

GROUP 13B

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

CONTENTS

GENERAL INFORMATION	13B-3	ON-VEHICLE SERVICE	13B-390
SERVICE SPECIFICATIONS	13B-7	THROTTLE BODY (THROTTLE VALVE AREA) CLEANING	13B-390
SEALANT	13B-7	ACCELERATOR PEDAL POSITION SWITCH AND ACCELERATOR PEDAL POSITION SENSOR (APS) ADJUSTMENT	13B-390
SPECIAL TOOLS	13B-8	FUEL PRESSURE TEST	13B-391
TROUBLESHOOTING	13B-11	FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE PRESSURIZED FUEL LINES)	13B-393
DIAGNOSIS TROUBLESHOOTING FLOW	13B-11	FUEL PUMP OPERATION CHECK	13B-393
DIAGNOSIS FUNCTION	13B-11	COMPONENT LOCATION	13B-394
INSPECTION CHART FOR DIAGNOSIS CODE	13B-20	ENGINE CONTROL RELAY CONTINUITY CHECK	13B-395
INSPECTION PROCEDURE FOR DIAGNOSIS CODES	13B-22	FUEL PUMP RELAY CONTINUITY CHECK	13B-395
INSPECTION CHART FOR TROUBLE SYMPTOMS	13B-248	INTAKE AIR TEMPERATURE SENSOR CHECK	13B-396
INSPECTION CHART FOR TROUBLE SYMPTOMS	13B-252	ENGINE COOLANT TEMPERATURE SENSOR CHECK	13B-396
CHECK AT THE ECU TERMINALS	13B-376	ACCELERATOR PEDAL POSITION SENSOR CHECK	13B-397
INSPECTION PROCEDURE USING OSCILLOSCOPE	13B-383	ACCELERATOR PEDAL POSITION SWITCH CHECK	13B-397
		OXYGEN SENSOR CHECK	13B-398
		INJECTOR CHECK	13B-400
		THROTTLE VALVE CONTROL SERVO CHECK	13B-400
		FUEL PRESSURE SOLENOID VALVE CHECK	13B-401

Continued on next page

13B-2

INJECTOR **13B-402**
REMOVAL AND INSTALLATION 13B-402

ENGINE-ECU **13B-406**
REMOVAL AND INSTALLATION 13B-406

THROTTLE BODY ASSEMBLY **13B-404**
REMOVAL AND INSTALLATION 13B-404

GENERAL INFORMATION

M1131000101782

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

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

FUEL INJECTION CONTROL

The injector drive times and injector timing are controlled so that the optimum air/fuel mixture is supplied to the engine to correspond to the continually-changing engine operation conditions. A single injector is mounted at the intake port of each cylinder. Fuel is sent under pressure from the fuel tank by the fuel pump, with the pressure being regulated by the fuel pressure regulator. The fuel thus regulated is distributed to each of the injectors.

Fuel injection is normally carried out once for each cylinder for every two rotations of the crankshaft. The firing order is 1-3-4-2. This is called sequential fuel injection. The engine-ECU provides a richer air/fuel mixture by carrying out "open-loop" control when the

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

THROTTLE VALVE OPENING CONTROL

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

IDLE SPEED CONTROL

The idle speed is kept at the optimum speed by controlling the amount of air that bypasses the throttle valve in accordance with changes in idling conditions and engine load during idling. The engine-ECU drives the idle speed control motor to keep the engine running at the pre-set idle target speed in accordance with the engine coolant temperature and

air conditioner load. In addition, when the air conditioner switch is turned off and on while the engine is idling, the idle speed control motor operates to adjust the throttle valve bypass air amount in accordance with the engine load conditions in order to avoid fluctuations in the engine speed.

IGNITION TIMING CONTROL

The power transistor located in the ignition primary circuit turns ON and OFF to control the primary current flow to the ignition coil. This controls the ignition timing in order to provide the optimum ignition timing with respect to the engine operating conditions. The ignition timing is determined by the engine-ECU from the engine speed, intake air volume, engine coolant temperature and atmospheric pressure.

SELF-DIAGNOSIS FUNCTION

- When an abnormality is detected in one of the sensors or actuators related to emission control, the engine warning lamp (check engine lamp) illuminates as a warning to the driver.
- When an abnormality is detected in one of the sensors or actuators, a diagnosis code corresponding to the abnormality is output.
- The RAM data inside the engine-ECU that is related to the sensors and actuators can be read by means of the M.U.T.-II/III. In addition, the actuators can be force-driven under certain circumstances.

OTHER CONTROL FUNCTIONS

1. Fuel Pump Control

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

2. A/C Relay Control

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

3. Fan Motor Control

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

4. 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.

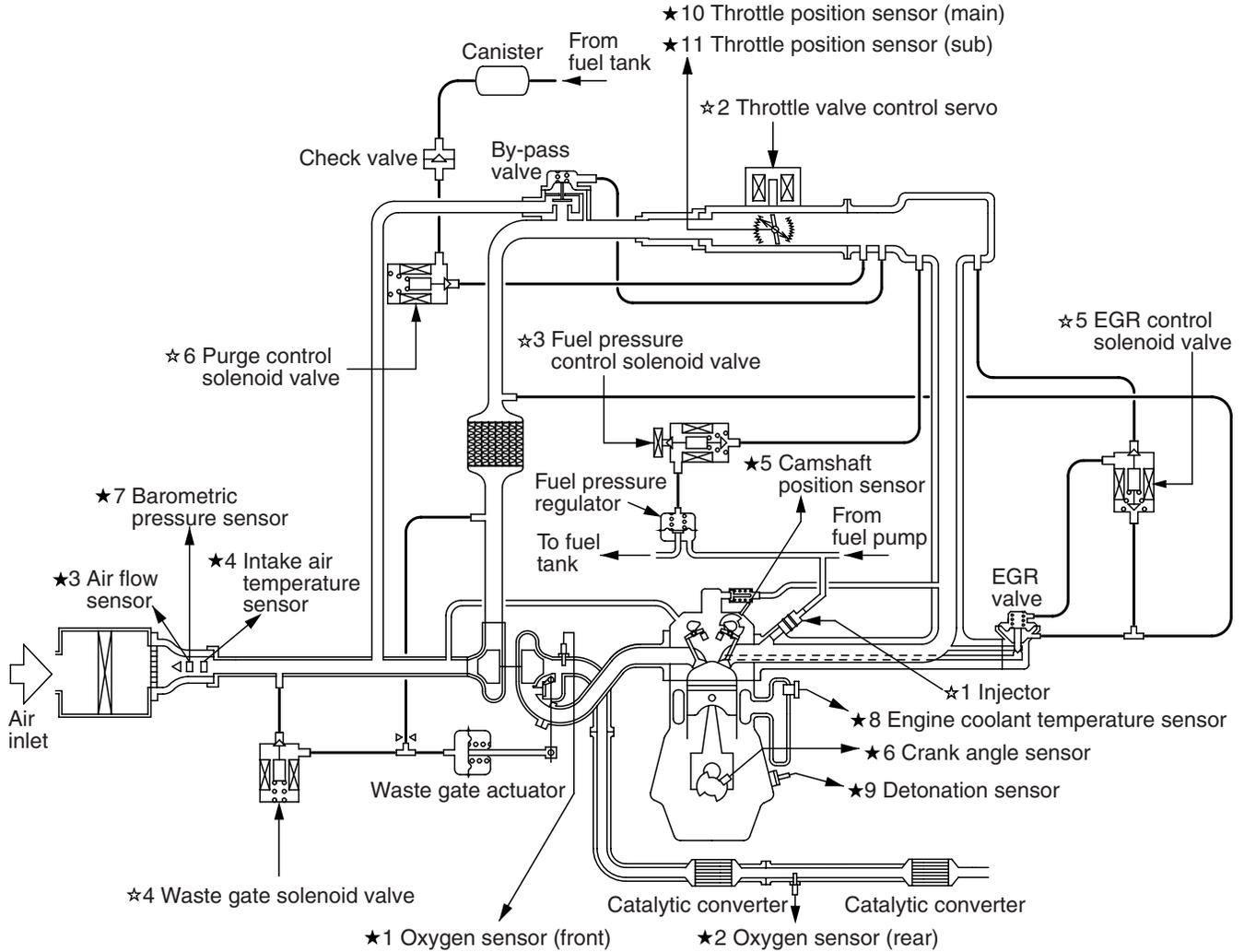
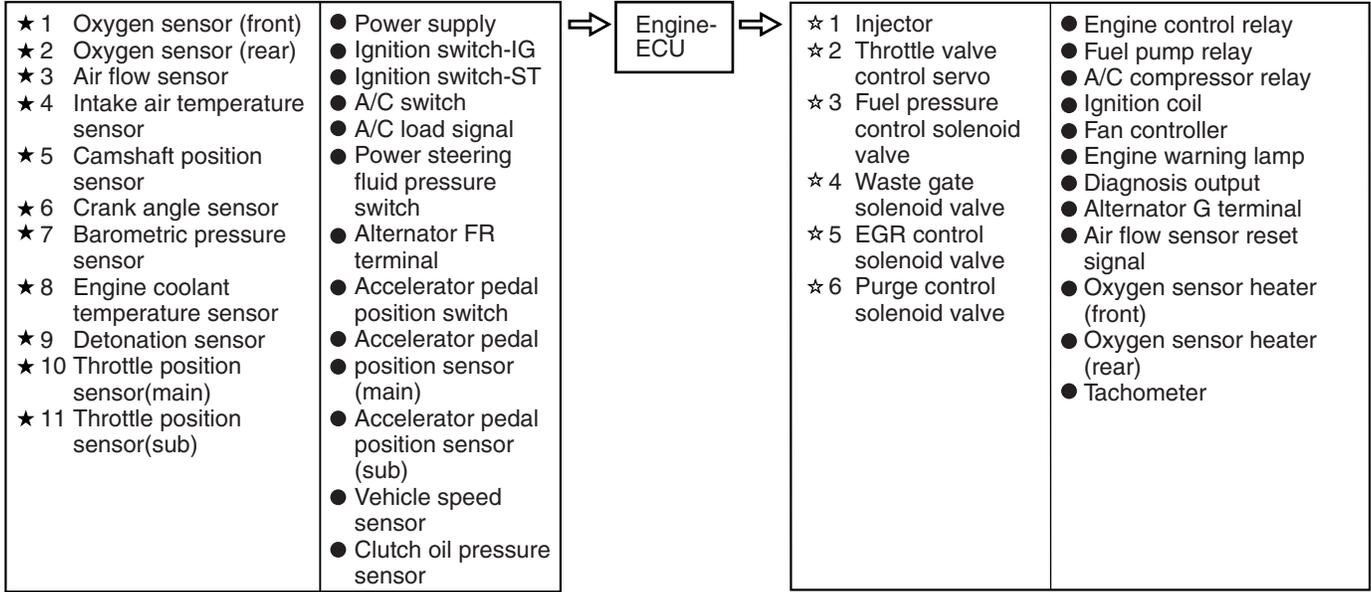
5. Purge Control Solenoid Valve Control
(Refer to GROUP 17 – Engine And Emission Control – Evaporative Emission Control System [P.17-60](#)).

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

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	Identification No.	E6T38985
Sensors	Air flow sensor	Karman vortex type
	Barometric pressure sensor	Semiconductor type
	Intake air temperature sensor	Thermistor type
	Engine coolant temperature	Thermistor type
	Oxygen sensor	Zirconia type
	Accelerator pedal position sensor	Variable resistor type
	Accelerator pedal position switch	Contact switch type
	Vehicle speed sensor	Magnetic resistive element type
	Camshaft position sensor	Hall element type
	Crank angle sensor	Hall element type
	Detonation sensor	Piezoelectric type
	Power steering fluid pressure switch	Contact switch type
	Clutch oil pressure sensor	Semiconductor type
	Actuators	Engine control relay type
Fuel pump relay type		Contact switch type
Injector type and number		Electromagnetic type, 4
Injector identification mark		CDH450
Throttle valve control servo relay		Contact switch type
EGR control solenoid valve		Duty cycle type solenoid valve
Purge control solenoid valve		Duty cycle type solenoid valve
Fuel pressure control solenoid valve		ON/OFF type solenoid valve
Waste gate solenoid valve		Duty cycle type solenoid valve
Fuel pressure regulator	Regulator pressure kPa	294

MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM



SERVICE SPECIFICATIONS

M1131000301140

Items		Specifications
Accelerator pedal position sensor adjusting voltage V		0.5 – 0.9
Accelerator pedal position sensor resistance k Ω		3.5 – 6.5
Intake air temperature sensor resistance k Ω	-20°C	13 – 17
	0°C	5.3 – 6.7
	20°C	2.3 – 3.0
	40°C	1.0 – 1.5
	60°C	0.56 – 0.76
	80°C	0.30 – 0.42
Engine coolant temperature sensor resistance k Ω	-20°C	14 – 17
	0°C	5.1 – 6.5
	20°C	2.1 – 2.7
	40°C	0.9 – 1.3
	60°C	0.48 – 0.68
	80°C	0.26 – 0.36
Oxygen sensor output voltage (at racing) V		0.6 – 1.0
Oxygen sensor heater resistance (at 20°C) Ω	Front	4.5 – 8.0
	Rear	11 – 18
Fuel pressure kPa	Vacuum hose disconnection	289 – 309 at curb idle
	Vacuum hose connection	Approximately 230 at curb idle
Fuel pressure control solenoid valve resistance (at 20°C) Ω		28 – 36
Injector coil resistance (at 20°C) Ω		13 – 16
Injector fuel leakage rate Drop/minute		1 or less
Throttle valve control servo coil resistance (at 20°C) Ω		0.3 – 100

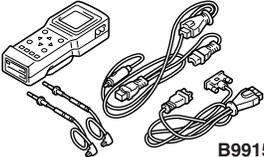
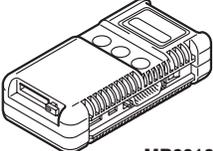
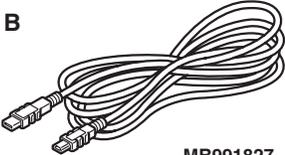
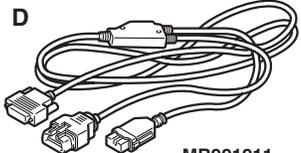
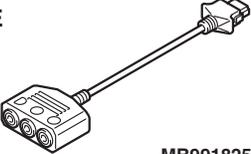
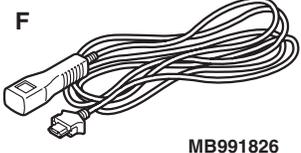
SEALANT

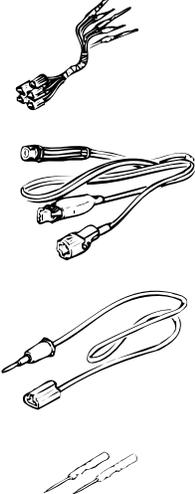
M1131000500765

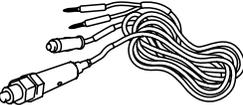
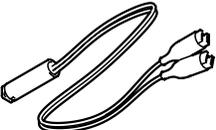
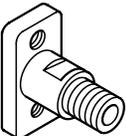
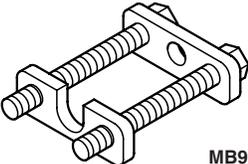
Item	Specified sealant	Remark
Engine coolant temperature sensor Threaded portion	3M Nut Locking Part No. 4171 or equivalent	Drying sealant

SPECIAL TOOLS

M1131000601259

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>DO NOT USE</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
	MB998478	Test harness (3-pin, triangle)	<ul style="list-style-type: none"> • Measurement of voltage during Troubleshooting • Inspection using an oscilloscope
	MD998464	Test harness (4-pin, square)	<ul style="list-style-type: none"> • Measurement of voltage during Troubleshooting • Inspection of oxygen sensor (front)
 <p data-bbox="354 1024 444 1045">MB991658</p>	MB991658	Test harness	<ul style="list-style-type: none"> • Measurement of voltage during Troubleshooting • Inspection using an oscilloscope • Inspection of data list • Inspection of oxygen sensor (rear)
 <p data-bbox="342 1612 433 1633">MB991223</p>	<p>MB991223</p> <p>A: MB991219</p> <p>B: MB991220</p> <p>C: MB991221</p> <p>D: MB991222</p>	<p>Harness set</p> <p>A: Test harness</p> <p>B: LED harness</p> <p>C: LED harness adapter</p> <p>D: Probe</p>	<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 data-bbox="362 785 456 806">MB991637</p>	MB991637	Fuel pressure gauge set	
 <p data-bbox="329 995 423 1016">MB991981</p>	MB991981	Fuel pressure gauge set	
 <p data-bbox="362 1199 456 1220">MD998706</p>	MD998706	Injector test set	Checking the spray condition of injectors
 <p data-bbox="362 1402 456 1423">MB991607</p>	MB991607	Injector test harness	
 <p data-bbox="362 1608 456 1629">MD998741</p>	MD998741	Injector test adaptor	
 <p data-bbox="362 1812 456 1833">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.

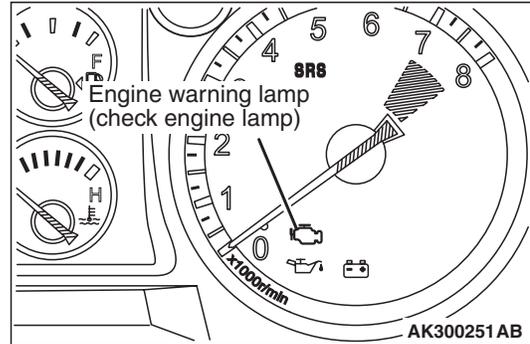
NOTE: If the engine-ECU is replaced, the steering lock cylinder and ignition key should be replaced together with it.

DIAGNOSIS FUNCTION

M1131150001260

M1131155500825

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
P0090	Fuel pressure control valve system
P0100	Air flow sensor system
P0105	Barometric pressure sensor system
P0110	Intake air temperature sensor system
P0115	Engine coolant temperature sensor system
P0122*	Throttle position sensor (main) circuit low input
P0123*	Throttle position sensor (main) circuit high input
P0125*	Feedback system monitor
P0130	Oxygen sensor (front) system
P0135	Oxygen sensor heater (front) system
P0136	Oxygen sensor (rear) system
P0141	Oxygen sensor heater (rear) system
P0170	Abnormal fuel system
P0201	No. 1 injector system
P0202	No. 2 injector system
P0203	No. 3 injector system
P0204	No. 4 injector system
P0222*	Throttle position sensor (sub) circuit low input
P0223*	Throttle position sensor (sub) circuit high input

Code No.	Diagnosis item
P0243	Waste gate solenoid valve system
P0300	Random cylinder misfire detection system
P0301*	No. 1 cylinder misfire detection system
P0302*	No. 2 cylinder misfire detection system
P0303*	No. 3 cylinder misfire detection system
P0304*	No. 4 cylinder misfire detection system
P0325	Detonation sensor system
P0335	Crank angle sensor system
P0340	Camshaft position sensor system
P0403	EGR control solenoid valve system
P0421	Warm up Catalyst malfunction
P0443	Purge control solenoid valve system
P0500	Vehicle speed sensor system
P0551*	Power steering fluid pressure switch system
P0638*	Throttle actuator control servo circuit range/performance/problem
P0642*	Throttle position sensor power supply
P0657*	Throttle actuator control servo relay circuit malfunction
P0805	Clutch oil pressure sensor system
P1603*	Battery back-up line system
P2100*	Throttle actuator control servo circuit (open)
P2101*	Throttle valve control magneto malfunction
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

NOTE:

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

METHOD OF READING AND ERASING DIAGNOSIS CODES

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

DIAGNOSIS USING DIAGNOSIS 2 MODE

1. Switch the diagnosis mode of the engine control unit to DIAGNOSIS 2 mode using the M.U.T.-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 "LOCK" (OFF) position and then back to "ON" position again.

NOTE: By turning the ignition switch to "LOCK" (OFF) position, the ENGINE-ECU will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.

5. Erase the diagnosis codes.

INSPECTION USING M.U.T.-II/III DATA LIST AND ACTUATOR TESTING

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

FREEZE FRAME DATA

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

The display items of freeze frame data are shown below.

DISPLAY ITEM LIST

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

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

DRIVE CYCLE

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

⚠ CAUTION

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

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

DRIVE CYCLE PATTERN LIST

Procedure	Monitor item	Diagnosis code
1	Catalytic converter monitor	P0421
2	Oxygen sensor (front) monitor	P0130
3	Other monitor	P0136, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0325, P0500, P0551

Procedure 1

Catalytic converter monitor	
Diagnosis code No.	P0421
Drive cycle pattern	<p>One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 16 minutes or more.</p> <p style="text-align: right;">AK301815AB</p>
Inspection condition	<ul style="list-style-type: none"> • Atmospheric temperature: -10°C or more
Test procedure	<ol style="list-style-type: none"> 1. Engine: start 2. Accelerate until the vehicle speed is 90 km/h or more. 3. Travel for 6 minutes or more while keeping the vehicle speed at 90 km/h or more. 4. Decelerate until the vehicle speed is within 80 km/h or less. 5. While traveling at 55 – 80 km/h for 10 minutes or more, fully close the throttle at least once in 2 minutes and decelerate for 10 seconds or more. <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.) 6. After completing the above deceleration, bring the vehicle speed back to 55 – 80 km/h and keep it in the range until starting the deceleration again. <ul style="list-style-type: none"> • Repeat the above deceleration at least 5 times. 7. Return the vehicle to the shop, then turn the ignition switch to "LOCK" (OFF) position.

Procedure 2

Oxygen sensor (front) monitor	
Diagnosis code No.	P0130
Drive cycle pattern	<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.	P0136, P0201, P0202, P0203, P0204, P0300, P0301, P0302, P0303, P0304, P0325, P0500, P0551
Drive cycle pattern	<p>One trip monitor [from start to ignition switch to "LOCK" (OFF) position] will be completed while traveling with the following drive cycle pattern. It will take 21 minutes or more.</p> <p style="text-align: right;">AK301817AB</p>
Inspection conditions	<ul style="list-style-type: none"> • 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 monitors the following main diagnosis items, judges if these items are in good condition or not, and stores its history. This history can be read out by using M.U.T.-II/III. (If the ECU has judged a item before, the M.U.T.-II/III displays "Complete").

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

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

FAIL-SAFE FUNCTION REFERENCE TABLE

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

Malfunctioning item	Control contents during malfunction
Air flow sensor	Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping.
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. • 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 (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 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 position sensor (main) is also malfunctioning.
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80°C.
Camshaft position sensor	Injectors fuel into the cylinders in the order 1-3-4-2 with irregular timing. (After the ignition switch is turned to the "ON" position, the No. 1 cylinder top dead center is not detected at all)
Oxygen sensor (front)	Air-fuel ratio feedback control (closed loop control) is not performed.
Oxygen sensor (rear)	Performs the feedback control (closed loop control) of the air-fuel ratio by using only the signal of the oxygen (front) installed on the front of the catalytic converter.
Detonation sensor	Fixes the ignition timing as that for regular gasoline.

Malfunctioning item	Control contents during malfunction
Ignition coil (incorporating power transistor)	Cuts off the fuel supply to cylinders with an abnormal ignition.
Alternator FR terminal	Does not control the output of the alternator according to an electrical load. (works as a normal alternator)
Misfiring	If the detected misfiring causes damage to the catalyst, the misfiring cylinder will be shut down
Throttle valve position feedback	<ul style="list-style-type: none"> • Suppresses the engine output by stopping the 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 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 the engine speed feedback control.

