



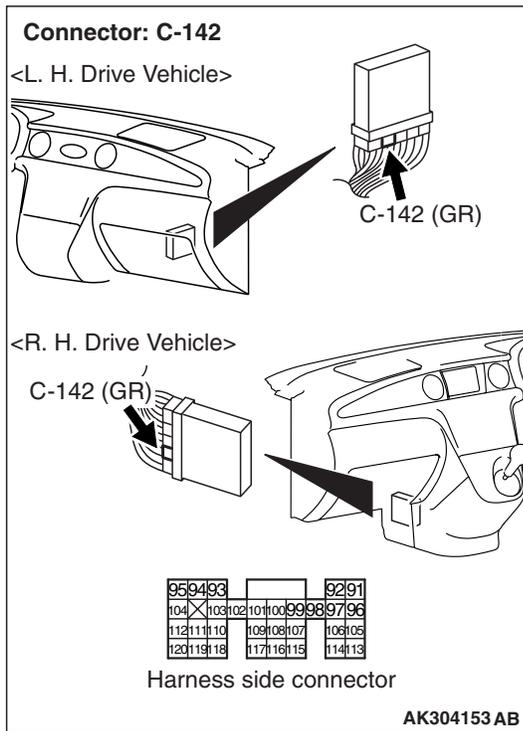
Q: Is the check result normal?

YES : Check intermediate connectors C-104 and C-116, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-02 (terminal No. 2) A/C pressure sensor connector and C-142 (terminal No. 118) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check power line for short circuit and damage.

NO : Repair.

**STEP 20. Connector check: C-142 engine-ECU
<M/T> connector or engine-A/T-ECU <A/T>
connector**



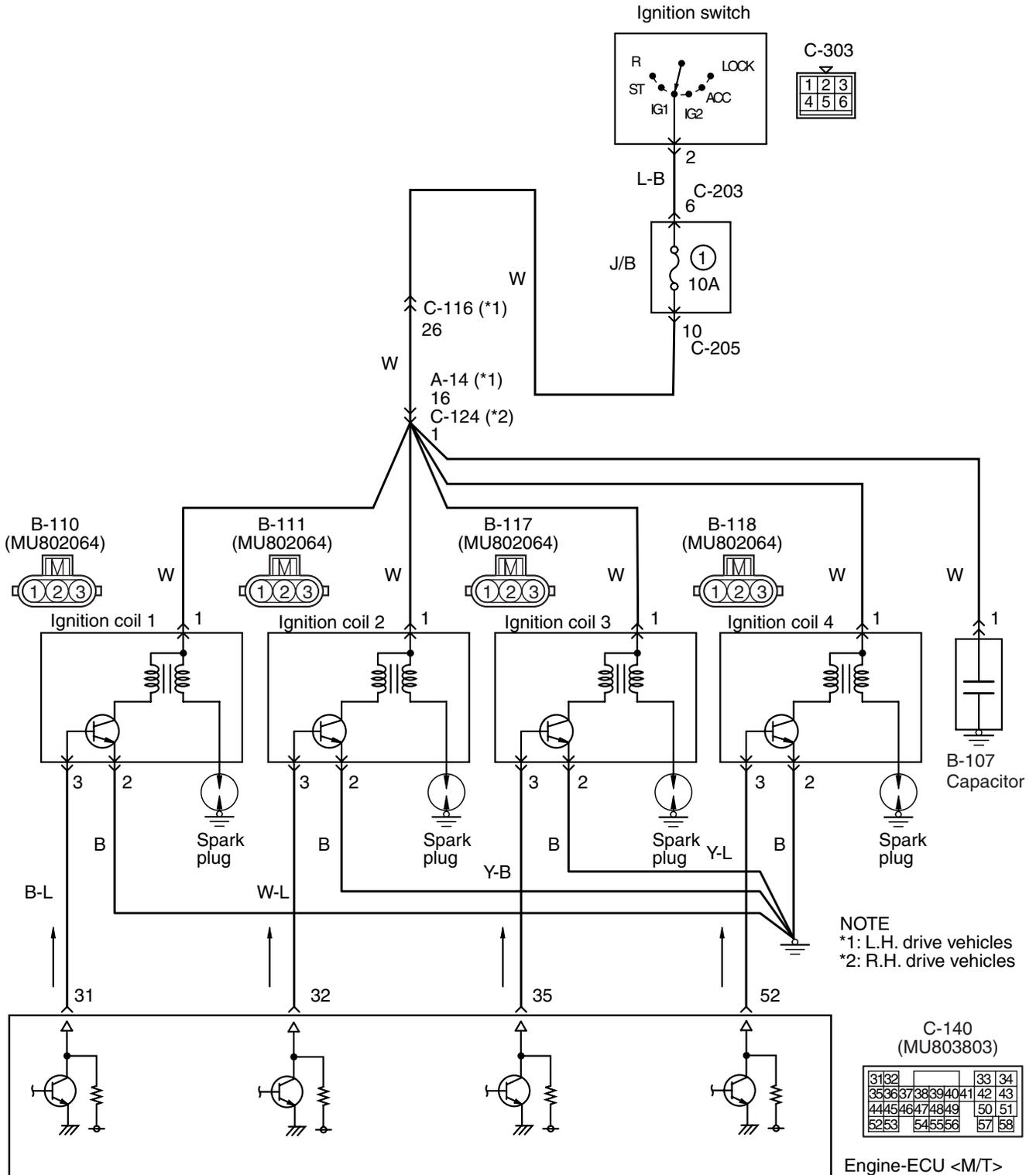
Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

Inspection Procedure 31: Ignition Circuit System

Ignition circuit



Wire colour code

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

OPERATION

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

NOTE:

*1: L.H. drive vehicle

*2: R.H. drive vehicle

STEP 1. Check spark plug.

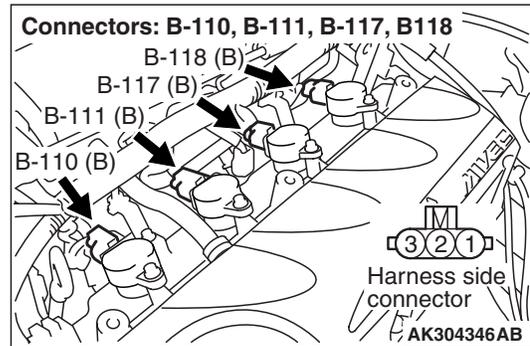
- Check spark plug itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-40](#)).

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Replace spark plug.

STEP 2. Connector check: B-110, B-111, B-117 and B-118 ignition coil connectors



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair.

STEP 3. Check ignition coil itself.

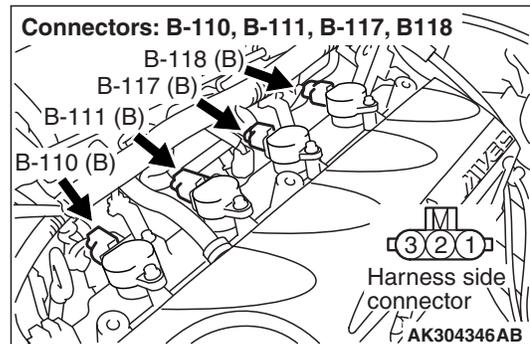
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service – Ignition coil check <4G69>[P.16-39](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace ignition coil.

STEP 4. Perform voltage measurement at B-110, B-111, B-117 and B-118 ignition coil connectors.



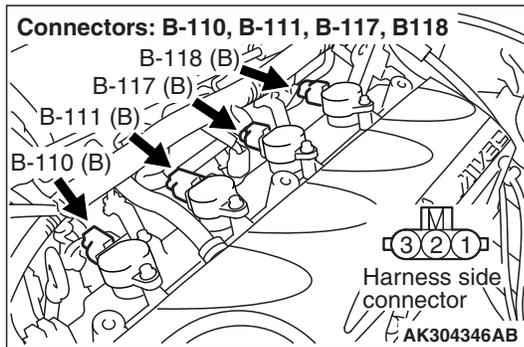
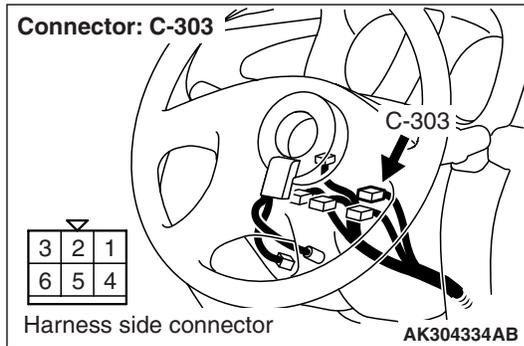
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

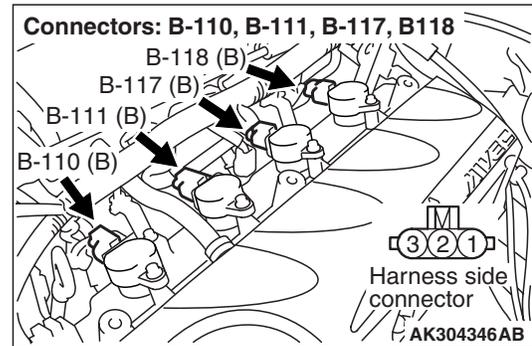
NO : Go to Step 5 .

STEP 5. Connector check: C-303 ignition switch connector**Q: Is the check result normal?**

YES : Check intermediate connectors A-14^{*1}, C-116^{*1}, C-124^{*2}, C-203 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between ignition switch connector and ignition coil connector

- a. Check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-110 (terminal No. 1) No. 1 ignition coil connector
- b. Check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-111 (terminal No. 1) No. 2 ignition coil connector
- c. Check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-117 (terminal No. 1) No. 3 ignition coil connector
- d. Check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-118 (terminal No. 1) No. 4 ignition coil connector
 - Check power supply line for open/short circuit.

NO : Repair.

STEP 6. Perform voltage measurement at B-110, B-111, B-117 and B-118 ignition coil connectors.

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

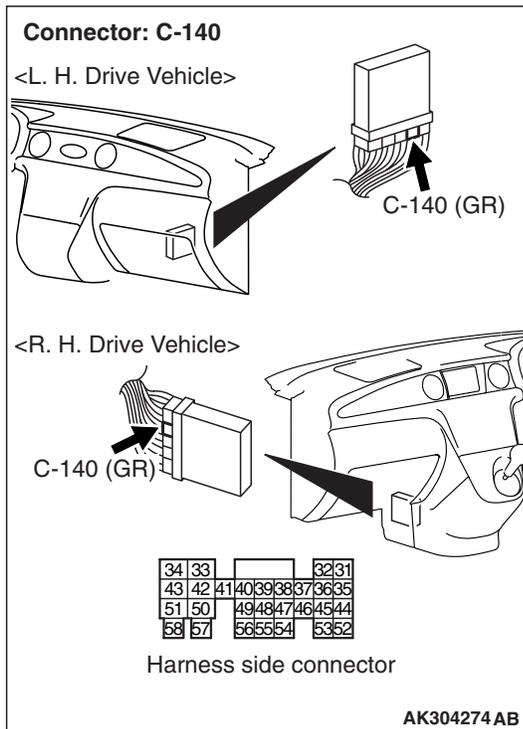
OK: 0.5 – 4.0 V

Q: Is the check result normal?

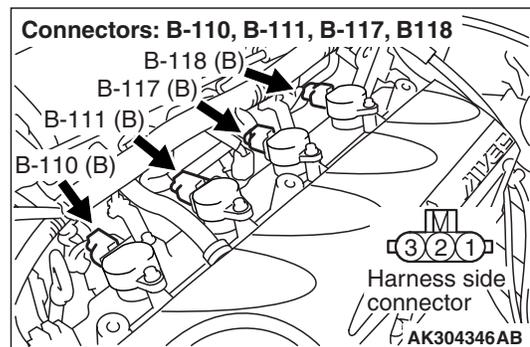
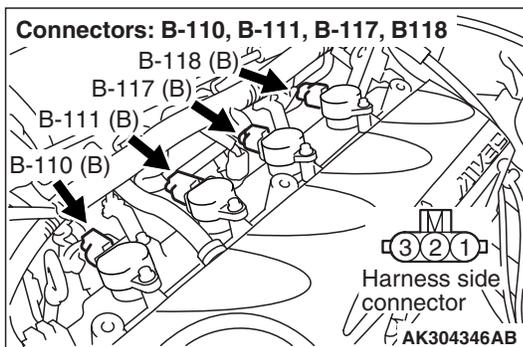
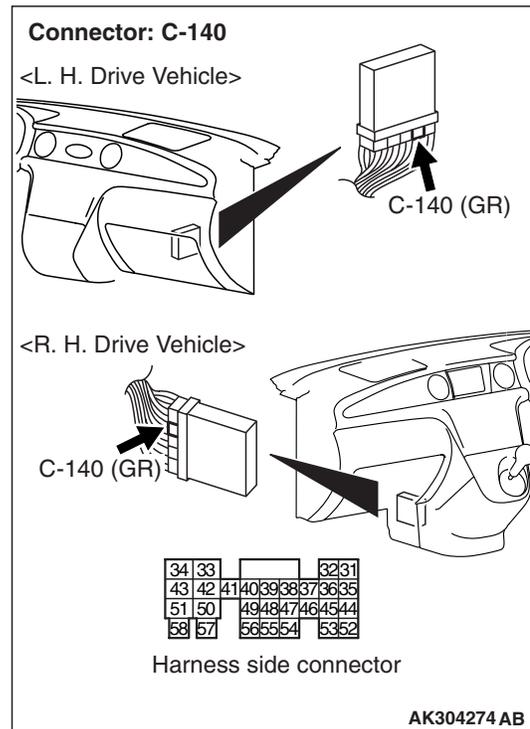
YES : Go to Step 12 .

NO : Go to Step 7 .

STEP 7. Perform voltage measurement at C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T>.



STEP 8. Connector check: C-140 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-110, B-111, B-117 and B-118 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 8 .

NO : Go to Step 9 .

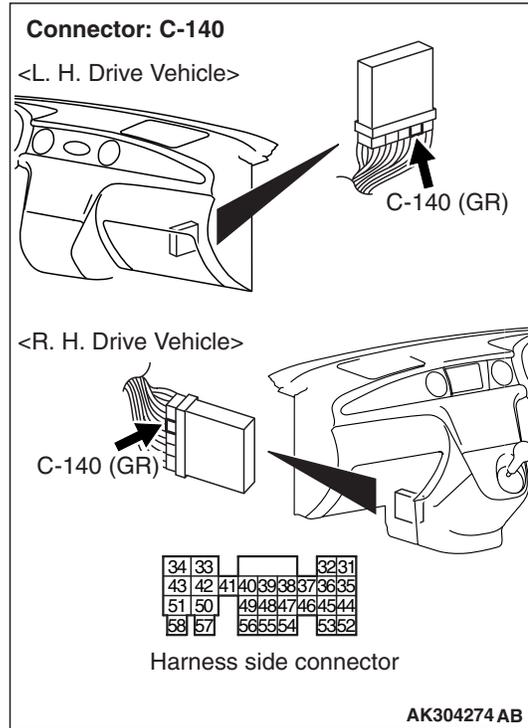
Q: Is the check result normal?

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-110 (terminal No. 3) No. 1 ignition coil connector and C-140 (terminal No. 31) engine-ECU <M/T> or connector engine-A/T-ECU <A/T> connector.
- b. Check and repair harness between B-111 (terminal No. 3) No. 2 ignition coil connector and C-140 (terminal No. 32) engine-ECU <M/T> or connector engine-A/T-ECU <A/T> connector.
- c. Check and repair harness between B-117 (terminal No. 3) No. 3 ignition coil connector and C-140 (terminal No. 35) engine-ECU <M/T> or connector engine-A/T-ECU <A/T> connector.
- d. Check and repair harness between B-118 (terminal No. 3) No. 4 ignition coil connector and C-140 (terminal No. 52) engine-ECU <M/T> or connector engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

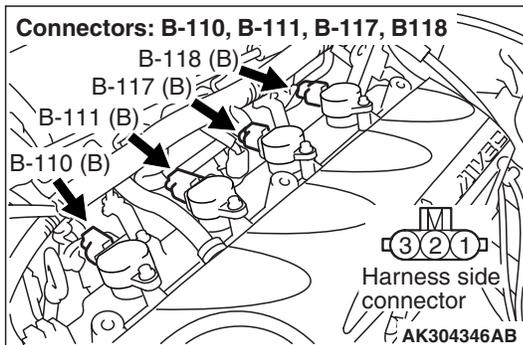
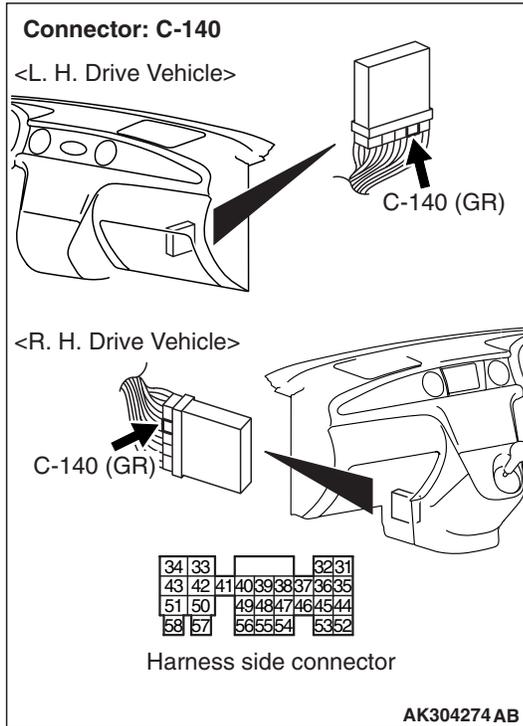
NO : Repair.