INSPECTION CHART FOR DIAGNOSIS CODE

M1131151001382

Code No.	Diagnosis item	Reference page
P0090	Fuel pressure control solenoid valve system	P.13B-22
P0100	Air flow sensor system	P.13B-28
P0105	Barometric pressure sensor system	P.13B-38
P0110	Intake air temperature sensor system	P.13B-47
P0115	Engine coolant temperature sensor system	P.13B-54
P0122*	Throttle position sensor (main) circuit low input	P.13B-61
P0123*	Throttle position sensor (main) circuit high input	P.13B-65
P0125*	Feedback system monitor	P.13B-68
P0130	Oxygen sensor (front) system	P.13B-72
P0135	Oxygen sensor heater (front) system	P.13B-78
P0136	Oxygen sensor (rear) system	P.13B-84
P0141	Oxygen sensor heater (rear) system	P.13B-90
P0170	Abnormal fuel system	P.13B-96
P0201	No.1 Injector system	P.13B-100
P0202	No.2 Injector system	P.13B-104
P0203	No.3 Injector system	P.13B-108
P0204	No.4 Injector system	P.13B-112
P0222*	Throttle position sensor (sub) circuit low input	P.13B-116
P0223*	Throttle position sensor (sub) circuit high input	P.13B-120
P0243	Waste gate solenoid valve system	P.13B-123
P0300	Random cylinder misfire detection system	P.13B-128
P0301*	No.1 cylinder misfire detection system	P.13B-131
P0302*	No.2 cylinder misfire detection system	P.13B-133
P0303*	No.3 cylinder misfire detection system	P.13B-136
P0304*	No.4 cylinder misfire detection system	P.13B-138
P0325	Detonation sensor system	P.13B-141
P0335	Crank angle sensor system	P.13B-145
P0340	Camshaft position sensor system	P.13B-155
P0403	EGR control solenoid valve system	P.13B-162
P0421	Warm up catalyst malfunction	P.13B-167
P0443	Purge control solenoid valve system	P.13B-168
P0500	Vehicle speed sensor system	P.13B-173
P0513	Immobilizer system	P.13B-176
P0551*	Power steering fluid pressure switch system	P.13B-178
P0622	Alternator FR terminal system	P.13B-183
P0638*	Throttle valve control servo circuit range/performance/problem	P.13B-188

Code No.	Diagnosis item	Reference page
P0642*	Throttle position sensor power supply	P.13B-190
P0657*	Throttle valve control servo relay circuit malfunction	P.13B-191
P0805	Clutch oil pressure sensor system	P.13B-197
P1603*	Battery back-up line system	P.13B-205
P2100*	Throttle valve control servo circuit (open)	P.13B-207
P2101*	Throttle valve control magneto malfunction	P.13B-210
P2102*	Throttle valve control servo circuit (shorted low)	P.13B-213
P2103*	Throttle valve control servo circuit (shorted high)	P.13B-216
P2121*	Accelerator pedal position sensor (main) circuit range/performance problem	P.13B-219
P2122*	Accelerator pedal position sensor (main) circuit low input	P.13B-222
P2123*	Accelerator pedal position sensor (main) circuit high input	P.13B-226
P2126*	Accelerator pedal position sensor (sub) circuit range/Performance problem	P.13B-229
P2127*	Accelerator pedal position sensor (sub) circuit low input	P.13B-232
P2128*	Accelerator pedal position sensor (sub) circuit high input	P.13B-236
P2135*	Throttle position sensor (main and sub) range/performance problem	P.13B-239
P2138*	Accelerator pedal position (main and sub) range/performance problem	P.13B-241
P2173*	Abnormal intake air amount	P.13B-247

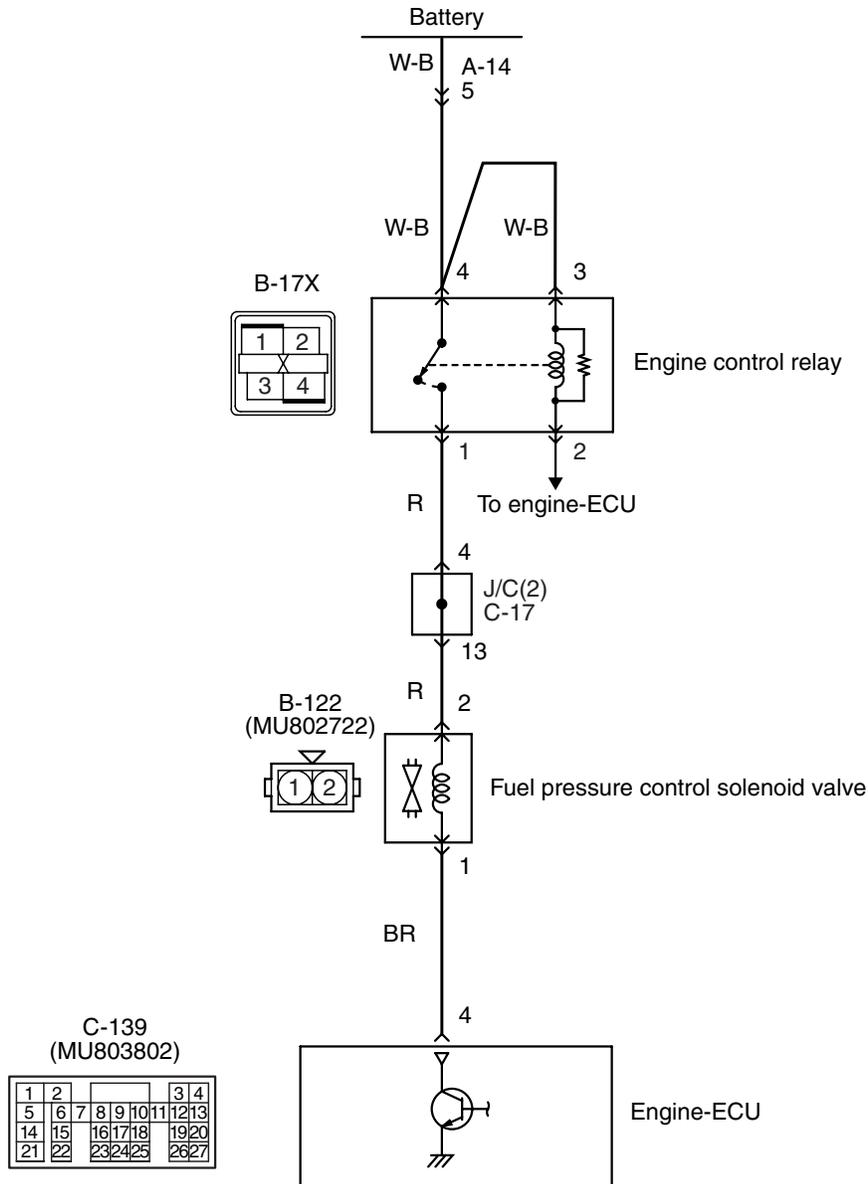
NOTE:

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

INSPECTION PROCEDURE FOR
DIAGNOSIS CODES

Code No. P0090: Fuel Pressure Control Solenoid Valve System

Fuel pressure 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

OPERATION

- Power is supplied from the engine control relay (terminal No. 1) to the fuel pressure control solenoid valve (terminal No. 2).
- The engine-ECU (terminal No. 4) causes the power transistor in the unit to be ON to supply power to the fuel pressure control solenoid valve (terminal No. 1).

FUNCTION

- In response to a signal from the engine-ECU, the fuel pressure control solenoid valve switches the pressure to be introduced into the fuel pressure regulator between the intake manifold negative pressure and atmospheric pressure.

TROUBLE JUDGMENT

Check Condition

- Battery voltage is 10 V or more.

Judgment Criterion

- Surge voltage cannot be detected within 1 seconds from the time when the fuel pressure control solenoid valve has changed from ON to OFF.

PROBABLE CAUSE

- Failed fuel pressure control solenoid valve
- Open/short circuit in fuel pressure control solenoid valve circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

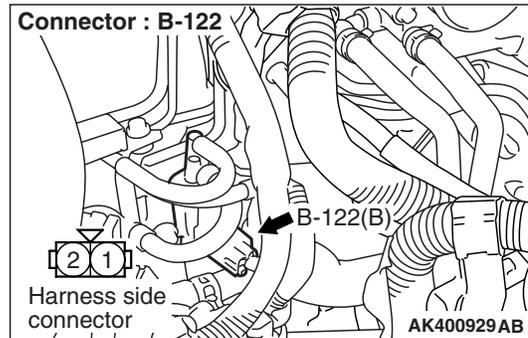
- Item 09: Fuel pressure control solenoid valve
OK: Operating sound can be heard and the valve vibrates.

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-122 fuel pressure control solenoid valve connector

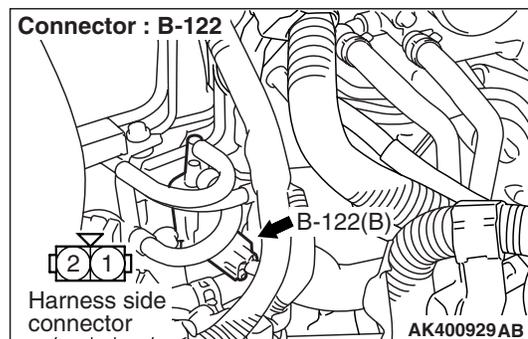


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at B-122 fuel pressure control solenoid valve connector.



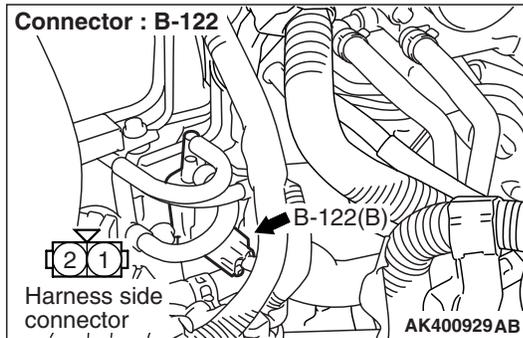
- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.

OK: 28 – 36 Ω (at 20°C)

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace fuel pressure control solenoid valve.

STEP 4. Perform voltage measurement at B-122 fuel pressure control solenoid valve connector.

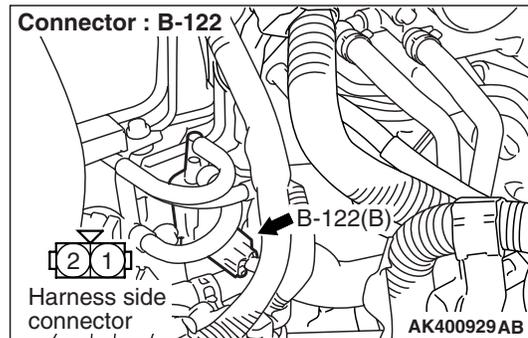
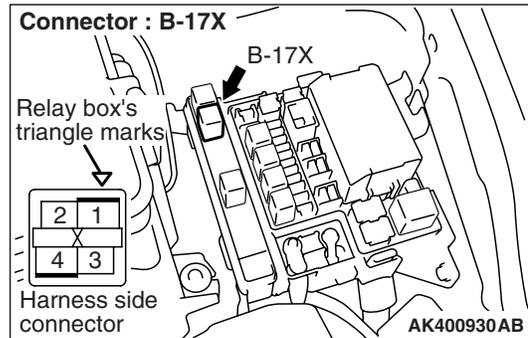
- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 2 and earth.

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

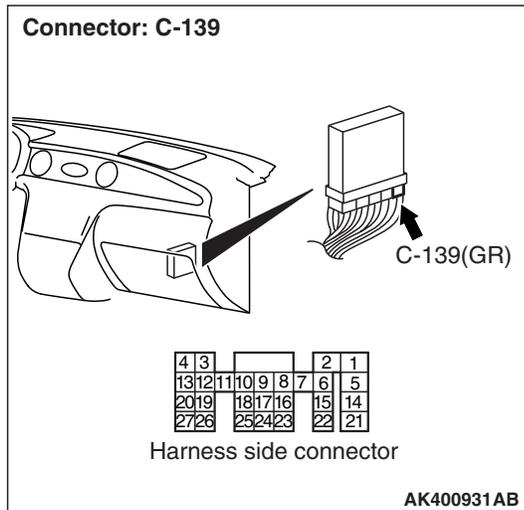
Q: Is the check result normal?

YES : Check intermediate connector C-17, and repair if necessary. If intermediate connector are normal, check and repair harness between B-122 (terminal No. 2) fuel pressure control solenoid valve connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 6. Perform voltage measurement at C-139 engine-ECU connector.



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

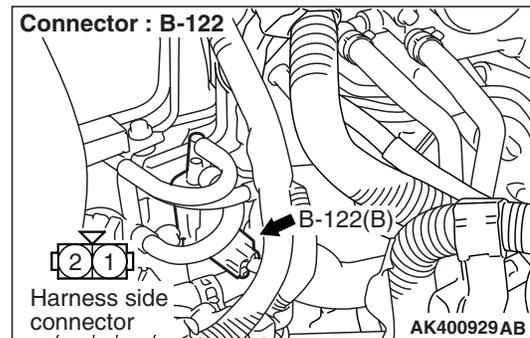
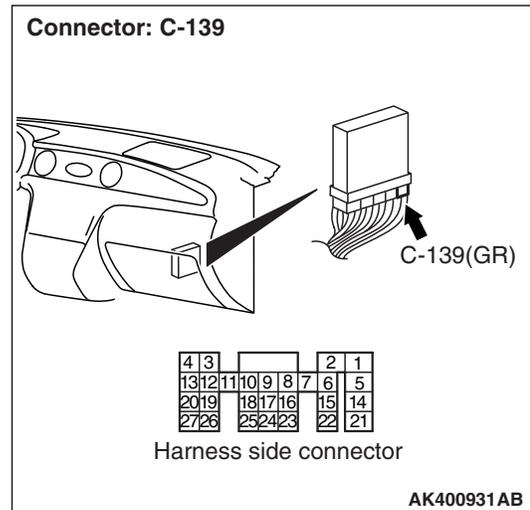
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Connector check: C-139 engine-ECU connector



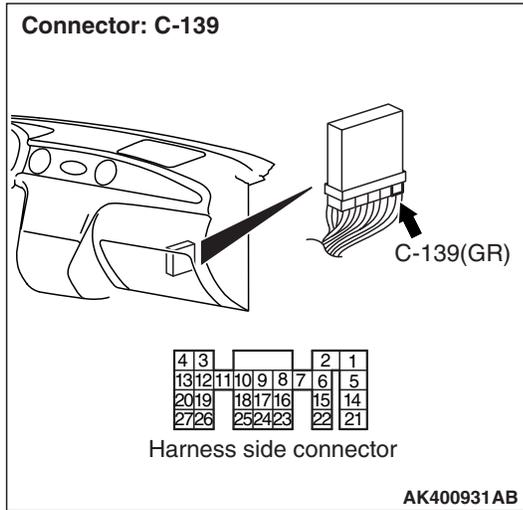
Q: Is the check result normal?

YES : Check and repair harness between B-122 (terminal No. 1) fuel pressure control solenoid valve connector and C-139 (terminal No. 4) engine-ECU connector.

- Check output line for open/short circuit.

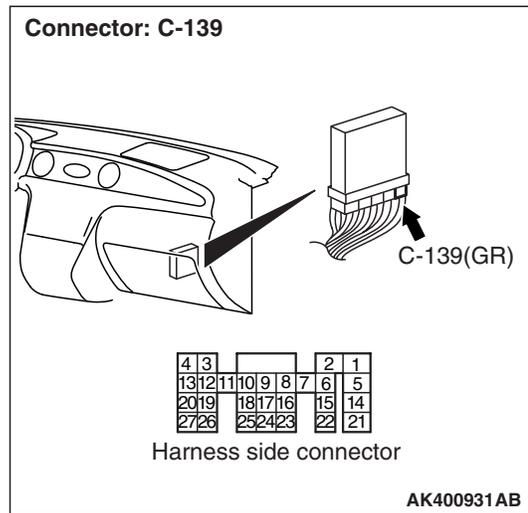
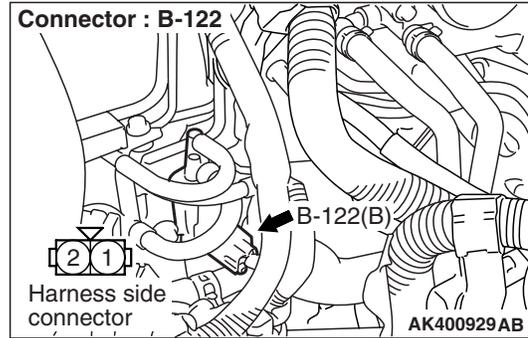
NO : Repair or replace.

STEP 8. Connector check: C-139 engine-ECU connector



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

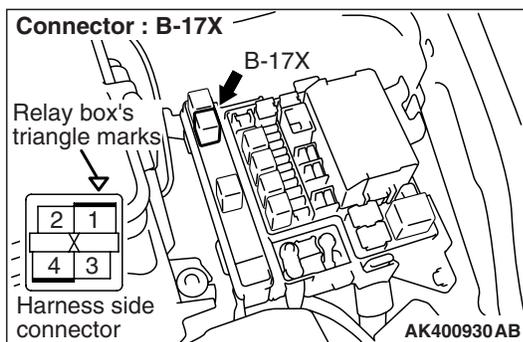
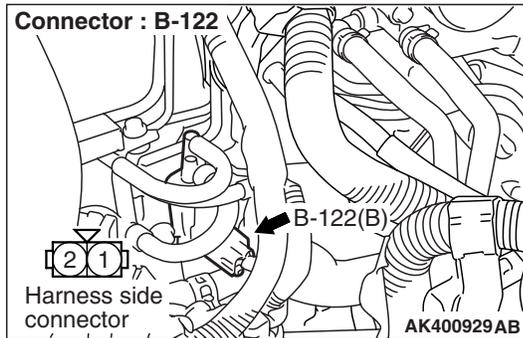
STEP 9. Check harness between B-122 (terminal No. 1) fuel pressure control solenoid valve connector and C-139 (terminal No. 4) engine-ECU connector.



- Check output line for damage.

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

STEP 10. Check harness between B-122 (terminal No. 2) fuel pressure control solenoid 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 11 .

NO : Repair.

STEP 11. M.U.T.-II/III actuator test

- Item 09: Fuel pressure control solenoid valve
OK: Operating sound can be heard and the valve vibrates.

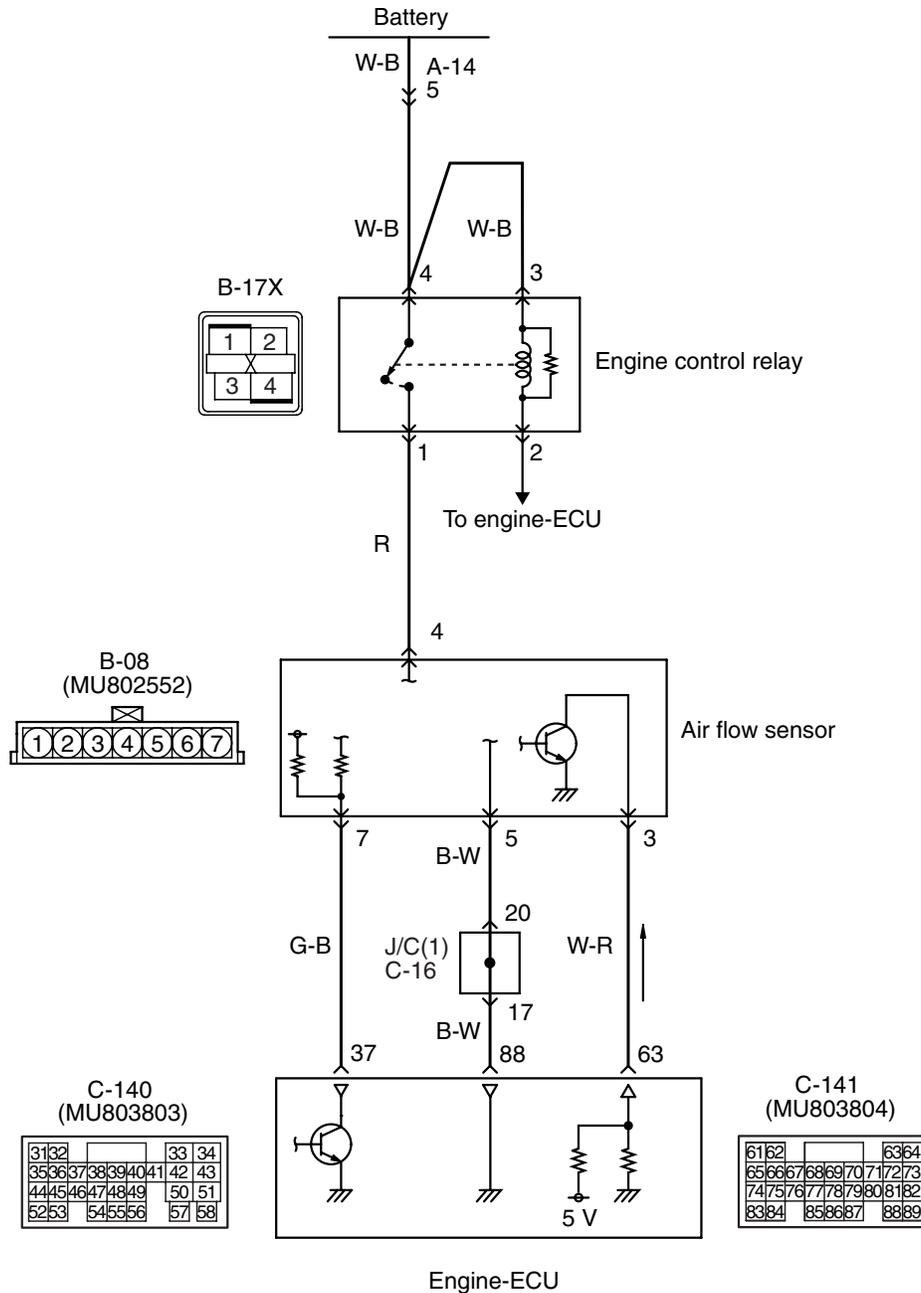
Q: Is the check result normal?

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

NO : Replace engine-ECU.

Code No. 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

AK400801AB

OPERATION

- Power is supplied to the air flow sensor (terminal No. 4) from the engine control relay (terminal No. 1) and earthed to the engine-ECU (terminal No. 88) from the air flow sensor (terminal No. 5).
- A power voltage of 5 V is applied to the air flow sensor output terminal (terminal No. 3) from the engine-ECU (terminal No. 63).

- An air flow sensor filter reset signal is inputted to the air flow sensor (terminal No. 7) from the engine-ECU (terminal No. 37).

FUNCTION

- Air flow sensor outputs a pulse signal proportional to the intake air flow rate.
- The engine-ECU determines the basic injection timing of the injector using the pulse signal output from the air flow sensor and the engine speed signal.
- When the throttle position sensor output is low, the engine-ECU causes the power transistor in the unit to be ON to send an air flow sensor filter reset signal to the air flow sensor. In response to the reset signal, the air flow sensor resets the filter circuit to improve the ability of the air flow sensor to measure the air flow rate in the area where the intake air flow rate is low.

TROUBLE JUDGMENT

Check Condition

- Engine speed of 500 r/min or more.

Judgment Criterion

- The sensor output frequency of 3.3 Hz or more for 2 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

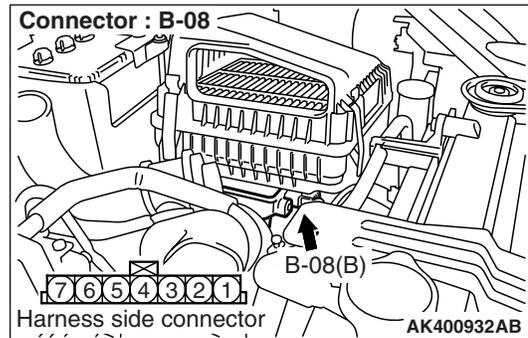
- Refer to Data List Reference Table [P.13B-368](#).
 - Item 12: Air flow sensor

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

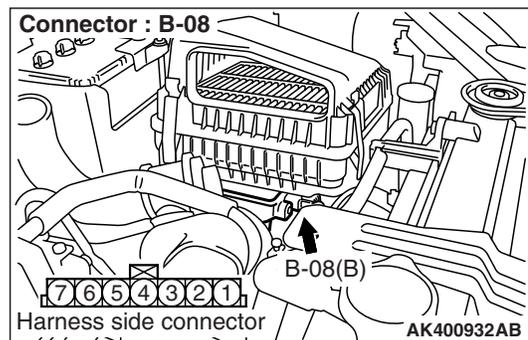


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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



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

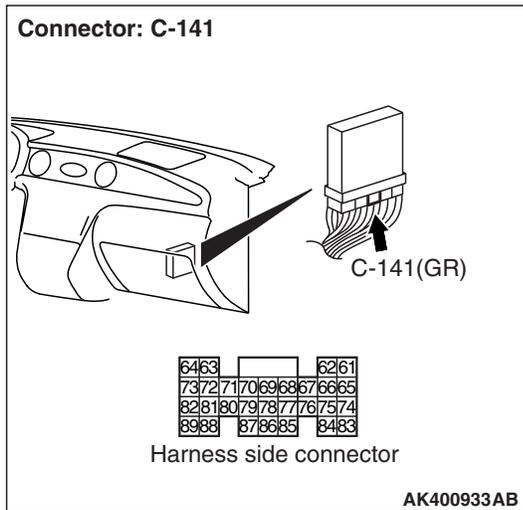
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 4 .

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



- Measure engine-ECU terminal voltage.
- Ignition switch: "ON"
- Voltage between terminal No. 63 and earth.

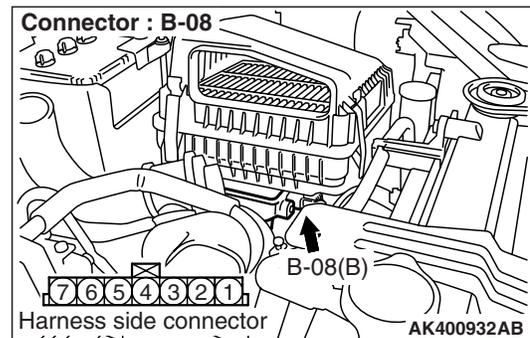
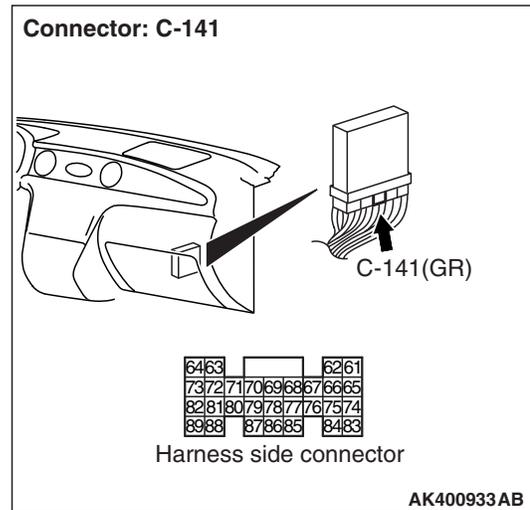
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: C-141 engine-ECU connector



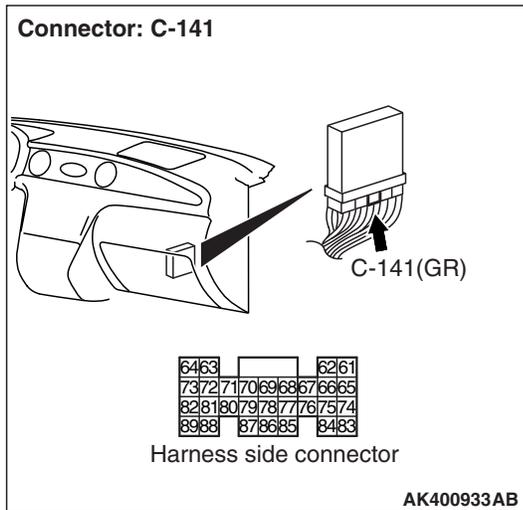
Q: Is the check result normal?

YES : Check and repair harness between B-08 (terminal No. 3) air flow sensor connector and C-141 (terminal No. 63) engine-ECU connector.

- Check output line for open circuit.

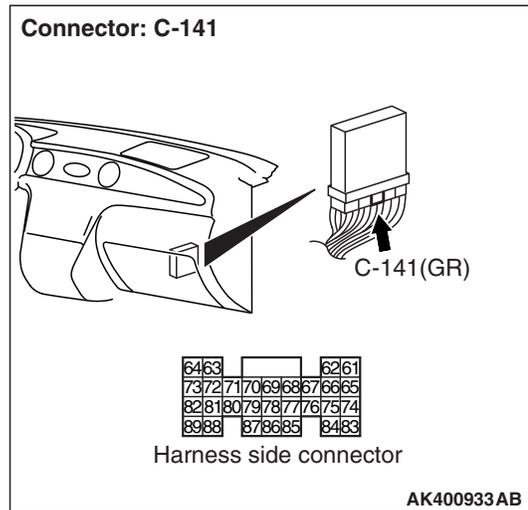
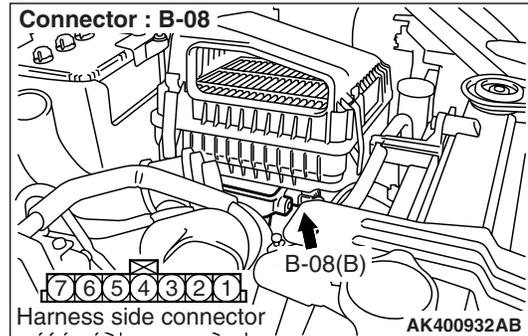
NO : Repair or replace.

STEP 6. Connector check: C-141 engine-ECU connector



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

STEP 7. Check harness between B-08 (terminal No. 3) air flow sensor connector and C-141 (terminal No. 63) engine-ECU connector.



- Check output line for short circuit.

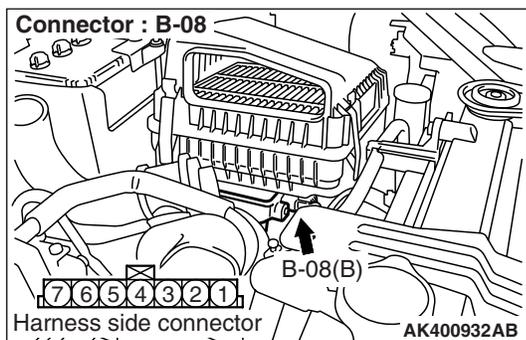
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair.

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

- Refer to Data List Reference Table [P.13B-368](#).
 - Item 12: Air flow sensor

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

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



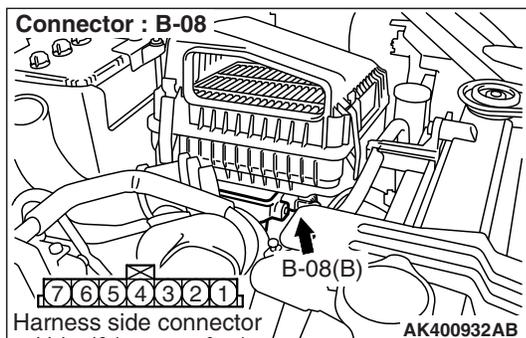
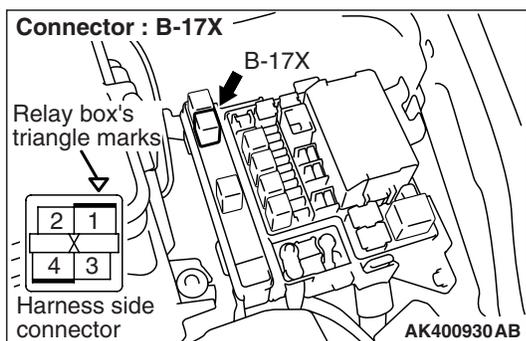
- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 4 and earth.

OK: System voltage

Q: Is the check result normal?

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

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



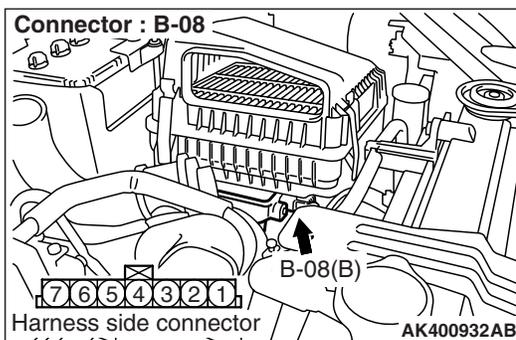
Q: Is the check result normal?

- YES :** Check and repair harness between B-08 (terminal No. 4) air flow sensor connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 11. Perform resistance measurement at B-08 air flow sensor connector.



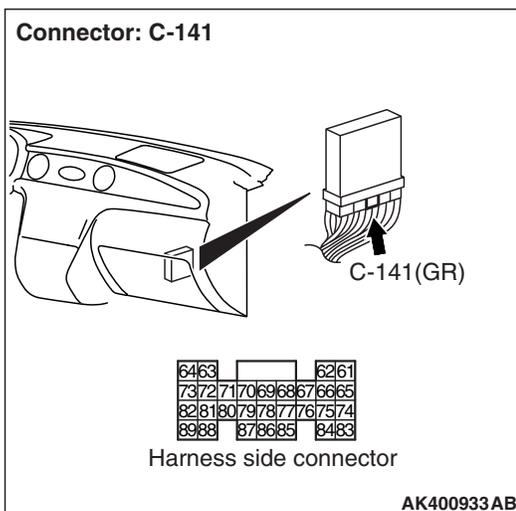
- Disconnect and measure at harness side.
- Resistance between terminal No. 5 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

- YES :** Go to Step 14 .
- NO :** Go to Step 12 .

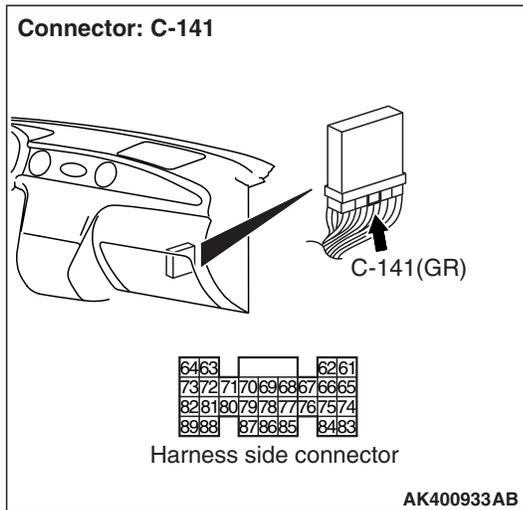
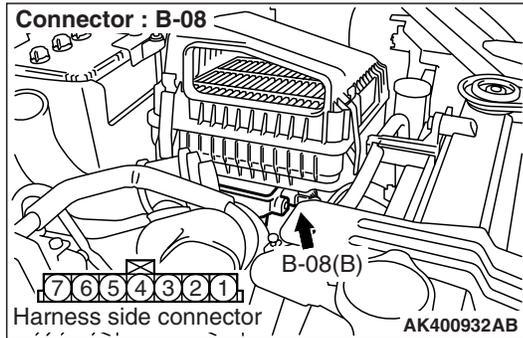
STEP 12. Connector check: C-141 engine-ECU connector



Q: Is the check result normal?

- YES :** Go to Step 13 .
- NO :** Repair or replace.

STEP 13. Check harness between B-08 (terminal No. 5) air flow sensor connector and C-141 (terminal No. 88) engine-ECU connector.



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

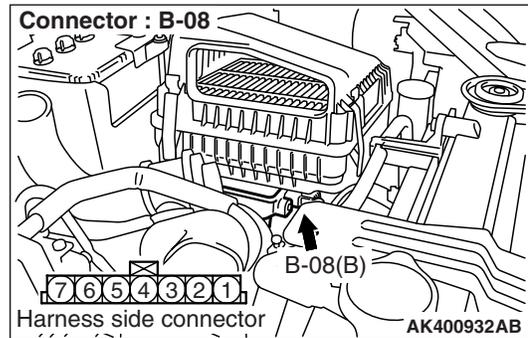
- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 14. Perform voltage measurement at B-08 air flow sensor connector.



- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Ignition switch: "ON"
- Voltage between terminal No. 7 and earth.

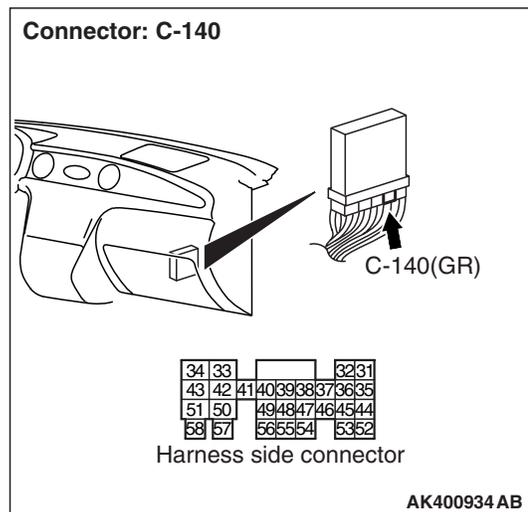
OK: 6 – 9 V

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Go to Step 15 .

STEP 15. Connector check: C-140 engine-ECU connector

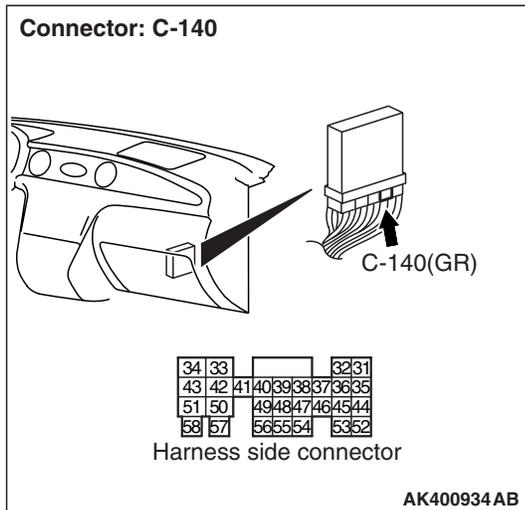
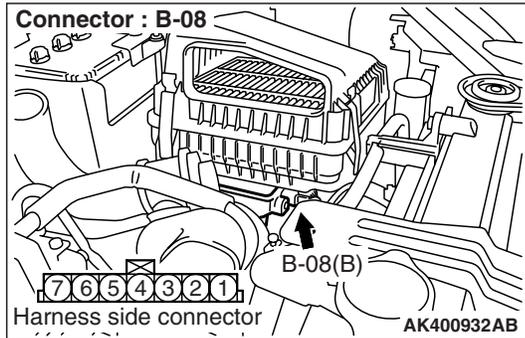


Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair or replace.

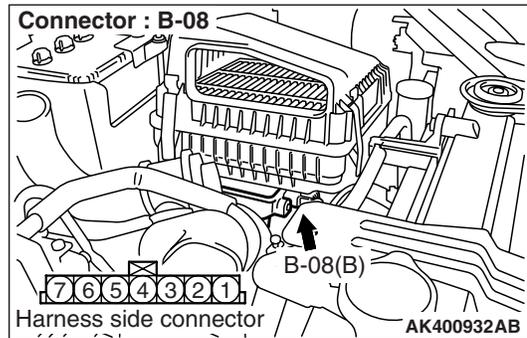
STEP 16. Check harness between B-08 (terminal No. 7) air flow sensor connector and C-140 (terminal No. 37) engine-ECU connector.



- Check reset signal line for short circuit.

Q: Is the check result normal?
YES : Replace air flow sensor.
NO : Repair.

STEP 17. Perform voltage measurement at B-08 air flow sensor connector.



- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Transmission: Neutral
- Voltage between terminal No. 7 and earth.

OK:

0 – 1 V (Engine: Idling)

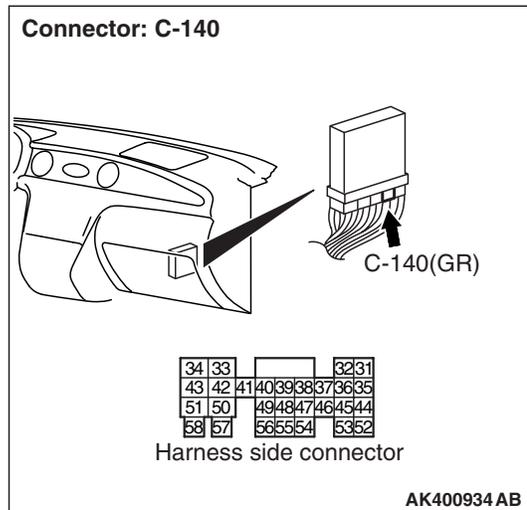
6 – 9 V (Engine: 3,000 r/min.)

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Go to Step 18 .

STEP 18. Connector check: C-140 engine-ECU connector

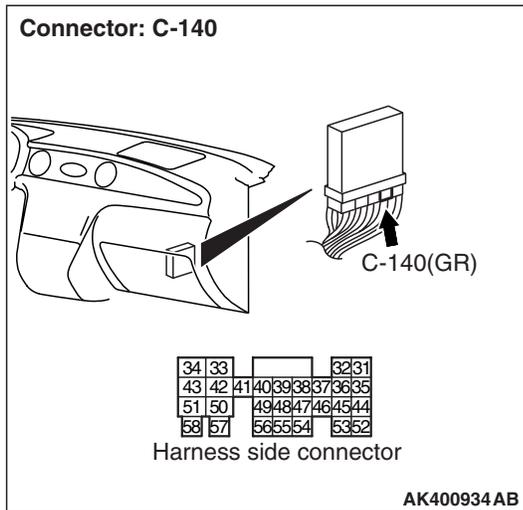
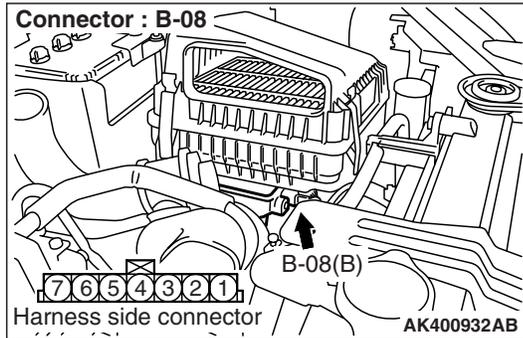


Q: Is the check result normal?

YES : Go to Step 19 .

NO : Repair or replace.

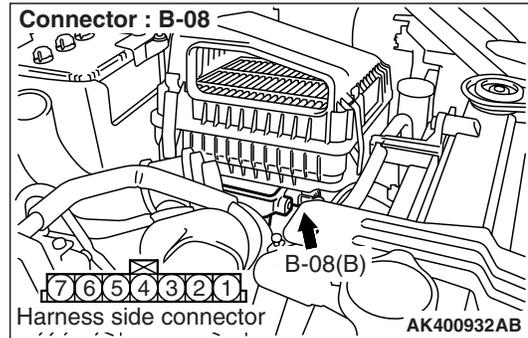
STEP 19. Check harness between B-08 (terminal No. 7) air flow sensor connector and C-140 (terminal No. 37) engine-ECU connector.



- Check reset signal line for open circuit and damage.

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

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



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

OK: Waveforms should be displayed on inspection procedure using an oscilloscope (Refer to P.13B-383) and noise should not be displayed in the waveform.

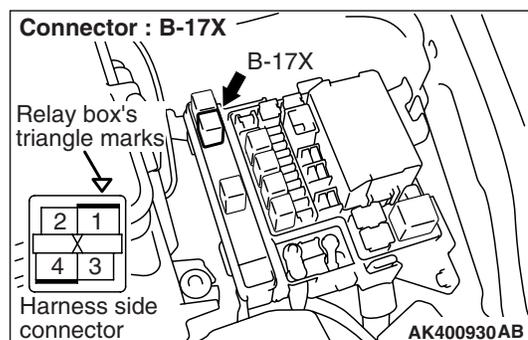
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 21 .

STEP 21. Replace air flow sensor.

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

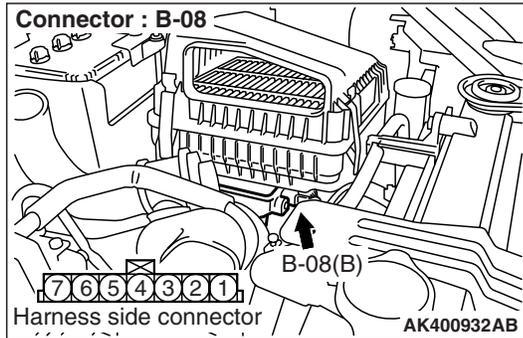
Q: Is the check result normal?
YES : Go to Step 22 .
NO : Check end.

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

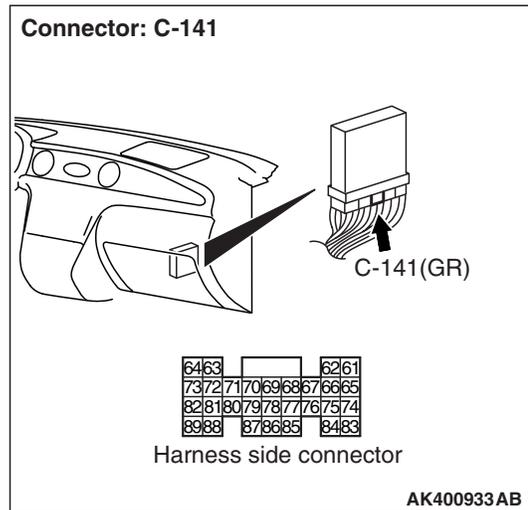
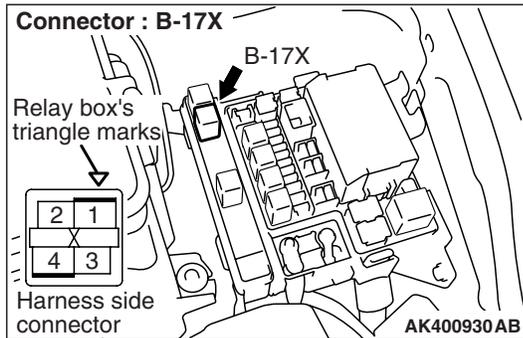
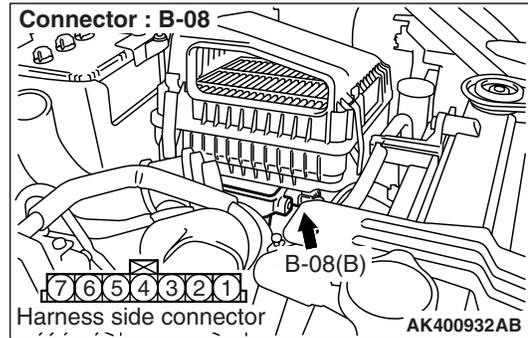


Q: Is the check result normal?
YES : Go to Step 23 .
NO : Repair or replace.

STEP 23. Check harness between B-08 (terminal No. 4) air flow sensor connector and B-17X (terminal No. 1) engine control relay connector.



STEP 25. Check harness between B-08 (terminal No. 3) air flow sensor connector and C-141 (terminal No. 63) engine-ECU connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 24 .

NO : Repair.

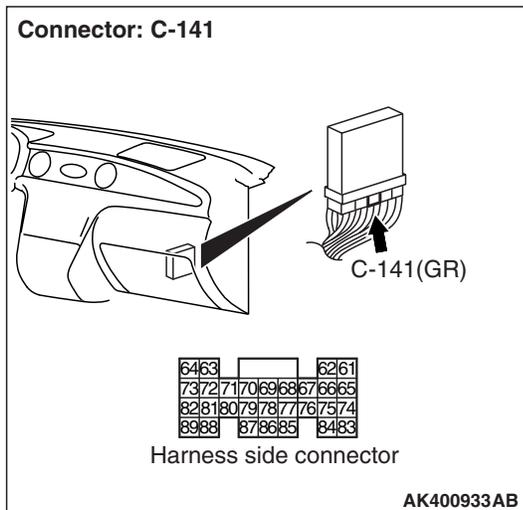
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 26 .

NO : Repair.