STEP 9. Connector check: C-140 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.

STEP 10. Check harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



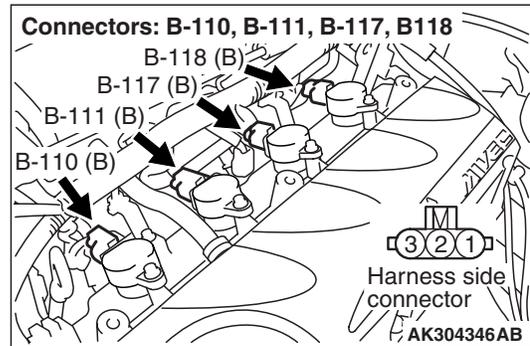
- Check and repair harness between B-110 (terminal No. 3) No. 1 ignition coil connector and C-140 (terminal No. 31) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-111 (terminal No. 3) No. 2 ignition coil connector and C-140 (terminal No. 32) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-117 (terminal No. 3) No. 3 ignition coil connector and C-140 (terminal No. 35) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-118 (terminal No. 3) No. 4 ignition coil connector and C-140 (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 11 .
NO : Repair.

STEP 11. Check the trouble symptoms.

- Q: Does trouble symptom persist?**
YES : Replace engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

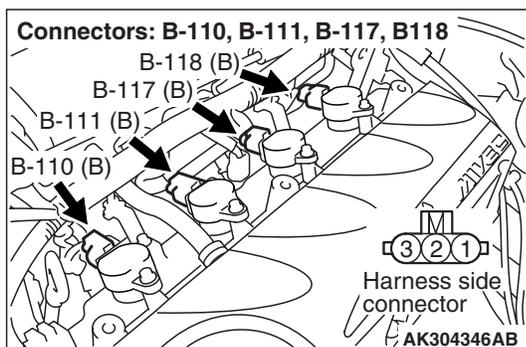
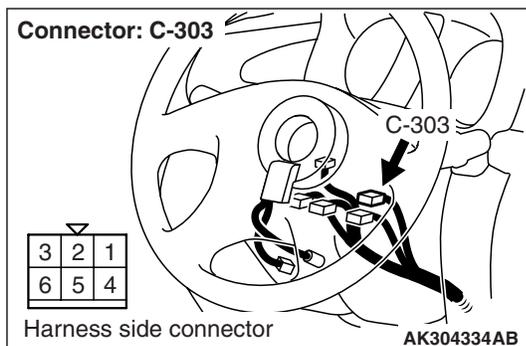
STEP 12. Perform resistance measurement at B-110, B-111, B-117 and B-118 ignition coil connectors.



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

- Q: Is the check result normal?**
YES : Go to Step 13.
NO : Check and repair harness between ignition coil connector and body earth
- Check and repair harness between B-110 (terminal No. 2) No. 1 ignition coil connector and body earth
 - Check and repair harness between B-111 (terminal No. 2) No. 2 ignition coil connector and body earth
 - Check and repair harness between B-117 (terminal No. 2) No. 3 ignition coil connector and body earth
 - Check and repair harness between B-118 (terminal No. 2) No. 4 ignition coil connector and body earth
 - Check earthing line for open circuit and damage.

STEP 13. Check harness between ignition switch connector and ignition coil connector.



- Check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-110 (terminal No. 1) No. 1 ignition coil connector
- Check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-111 (terminal No. 1) No. 2 ignition coil connector
- Check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-117 (terminal No. 1) No. 3 ignition coil connector
- Check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-118 (terminal No. 1) No. 4 ignition coil connector

NOTE: Before checking harness, check intermediate connectors A-14*¹, C-116*¹, C-124*², C-203 and C-205, and repair if necessary.

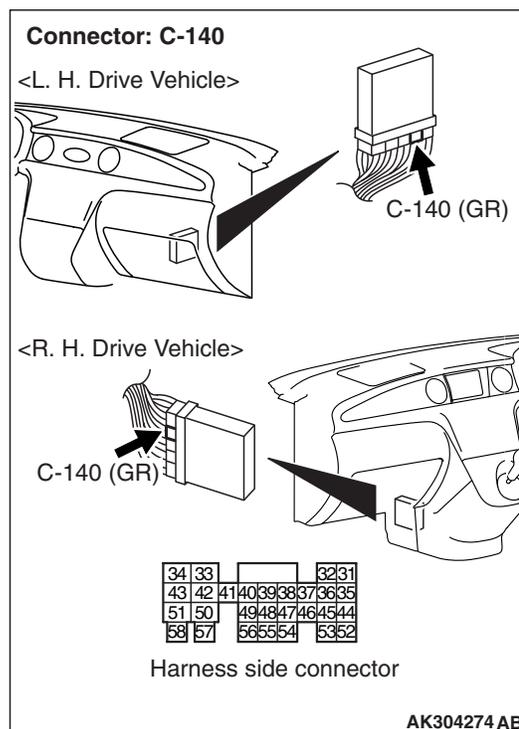
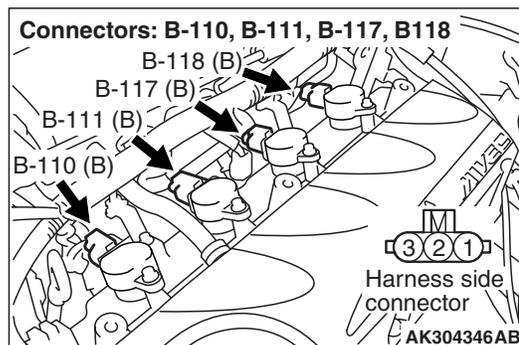
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14. Check harness between ignition coil connector and engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check and repair harness between B-110 (terminal No. 3) No. 1 ignition coil connector and C-140 (terminal No. 31) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-111 (terminal No. 3) No. 2 ignition coil connector and C-140 (terminal No. 32) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-117 (terminal No. 3) No. 3 ignition coil connector and C-140 (terminal No. 35) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
- Check and repair harness between B-118 (terminal No. 3) No. 4 ignition coil connector and C-140 (terminal No. 52) engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
 - Check output line for damage.

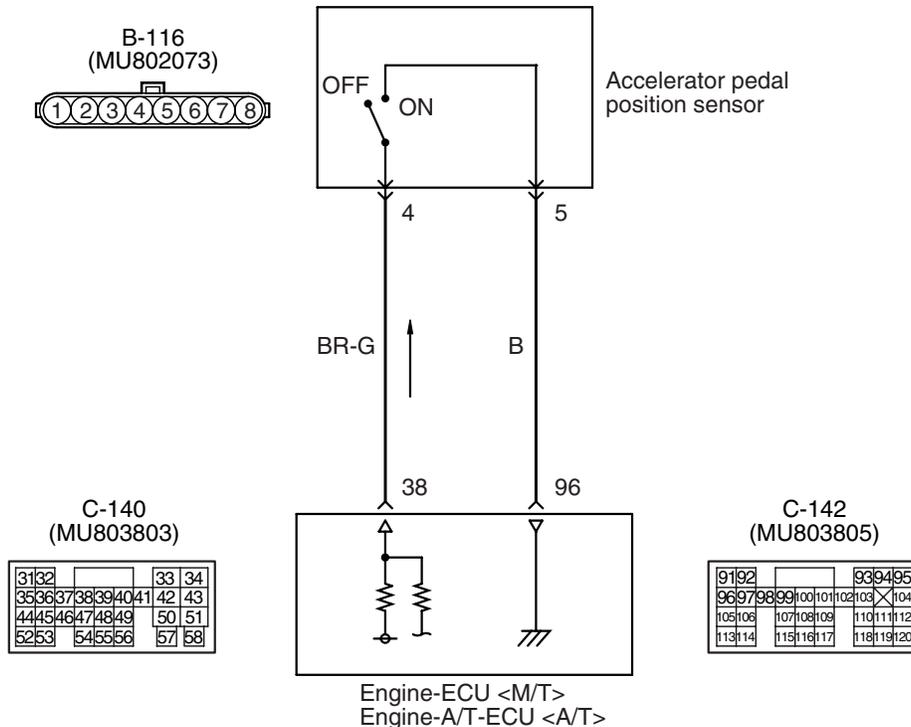
Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

Inspection Procedure 32: 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

AK304332AB

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

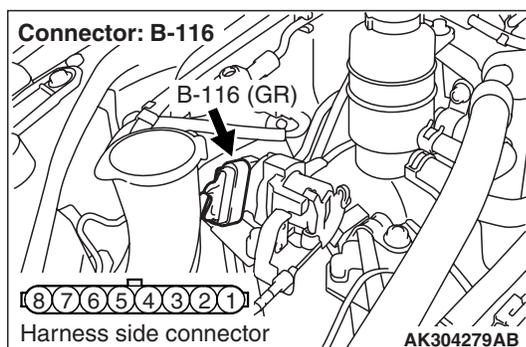
- Accelerator pedal position switch turns OFF when amount of travel of the accelerator pedal exceeds the prescribed value.

- 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>

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-116 accelerator pedal position sensor connector

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair.

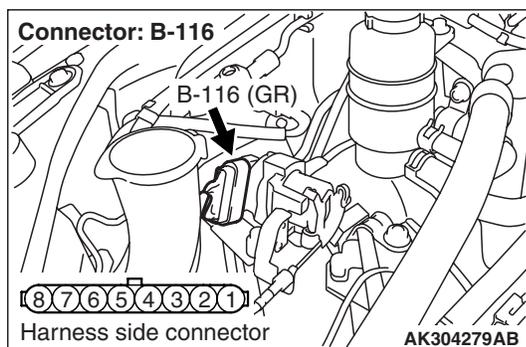
STEP 2. Check accelerator pedal position switch itself

- Check accelerator pedal position switch itself (Refer to P.13C-432).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace accelerator pedal position sensor.

STEP 3. Perform voltage measurement at B-116 accelerator pedal position sensor connector.

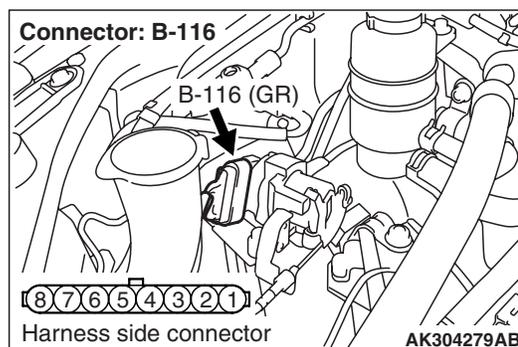
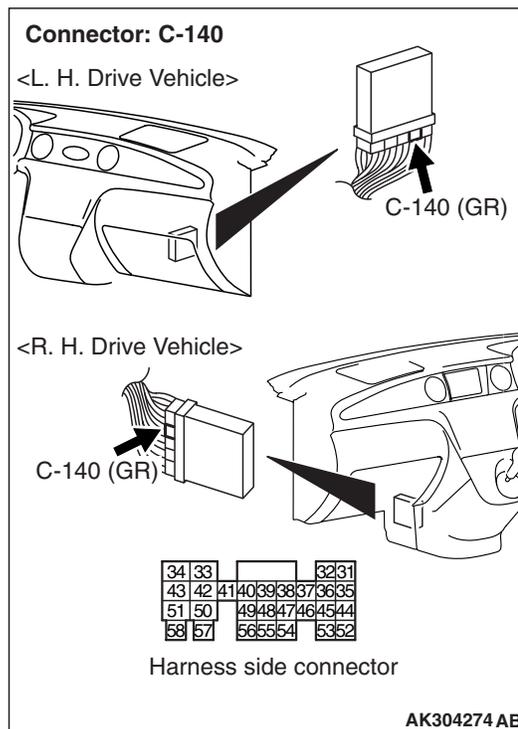
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 4 and earth.

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-140 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-116 accelerator pedal position sensor
- Ignition switch: ON
- Voltage between terminal No. 38 and earth.

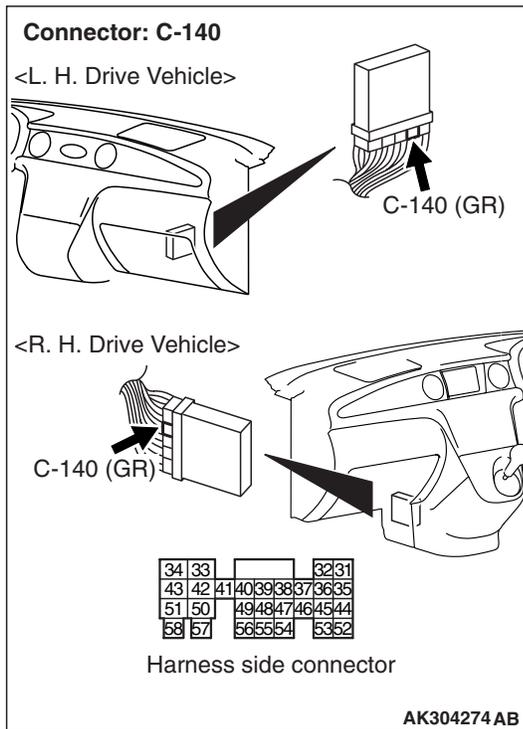
OK: 4.9 – 5.1 V

Q: Is the check result normal?

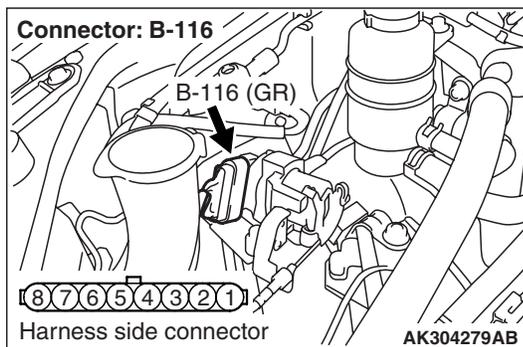
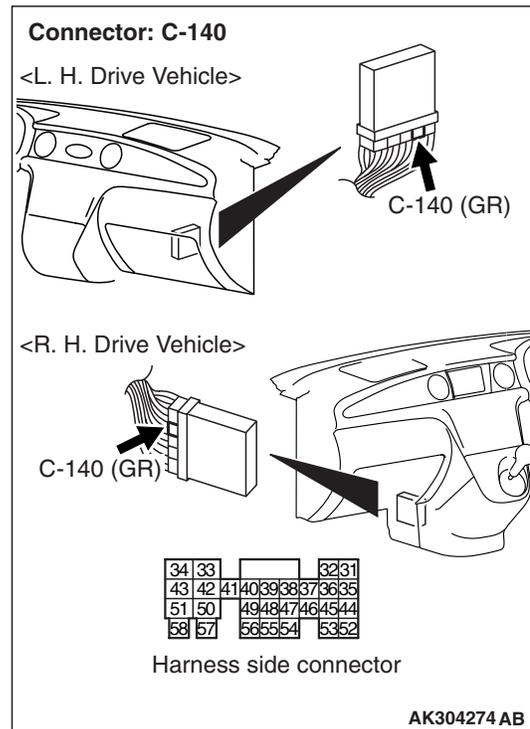
YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



STEP 6. Connector check: C-140 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.

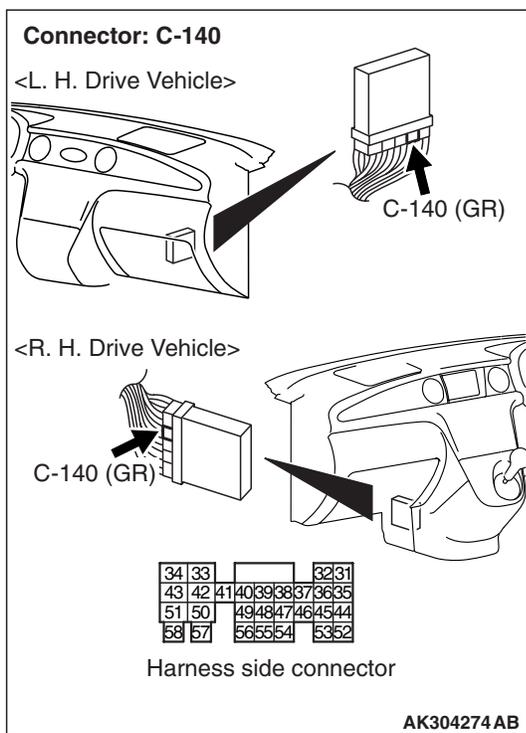
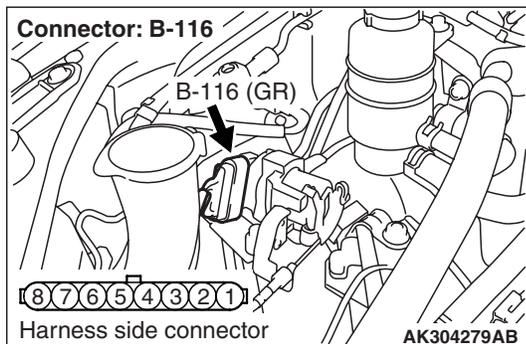
Q: Is the check result normal?