STEP 24. Connector check: C-141 engine-ECU connector

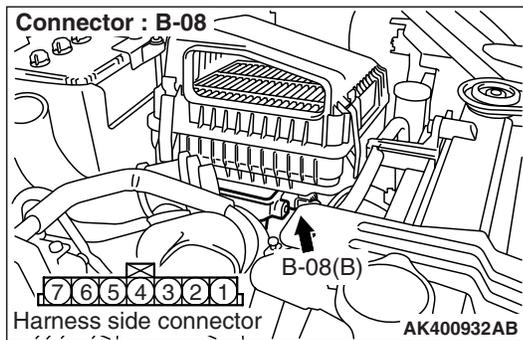
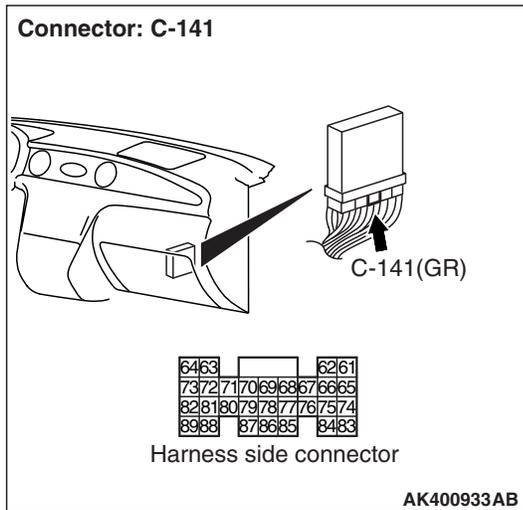


Q: Is the check result normal?

YES : Go to Step 25 .

NO : Repair or replace.

STEP 26. Connector check: C-141 engine-ECU connector



Q: Is the check result normal?

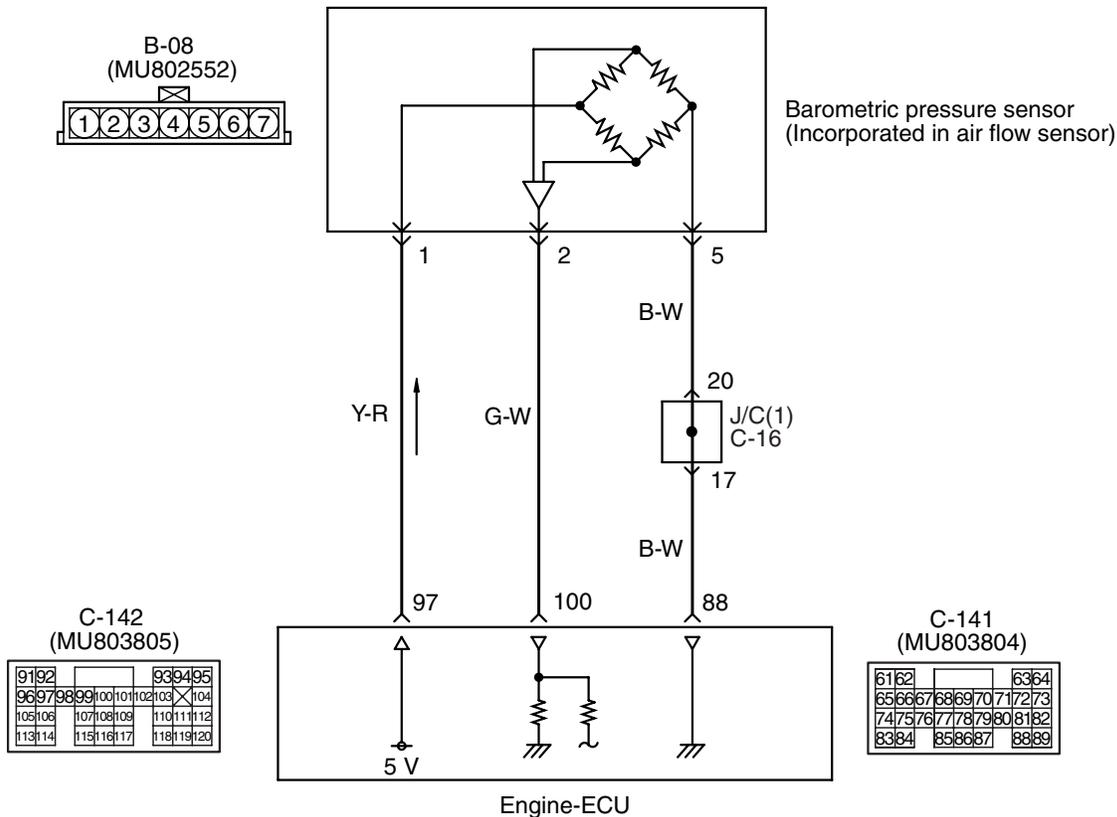
YES : Check intermediate connector C-16, and repair if necessary. If intermediate connector are normal, check and repair harness between B-08 (terminal No. 5) air flow sensor connector and C-141 (terminal No. 88) engine-ECU connector.

- Check earthing line for damage.

No : Repair or replace.

Code No. P105: Barometric Pressure Sensor System

Barometric pressure sensor circuit



Wire colour code

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

AK400802AB

OPERATION

- A power voltage of 5 V is applied to the barometric pressure sensor power terminal (terminal No. 1) of the air flow sensor connector from the engine-ECU (terminal No. 97) and earthed to the engine-ECU (terminal No. 88) from the air flow sensor (terminal No. 5).
- The sensor signal is inputted to the engine-ECU (terminal No. 100) from the barometric pressure sensor output terminal (terminal No. 2) of the air flow sensor connector.

FUNCTION

- The barometric pressure sensor converts the barometric pressure into a voltage signal and inputs the signal to the engine-ECU.
- In response to the signal, the engine-ECU corrects the fuel injection amount, etc.

TROUBLE JUDGMENT**Check Condition**

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

Judgment Criterion

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

or

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

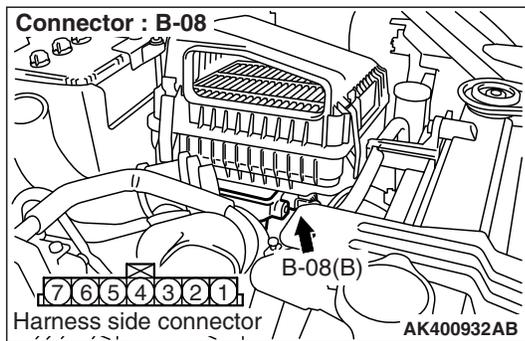
- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 25: Barometric pressure sensor

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

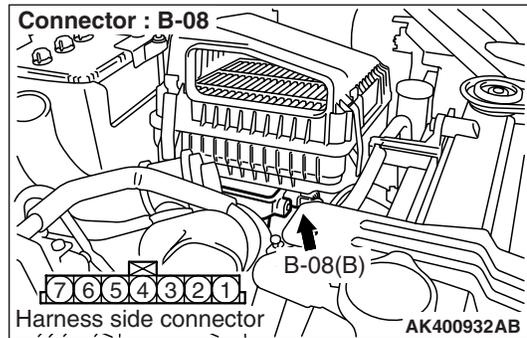


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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



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

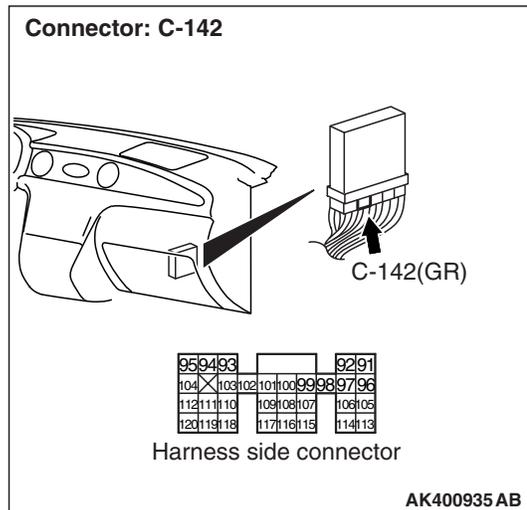
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 4 .

STEP 4. Perform voltage measurement at C-142 engine-ECU connector.



- Measure engine-ECU terminal voltage.
- Ignition switch: "ON"
- Voltage between terminal No. 97 and earth.

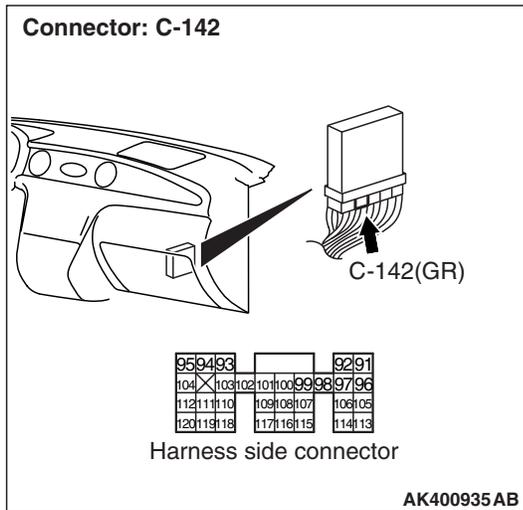
OK: 4.9 – 5.1 V

Q: Is the check result normal?

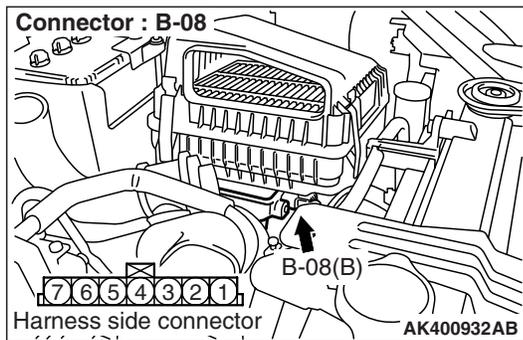
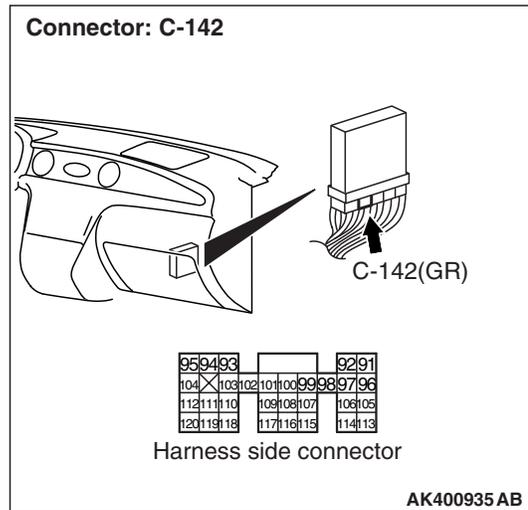
YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: C-142 engine-ECU connector



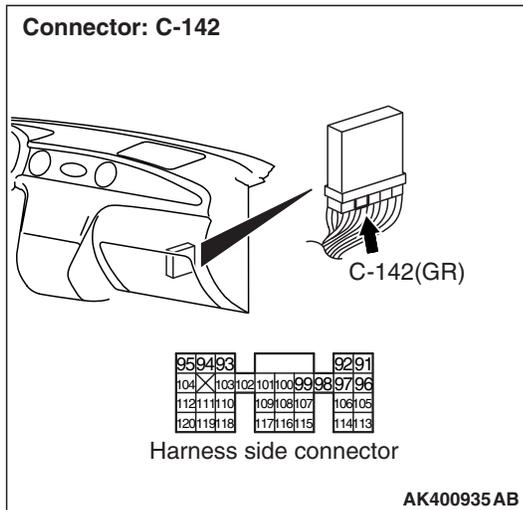
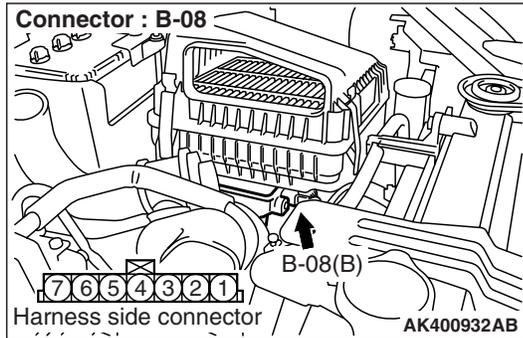
STEP 6. Connector check: C-142 engine-ECU connector



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

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. 97) engine-ECU connector.
 • Check power supply line for open circuit.
NO : Repair or replace.

STEP 7. Check harness between B-08 (terminal No. 1) air flow sensor connector and C-142 (terminal No. 97) engine-ECU connector.



- Check power supply line for short circuit.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

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

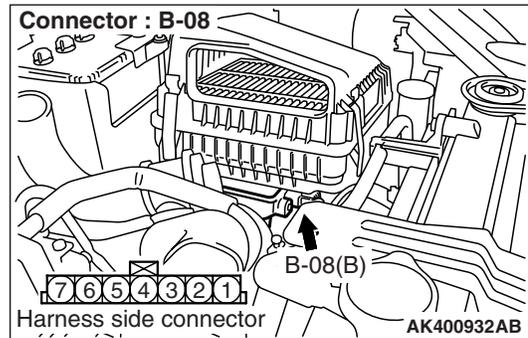
- Refer to Data List Reference Table P.13B-368.
 - Item No. 25: Barometric pressure sensor

Q: Is the check result normal?

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

NO : Replace engine-ECU.

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



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

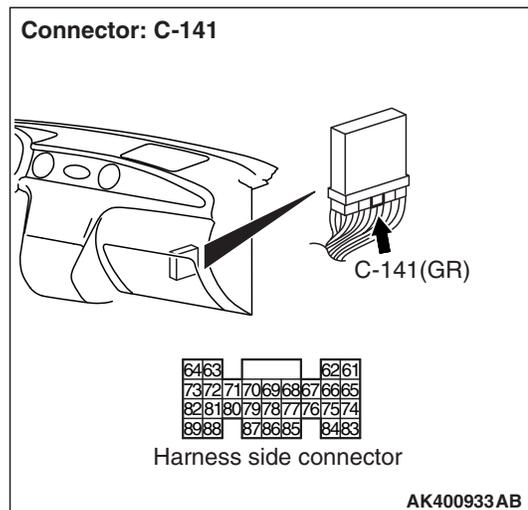
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 10 .

STEP 10. Connector check: C-141 engine-ECU connector

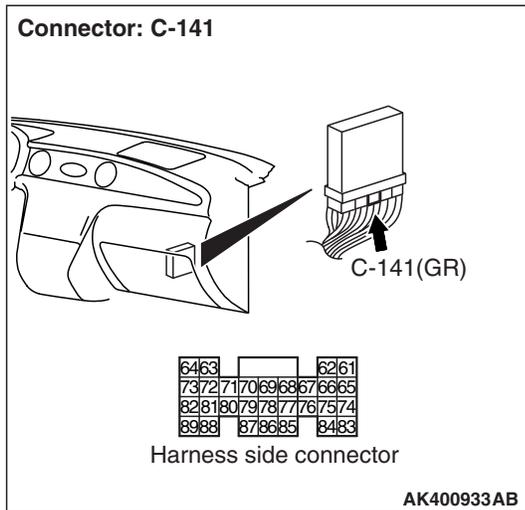
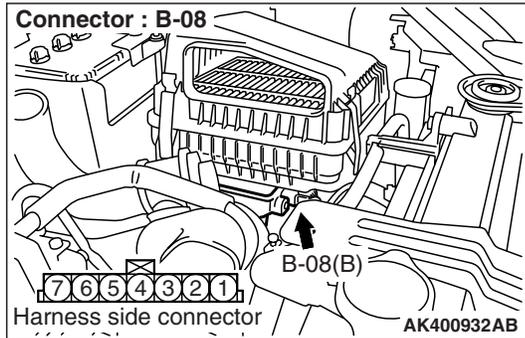


Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair or replace.

STEP 11. Check harness between B-08 (terminal No. 5) air flow sensor connector and C-141 (terminal No. 88) engine-ECU connector.



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

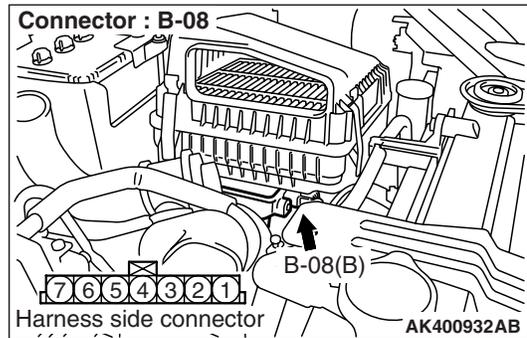
- Check earthing line for open circuit or damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 12. Perform voltage measurement at B-08 air flow sensor connector.



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

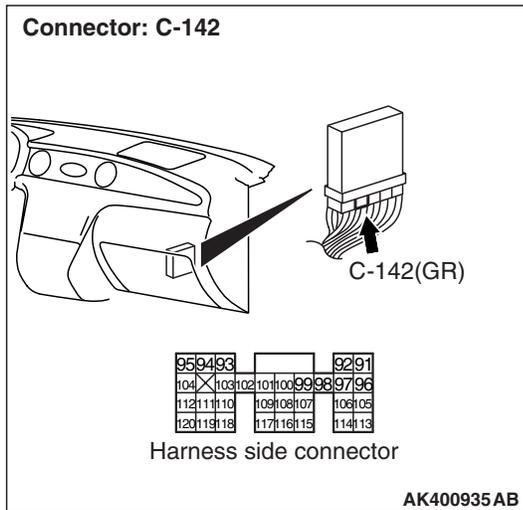
OK: 4.9 – 5.1 V

Q: Is the check result normal?

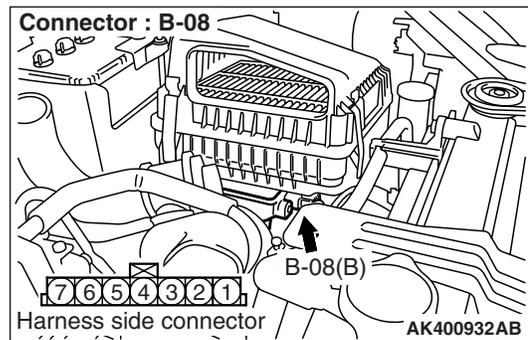
YES : Go to Step 14 .

NO : Go to Step 13 .

STEP 13. Connector check: C-142 engine-ECU connector



STEP 14. Perform voltage measurement at B-08 air flow sensor connector.



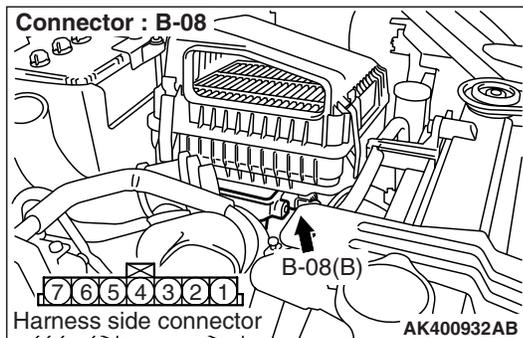
- Use special tool test harness (MB991709) to connect only terminal No. 1, No. 2 and No. 5, and then measure at pick-up harness.
- Ignition switch: "ON"
- Voltage between terminal No. 5 and earth.

OK: 0.5 V or less

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Go to Step 15 .



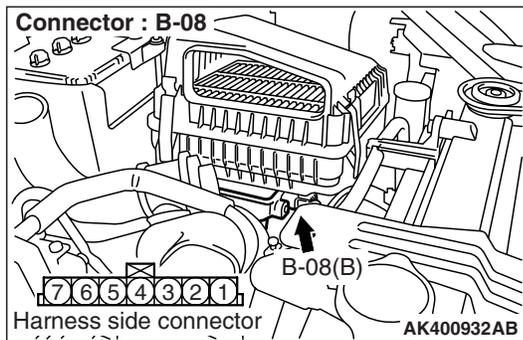
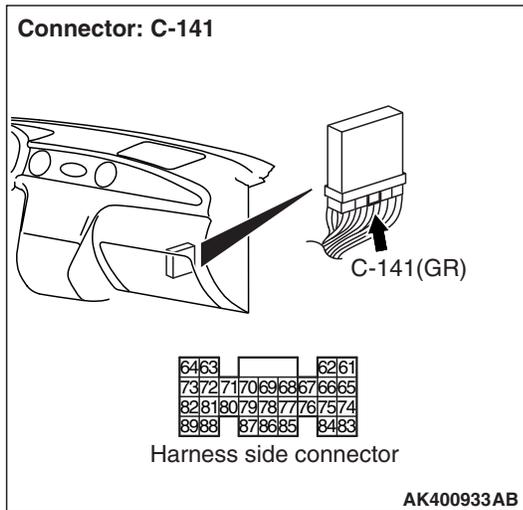
Q: Is the check result normal?

YES : Check and repair harness between B-08 (terminal No. 1) air flow sensor connector and C-142 (terminal No. 97) engine-ECU connector.

- Check power supply line for damage.

NO : Repair or replace.

STEP 15. Connector check: C-141 engine-ECU connector



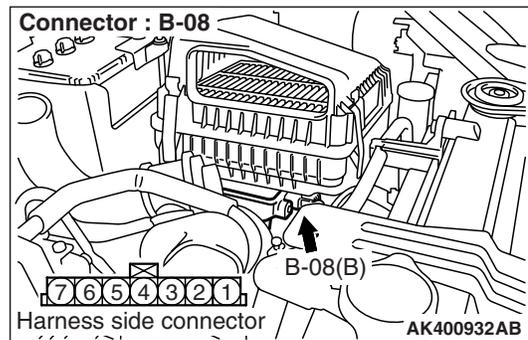
Q: Is the check result normal?

YES : Check intermediate connector C-16, and repair if necessary. If intermediate connector are normal, check and repair harness between B-08 (terminal No. 5) air flow sensor connector and C-141 (terminal No. 88) engine-ECU connector.

- Check earthing line for damage.

NO : Repair or replace.

STEP 16. Perform voltage measurement at B-08 air flow sensor connector.



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

OK:

Altitude 0 m: 3.8 – 4.2 V

Altitude 600 m: 3.5 – 3.9 V

Altitude 1,200 m: 3.3 – 3.7 V

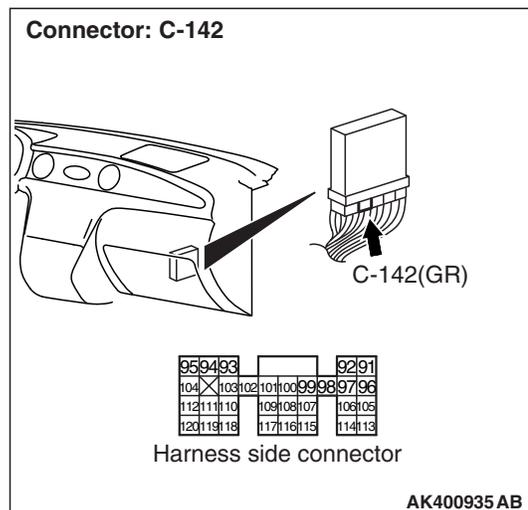
Altitude 1,800 m: 3.0 – 3.4 V

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Go to Step 17 .

STEP 17. Connector check: C-142 engine-ECU connector

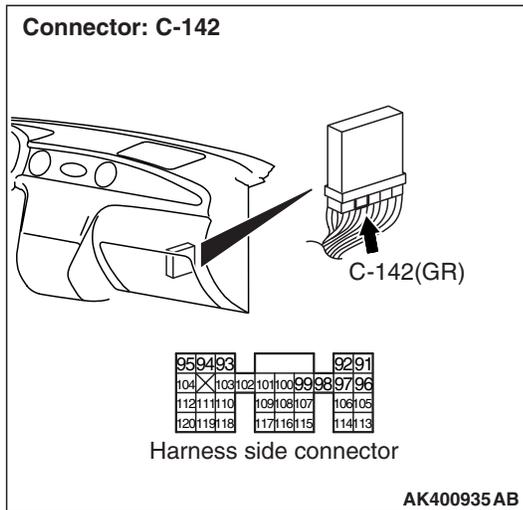
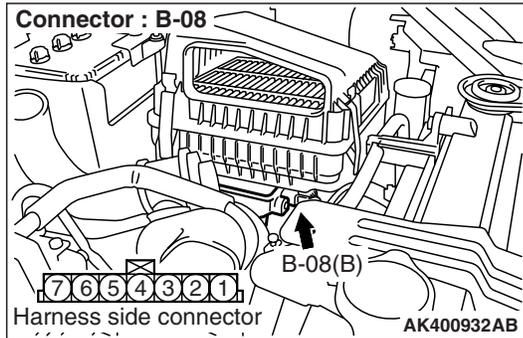


Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair or replace.