YES : Check and repair harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check output line for open circuit.

NO : Repair.

STEP 7. Check harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

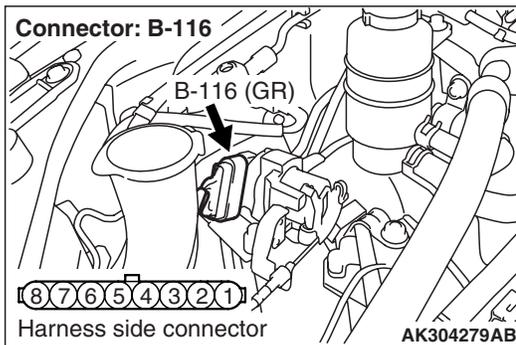


- Check output line for short circuit.

Q: Is the check result normal?

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

STEP 8. Perform resistance measurement at B-116 accelerator pedal position sensor connector.



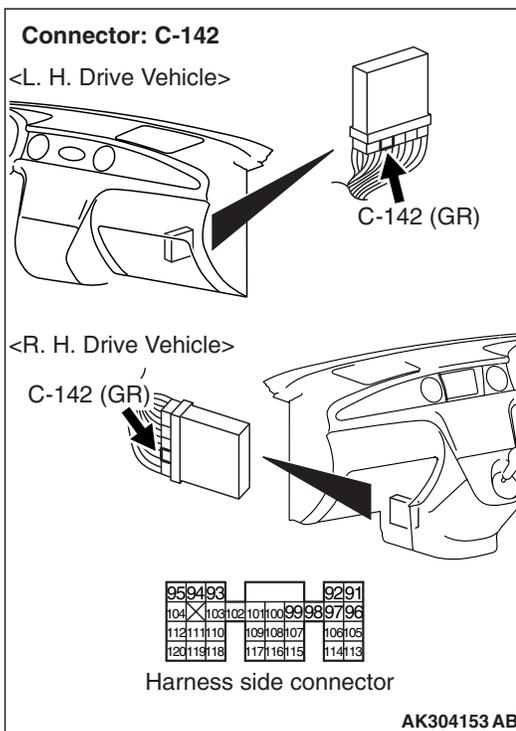
- Disconnect connector and measure at harness side.
- Resistance between terminal No. 5 and earth.
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 11 .
NO : Go to Step 9 .

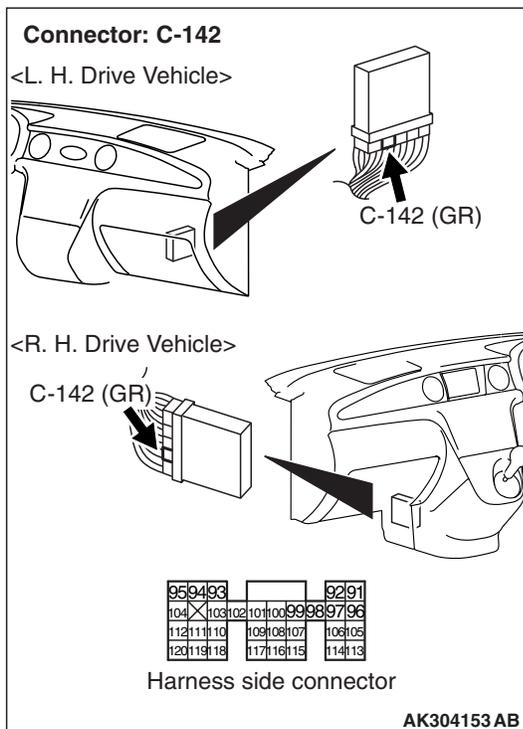
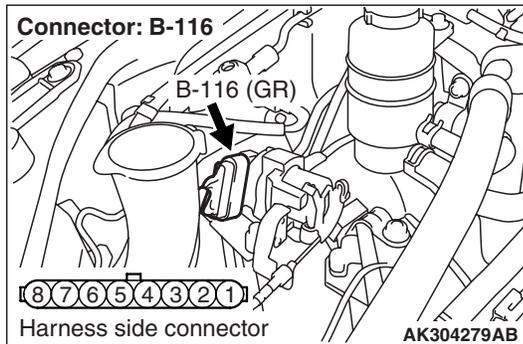
STEP 9. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector

Q: Is the check result normal?



YES : Go to Step 10 .
NO : Repair.

STEP 10. Check harness between B-116 (terminal No. 5) accelerator pedal position sensor connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



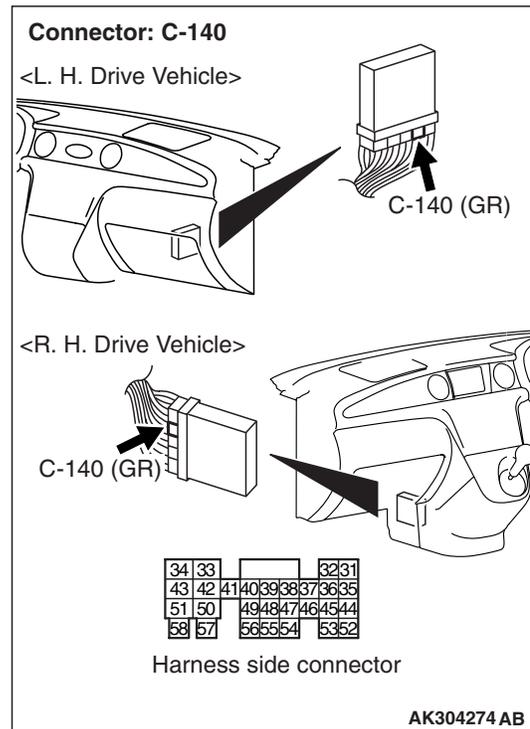
- Check earthing line for open circuit and damage.

Q: Is the check result normal?

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

NO : Repair.

STEP 11. Perform voltage measurement at C-140 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)

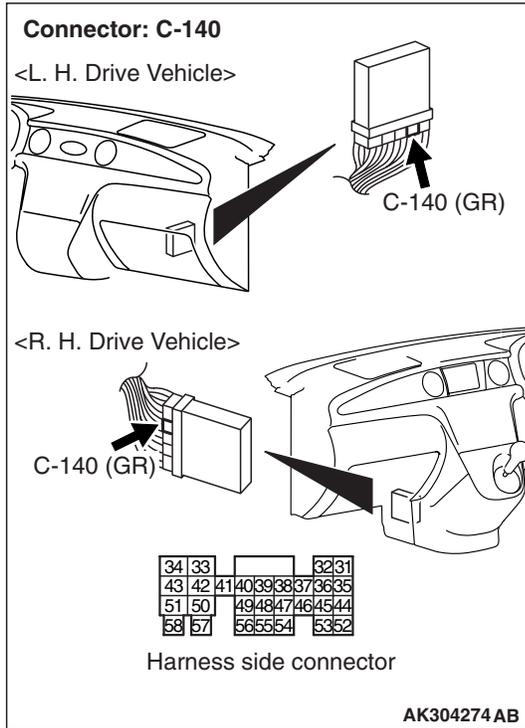
4 V or more (Depress the accelerator pedal)

Q: Is the check result normal?

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

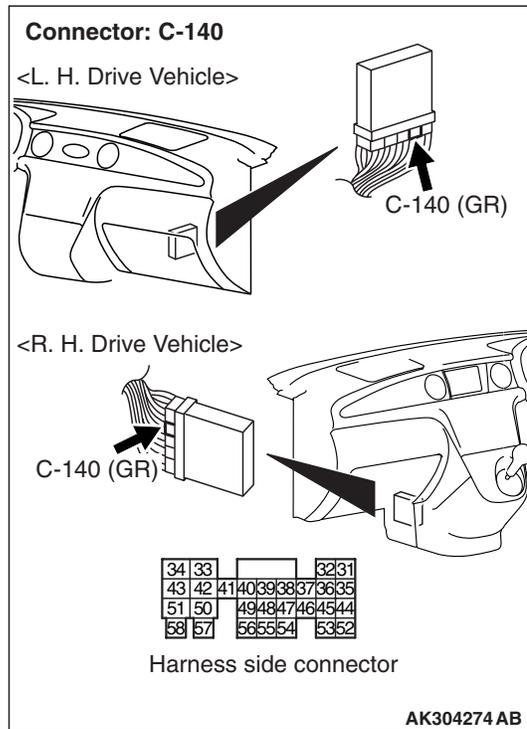
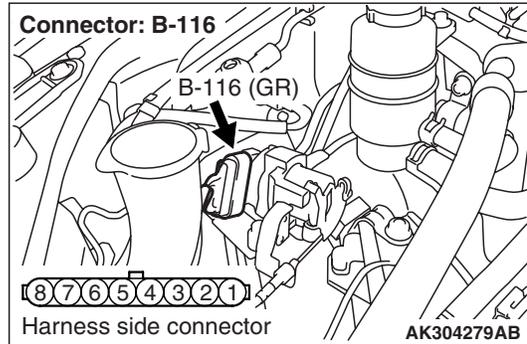
NO : Go to Step 12 .

STEP 12. Connector check: C-140 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



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

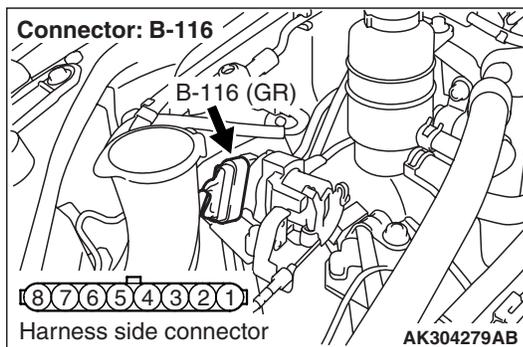
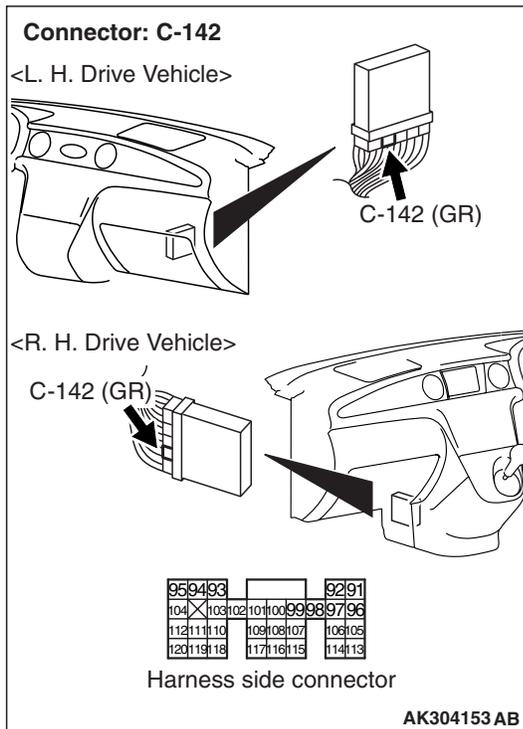
STEP 13. Check harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.



- Check output line for damage.

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

STEP 14. Connector check: C-142 engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector



Q: Is the check result normal?

YES : Check harness between B-116 (terminal No. 5) accelerator pedal position sensor connector and C-142 (terminal No. 96) engine-ECU <M/T> connector or engine-A/T-ECU <A/T> connector.

- Check earthing line for damage.

NO : Repair.

Data List Reference Table

M1131152002764

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page	
11	Cylinder 1,4 oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	200 mV or less	Code No. P0130	P.13C-67
			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	<ul style="list-style-type: none"> • Engine coolant temperature: 85 – 95°C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral <M/T>, "P" range <A/T> 	Idle operation	2.0 – 6.0 g/s	–	–
			2,500 r/min	6.0 – 16.0 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.13C-40
			Intake air temperature: 0°C	0°C		
			Intake air temperature: 20°C	20°C		
			Intake air temperature: 40°C	40°C		
			Intake air temperature: 80°C	80°C		

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page	
14	Throttle position sensor (sub) *4	<ul style="list-style-type: none"> • Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and the connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. • Ignition switch: ON 	Fully close the throttle valve with your finger	2,200 – 2,800 mV	Code No. P0222, P0223	P.13C-146 P.13C-150
			Fully open the throttle valve with your finger	4,600 mV or more		
16	Power supply voltage	Ignition switch: "ON"	System voltage	Procedure No. 24	P.13C-339	
18	Cranking signal (ignition switch-ST)	Ignition switch: "ON"	Engine: Stopped	OFF	Procedure No. 24	P.13C-339
			Engine: Cranking	ON		
21	Engine coolant temperature sensor	Ignition switch: "ON" or engine running	Coolant temperature: –20°C	–20°C	Code No. P0115	P.13C-47
			Coolant temperature: 0°C	0°C		
			Coolant temperature: 20°C	20°C		
			Coolant temperature: 40°C	40°C		
			Coolant temperature: 80°C	80°C		

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page		
22	Crank angle sensor	<ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected 	Compare engine speed on tachometer with the value displayed on M.U.T.-II/III	Matched	Code No. P0335	P.13C-170	
		Engine: Idle operation	Coolant temperature: -20°C	1,275 – 1,475 r/min			
			Coolant temperature: 0°C	1,220 – 1,420 r/min			
			Coolant temperature: 20°C	1,100 – 1,300 r/min			
			Coolant temperature: 40°C	930 – 1,130 r/min			
Coolant temperature: 80°C	600 – 800 r/min						
25	Barometric pressure sensor	Ignition switch: "ON"	Altitude: 0m	101 kPa	Code No. P2226	P.13C-277	
			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. 32	P.13C-395	
			Depress the accelerator pedal	OFF			
27	Power steering fluid pressure switch	Engine: Idle operation	Steering wheel: Not operated	OFF	Code No. P0551	P.13C-206	
			Steering wheel: Operated	ON			
28	A/C switch	Engine: Idle	AC switch: OFF	OFF	Procedure No. 27	P.13C-361	
			AC switch: ON	A/C compressor is not driven			OFF
				A/C compressor is driven			ON
37	Volumetric efficiency	<ul style="list-style-type: none"> Engine coolant temperature: 85 – 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral <M/T>, "P" range <A/T> 	Idle operation	13 – 33%	–	–	
			2,500 r/min	12 – 32%			
			Excessive acceleration	According to acceleration, volumetric efficiency is increased.			

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page		
39	Cylinder 2,3 oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer acceleration)	Excessive deceleration from 4,000 r/min	200 mV or less	Code No. P0150	P.13C-93	
			At excessive acceleration	600 – 1,000 ms			
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU)	Idle operation	400 mV or less			
			2,500 r/min	⇔ 600 – 1,000 mV (altered)			
41	Injectors *2	Engine: Cranking	Coolant temperature: 0°C (all cylinders in simultaneous injecting operation)	60.5 – 80.5 ms	–	–	
			Coolant temperature: 20°C	23.7 – 33.7 ms			
			Coolant temperature: 80°C	7.2 – 13.2 ms			
	Injectors*3	<ul style="list-style-type: none"> • Engine coolant temperature: 80 – 95°C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral <M/T>, "P" range <A/T> 	Idle operation	1.0 – 2.2 ms			
			2,500 r/min	1.0 – 3.1 ms			
			Excessive acceleration	Increased			
44	Ignition advance	<ul style="list-style-type: none"> • Engine: After warm-up • Install timing light (for use to measure actual ignition timing) 	Idle operation	2 – 18°BTDC	Procedure No. 31	P.13C-388	
			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.13C-366	
			A/C switch: ON	A/C compressor is not driven			OFF
				A/C compressor is driven			ON
59	Cylinder 1,4 Oxygen Sensor (rear)	Engine: After warm-up	At excessive acceleration	0 mV or less ⇔ 600 – 1,000 mV (altered)	Code No. P0136	P.13C-79	

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page	
68	EGR valve	<ul style="list-style-type: none"> Engine coolant temperature: 85 – 95°C Lights and all accessories: "OFF" Transmission: Neutral <M/T>, "P" range <A/T> 	Idling	2 – 8 STEP	Code No. P0403	P.13C-189
			2,500 r/min	2 – 8 STEP		
69	Cylinder 2,3 oxygen sensor (rear)	Engine: After warm-up	At excessive acceleration	0 mV or less ⇔ 600 – 1,000 mV (altered)	Code No. P0156	P.13C-106
77	Accelerator pedal position sensor (sub)	Ignition switch: ON	Release the accelerator pedal	335 – 935 mV	Code No. P2126, P2127, P2128	P.13C-259 P.13C-262 P.13C-266
			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	335 – 935 mV	Code No. P2121, P2122, P2123	P.13C-249 P.13C-252 P.13C-256
			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)	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. Ignition switch: ON 	Fully close the throttle valve with your finger	300 – 700 mV	Code No. P0122, P0123	P.13C-54 P.13C-58
			Fully open the throttle valve with your finger	4,000 mV or more		
			No load	520 – 620 mV		
		• Shift lever: "N" → "D" <A/ T>		540 – 640 mV		