STEP 18. Check harness between B-08 (terminal No. 2) air flow sensor connector and C-142 (terminal No. 100) engine-ECU connector.



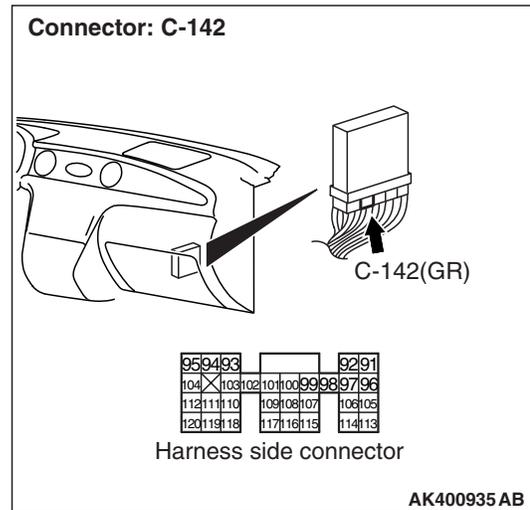
- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Replace air flow sensor.

NO : Repair.

STEP 19. Perform voltage measurement at C-142 engine-ECU connector.



- Measure engine-ECU terminal voltage.
- Ignition switch: "ON"
- Voltage between terminal No. 100 and earth.

OK:

Altitude 0 m: 3.8 – 4.2 V

Altitude 600 m: 3.5 – 3.9 V

Altitude 1,200 m: 3.3 – 3.7 V

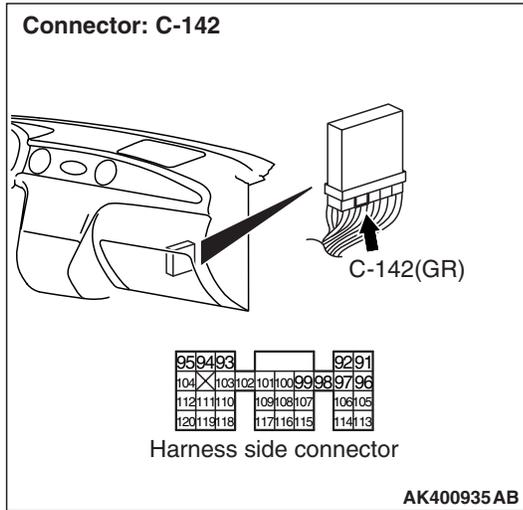
Altitude 1,800 m: 3.0 – 3.4 V

Q: Is the check result normal?

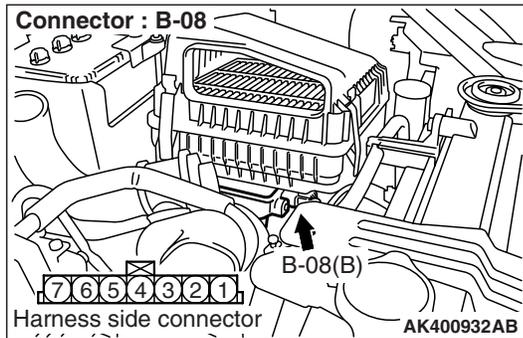
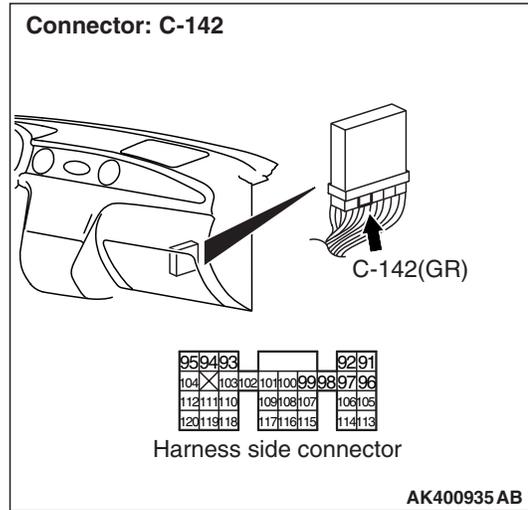
YES : Go to Step 21 .

NO : Go to Step 20 .

STEP 20. Connector check: C-142 engine-ECU connector



STEP 21. Connector check: C-142 engine-ECU connector

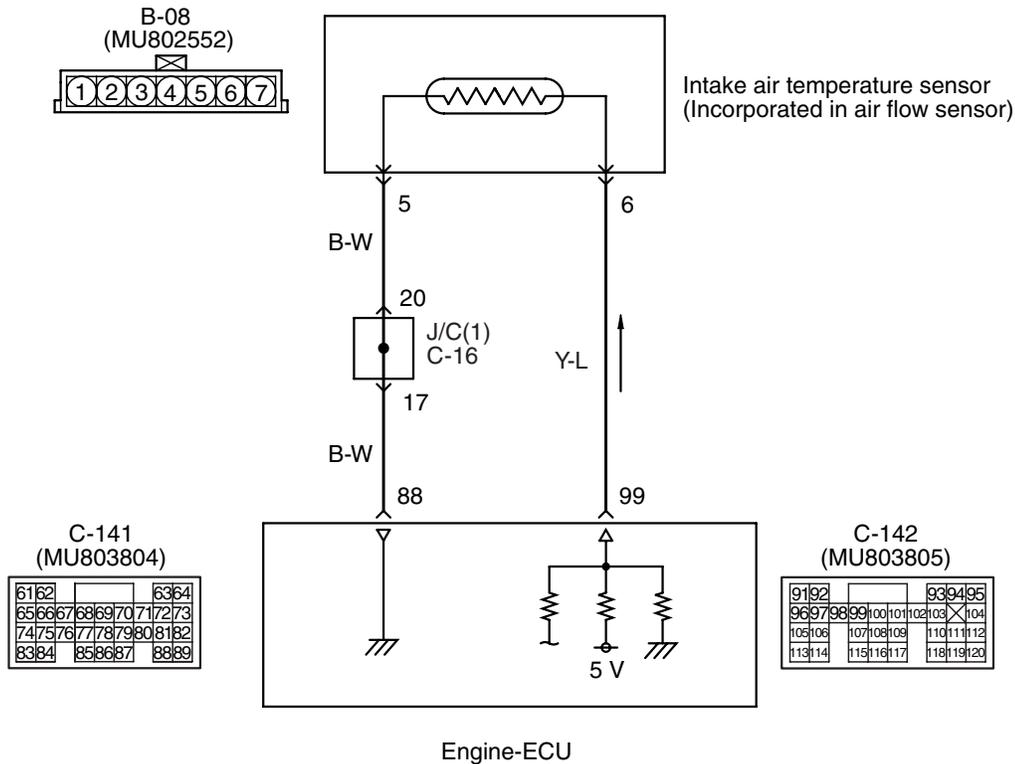


Q: Is the check result normal?
YES : Go to Step 8 .
NO : Repair or replace.

Q: Is the check result normal?
YES : Check and repair harness between B-08 (terminal No. 2) air flow sensor connector and C-142 (terminal No. 100) engine-ECU connector.
 • Check output line for open circuit and damage.
NO : Repair or replace.

Code No. P0110: Intake Air Temperature Sensor System

Intake air temperature sensor circuit



Wire colour code

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

AK400803AB

OPERATION

- A power voltage of 5 V is applied to the intake air temperature sensor output terminal (terminal No. 6) of the air flow sensor connector from the engine-ECU (terminal No. 99)
- The power voltage is earthed to the engine-ECU (terminal No. 88) from the air flow sensor (terminal No. 5).

FUNCTION

- The intake air temperature sensor converts the intake air temperature into a voltage and inputs the voltage signal to the engine-ECU.
- In response to the signal, the engine-ECU corrects the fuel injection amount, etc.

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

TROUBLE JUDGMENT

Check Condition

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

Judgment Criterion

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

or

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

PROBABLE CAUSE

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

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

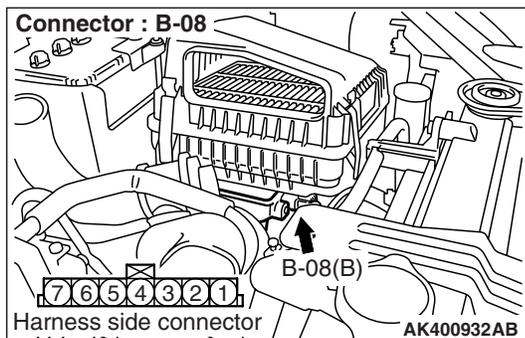
- Item 13: Intake air temperature sensor

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 or replace.

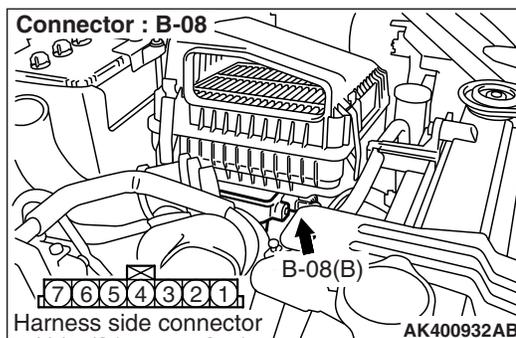
STEP 3. Check intake air temperature sensor itself.

- Check intake air temperature sensor itself (Refer to P.13B-396).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace air flow sensor.

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

- Disconnect connector, and measure at harness side.

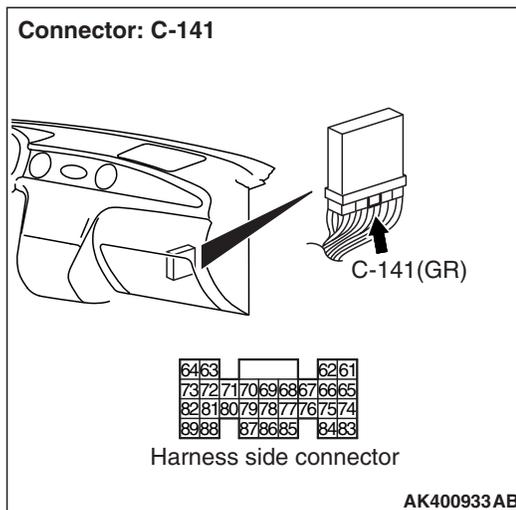
- Resistance between terminal No. 5 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 8 .

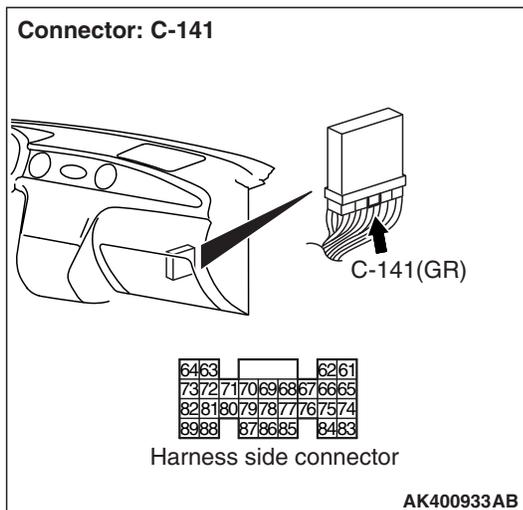
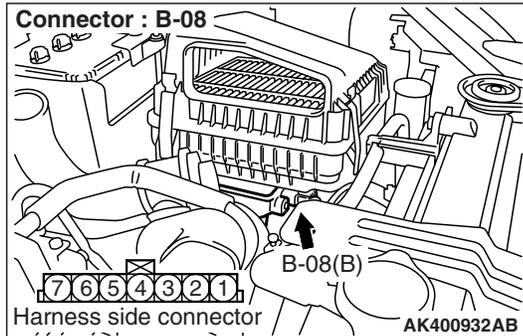
NO : Go to Step 5 .

STEP 5. Connector check: C-141 engine-ECU connector**Q: Is the check result normal?**

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check harness between B-08 (terminal No. 5) air flow sensor connector and C-141 (terminal No. 88) engine-ECU connector.



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

- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

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

- Item 13: Intake air temperature sensor

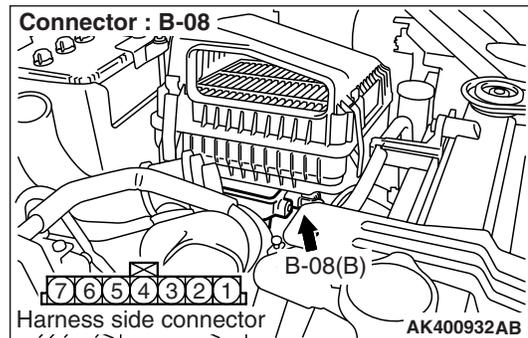
OK: At ambient temperature (atmospheric temperature) or equivalent.

Q: Is the check result normal?

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

NO : Replace engine-ECU.

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



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

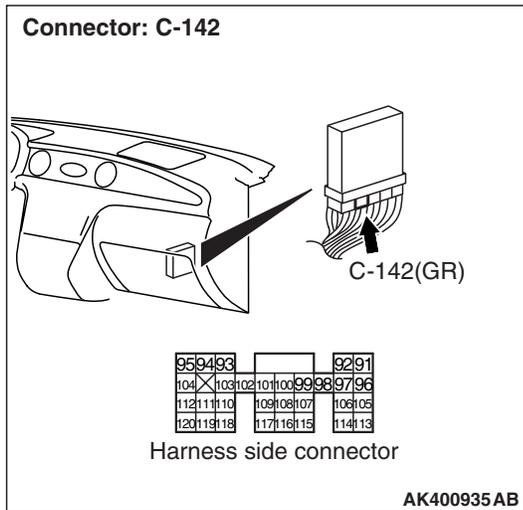
OK: 4.5 – 4.9 V

Q: Is the check result normal?

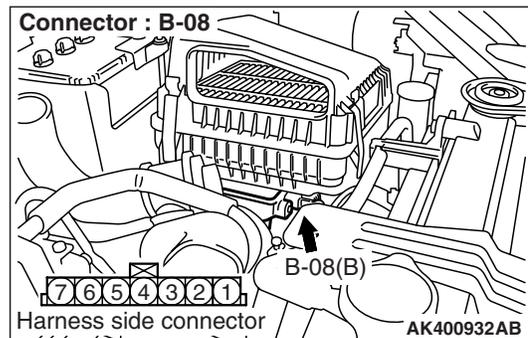
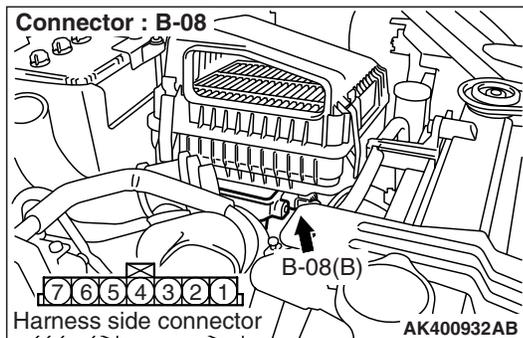
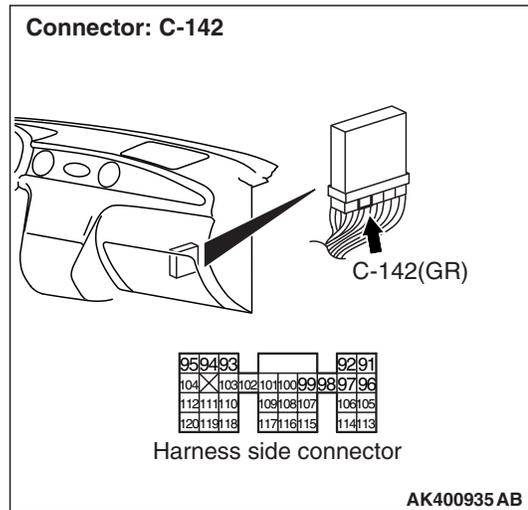
YES : Go to Step 13 .

NO : Go to Step 9 .

STEP 9. Perform voltage measurement at C-142 engine-ECU connector.



STEP 10. Connector check: C-142 engine-ECU connector



- Measure engine-ECU 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 .

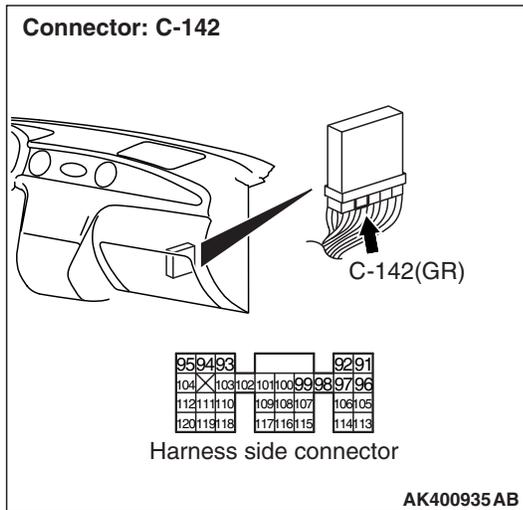
Q: Is the check result normal?

YES : Check and repair harness between B-08 (terminal No. 6) air flow sensor connector and C-142 (terminal No. 99) engine-ECU connector.

- Check output line for open circuit.

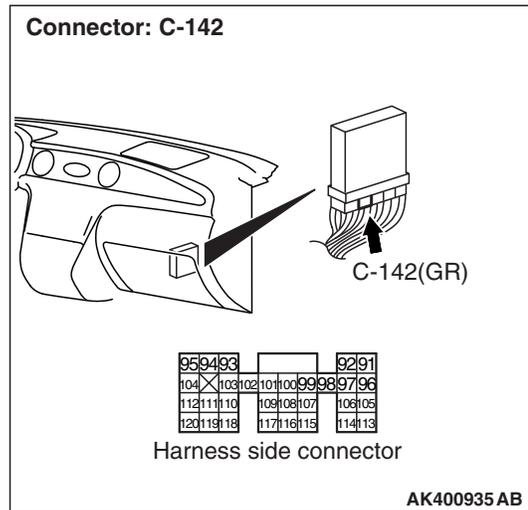
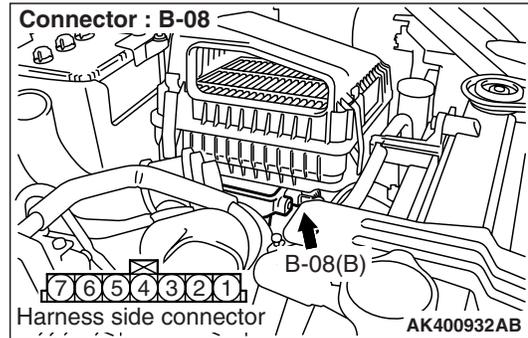
NO : Repair or replace.

STEP 11. Connector check: C-142 engine-ECU connector



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

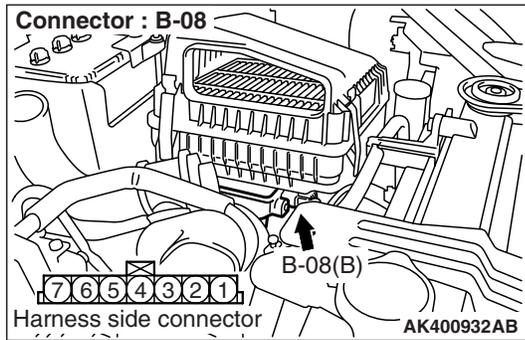
STEP 12. Check harness between B-08 (terminal No. 6) air flow sensor connector and C-142 (terminal No. 99) engine-ECU connector.



- Check output line for short circuit.

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

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



- Use special tool test harness (MB991709) to connect only terminal No. 5 and No. 6, and then measure at pick-up harness.
- Ignition switch: "ON"
- Voltage between terminal No. 6 and earth.

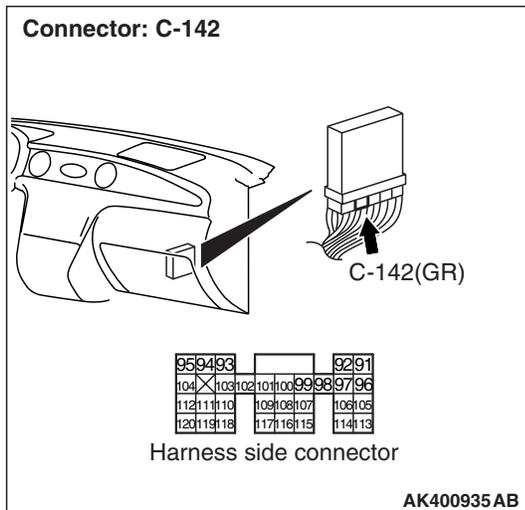
OK:

- Ambient temperature at -20°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 .

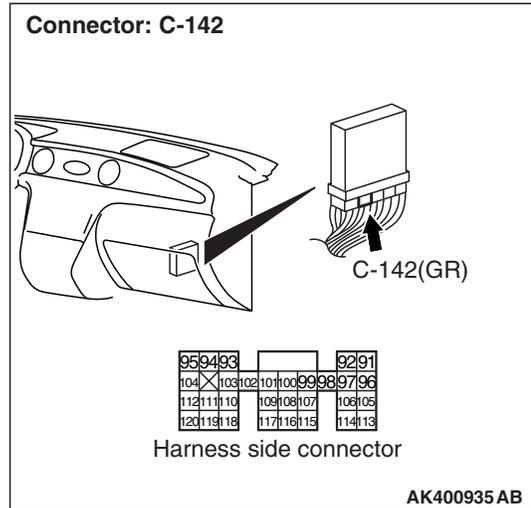
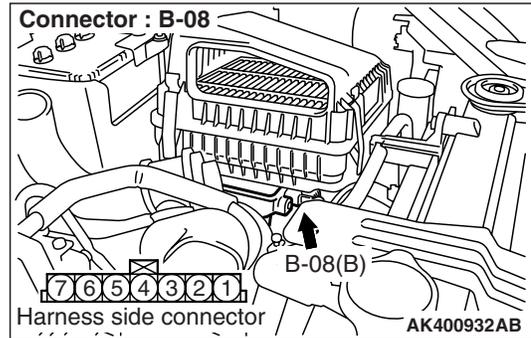
STEP 14. Connector check: C-142 engine-ECU connector



Q: Is the check result normal?

- YES :** Go to Step 15 .
- NO :** Repair or replace.

STEP 15. Check harness between B-08 (terminal No. 6) air flow sensor connector and C-142 (terminal No. 99) engine-ECU connector.

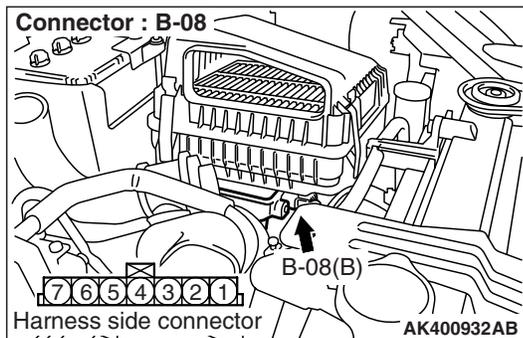
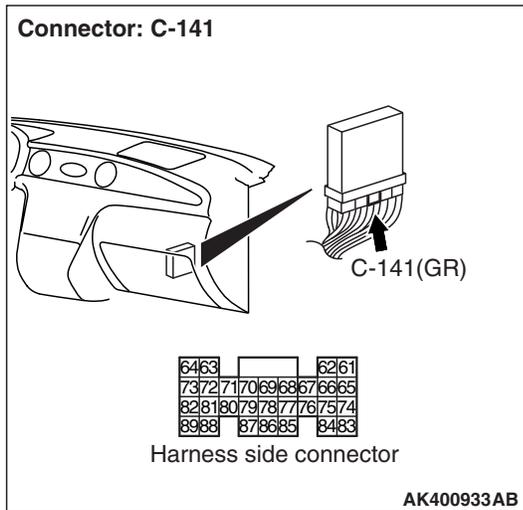


- Check output line for damage.

Q: Is the check result normal?

- YES :** Go to Step 16 .
- NO :** Repair.