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.13C-30
			Altitude: 600 m	95 kPa		
			Altitude: 1,200 m	88 kPa		
			Altitude: 1,800 m	81 kPa		
		<ul style="list-style-type: none"> • Engine coolant temperature: 85 – 95°C • Lights and all accessories: "OFF" • Transmission: Neutral <M/T>, "P" range <A/ T> 	Idle operation	16 – 36 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.13C-54 P.13C-58	
12 *5	Air flow sensor	<ul style="list-style-type: none"> • Engine coolant temperature: 85 – 95°C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral <M/T>, "P" range <A/T> 	Idle operation	2.0 – 6.0 g/s	–	–
			2,500 r/min	8.0 – 16.0 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.13C-40
			Intake air temperature: 0°C	0°C		
			Intake air temperature: 20°C	20°C		
			Intake air temperature: 40°C	40°C		
			Intake air temperature: 80°C	80° C		

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page	
21 *5	Engine coolant temperature sensor	Ignition switch: "ON" or engine running	Coolant temperature: -20°C	-20°C	Code No. P0115	P.13C-47
			Coolant temperature: 0°C	0°C		
			Coolant temperature: 20°C	20°C		
			Coolant temperature: 40°C	40°C		
			Coolant temperature: 80°C	80°C		
22 *5	Crank angle sensor	<ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected 	Compare engine speed on tachometer with the value displayed on M.U.T.-II/III	Matched	—	—
		Engine: Idle operation	Coolant temperature: -20°C	1,275 – 1,475 r/min	—	—
			Coolant temperature: 0°C	1,220 – 1,420 r/min	—	—
			Coolant temperature: 20°C	1,100 – 1,300 r/min	—	—
			Coolant temperature: 40°C	930 – 1,130 r/min	—	—
Coolant temperature: 80°C	600 – 800 r/min	—	—			
24 *5	Vehicle speed sensor	Drive 40 km/h	Approximately 40 km/h	—	—	
44 *5	Ignition advance	<ul style="list-style-type: none"> Engine: After warm-up Install timing light (for use to measure actual ignition timing) 	Idle operation	2 – 18 deg	—	—
			2,500 r/min	22 – 42 deg		
81 *5	Long-term fuel compensation cylinder 1, 4	Engine: After warm-up, 2,500 r/min without any load (during closed loop)	-12.5 to 12.5%	Code No. P0170	P.13C-119	
82 *5	Short-term fuel compensation cylinder 1, 4	Engine: After warm-up, 2,500 r/min without any load (during closed loop)	-25 to 25%	Code No. P0170	P.13C-119	

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page	
83 *5	Long-term fuel compensation on cylinder 2, 3	Engine: After warm-up, 2,500 r/min without any load (during closed loop)	-12.5 to 12.5%	Code No. P0173	P.13C-122	
84 *5	Short-term fuel compensation on cylinder 2, 3	Engine: After warm-up, 2,500 r/min without any load (during closed loop)	-25 to 25%	Code No. P0173	P.13C-122	
87 *5	Calculation load value	Engine: After warm-up	Idle operation	13 – 33%	–	–
			2,500 r/min	10 – 30%		
88 *5	Fuel control condition cylinder 1, 4	Engine: After warm-up	2,500 r/min	Closed loop	–	–
			Acceleration	Open loop-drive condition		
89 *5	Fuel control condition cylinder 2, 3	Engine: After warm-up	2,500 r/min	Closed loop	–	–
			Acceleration	Open loop-drive condition		
8A *5	Throttle position sensor (main) *4	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor, and then connect terminal numbers No. 3, and No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. Ignition switch: ON 	Fully close the throttle valve with your finger	0 – 5%	Code No. P0122, P0123	P.13C-54 P.13C-58
			Fully open the throttle valve with your finger	88% or more		
A1 *5	Cylinder 1, 4 oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	0.2 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0130	P.13C-67
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU <M/T> or engine-A/T-ECU <A/T>)	Idle operation 2,500 r/min	0.4 V or less ⇔ 0.6 – 1 V (altered)		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
A2 *5	Cylinder 1, 4 oxygen sensor (rear)	Engine: After warm-up	At excessive acceleration	0 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0136	P.13C-79
A3 *5	Cylinder 2,3 oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	0.2 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0150	P.13C-93
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU <M/T> or engine-A/T-ECU <A/T>)	Idle operation 2,500 r/min	0.4 V or less ⇔ 0.6 – 1V (altered)		
A4 *5	Cylinder 2,3 oxygen sensor (rear)	Engine: After warm-up	At excessive acceleration	0 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0156	P.13C-106
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.*

Actuator Test Reference Table

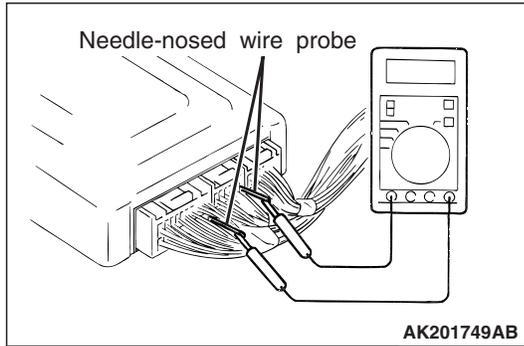
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Item No.	Inspection item	Drive content	Inspection conditions		Normal condition	Code No. /Inspection procedure No.	Reference page
01	Injector	Cut off No. 1 injector	Engine: After warm-up, idle operation (Cut off injectors sequentially to check for a cylinder that does not change engine in idle status.		Engine is changed (becomes unstable or stalled)	Code No. P0201	P.13C-126
02		Cut off No. 2 injector				Code No. P0202	P.13C-131
03		Cut off No. 3 injector				Code No. P0203	P.13C-136
04		Cut off No. 4 injector				Code No. P0204	P.13C-141
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.13C-345
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.13C-196
17	Basic ignition timing	Switch engine-ECU <M/T> or engine-A/T-ECU <A/T> to ignition timing adjusting mode	<ul style="list-style-type: none"> • Engine: Idle operation • Install timing light 		5° BTDC	—	—
21	Fan controller	Actuate fan motor	<ul style="list-style-type: none"> • Ignition switch: "ON" • A/C switch: ON 		Fan motor is rotated	Procedure No. 22	P.13C-334
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. P1010	P.13C-227
34	Throttle valve control servo	Stop the throttle valve control servo	Ignition switch: "ON"		Throttle valve is open	Code No. P2100, P2101, P2102, P2103	P.13C-236 P.13C-240 P.13C-243 P.13C-246

CHECK AT THE ECU TERMINALS

M1131153500971

TERMINAL VOLTAGE CHECK CHART



1. Connect a needle-nosed wire probe to a voltmeter probe.
2. Insert the needle-nosed wire probe into each of the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector terminals from the wire side, and measure the voltage while referring to the check chart.

NOTE:

1. Make the voltage measurement with the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector connected.
2. You may find it convenient to pull out the engine-ECU <M/T> or engine-A/T-ECU <A/T> to make it easier to reach the connector terminals.
3. The checks can be carried out off the order given in the chart.

CAUTION

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU <M/T> or engine-A/T-ECU <A/T> or all of them. Be careful to prevent this!

3. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

Engine-ECU <M/T> or engine-A/T-ECU <A/T> Connector Terminal Arrangement

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

C-139	C-140	C-141	C-142	C-138
1	32	34	92	122
2	31	33	91	121
5	37	38	98	126
6	36	39	97	125
14	40	40	100	134
15	49	41	101	135
21	56	42	109	143
	53	43	108	142
	52	44	107	141
	51	45	110	140
	50	46	111	139
	49	47	112	138
	48	48	119	137
	55	49	118	136
	54	50	117	144
	53	51	116	
	52	52	115	
	51	53	114	
	50	54	113	
	49	55	112	
	48	56	111	
	47	57	110	
	46	58	109	
	45	59	108	
	44	60	107	
	43	61	106	
	42	62	105	
	41	63	104	
	40	64	103	
	39	65	102	
	38	66	101	
	37	67	100	
	36	68	99	
	35	69	98	
	34	70	97	
	33	71	96	
	32	72	95	
	31	73	94	
	30	74	93	
	29	75	92	
	28	76	91	
	27	77	90	
	26	78	89	
	25	79	88	
	24	80	87	
	23	81	86	
	22	82	85	
	21	83	84	
	20	84	83	
	19	85	82	
	18	86	81	
	17	87	80	
	16	88	79	
	15	89	78	
	14	90	77	
	13	91	76	
	12	92	75	
	11	93	74	
	10	94	73	
	9	95	72	
	8	96	71	
	7	97	70	
	6	98	69	
	5	99	68	
	4	100	67	
	3	101	66	
	2	102	65	
	1	103	64	

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Terminal No.	Check item	Check condition (Engine condition)	Normal condition
1	No. 1 injector	While engine is idling after having warmed up, suddenly depress the accelerator pedal.	From 9 – 13 V*, momentarily drops slightly
5	No. 2 injector		
14	No. 3 injector		
21	No. 4 injector		
3	EGR valve (A)	Ignition switch: Immediately after turning ON	5 – 8 V* (fluctuates for approximately 3 seconds)
12	EGR valve (B)		
19	EGR valve (C)		
26	EGR valve (D)		
7	Engine warning lamp	Ignition switch: "LOCK" (OFF) → "ON"	1 V or less → System voltage (After several seconds have elapsed)

Terminal No.	Check item	Check condition (Engine condition)	Normal condition	
8	A/C relay	<ul style="list-style-type: none"> • Engine: Idle speed • A/C switch: OFF → ON (A/C compressor is operating) 	System voltage → 1 V or less	
10	Cylinder 2,3 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	Cylinder 2,3 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	
24	Cylinder 1,4 oxygen sensor heater (rear)	Engine: Idling after warming up	1 V or less	
		Engine: 5,000 r/min	System voltage	
25	Cylinder 1,4 oxygen sensor heater (front)	Engine: Idling after warming up	9 – 11 V	
		Engine: Racing	System voltage	
31	Ignition coil – No. 1	Engine r/min: 3,000 r/min	0.3 – 3.0 V*	
32	Ignition coil – No. 2			
35	Ignition coil – No. 3			
52	Ignition coil – No. 4			
34	Power supply	Ignition switch: "ON"	System voltage	
43				
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	<ul style="list-style-type: none"> • Engine: Warm, idle (radiator fan: OFF) • Headlamp: OFF → ON • Stop lamp: OFF → ON • Rear defogger switch: OFF → ON 	Voltage increases	
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	

Terminal No.	Check item	Check condition (Engine condition)	Normal condition	
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	<ul style="list-style-type: none"> Ignition switch: "ON" Move the vehicle forward slowly 	0 ↔ 5 V Changes repeatedly	
86	Alternator FR terminal	<ul style="list-style-type: none"> Engine: Warm, idle (radiator fan: OFF) Headlamp: OFF → ON Stop lamp: OFF → ON Rear defogger switch: OFF → ON 	Voltage decreases	
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	
95	Oil control valve	Ignition switch: "ON"	System voltage	
		Engine: warming up, 4,500 r/min	4.0 – 10 V*	
97	Sensor impressed voltage	Ignition switch: "ON"	4.9 – 5.1 V	
98	Engine coolant temperature sensor	Ignition switch: "ON"	When engine coolant temperature is –20°C	3.9 – 4.5 V
			When engine coolant temperature is 0°C	3.2 – 3.8 V
			When engine coolant temperature is 20°C	2.3 – 2.9 V
			When engine coolant temperature is 40°C	1.3 – 1.9 V
			When engine coolant temperature is 60°C	0.7 – 1.3 V
			When engine coolant temperature is 80°C	0.3 – 0.9 V

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
99	Intake air temperature sensor	Ignition switch: "ON"	When intake air temperature is -20°C	3.8 – 4.4 V
			When intake air temperature is 0°C	3.2 – 3.8 V
			When intake air temperature is 20°C	2.3 – 2.9 V
			When intake air temperature is 40°C	1.5 – 2.1 V
			When intake air temperature is 60°C	0.8 – 1.4 V
			When intake air temperature is 80°C	0.4 – 1.0 V
101	Manifold absolute pressure sensor	Engine: idling		0.8 – 2.4 V
		<ul style="list-style-type: none"> • 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	Cylinder 2,3 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)
109	Cylinder 1,4 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)
113	Throttle position sensor (sub)	<ul style="list-style-type: none"> • Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool (MB991658). • Ignition switch: "ON" 	Fully close the throttle valve with your finger	2.2 – 2.8 V
			Fully open the throttle valve with your finger	4.6 V or more
114	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	0.335 – 0.935 V
			Depress the accelerator pedal fully	4.0 V or more

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
115	Throttle position sensor (main)	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool (MB991658). Ignition switch: "ON" 	Fully close the throttle valve with your finger	0.3 – 0.7 V
			Fully open the throttle valve with your finger	4.0 V or more
116	Cylinder 2,3 oxygen sensor (rear)	Engine: Idling after warmed up (Check using a digital type voltmeter)		0 ⇔ 0.6 V (Changes repeatedly)
117	Cylinder 1,4 oxygen sensor (rear)	Engine: Idling after warmed up (Check using a digital type voltmeter)		0 ⇔ 0.6 V (Changes repeatedly)
118	A/C pressure sensor	<ul style="list-style-type: none"> Engine: Idling A/C switch: ON 	When A/C is "MAX, COOL" condition (when the load by A/C is high)	2.2 V or more
			When A/C is "MAX, HOT" condition (when the load by A/C is low)	1.8 V or less
132	Power supply voltage applied to throttle valve control servo	Ignition switch: "ON"		System voltage
133	Throttle valve control servo (+)	<ul style="list-style-type: none"> Ignition switch: "ON" Accelerator pedal: fully opened → fully closed 		Decreases slightly (approximately 2 V) from battery voltage.
141	Throttle valve control servo (–)	<ul style="list-style-type: none"> Ignition switch: "ON" Accelerator pedal: fully closed → fully opened 		Decreases slightly (approximately 2 V) from battery voltage.

NOTE: *:The average voltage is shown when an analog voltmeter is used (because the average voltage might not be shown stably when digital voltmeter is used).

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to "LOCK" (OFF) position.
2. Disconnect the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU <M/T> or engine-A/T-ECU <A/T> harness-side connector while referring to the check chart.

NOTE:

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

CAUTION

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

4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and the repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-ECU <M/T> or engine-A/T-ECU <A/T> Harness Side Connector Terminal Arrangement