STEP 16. Connector check: C-141 engine-ECU connector



Q: Is the check result normal?

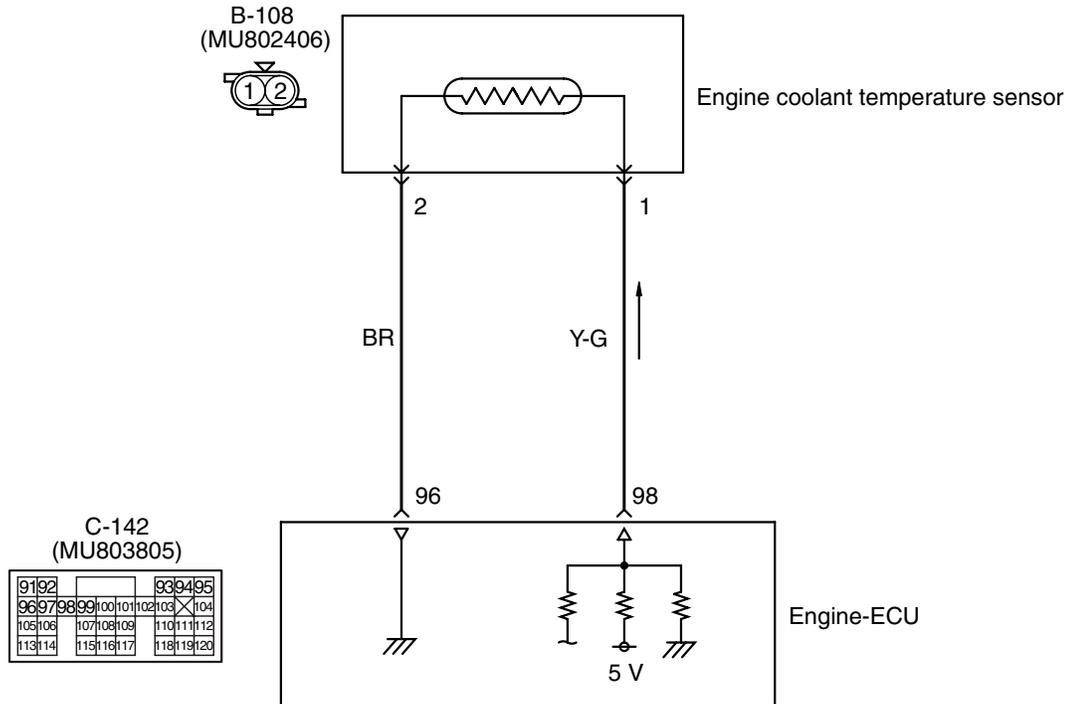
YES : Check intermediate connector C-16, and repair if necessary. If intermediate connector are normal, check and repair harness between B-08 (terminal No. 5) air flow sensor connector and C-141 (terminal No. 88) engine-ECU connector.

- Check earthing line for damage.

NO : Repair or replace.

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

AK400804AB

OPERATION

- A power voltage of 5 V is applied to the engine coolant temperature sensor output terminal (terminal No. 1) from the engine-ECU (terminal No. 98).
- The power voltage is earthed to the engine-ECU (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.
- In response to the signal, the engine-ECU controls the fuel injection amount and the fast idle speed when the engine is cold state.

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

TROUBLE JUDGMENT

Check Condition

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

Judgment Criterion

- The sensor output voltage of 4.6 V or more (engine coolant temperature of -45°C or equivalent) for 2 seconds,

or

- The sensor output voltage of 0.1 V or less (engine coolant temperature of 140°C or more, or equivalent) for 2 seconds.

Check Condition

- Ignition switch: "ON"
- Engine speed of 50 r/min. or more

Judging Conditions

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

PROBABLE CAUSE

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

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.

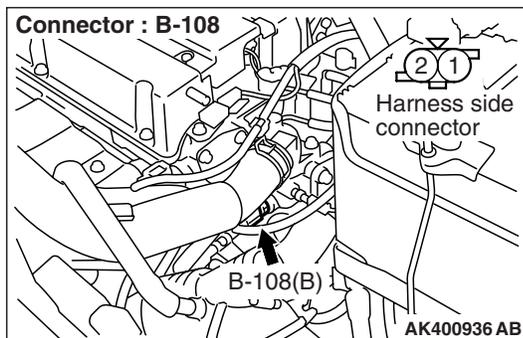
Engine hot state: At 80 – 120°C

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

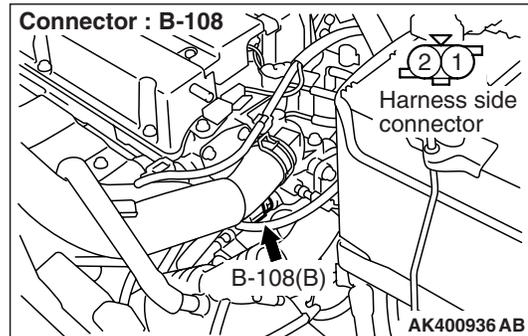


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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



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

OK:

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

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

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

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

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

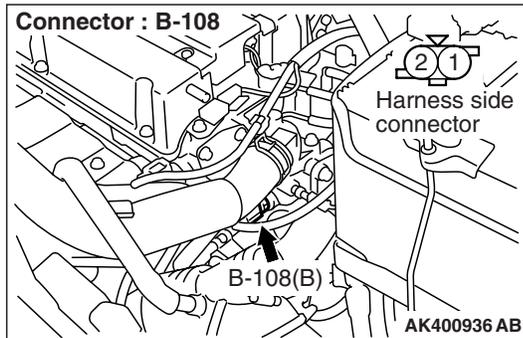
Engine coolant temperature at 80°C: 0.26 – 0.36 kΩ

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace engine coolant temperature sensor.

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



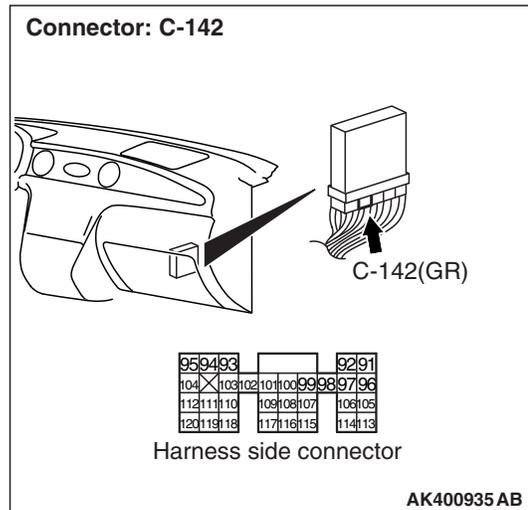
- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 1 and earth.
OK: 4.5 – 4.9 V

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 5 .

STEP 5. Perform voltage measurement at C-142 engine-ECU connector.

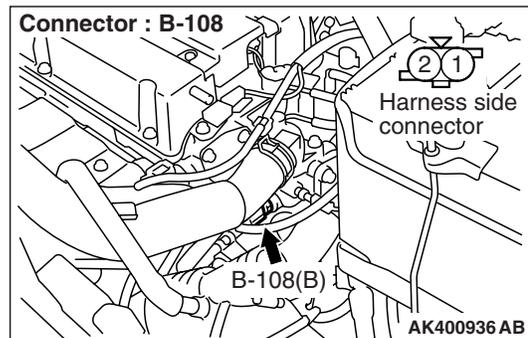


- Measure engine-ECU terminal voltage.
- Disconnect B-108 engine coolant temperature sensor.
- Ignition switch: "ON"
- Voltage between terminal No. 98 and earth.
OK: 4.5 – 4.9 V

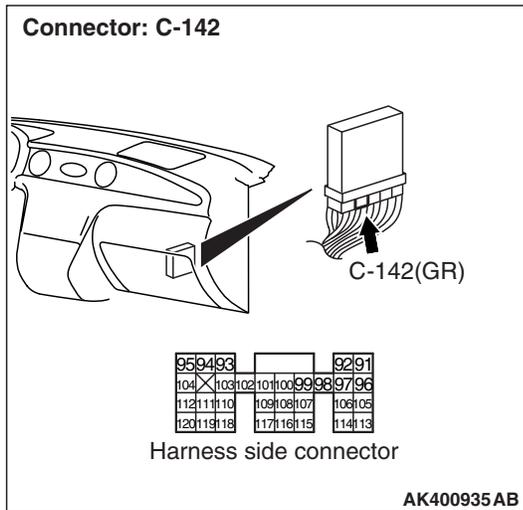
Q: Is the check result normal?

YES : Go to Step 6 .

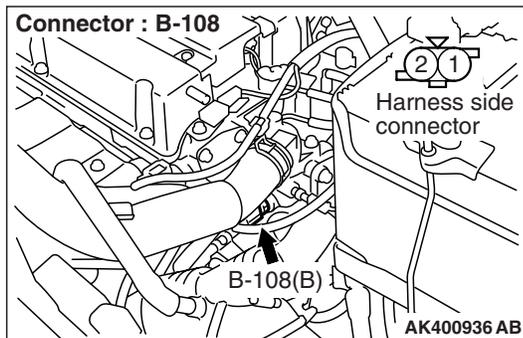
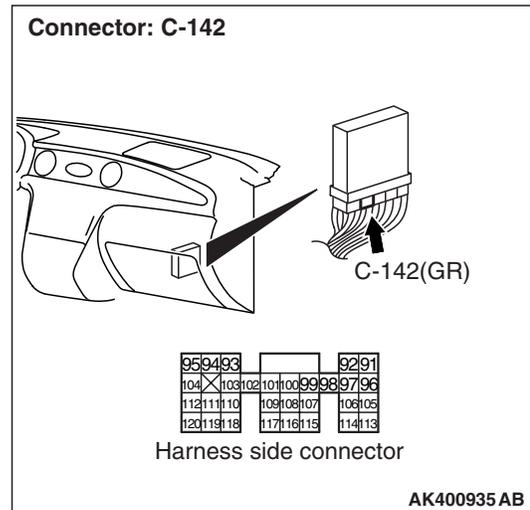
NO : Go to Step 7 .



STEP 6. Connector check: C-142 engine-ECU connector



STEP 7. Connector check: C-142 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

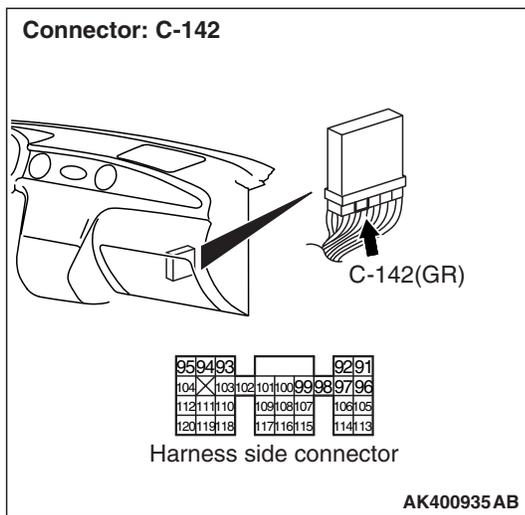
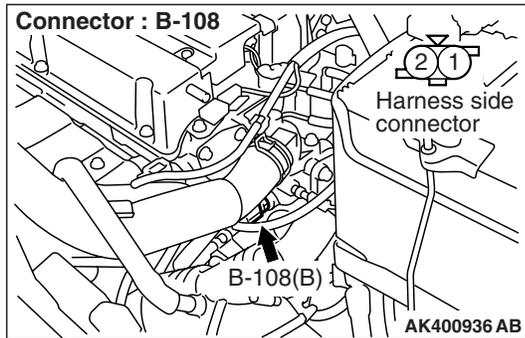
Q: Is the check result normal?

YES : Check and repair harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-142 (terminal No. 98) engine-ECU connector.

- Check output line for open circuit.

NO : Repair or replace.

STEP 8. Check harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-142 (terminal No. 98) engine-ECU connector.



- Check output line for short circuit.

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

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

- Item 21: Engine coolant temperature sensor

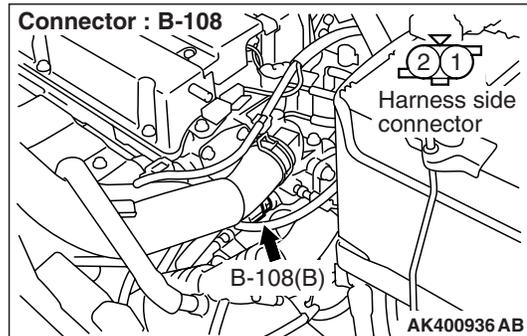
OK:

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

Engine hot state: At 80 – 120°C

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).
NO : Replace engine-ECU.

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

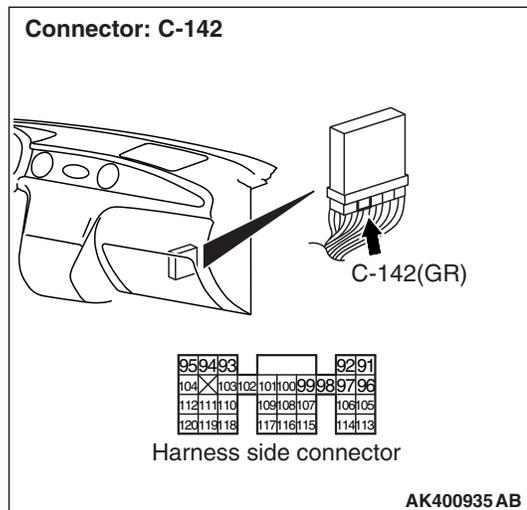


- Disconnect connector and measure at harness side.
- Resistance between terminal No. 2 and earth.
OK: Continuity (2 Ω or less)

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

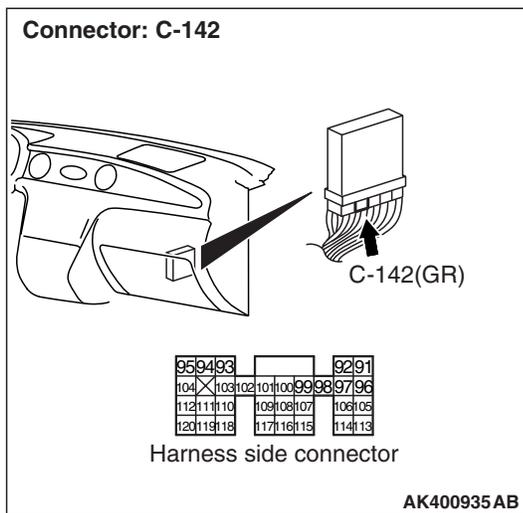
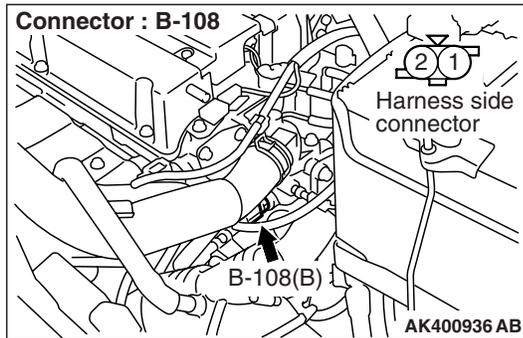
STEP 11. Connector check: C-142 engine-ECU connector

Q: Is the check result normal?



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

STEP 12. Check harness between B-108 (terminal No. 2) engine coolant temperature sensor connector and C-142 (terminal No. 96) engine-ECU connector.

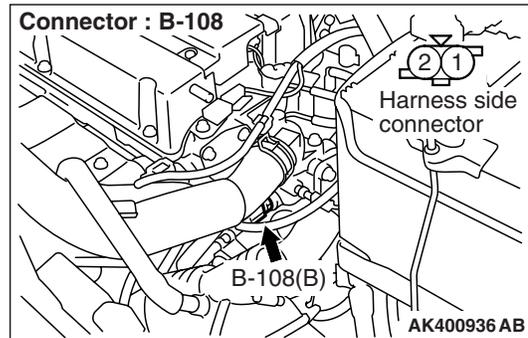


- Check earthing line for open circuit and damage.

Q: Is the check result normal?

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

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



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

OK:

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

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

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

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

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

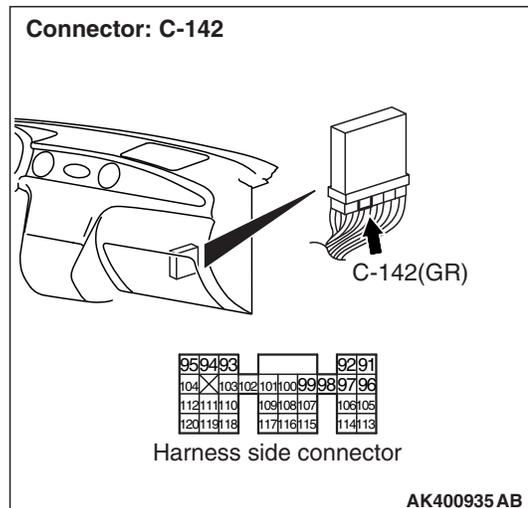
Engine coolant temperature at 80°C : 0.3 – 0.9 V

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 14 .

STEP 14. Connector check: C-142 engine-ECU connector

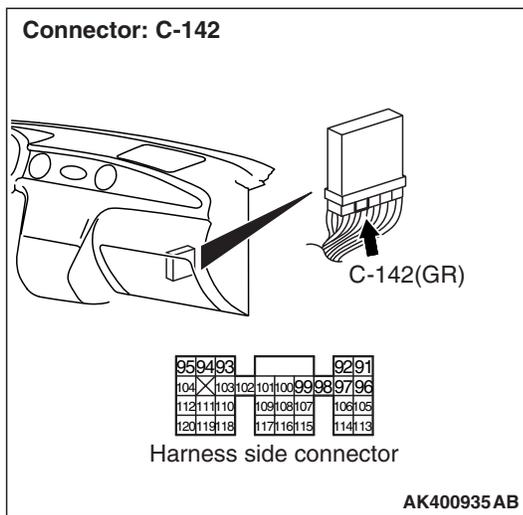
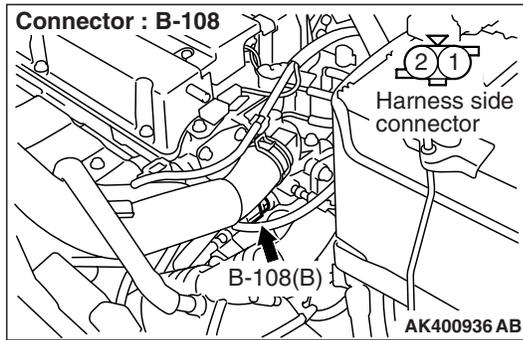


Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair or replace.

STEP 15. Check harness between B-108 (terminal No. 1) engine coolant temperature sensor connector and C-142 (terminal No. 98) engine-ECU connector.

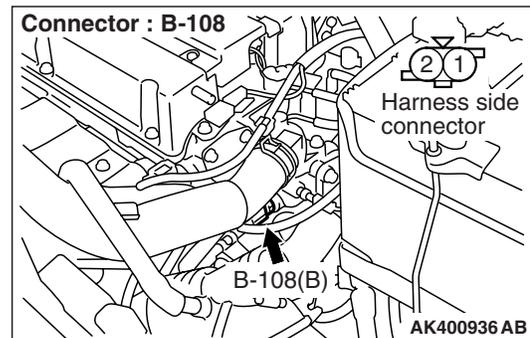
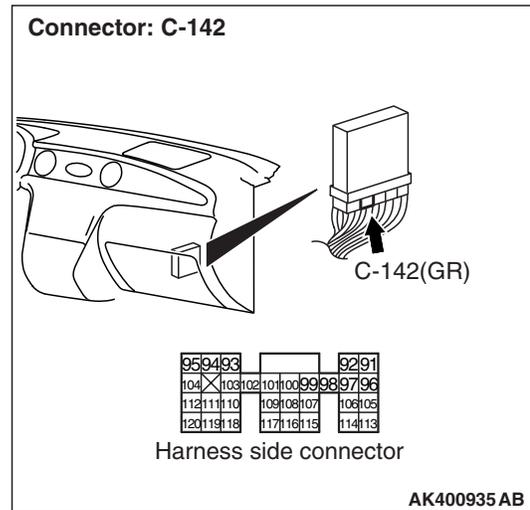


- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 16 .
NO : Repair.

STEP 16. Connector check: C-142 engine-ECU connector



Q: Is the check result normal?

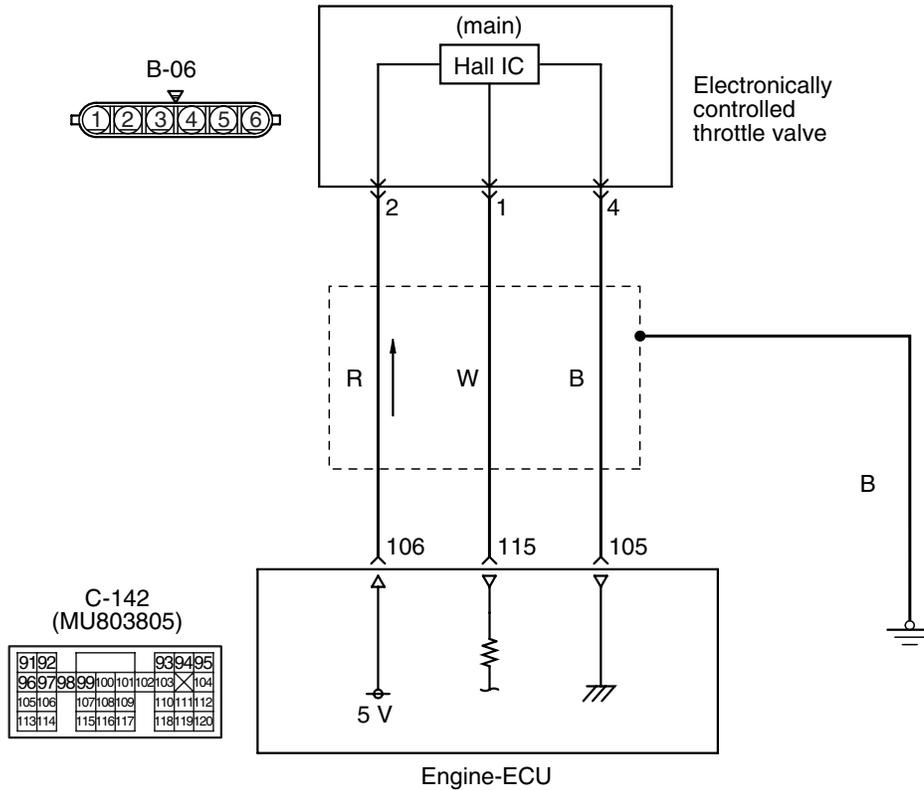
YES : Check harness between B-108 (terminal No. 2) engine coolant temperature sensor connector and C-142 (terminal No. 96) engine-ECU connector.

- Check earthing line for damage.

NO : Repair or replace.

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

AK304122AD

OPERATION

- A power voltage of 5 V is applied to the electronically controlled throttle valve (terminal No. 2) from the engine-ECU (terminal No. 106).
- The power voltage is earthed to the engine-ECU (terminal No. 105) from the electronically controlled throttle valve (terminal No. 4).
- The sensor signal is inputted to the engine-ECU (terminal No. 115) from the electronically controlled throttle valve output terminal (terminal No. 1).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the Engine-ECU.
- The Engine-ECU 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

DIAGNOSIS PROCEDURE

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

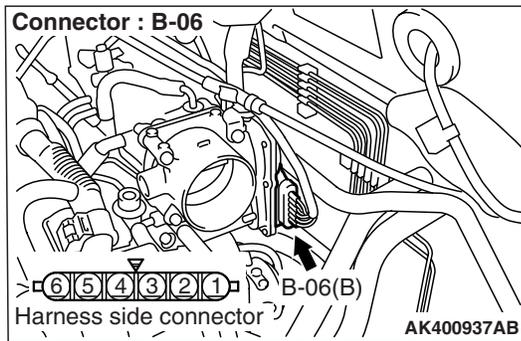
- Refer to Data List Reference Table P.13B-368.
 - a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

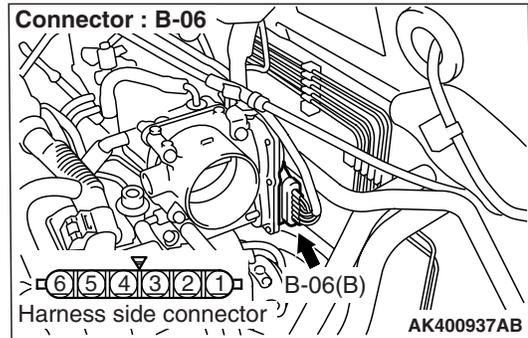


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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. 2 and earth.

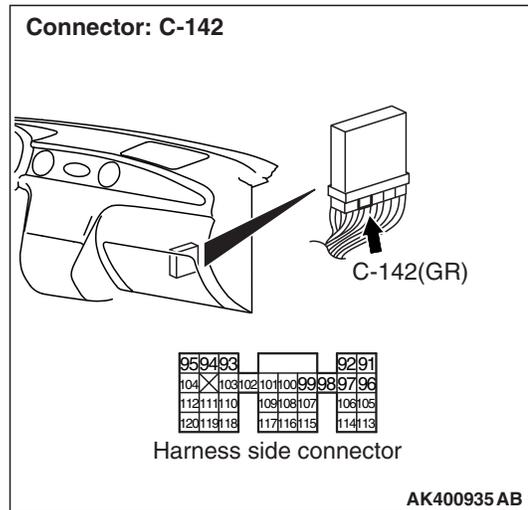
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU connector

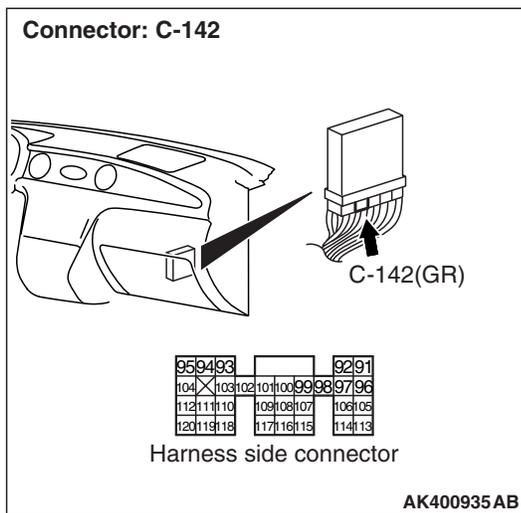
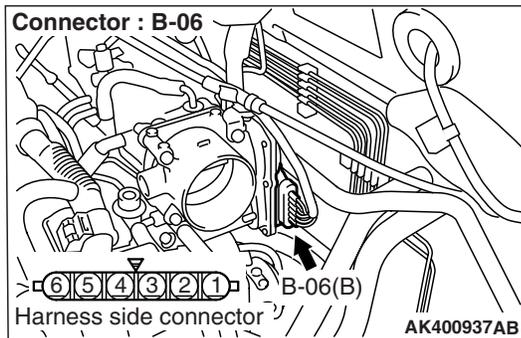


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-142 (terminal No. 106) engine-ECU connector.



- Check power supply line for open/short circuit.

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

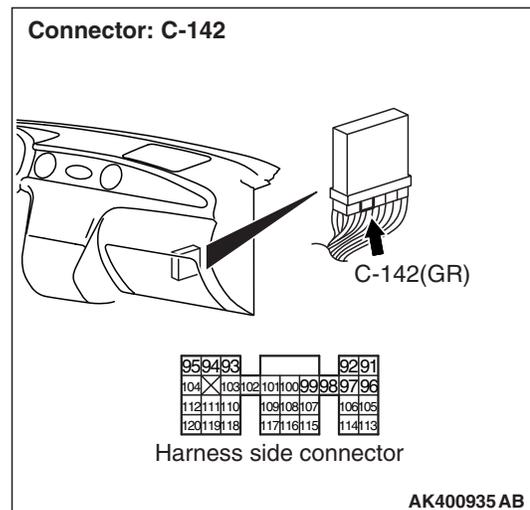
STEP 6. M.U.T.-II/III data list

- Refer to Data List Reference Table P.13B-368.
 - 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.

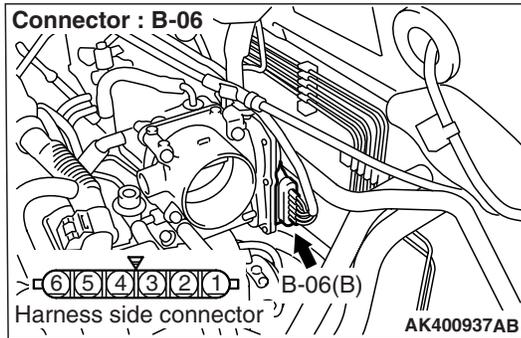
STEP 7. Connector check: C-142 engine-ECU connector



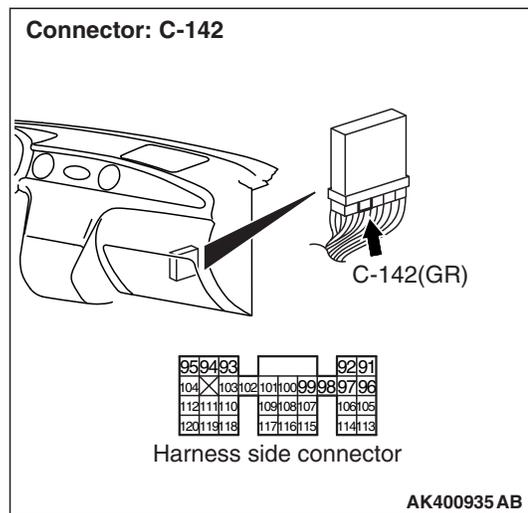
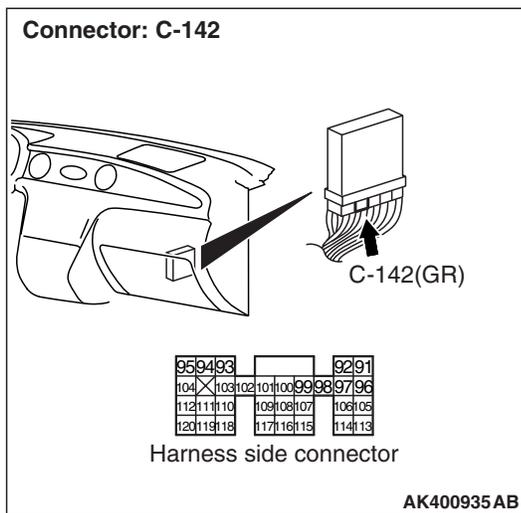
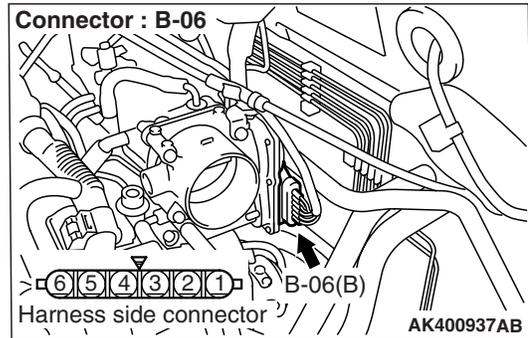
Q: Is the check result normal?

YES : Go to Step 8 .
NO : Repair or replace.

STEP 8. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-142 (terminal No. 106) engine-ECU connector.



STEP 9. Check harness between B-06 (terminal No. 1) electronically controlled throttle valve connector and C-142 (terminal No. 115) engine-ECU 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

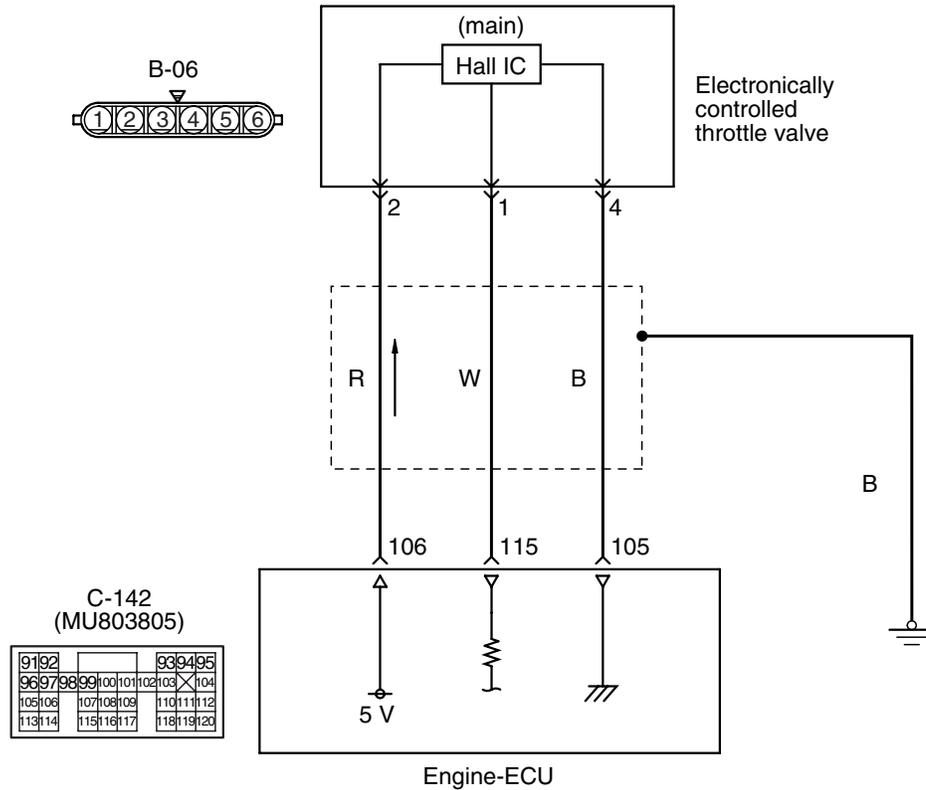
- After replacing the electronically controlled throttle valve, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Check end.
NO : Replace engine-ECU.

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

AK304122AD

OPERATION

- A power voltage of 5 V is applied to the electronically controlled throttle valve (terminal No. 2) from the engine-ECU (terminal No. 106).
- The power voltage is earthed to the engine-ECU (terminal No. 105) from the electronically controlled throttle valve (terminal No. 4).
- The sensor signal is inputted to the engine-ECU (terminal No. 115) from the electronically controlled throttle valve output terminal (terminal No. 1).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the Engine-ECU.
- The Engine-ECU 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

DIAGNOSIS PROCEDURE

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

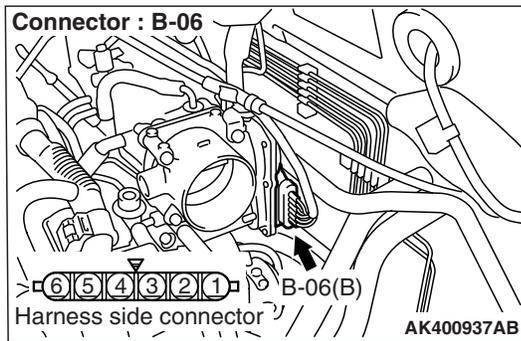
- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 79: Throttle position sensor (main)

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

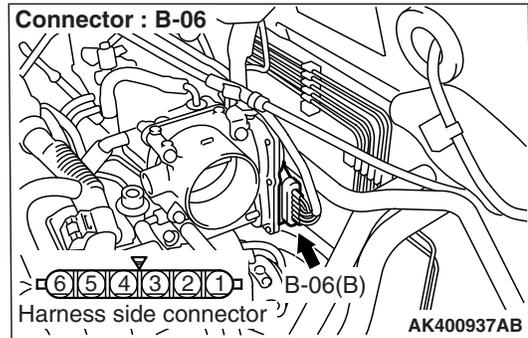


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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



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

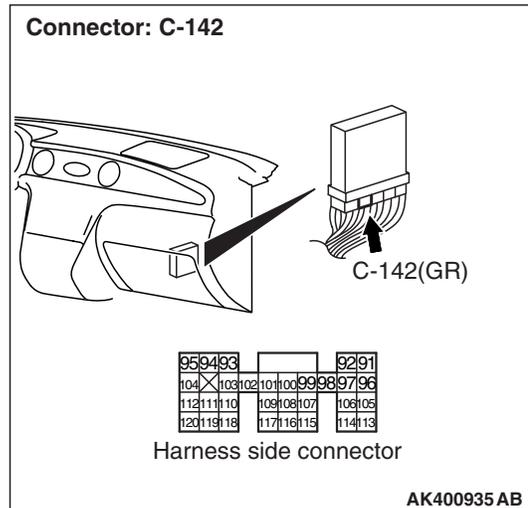
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU connector

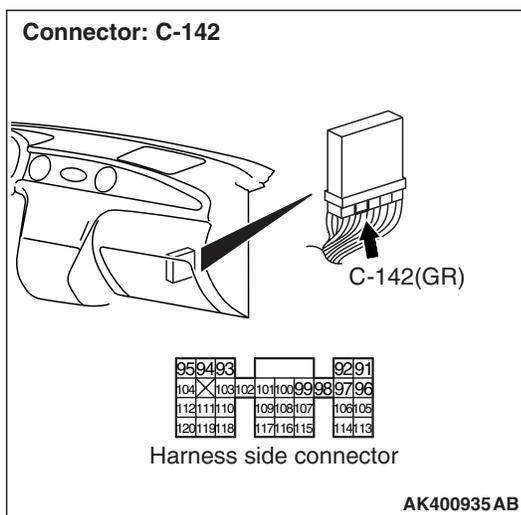
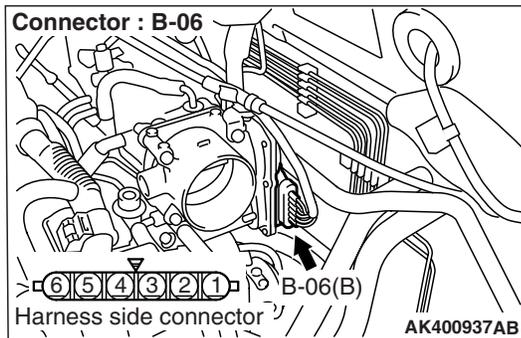


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-06 (terminal No. 4) electronically controlled throttle valve connector and C-142 (terminal No. 105) engine-ECU connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

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

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

- Refer to Data List Reference Table [P.13B-368](#).
 - 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.

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.

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

- Refer to P0201 injector circuit [P.13B-100](#).
- Refer to P0202 injector circuit [P.13B-104](#).
Refer to P0203 injector circuit [P.13B-108](#).
Refer to P0204 injector circuit [P.13B-112](#).
- Refer to P0130 Oxygen sensor (front) circuit [P.13B-72](#).

FUNCTION

- The engine-ECU effects air-fuel ratio feedback control in accordance with the signals from the oxygen sensor (front).
- If the heated 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 is approximately 76°C or more.
- Within the range of air-fuel ratio feedback operation.
- Not in slowing down 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

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.13B-20](#)).
NO : Go to Step 2 .

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

- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 12: Air flow sensor
 - b. Item 21: Engine coolant temperature sensor
 - c. Item 25: Barometric pressure sensor
 - d. Item 59: Oxygen sensor (rear)

Q: Are the check results normal?

- YES :** Go to Step 3 .
NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes [P.13B-20](#)).

STEP 3. Check for intake of air from intake hose and inlet manifold.**Q: Is the check result normal?**

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

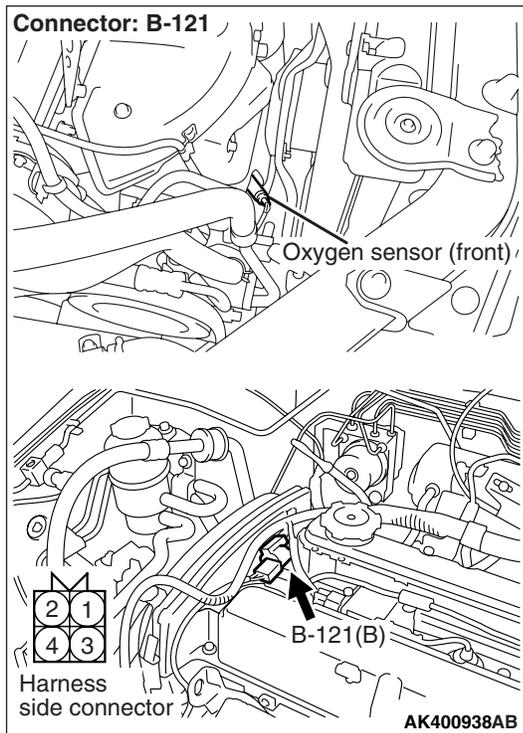
STEP 4. Check for leakage of exhaust emission from exhaust manifold.**Q: Is the check result normal?**

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

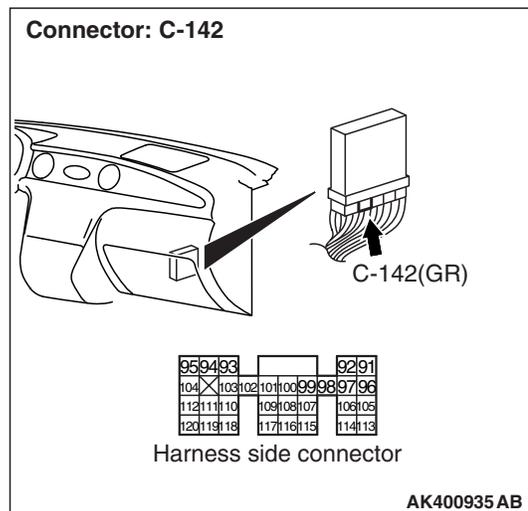
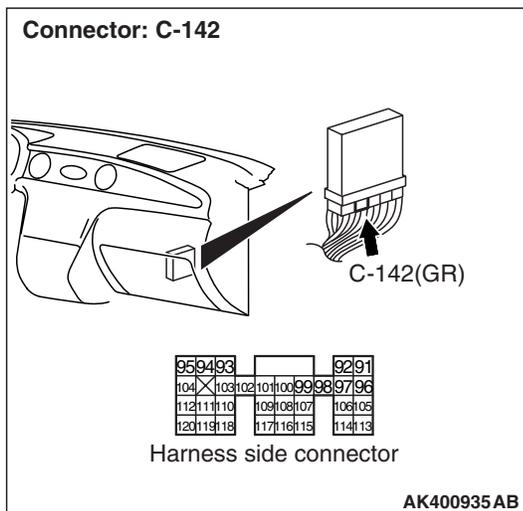
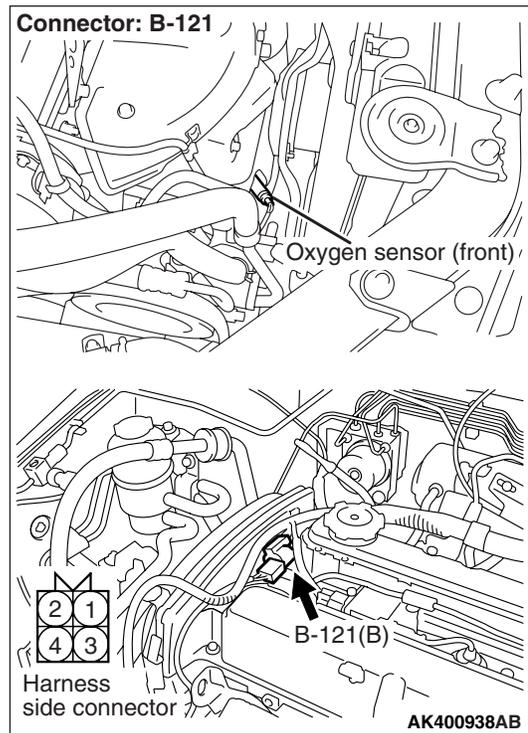
STEP 5. Check throttle body (throttle valve portion) for contamination.**Q: Is the check result normal?**

- YES :** Go to Step 6 .
NO : Clean throttle body (throttle valve portion) (Refer to [P.13B-390](#)).

STEP 6. Connector check: B-121 oxygen sensor (front) connector and C-142 engine-ECU connector



STEP 8. Check harness between B-121 oxygen sensor (front) connector and C-142 engine-ECU connector.



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

- Check output line for damage.

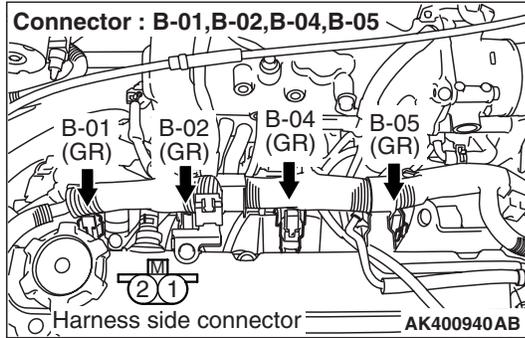
Q: Is the check result normal?
YES : Go to Step 9 .
NO : Repair.

STEP 7. Check oxygen sensor (front) itself.

- Check oxygen sensor (front) itself (Refer to [P.13B-398](#)).

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Replace oxygen sensor (front).

STEP 9. 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)

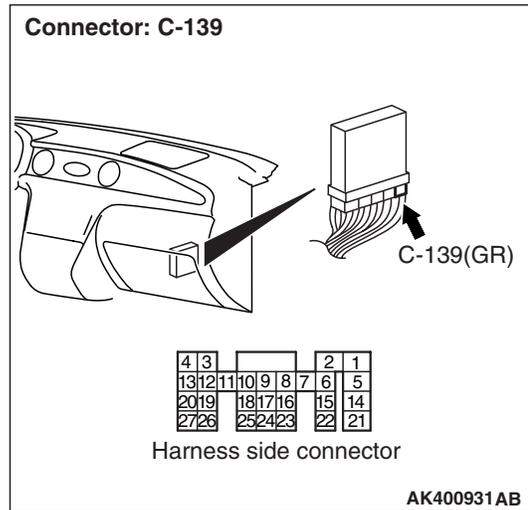
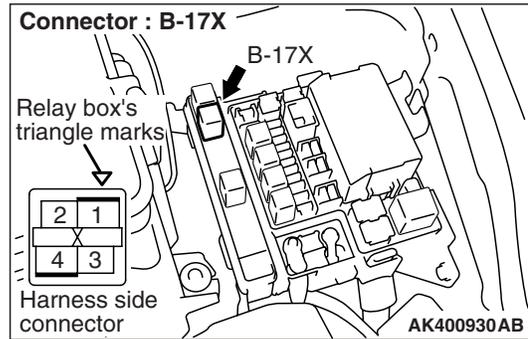
Q: Are the check results normal?
YES : Go to Step 10 .
NO : Repair or replace.

STEP 10. Check injector itself.

- Check Injector itself (Refer to [P.13B-400](#)).

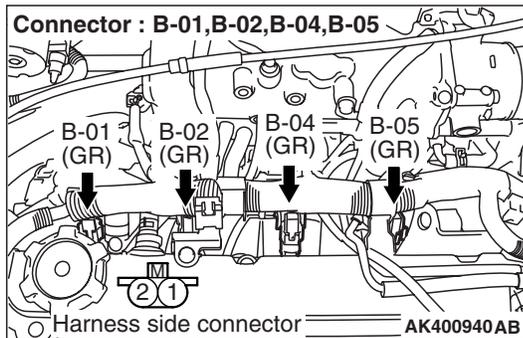
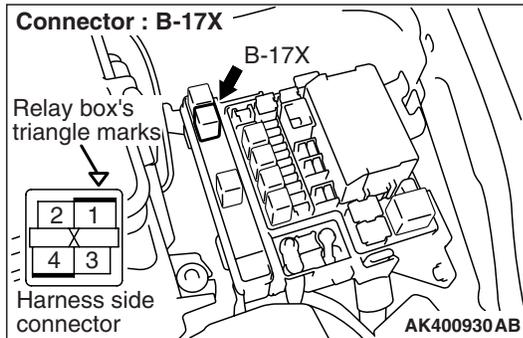
Q: Is the check result normal?
YES : Go to Step 11 .
NO : Replace injector.