Engine-ECU <M/T> or Engine-A/T-ECU <A/T> Harness Side Connector

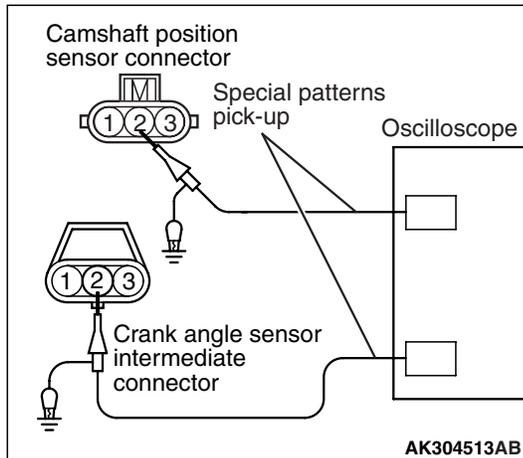
C-138	C-142	C-141	C-140	C-139
123 124	121 122	92 91	62 61	32 31
132 133	104 105	72 73	43 44	4 5
142 143	111 112	81 82	51 52	13 14
131 139	103 104	88 89	57 58	20 21
128 129	109 110	80 81	54 55	27 28
136 137	118 119	88 89	56 57	34 35
144 145	127 128	114 115	84 85	42 43
	135 136	117 118	86 87	50 51
	142 143	117 118	87 88	58 59
	143 144	117 118	87 88	66 67
	144 145	117 118	87 88	74 75
	145 146	117 118	87 88	82 83
		117 118	87 88	90 91
		117 118	87 88	98 99
		117 118	87 88	106 107
		117 118	87 88	114 115
		117 118	87 88	122 123
		117 118	87 88	130 131
		117 118	87 88	138 139
		117 118	87 88	146 147
		117 118	87 88	154 155
		117 118	87 88	162 163
		117 118	87 88	170 171
		117 118	87 88	178 179
		117 118	87 88	186 187
		117 118	87 88	194 195
		117 118	87 88	202 203
		117 118	87 88	210 211
		117 118	87 88	218 219
		117 118	87 88	226 227
		117 118	87 88	234 235
		117 118	87 88	242 243
		117 118	87 88	250 251
		117 118	87 88	258 259
		117 118	87 88	266 267
		117 118	87 88	274 275
		117 118	87 88	282 283
		117 118	87 88	290 291
		117 118	87 88	298 299
		117 118	87 88	306 307
		117 118	87 88	314 315
		117 118	87 88	322 323
		117 118	87 88	330 331
		117 118	87 88	338 339
		117 118	87 88	346 347
		117 118	87 88	354 355
		117 118	87 88	362 363
		117 118	87 88	370 371
		117 118	87 88	378 379
		117 118	87 88	386 387
		117 118	87 88	394 395
		117 118	87 88	402 403
		117 118	87 88	410 411
		117 118	87 88	418 419
		117 118	87 88	426 427
		117 118	87 88	434 435
		117 118	87 88	442 443
		117 118	87 88	450 451
		117 118	87 88	458 459
		117 118	87 88	466 467
		117 118	87 88	474 475
		117 118	87 88	482 483
		117 118	87 88	490 491
		117 118	87 88	498 499
		117 118	87 88	506 507
		117 118	87 88	514 515
		117 118	87 88	522 523
		117 118	87 88	530 531
		117 118	87 88	538 539
		117 118	87 88	546 547
		117 118	87 88	554 555
		117 118	87 88	562 563
		117 118	87 88	570 571
		117 118	87 88	578 579
		117 118	87 88	586 587
		117 118	87 88	594 595
		117 118	87 88	602 603
		117 118	87 88	610 611
		117 118	87 88	618 619
		117 118	87 88	626 627
		117 118	87 88	634 635
		117 118	87 88	642 643
		117 118	87 88	650 651
		117 118	87 88	658 659
		117 118	87 88	666 667
		117 118	87 88	674 675
		117 118	87 88	682 683
		117 118	87 88	690 691
		117 118	87 88	698 699
		117 118	87 88	706 707
		117 118	87 88	714 715
		117 118	87 88	722 723
		117 118	87 88	730 731
		117 118	87 88	738 739
		117 118	87 88	746 747
		117 118	87 88	754 755
		117 118	87 88	762 763
		117 118	87 88	770 771
		117 118	87 88	778 779
		117 118	87 88	786 787
		117 118	87 88	794 795
		117 118	87 88	802 803
		117 118	87 88	810 811
		117 118	87 88	818 819
		117 118	87 88	826 827
		117 118	87 88	834 835
		117 118	87 88	842 843
		117 118	87 88	850 851
		117 118	87 88	858 859
		117 118	87 88	866 867
		117 118	87 88	874 875
		117 118	87 88	882 883
		117 118	87 88	890 891
		117 118	87 88	898 899
		117 118	87 88	906 907
		117 118	87 88	914 915
		117 118	87 88	922 923
		117 118	87 88	930 931
		117 118	87 88	938 939
		117 118	87 88	946 947
		117 118	87 88	954 955
		117 118	87 88	962 963
		117 118	87 88	970 971
		117 118	87 88	978 979
		117 118	87 88	986 987
		117 118	87 88	994 995
		117 118	87 88	1002 1003
		117 118	87 88	1010 1011
		117 118	87 88	1018 1019
		117 118	87 88	1026 1027
		117 118	87 88	1034 1035
		117 118	87 88	1042 1043
		117 118	87 88	1050 1051
		117 118	87 88	1058 1059
		117 118	87 88	1066 1067
		117 118	87 88	1074 1075
		117 118	87 88	1082 1083
		117 118	87 88	1090 1091
		117 118	87 88	1098 1099
		117 118	87 88	1106 1107
		117 118	87 88	1114 1115
		117 118	87 88	1122 1123
		117 118	87 88	1130 1131
		117 118	87 88	1138 1139
		117 118	87 88	1146 1147
		117 118	87 88	1154 1155
		117 118	87 88	1162 1163
		117 118	87 88	1170 1171
		117 118	87 88	1178 1179
		117 118	87 88	1186 1187
		117 118	87 88	1194 1195
		117 118	87 88	1202 1203
		117 118	87 88	1210 1211
		117 118	87 88	1218 1219
		117 118	87 88	1226 1227
		117 118	87 88	1234 1235
		117 118	87 88	1242 1243
		117 118	87 88	1250 1251
		117 118	87 88	1258 1259
		117 118	87 88	1266 1267
		117 118	87 88	1274 1275
		117 118	87 88	1282 1283
		117 118	87 88	1290 1291
		117 118	87 88	1298 1299
		117 118	87 88	1306 1307
		117 118	87 88	1314 1315
		117 118	87 88	1322 1323
		117 118	87 88	1330 1331
		117 118	87 88	1338 1339
		117 118	87 88	1346 1347
		117 118	87 88	1354 1355
		117 118	87 88	1362 1363
		117 118	87 88	1370 1371
		117 118	87 88	1378 1379
		117 118	87 88	1386 1387
		117 118	87 88	1394 1395
		117 118	87 88	1402 1403
		117 118	87 88	1410 1411
		117 118	87 88	1418 1419
		117 118	87 88	1426 1427
		117 118	87 88	1434 1435
		117 118	87 88	1442 1443
		117 118	87 88	1450 1451
		117 118	87 88	1458 1459
		117 118	87 88	1466 1467
		117 118	87 88	1474 1475
		117 118	87 88	1482 1483
		117 118	87 88	1490 1491
		117 118	87 88	1498 1499
		117 118	87 88	1506 1507
		117 118	87 88	1514 1515
		117 118	87 88	1522 1523
		117 118	87 88	1530 1531
		117 118	87 88	1538 1539
		117 118	87 88	1546 1547
		117 118	87 88	1554 1555

Terminal No.	Inspection item	Normal condition (Check condition)
23 – 34	Purge control solenoid valve	30 – 34 Ω (At 20°C)
33 – Body earth	ECU earth	Continuity (2 Ω or less)
42 – Body earth		
144 – Body earth		
145 – Body earth		
34 – 95	Oil control valve	6.9 – 7.9 Ω (at 20°C)
96 – 98	Engine coolant temperature sensor	14 – 17 k Ω (When coolant temperature is –20°C)
		5.1 – 6.5 k Ω (When coolant temperature is 0°C)
		2.1 – 2.7 k Ω (When coolant temperature is 20°C)
		0.9 – 1.3 k Ω (When coolant temperature is 40°C)
		0.48 – 0.68 k Ω (When coolant temperature is 60°C)
96 – 99	Intake air temperature sensor	0.26 – 0.36 k Ω (When coolant temperature is 80°C)
		13 – 17 k Ω (When intake air temperature is –20°C)
		5.3 – 6.7 k Ω (When intake air temperature is 0°C)
		2.3 – 3.0 k Ω (When intake air temperature is 20°C)
		1.0 – 1.5 k Ω (When intake air temperature is 40°C)
		0.56 – 0.76 k Ω (When intake air temperature is 60°C)
133 – 141	Throttle actuator control motor	0.30 – 0.42 k Ω (When intake air temperature is 80°C)
		0.3 – 80 Ω (at 20°C)

INSPECTION PROCEDURE USING OSCILLOSCOPE

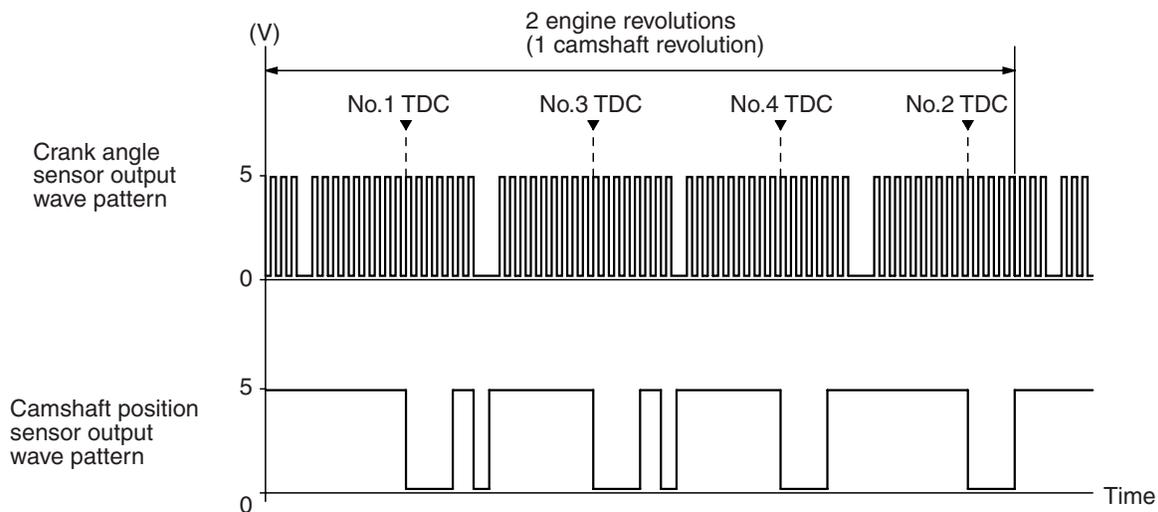
The output signals of the sensors and the conditions of the actuation signals of the actuators can be inspected visually by observing the waveforms on the oscilloscope.

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).

Standard Wave Pattern



TDC: Top dead centre

AK304514AB

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

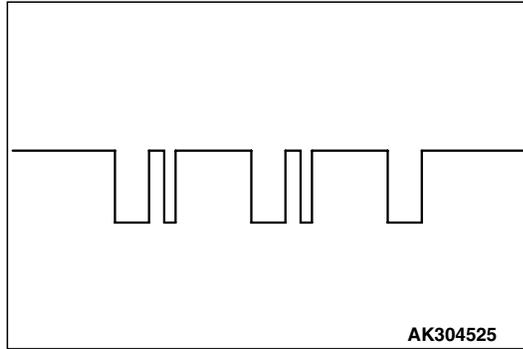
Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine speed	Idle

Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.

Examples of Abnormal Wave Patterns



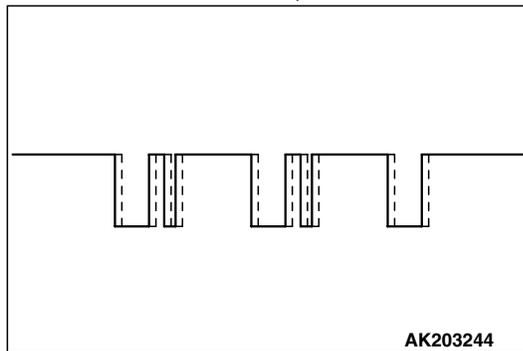
Example 1

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

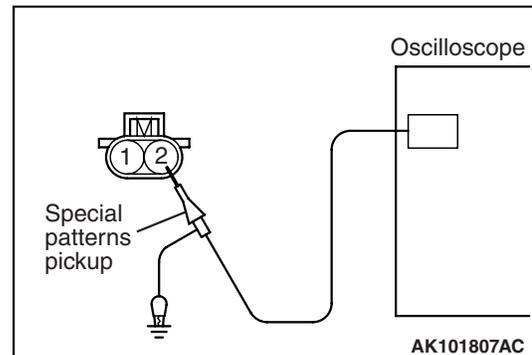
Abnormality in sensor disk

Wave pattern characteristics

Wave pattern is displaced to the left or right.

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)

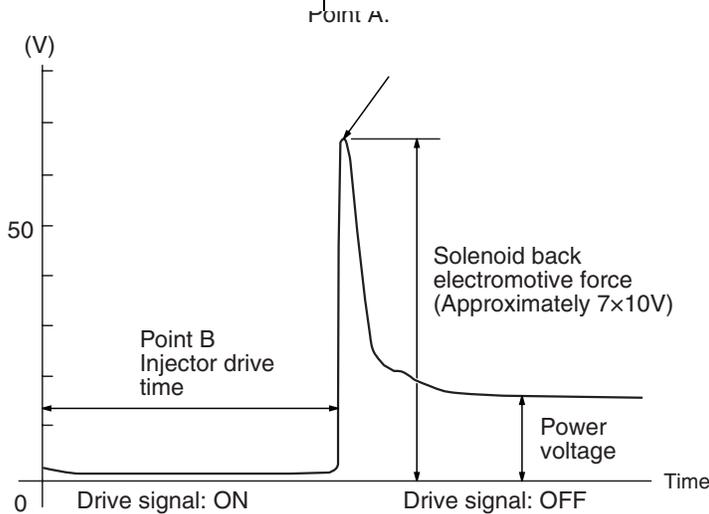
1. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 1 (When checking the No. 1 cylinder).
2. Connect the oscilloscope special patterns pickup to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 5 (When checking the No. 2 cylinder).
3. Connect 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



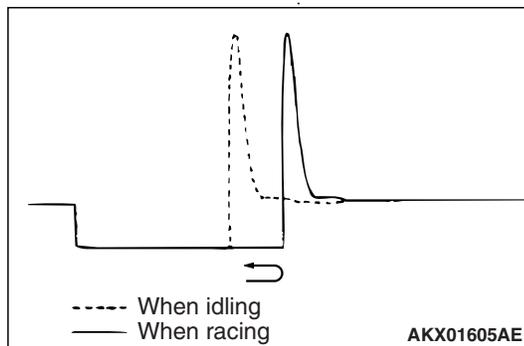
AK301250AC

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 all.

Point B: Injector drive time

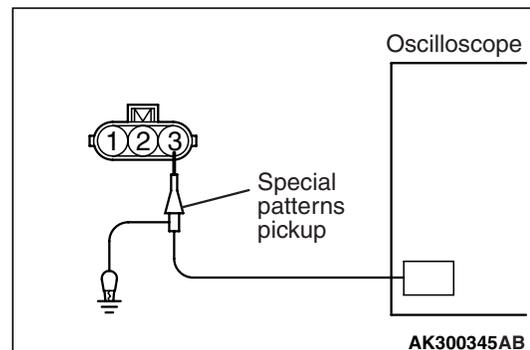


The injector drive time will be synchronized with the M.U.T.-II tester display.

- 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.

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.)

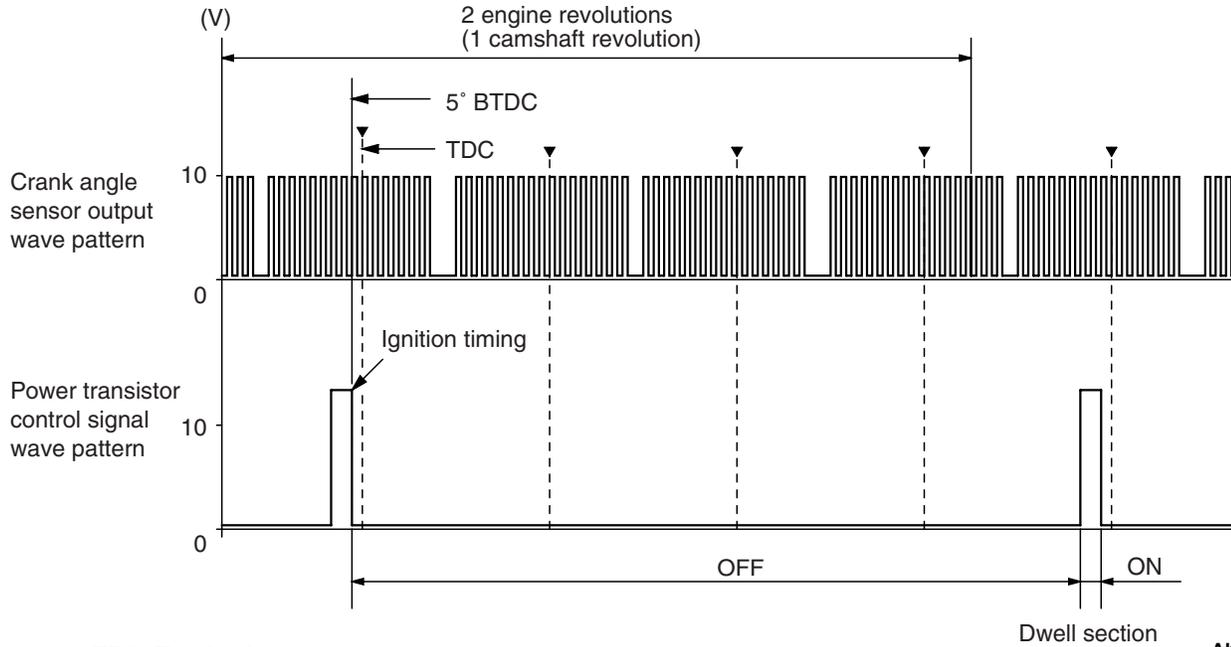
2. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 32. (When checking the number 2 cylinder.)
3. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 35. (When checking the number 3 cylinder.)
4. Connect the oscilloscope probe 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

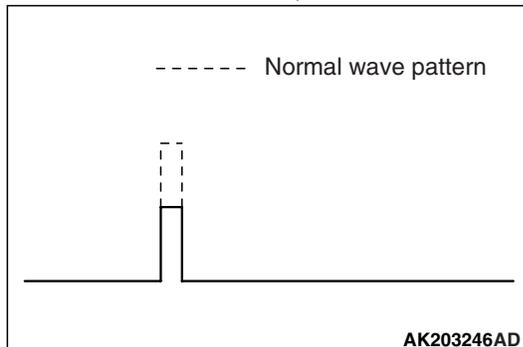
Dwell section

AK203245AC

Wave Pattern Observation Points

Point: When the engine speed increases, verify that the power transistor control signal (ignition timing) advances.

Examples of Abnormal Wave Patterns



Example

Wave pattern during engine cranking

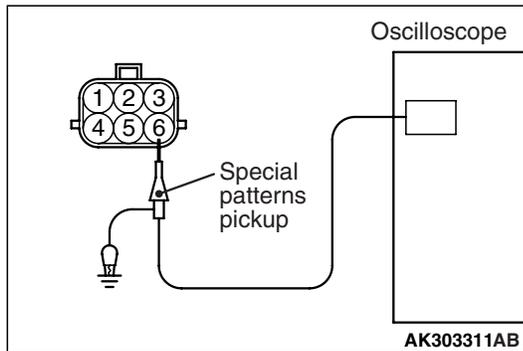
Cause of problem

Open-circuit in ignition primary circuit

Wave pattern characteristics

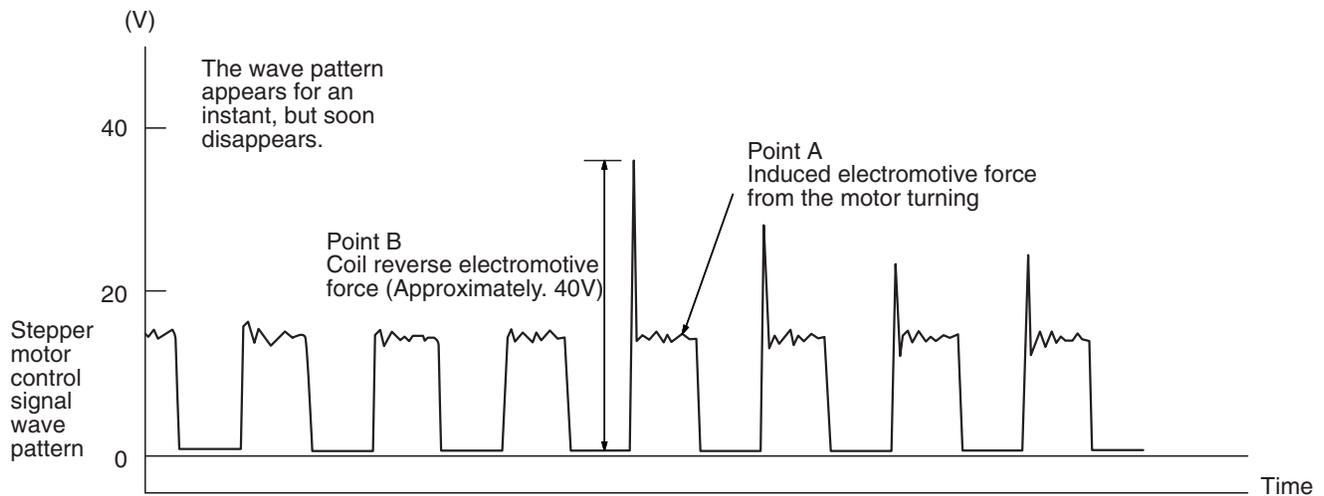
Top-right part of the build-up section cannot be seen, and voltage value is approximately 2 V too low.

EGR VALVE (STEPPER MOTOR) Measurement Method



1. Disconnect the EGR valve connector, and connect the special tool test harness (MB991658) in between.
2. Connect the oscilloscope probe to the EGR valve-side connector terminal 1, terminal 3, terminal 4 and terminal 6 respectively.

Standard wave pattern



AK301251AB

Wave pattern Observation Points

Check that the standard wave pattern appears when the EGR control servo is operating.

Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

Contrast with standard wave pattern	Probable cause
Induced electromotive force does not appear or is extremely small.	Motor is malfunctioning

Alternate Method (Test Harness not Available)

1. Connect the oscilloscope probe to engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal No. 3, connection terminal No. 12, connection terminal No. 19, and connection terminal No. 26 respectively.

Standard Wave Pattern

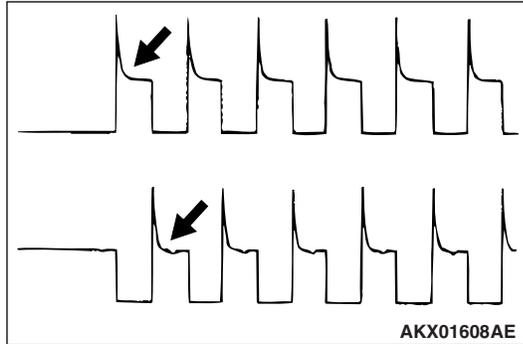
Observation condition

Function	Special patterns
Pattern height	High
Pattern selector	Display
Engine	Ignition switch: OFF → ON

Point B: Height of coil reverse electromotive force

Contrast with standard wave pattern	Probable cause
Coil reverse electromotive force does not appear or is extremely small.	Short in the coil

Examples of Abnormal Wave Patterns



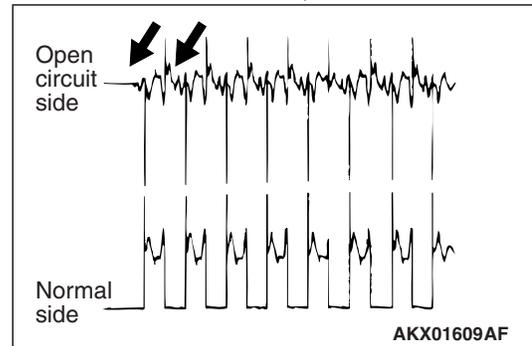
Example 1

Cause of problem

Sensor interface malfunction. (Motor is not operating)

Wave pattern characteristics

Induced electromotive force from the motor turning dose not appear.



Example 2

Cause of problem

Open circuit in the line between the EGR valve and the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Wave pattern characteristics

Current is not supplied to the motor coil on the open circuit side. (Voltage dose not drop to 0 V.)

Furthermore, the induced electromotive force waveform at the normal side is slightly different from the normal waveform.

ON-VEHICLE SERVICE

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001000484

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.

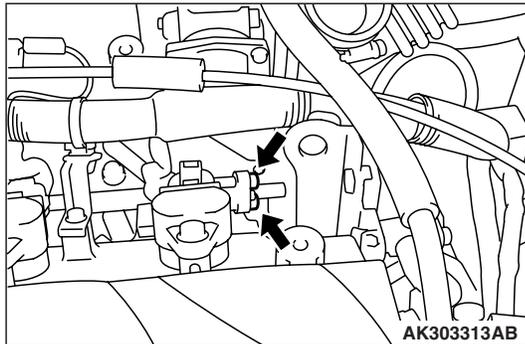
FUEL PRESSURE TEST

M1131001900971

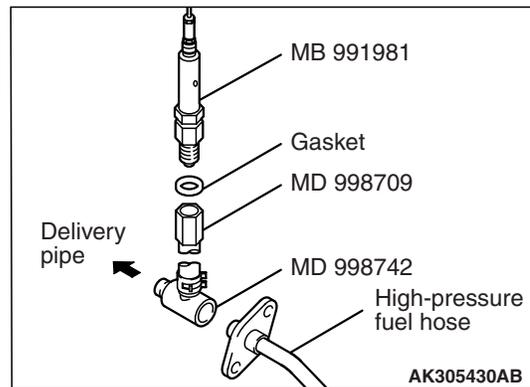
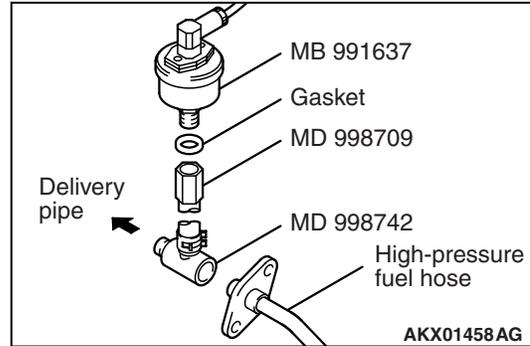
1. Release residual pressure from the fuel pipe line to prevent fuel gush out (Refer to P.13C-428).

⚠ CAUTION

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

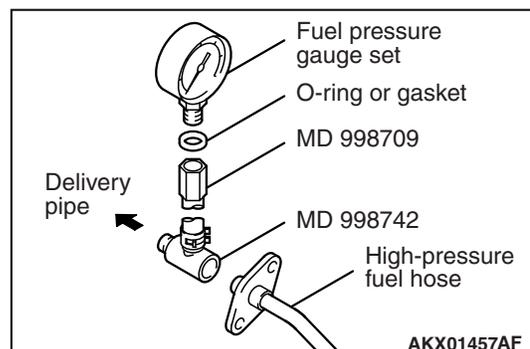


2. Disconnect the high-pressure fuel hose at the delivery pipe side.
3. Assemble the fuel pressure measurement tools as follows.



<When using the fuel pressure gauge set (special tool)>

- a. Remove the union joint and bolt from the special tool Adaptor hose (MD998709) and attach the special tool Hose adaptor (MD998742) to the adaptor hose.
- b. Via a gasket, install the special tool Fuel pressure gauge set (MB991637 or MB991981) into the special tool that has already assembled as described in (a) above.



<When using the fuel pressure gauge>

- a. Remove the union joint and bolt from special tool Adaptor hose (MD998709) and attach the special tool Hose adaptor (MD998742) to the adaptor hose.
- b. Via a suitable O-ring or gasket, install the fuel pressure gauge to the special tool that has already assembled as described in (a) above.

4. Install the assembled fuel pressure measurement tools between the fuel rail and fuel high-pressure hose.

⚠ CAUTION

To prevent damage to the M.U.T.-II/III, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting the M.U.T.-II/III.

5. Connect the M.U.T.-II/III to the diagnosis connector.
6. Turn the ignition switch to "ON" position (But do not start the engine).
7. Select "Item No. 07" from the M.U.T.-II/III Actuator test to drive the fuel pump. Check that there are no fuel leaks from any parts.

8. Finish the actuator test or turn the ignition switch to "LOCK" (OFF) position.
9. Start the engine and run at idle.
10. 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
<ul style="list-style-type: none"> 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.13C-428).

⚠ 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.

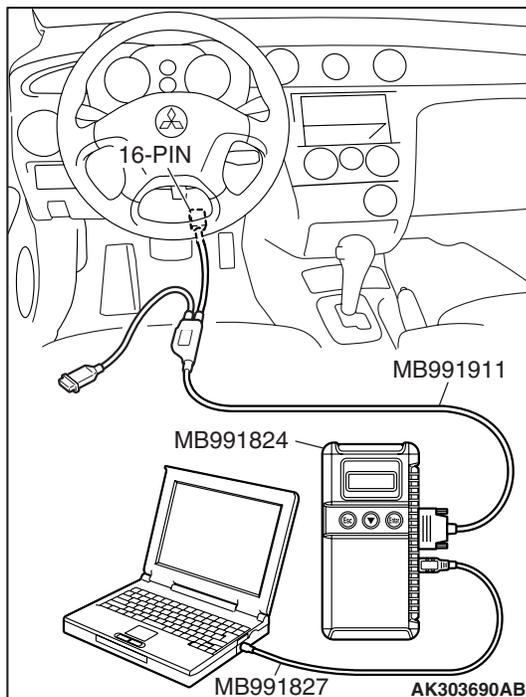
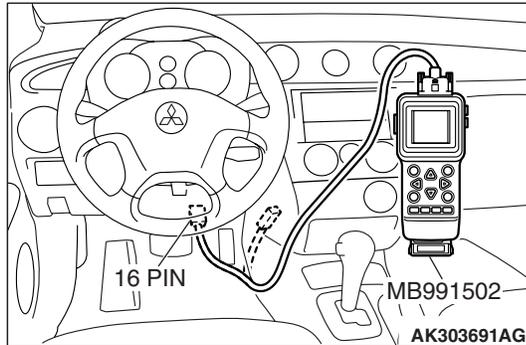
16. Replace the O-ring at the end of the fuel high pressure hose with a new one. Furthermore, apply engine oil to the new O-ring before replacement.
17. Fit the fuel high pressure hose over the delivery pipe and tighten the bolt to specified torque.
- Tightening torque: 8.8 ± 1.9 N·m**
18. Check for 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

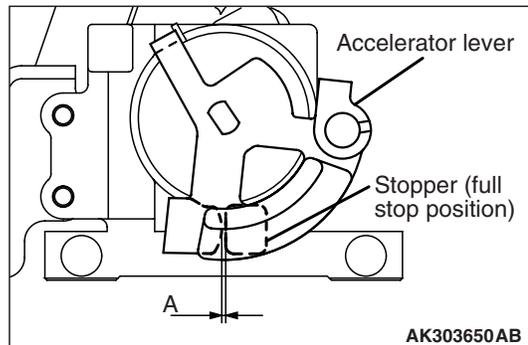
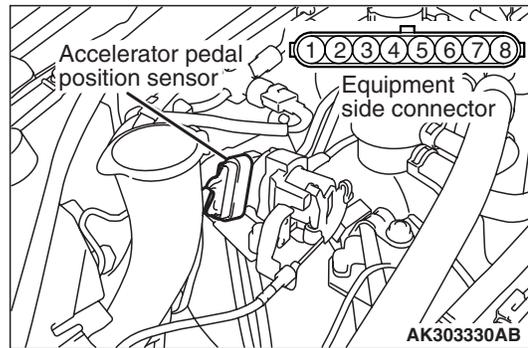
M1131053400041

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.



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: 0.5 – 0.9 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.

**FUEL PUMP CONNECTOR
DISCONNECTION (HOW TO REDUCE
PRESSURIZED FUEL LINES)**

M1131000900848

The service procedure is the same as the vehicles with 4G63-Non-Turbo- engine. (Refer to GROUP 13A - On-vehicle Service [P.13A-318](#)).

FUEL PUMP OPERATION CHECK

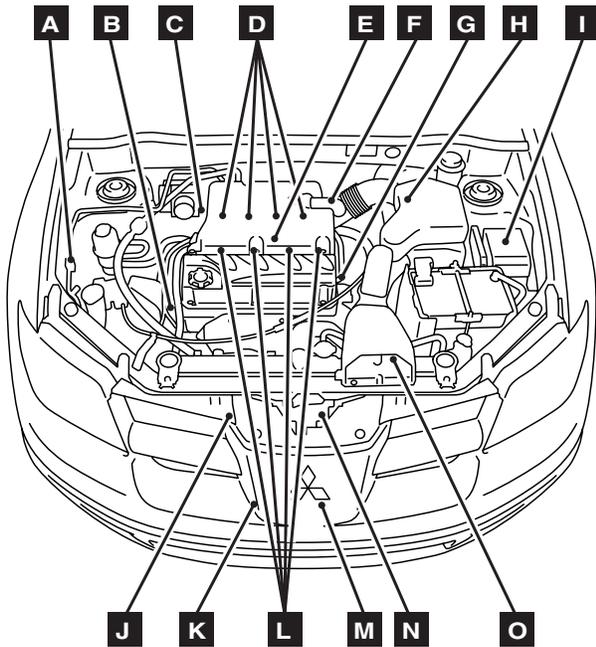
M1131002000959

The service procedure is the same as the vehicles with 4G63-Non-Turbo engine. (Refer to GROUP 13A - On-vehicle Service [P.13A-319](#)).

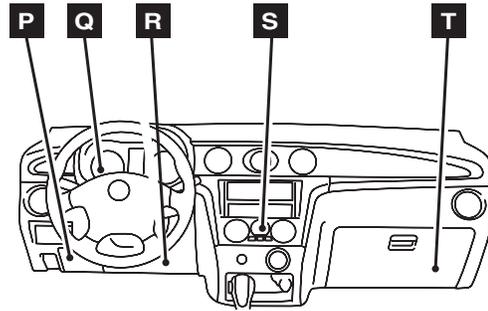
COMPONENT LOCATION

M1131002100815

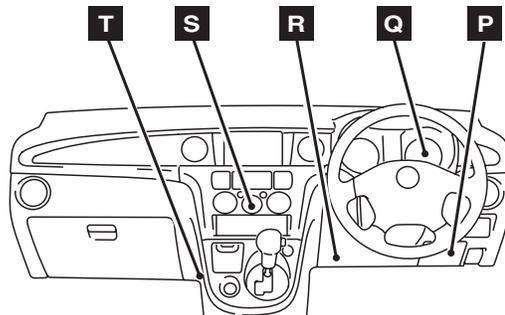
Name	Symbol	Name	Symbol
Accelerator pedal position sensor (with accelerator pedal position switch)	A	A/C relay	I
A/C pressure sensor	A	Engine control relay	I
		Throttle valve control servo relay	I
Crank angle sensor	B	Cylinder 1,4 oxygen sensor (front)	J
Detonation sensor	C	Cylinder 1,4 oxygen sensor (rear)	K
Manifold absolute pressure sensor	C	Ignition coil	L
Purge control solenoid valve	C	Cylinder 2,3 oxygen sensor (rear)	M
Injector	D	Cylinder 2,3 oxygen sensor (front)	N
EGR valve	E	Inhibitor switch <A/T>	O
Electronic-controlled throttle valve (Throttle position sensor and throttle valve control servo)	F	Power steering fluid pressure switch	O
		Fuel pump relay (1) and (2)	P
Vehicle speed sensor <M/T>	F	Engine warning lamp (check engine lamp)	Q
Camshaft position sensor	G	Diagnosis connector	R
Oil control valve	G	A/C switch	S
Engine coolant temperature sensor	G	Engine-ECU <M/T> or engine-A/T-ECU <A/T> (with barometric pressure sensor)	T
Air flow sensor (with intake air temperature sensor)	H		



<L. H. Drive Vehicle>



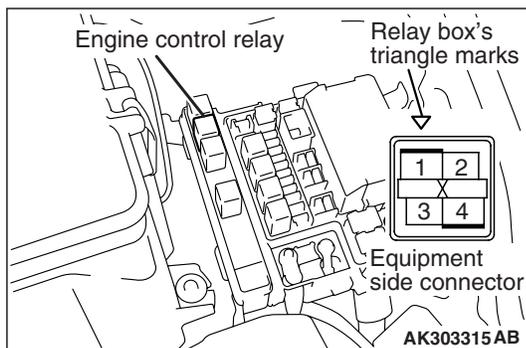
<R. H. Drive Vehicle>



AK303314 AB

ENGINE CONTROL RELAY CONTINUITY CHECK

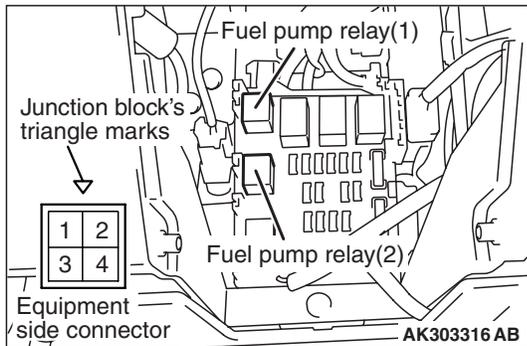
M1131050001003



Tester Connection Terminal	Battery Voltage	Normal State
2 - 3	No Voltage	Continuity
1 - 4	No Voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 3 and negative (-) terminal of battery to terminal No. 2.)	Continuity (2 Ω or less)

FUEL PUMP RELAY CONTINUITY CHECK

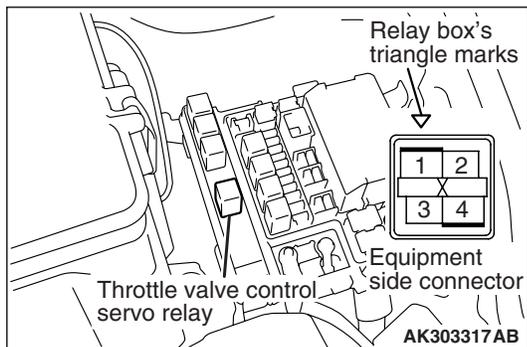
M1131033001000



Tester Connection Terminal	Battery Voltage	Normal State
2 - 3	No Voltage	Continuity
1 - 4	No Voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 3 and negative (-) terminal of battery to terminal No. 2.)	Continuity (2 Ω or less)

THROTTLE VALVE CONTROL SERVO RELAY CONTINUITY CHECK

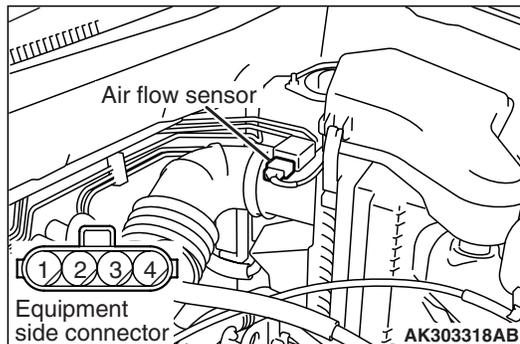
M1131053500305



Tester Connection Terminal	Battery Voltage	Normal State
2 - 3	No Voltage	Continuity
1 - 4	No Voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 3 and negative (-) terminal of battery to terminal No. 2.)	Continuity (2 Ω or less)

INTAKE AIR TEMPERATURE SENSOR CHECK

M1131002800535

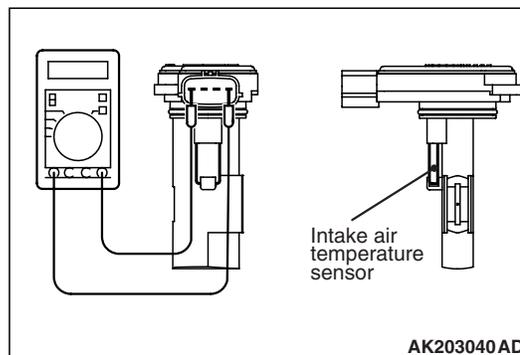


1. Disconnect the air flow sensor connector.
2. Measure resistance between terminals No. 1 and No. 4.

Standard value:

- 13 – 17 kΩ (at -20°C)
- 5.3 – 6.7 kΩ (at 0°C)
- 2.3 – 3.0 kΩ (at 20°C)
- 1.0 – 1.5 kΩ (at 40°C)
- 0.56 – 0.76 kΩ (at 60°C)
- 0.30 – 0.45 kΩ (at 80°C)

3. Remove the air flow sensor



4. Measure resistance while heating the sensor using a hair drier.

Normal condition:

Temperature (°C)	Resistance (kΩ)
Higher	Smaller

5. If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.
6. Install the air flow sensor and tighten it to the specified torque.

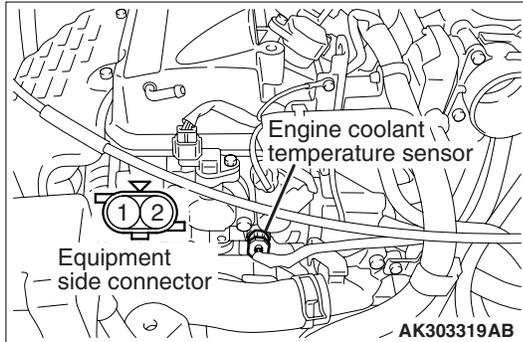
Tightening torque: 1.8 ± 0.6 N·m

ENGINE COOLANT TEMPERATURE SENSOR CHECK

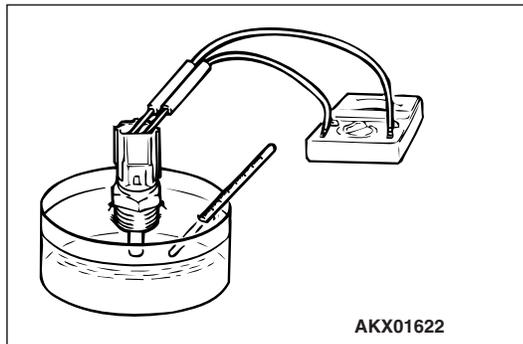
M1131003100506

CAUTION

Be careful not to touch the connector (resin section) with the tool when removing and installing.



1. Remove the engine coolant temperature sensor.



2. With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

Standard value:

14 – 17 k Ω (at -20°C)

5.1 – 6.5 k Ω (at 0°C)

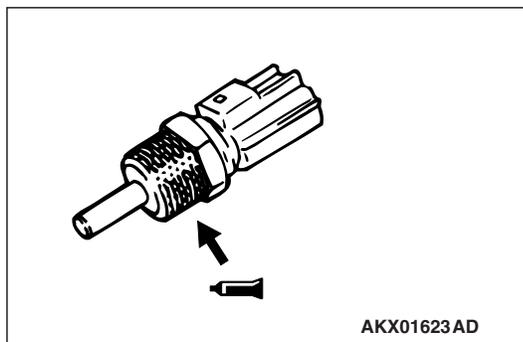
2.1 – 2.7 k Ω (at 20°C)

0.9 – 1.3 k Ω (at 40°C)

0.48 – 0.68 k Ω (at 60°C)

0.26 – 0.36 k Ω (at 80°C)

3. If the resistance deviates from the standard value greatly, replace the sensor.



4. Apply sealant to threaded portion.

Specified sealant:

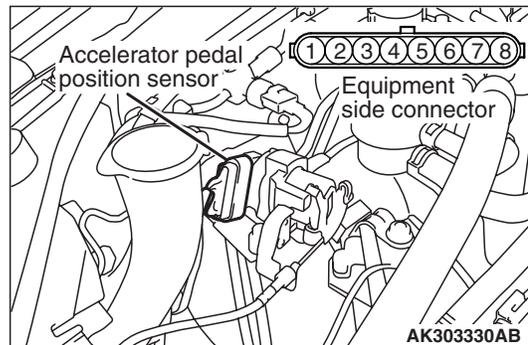
3M NUT Locking Part No. 4171 or equivalent

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

M1130503400093



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 k Ω

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:

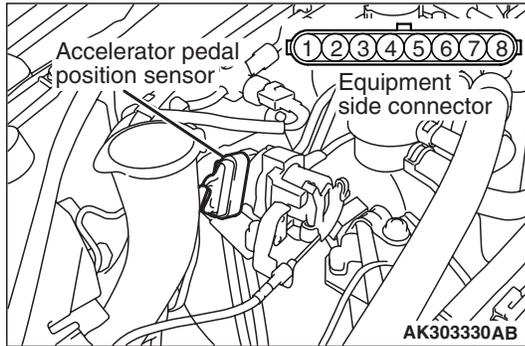
Depress the accelerator pedal slowly.	Resistance value changes in accordance with the accelerator pedal depression smoothly.
---------------------------------------	--

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.13C-427.)

ACCELERATOR PEDAL POSITION SWITCH CHECK

M1131052500045



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)

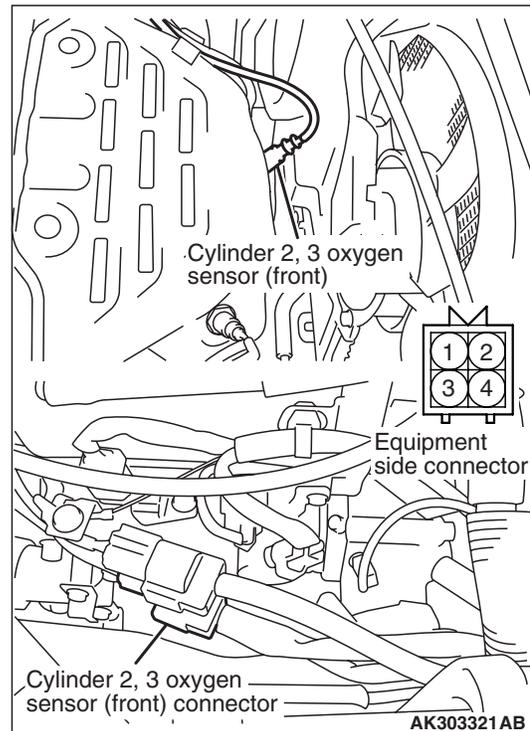
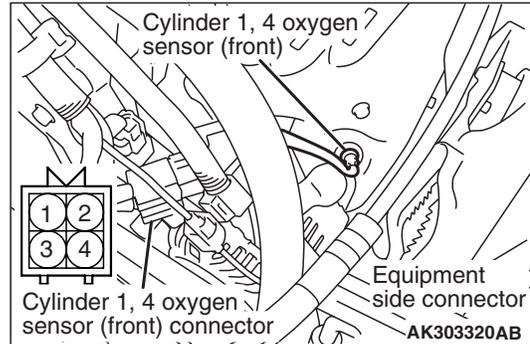
3. If defective, replace the accelerator pedal position sensor.

NOTE: After replacement, adjust the accelerator pedal position sensor. (Refer to P.13C-427.)

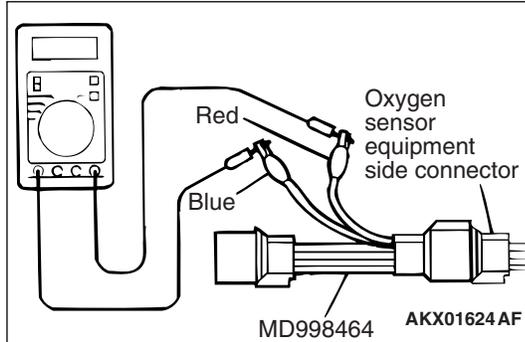
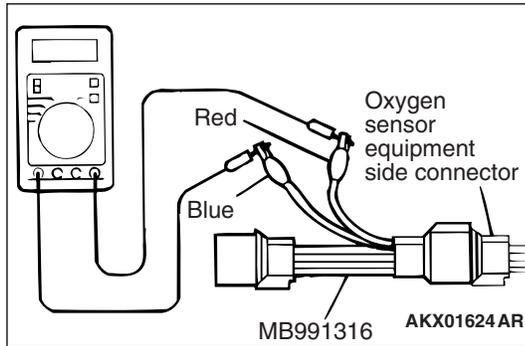
OXYGEN SENSOR CHECK

M1131005000679

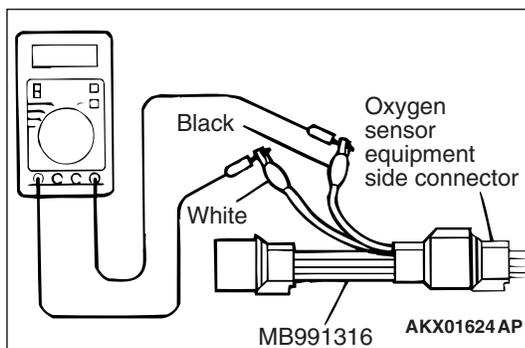
OXYGEN SENSOR (FRONT)



1. Disconnect the oxygen sensor connector and connect the special tool Test harness (MB991316) to the connector on the oxygen sensor side.



2. Make sure that there is continuity ($4.5 - 8.0 \Omega$ at 20°C) between terminal No. 1 (red clip of special tool) and No. 3 (blue clip of special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.
5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.



6. Connect a digital voltage meter between terminal No. 2 (black clip of special tool) and No. 4 (white clip of special tool).

7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air-fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V.

CAUTION

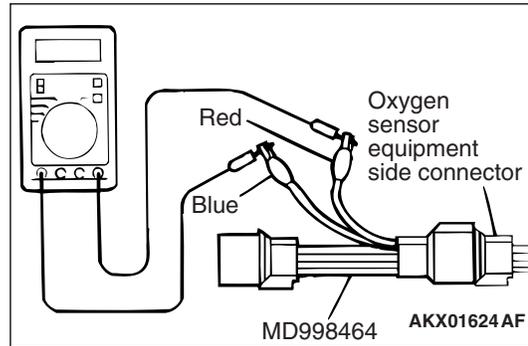
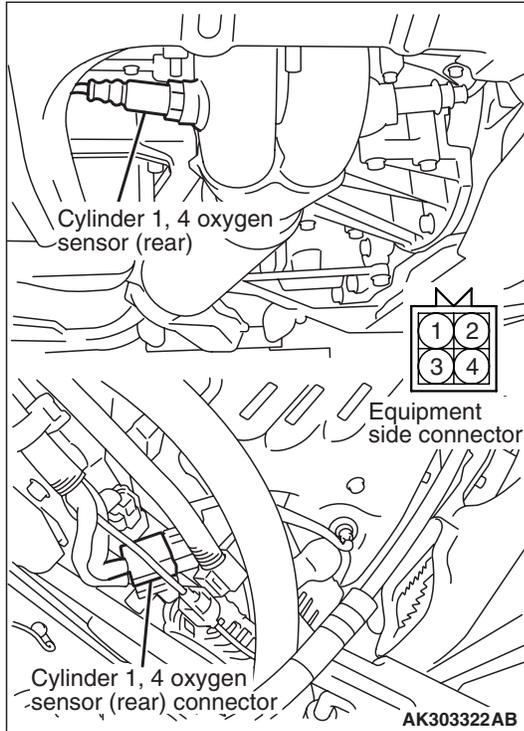
- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
- Be careful the heater is broken when voltage of beyond 8V is applied to the oxygen sensor heater.

NOTE: If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 1 (red clip of special tool) and the terminal No. 3 (blue clip of special tool) of the oxygen sensor with a (+) terminal and (-) terminal of 8 V power supply respectively, then check again.

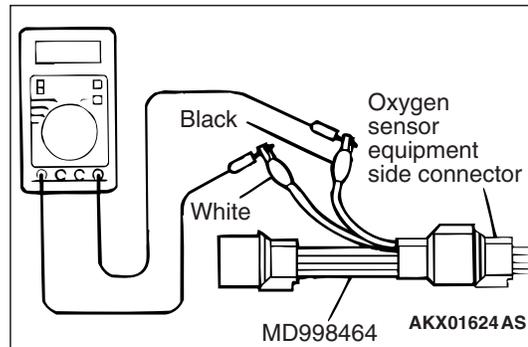
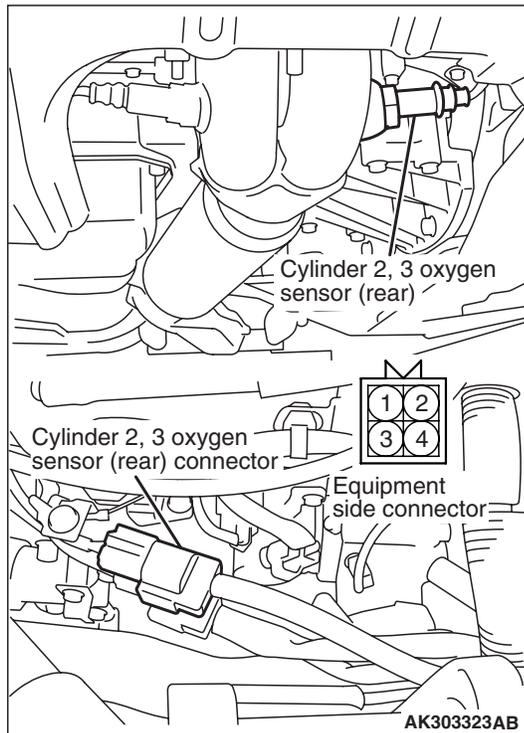
8. If the sensor is defective, replace the oxygen sensor.

NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Manifold. P.15-20.

OXYGEN SENSOR (REAR)



2. Make sure that there is continuity ($11 - 18 \Omega$ at 20°C) between terminal No.1 (red clip of special tool) and No. 3 (blue clip of special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.
5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.



6. Connect a digital voltage meter between terminal No.2 (black clip of special tool) and No. 4 (white clip of special tool).
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air-fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V.

1. Disconnect the oxygen sensor connector and connect the special tool Test harness (MD998464) to the connector on the oxygen sensor side.

CAUTION

- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
- Be careful the heater is broken when voltage of beyond 12 V is applied to the oxygen sensor heater.

NOTE: If the sufficiently high temperature (of approximate 400 °C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.2 and the terminal No. 1 of the oxygen sensor with a (+) terminal and (-) terminal of 12 V power supply respectively, then check again.

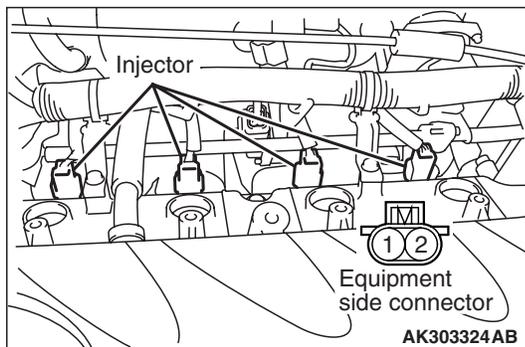
8. If the sensor is defective, replace the oxygen sensor.

NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler P.15-25.

INJECTOR CHECK

M1131005200509

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.

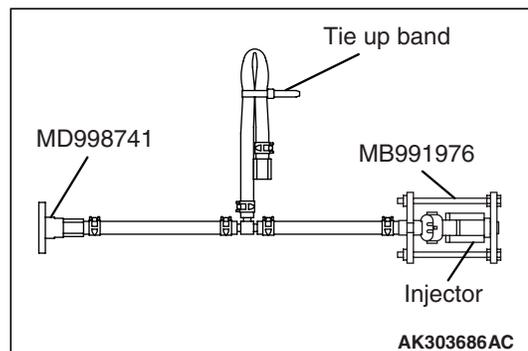
CHECK THE INJECTION CONDITION

1. Carry out the procedure to prevent flow of the fuel (Refer to P.13C-428).

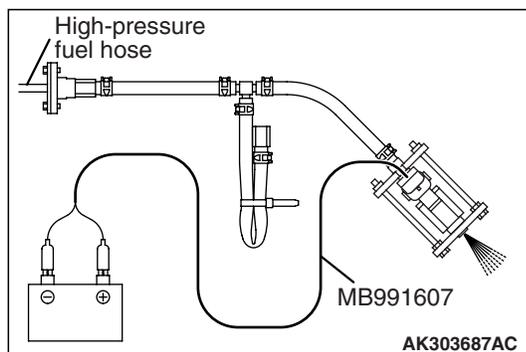
CAUTION

Do not make fuel splash by covering fuel with waste and so on because the residual pressure is in the fuel pipeline.

2. Remove the fuel high-pressure hose at the delivery pipe side.



3. Remove the injector.
4. Assemble Injector Test Set (MD998706) of the special tool as shown in Fig.
 - a. Install the injector to the installation hose for the injector and then fix it using Injector Holder (MB991976) of the special tool.
 - b. Install Injector Test Adaptor (MD998741) of the special tool to another hose connected with the installation hose for the injector.
 - c. Fold, band and tie up the rest of hose completely in order to prevent from fuel leakage because it is not used.
5. Install Injector Test Set (MD998706) of the special tool to the fuel high-pressure hose.
6. Connect the M.U.T.-III to the diagnosis connector.
7. Turn the ignition switch to "ON" position (but do not start the engine).
8. Select "Item No. 07" from M.U.T.-III actuator test and drive the fuel pump.



9. Connect Injector Test Harness (MB991607) of the special tool between the injector and battery, and then actuate the injector.
10. Check the fuel spray condition. The condition can be considered satisfactory unless it is extremely poor.
11. Stop actuating the injector. Check leakage from the injector nozzle. Turn the ignition switch to "LOCK OFF" position and then disconnect M.U.T.-III.
12. Actuate the injector until the fuel cannot flow. Draw the fuel out from the special tool.
13. Remove the special tool.
14. If the fuel spray condition is extremely poor or if there is the fuel leakage from the injector nozzle, replace the injector.
15. Install the injector and fuel high-pressure hose.

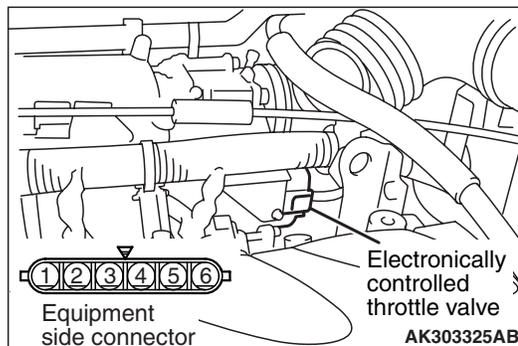
THROTTLE VALVE CONTROL SERVO CHECK

M1130532400037

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.

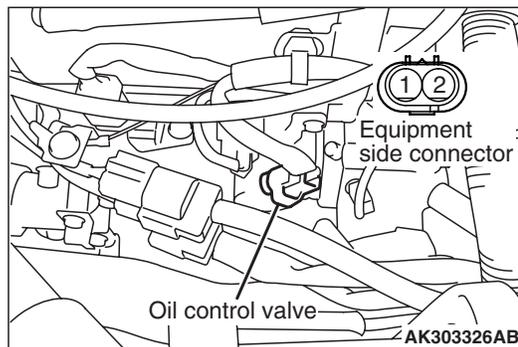
Standard value: 0.3 – 80 Ω (at 20°C)

3. If resistance is outside the standard value, replace the throttle body assembly.

OIL CONTROL VALVE CHECK

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OPERATION CHECK



1. Disconnect the oil control valve connector.

CAUTION

To prevent the coil from burning, keep the duration of the voltage application as short as possible.

2. Apply battery voltage to the terminals of the connector at the oil control valve, and make sure the oil control valve makes a clicking sound.

MEASUREMENT OF RESISTANCE BETWEEN TERMINALS

1. Disconnect the oil control valve connector.
2. Measure the resistance between the terminals of the connector at the oil control valve.

Standard value: 6.9 – 7.9 Ω (at 20°C)

3. If resistance is outside the standard value, replace the oil control valve.

INJECTOR

REMOVAL AND INSTALLATION

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CAUTION

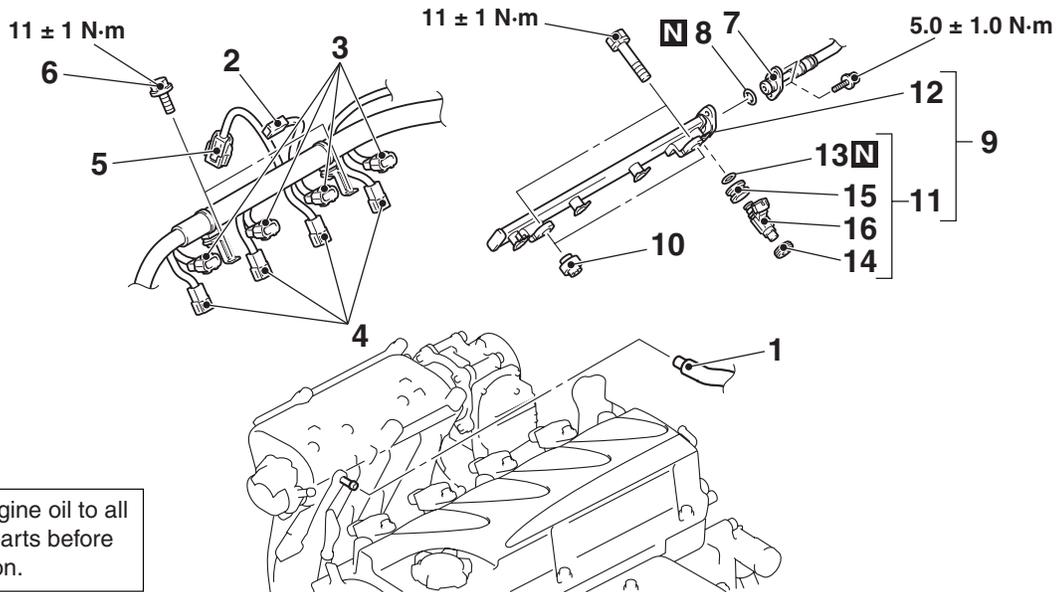
When the fuel injector replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-21).

Pre-removal Operation

- Fuel Discharge Prevention (Refer to P.13C-428).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-8).

Post-installation Operation

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-8).
- Fuel Leakage Inspection.



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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
- >>A<< 7. Fuel high-pressure hose connection

<<A>>

>>A<<

Removal steps (Continued)

8. O-ring
9. Fuel delivery pipe and fuel injector assembly
10. Insulators
11. Fuel injector assembly
12. Fuel delivery pipe
13. O-ring
14. Insulators
15. Grommets
16. 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.
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

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CAUTION

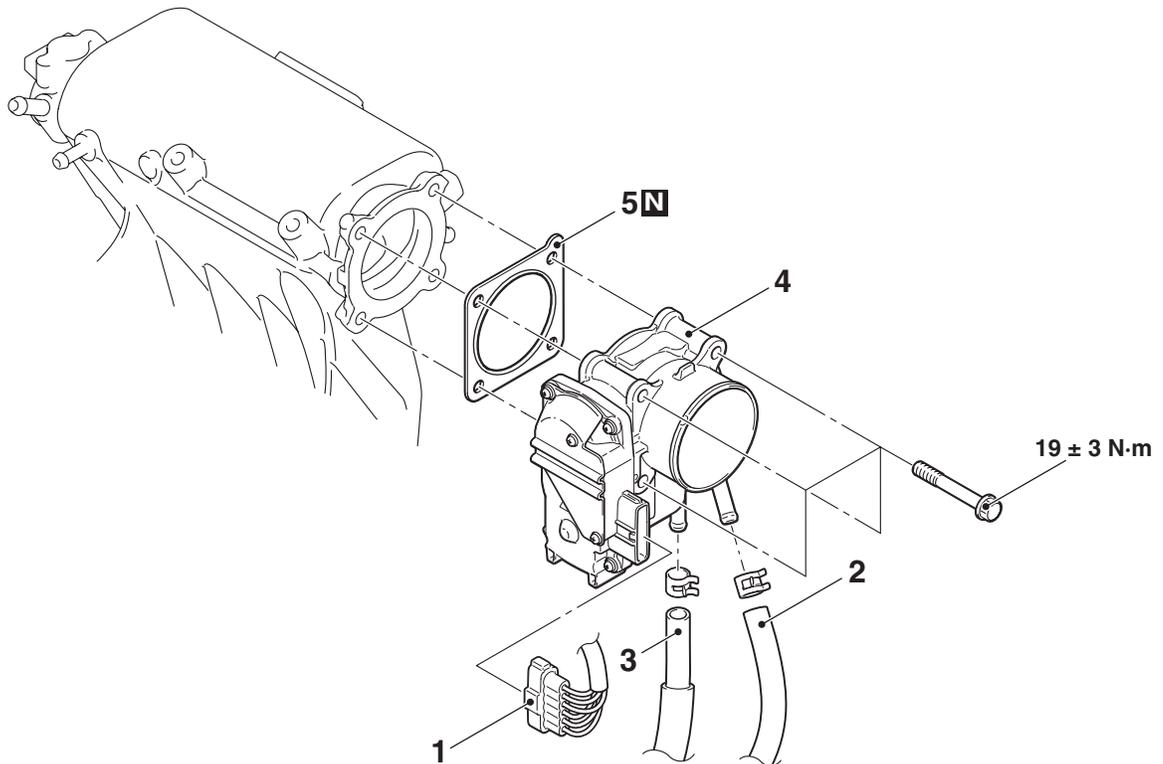
- When the throttle body assembly replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-21).
- Do not loosen the fixing screws for the resin cover of throttle body assembly. If the screws are loosened, the sensor incorporated in the resin cover becomes misaligned and the throttle body can not work normally.

Pre-removal Operation

- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-17).
- Air Cleaner Removal (Refer to GROUP 15, Air Cleaner P.15-8).

Post-installation Operation

- Air Cleaner Installation (Refer to GROUP 15, Air Cleaner P.15-8).
- Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-17).



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>>B<<

Removal steps

- Initialisation procedure (installation only)
1. Throttle position sensor connector
 2. Water return hose connection

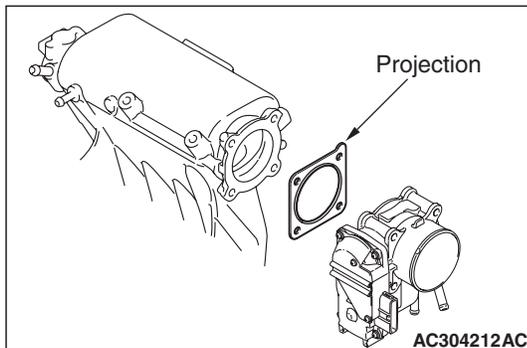
>>A<<

Removal steps (Continued)

3. Water feed hose connection
4. Throttle body assembly
5. Throttle body gasket

INSTALLATION SERVICE POINTS
>>A<< THROTTLE BODY GASKET
INSTALLATION**⚠ CAUTION**

Poor idling etc. may result if the throttle body gasket is installed incorrectly.



Install the throttle body gasket as its protrusion is in the direction shown.

>>B<< INITIALISATION PROCEDURE

Turn the ignition switch on then off, and keep it off for at least 10 seconds.

ENGINE-ECU AND ENGINE-A/T-ECU

REMOVAL AND INSTALLATION

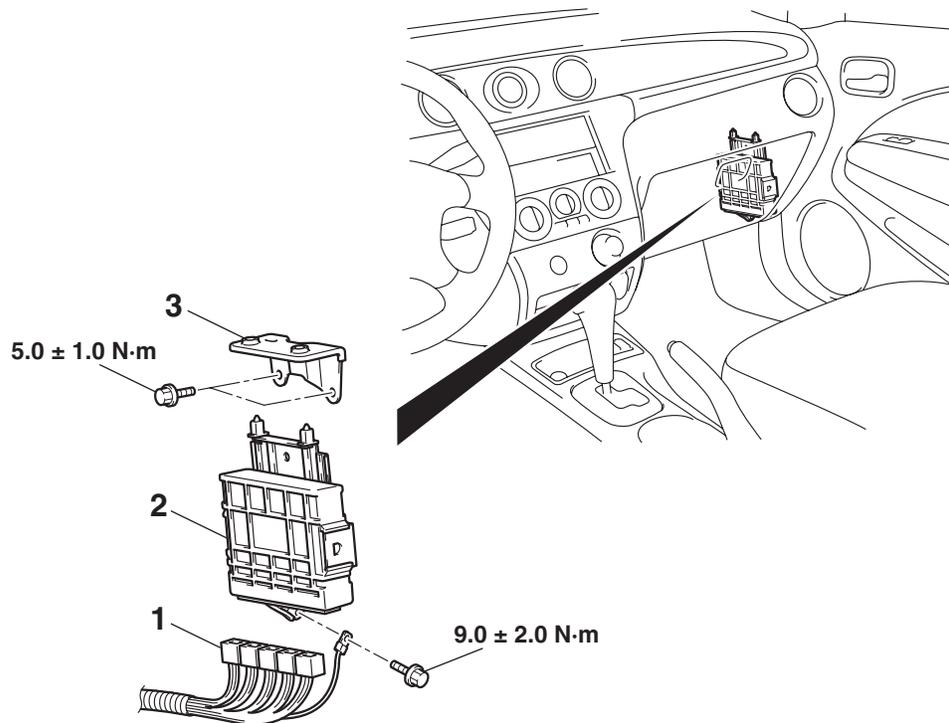
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⚠ CAUTION

- When the engine-ECU <M/T> or the engine-A/T-ECU <A/T> replacement is performed, always refer to GROUP 54A, On-vehicle Service - How to Register Encrypted Code P.54A-22.
- After the engine-ECU <M/T> or the engine-A/T-ECU <A/T> is replaced, idling speed may be unstable because the MPI engine learning is not completed. To make it stable, make the system learn the idling (Refer to GROUP 00 – Precautions before Service, Learning Procedure for Idling in MPI Engine P.00-21).

Pre-removal and Post-installation Operation

Cowl Side Trim (RH) Removal and Installation (Refer to GROUP 52A, Trim P.52A-10).



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Removal Steps

- >>A<<
- Initialisation procedure (installation only)
 - 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>
 - 3. Engine-ECU bracket <M/T> or Engine-A/T-ECU bracket <A/T>

INSTALLATION SERVICE POINT

>>A<< INITIALISATION PROCEDURE

Turn the ignition switch on then off, and keep it off for at least 10 seconds.

NOTES