STEP 11. Connector check: B-17X engine control relay connector and B-139 engine-ECU connector.



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

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



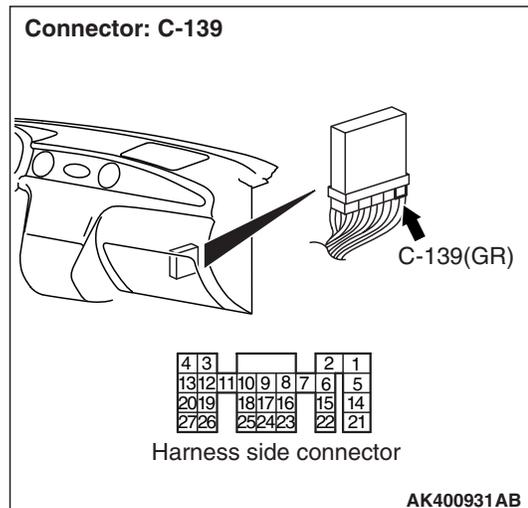
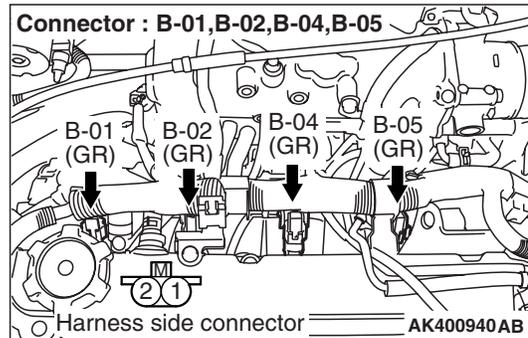
- Check harness between B-17X (terminal No. 1) engine control relay connector and B-01 (terminal No. 1) No. 1 injector connector.
- Check harness between B-17X (terminal No. 1) engine control relay connector and B-02 (terminal No. 1) No. 2 injector connector.
- Check harness between B-17X (terminal No.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

Q: Are the check results normal?

YES : Go to Step 13 .

NO : Repair.

STEP 13. Check harness between injector connector and C-139 engine-ECU connector.



- Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-139 (terminal No. 1) engine-ECU connector.
- Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-139 (terminal No. 5) engine-ECU connector.
- Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-139 (terminal No. 14) engine-ECU connector.
- Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-139 (terminal No. 21) engine-ECU connector.

Q: Are the check results normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14. Fuel pressure measurement.

- Fuel pressure measurement (Refer to [P.13B-391](#)).

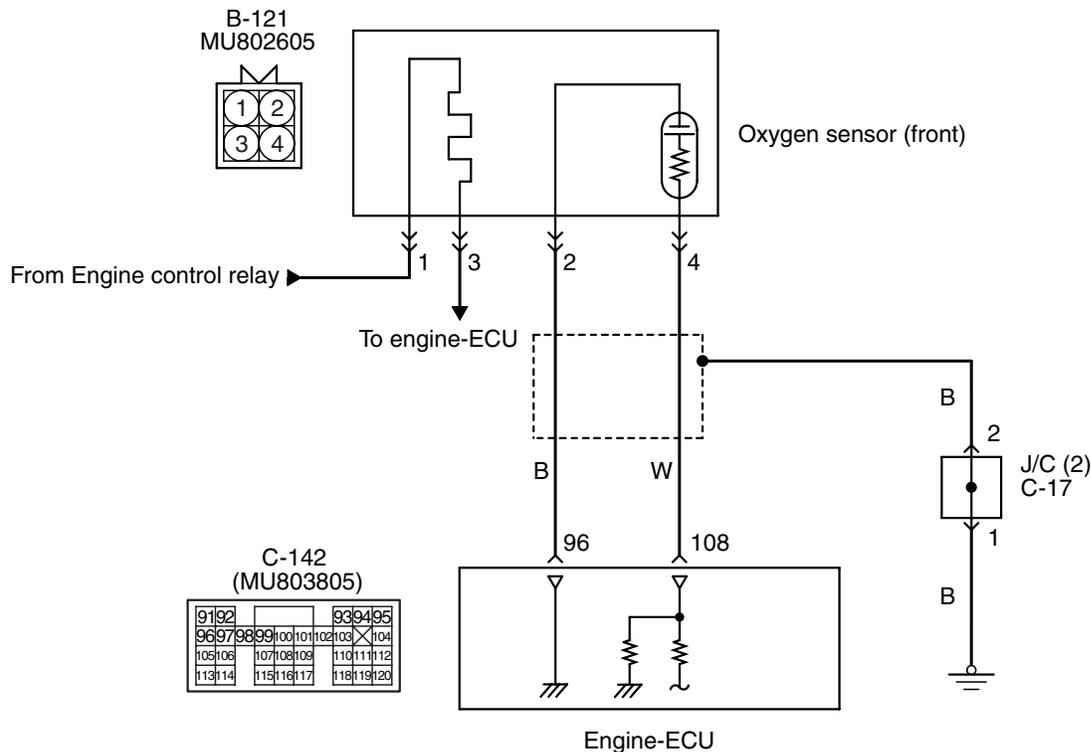
Q: Is the check result normal?

YES : Replace engine-ECU.

NO : Repair.

Code No. P0130: Oxygen Sensor (front) System

Oxygen sensor (front) circuit



Wire colour code

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

AK400805AB

OPERATION

- The sensor signal is inputted to the engine-ECU (terminal No. 108) from the oxygen sensor (front) output terminal (terminal No. 4).
- The oxygen sensor (front) (terminal No. 2) is earthed with engine-ECU (terminal No. 96).

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

- Above 3 minutes later after the engine has started up.
- The engine coolant temperature is approximately 80°C or more.
- The volumetric efficiency 25% or more.
- The engine speed of 1,200 r/min. or more.

Judgment Criterion

- When the oxygen sensor (front) output voltage is 0.2 V or less, and a power voltage of 5 V is applied to the oxygen sensor (front) in the engine-ECU, the sensor output voltage is 4.5 V or more.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

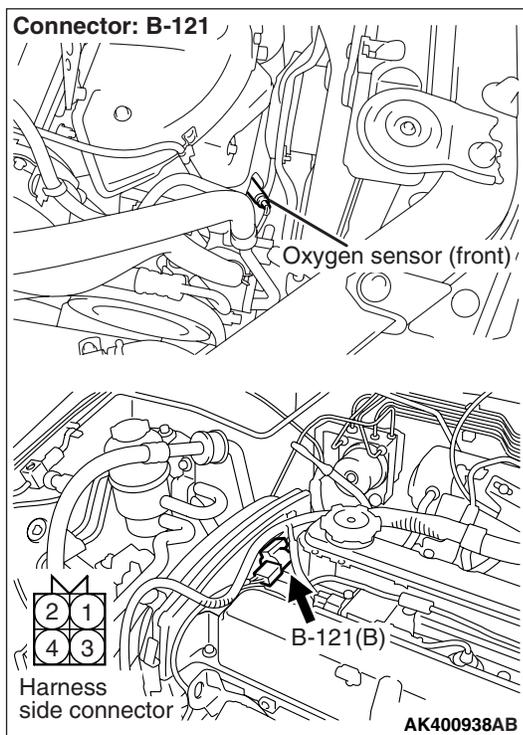
- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 11: Oxygen sensor (front)

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-121 oxygen sensor (front) connector

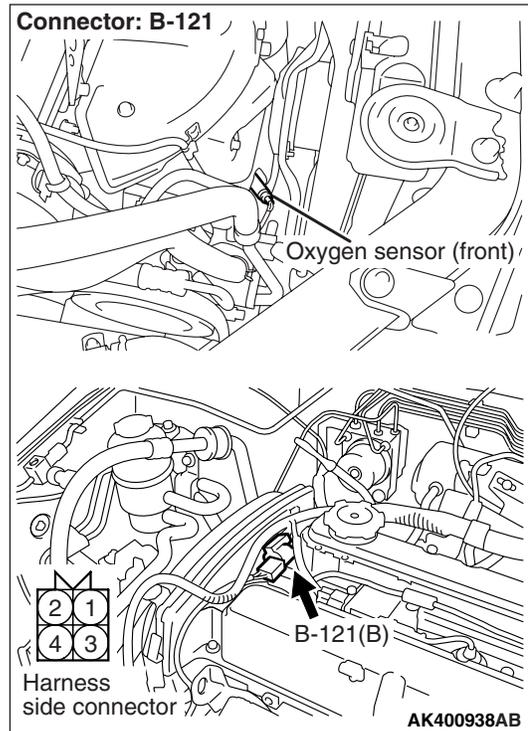


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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



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

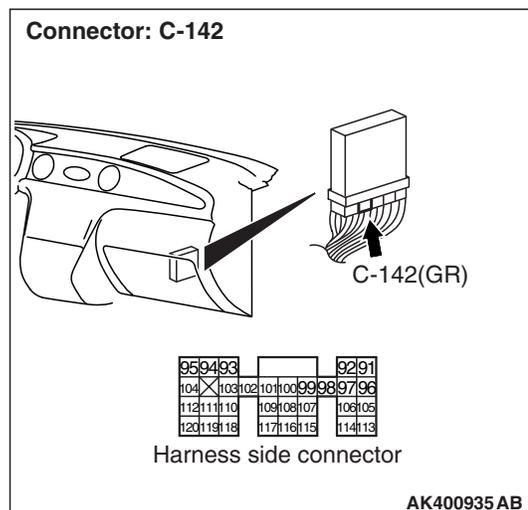
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU connector

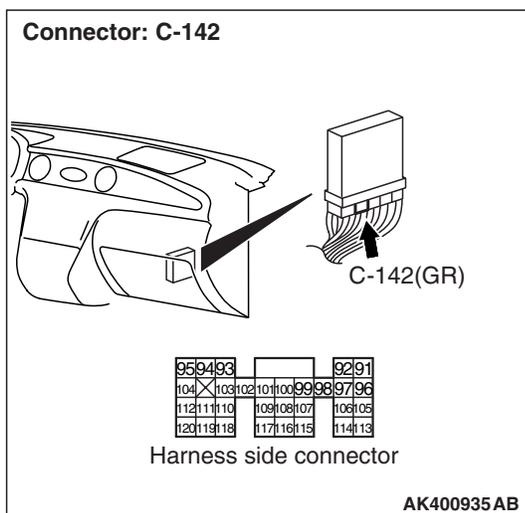
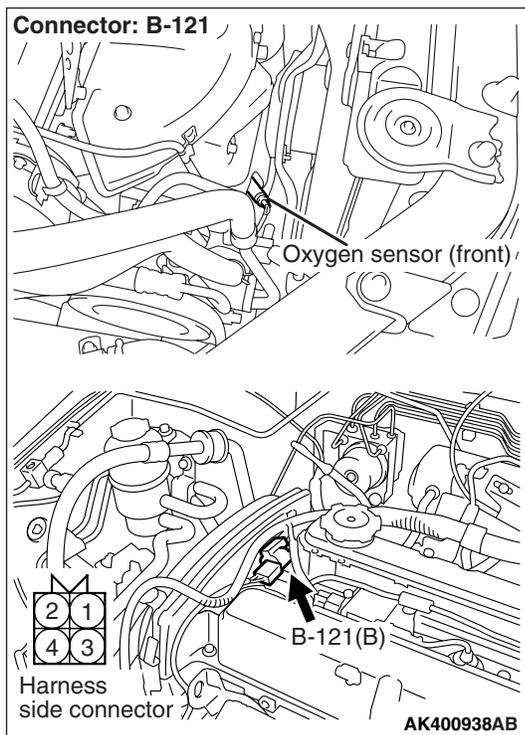


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-121 (terminal No. 2) oxygen sensor connector and C-142 (terminal No. 96) engine-ECU connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

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

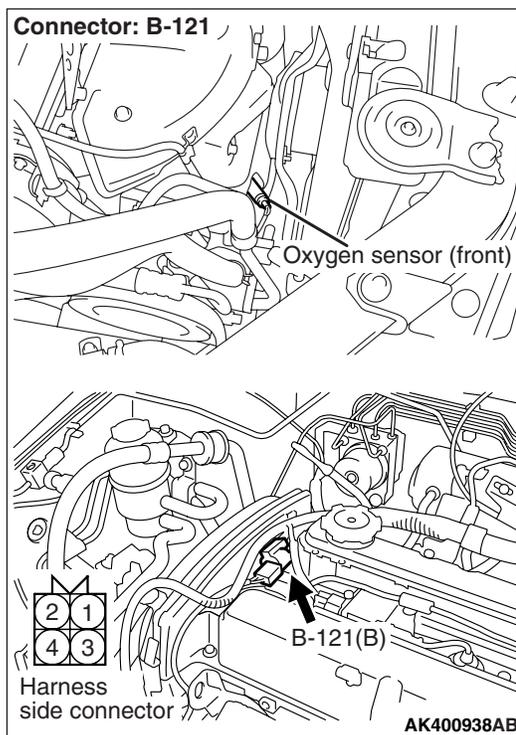
STEP 6. M.U.T.-II/III data list

- Refer to Data List Reference Table P.13B-368.
 - a. Item 11: Oxygen sensor (front)

Q: Is the check result normal?

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

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



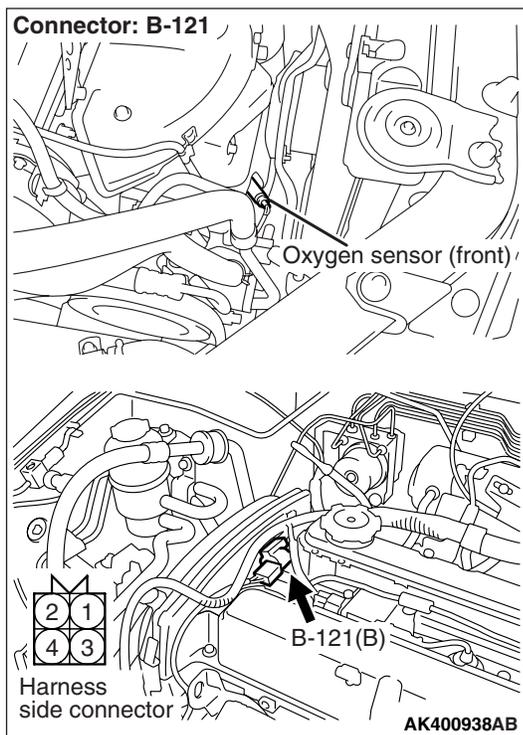
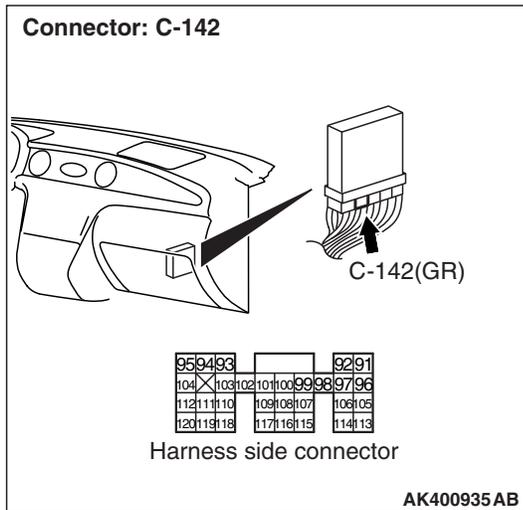
- Use special tool test harness (MD998464) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Ignition switch: "ON"
- Voltage between terminal No. 2 and earth.

OK: 0.5V or less

Q: Is the check result normal?

- YES :** Go to Step 9 .
NO : Go to Step 8 .

STEP 8. Connector check: C-142 engine-ECU connector



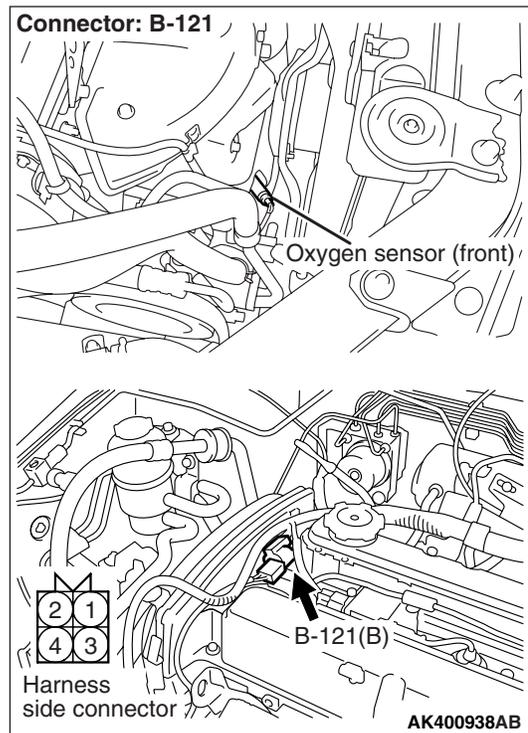
Q: Is the check result normal?

YES : Check and repair harness between B-121 (terminal No. 2) oxygen sensor (front) connector and C-142 (terminal No. 96) engine-ECU connector.

- Check earthing line for damage.

NO : Repair or replace.

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



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

OK:

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

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 10 .

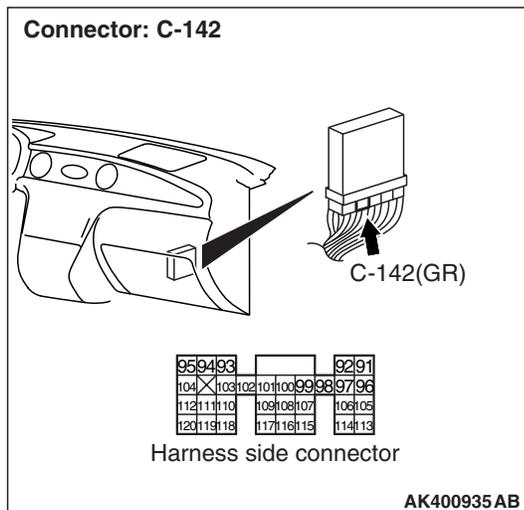
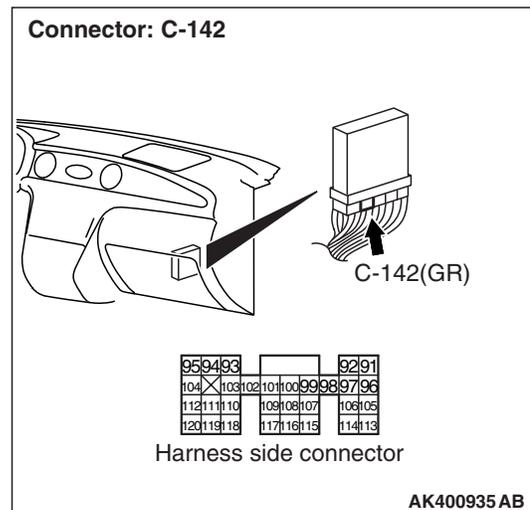
STEP 10. Check oxygen sensor (front) itself

- Check oxygen sensor itself (Refer to P.13B-398).

Q: Is the check result normal?

YES : Go to Step 11 .

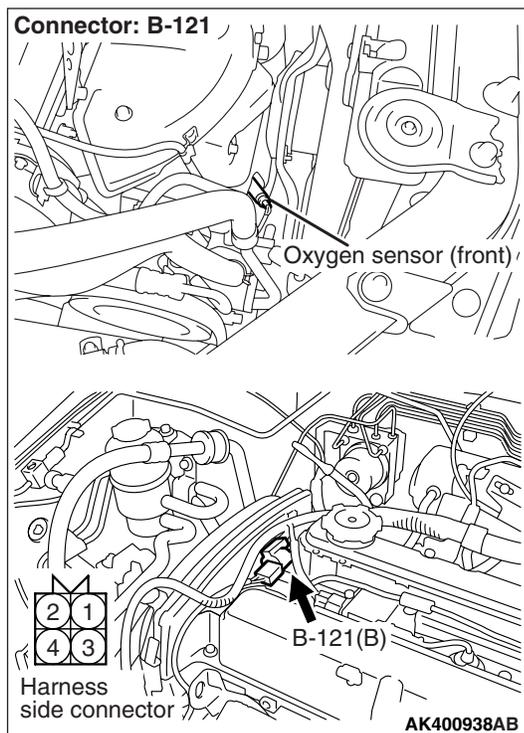
NO : Replace oxygen sensor (front).

STEP 11. Connector check: C-142 engine-ECU connector**STEP 12. Perform voltage measurement at C-142 engine-ECU connector.**

- Measure engine-ECU terminal voltage.
- Transmission: Neutral
- Engine: After warm-up
- Voltage between terminal No. 108 and earth.

OK:

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

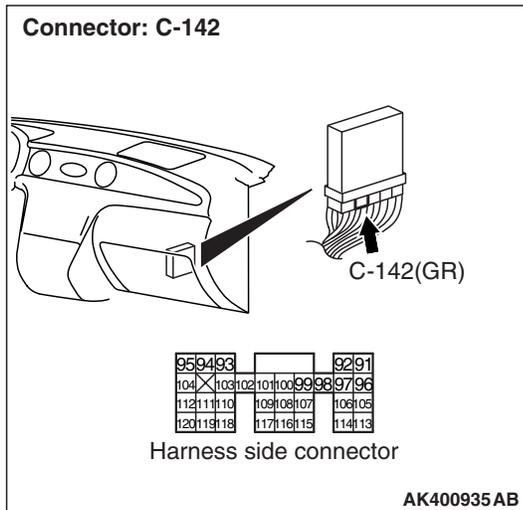
Q: Is the check result normal?**YES :** Go to Step 14 .**NO :** Go to Step 13 .**Q: Is the check result normal?**

YES : Check and repair harness between B-121 (terminal No. 4) oxygen sensor (front) connector and C-142 (terminal No. 108) engine-ECU connector.

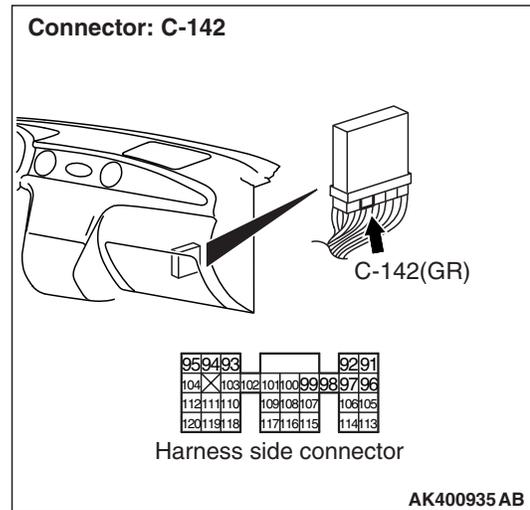
- Check output line for damage.

NO : Repair or replace.

STEP 13. Connector check: C-142 engine-ECU connector



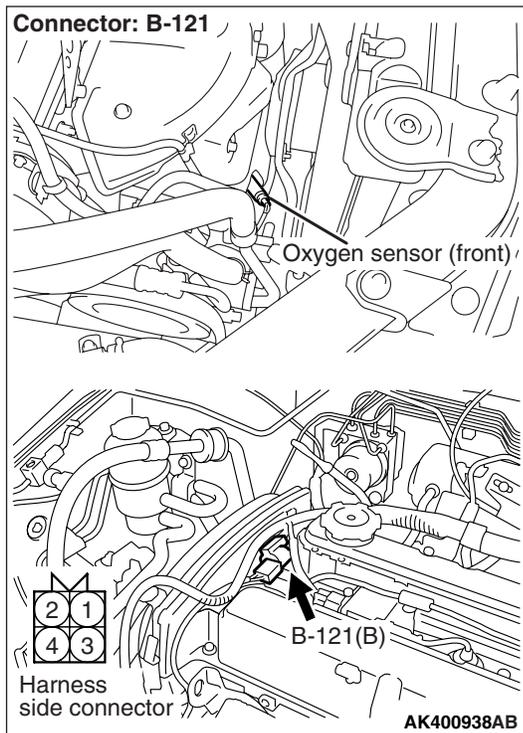
STEP 14. Connector check: C-142 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.



Q: Is the check result normal?

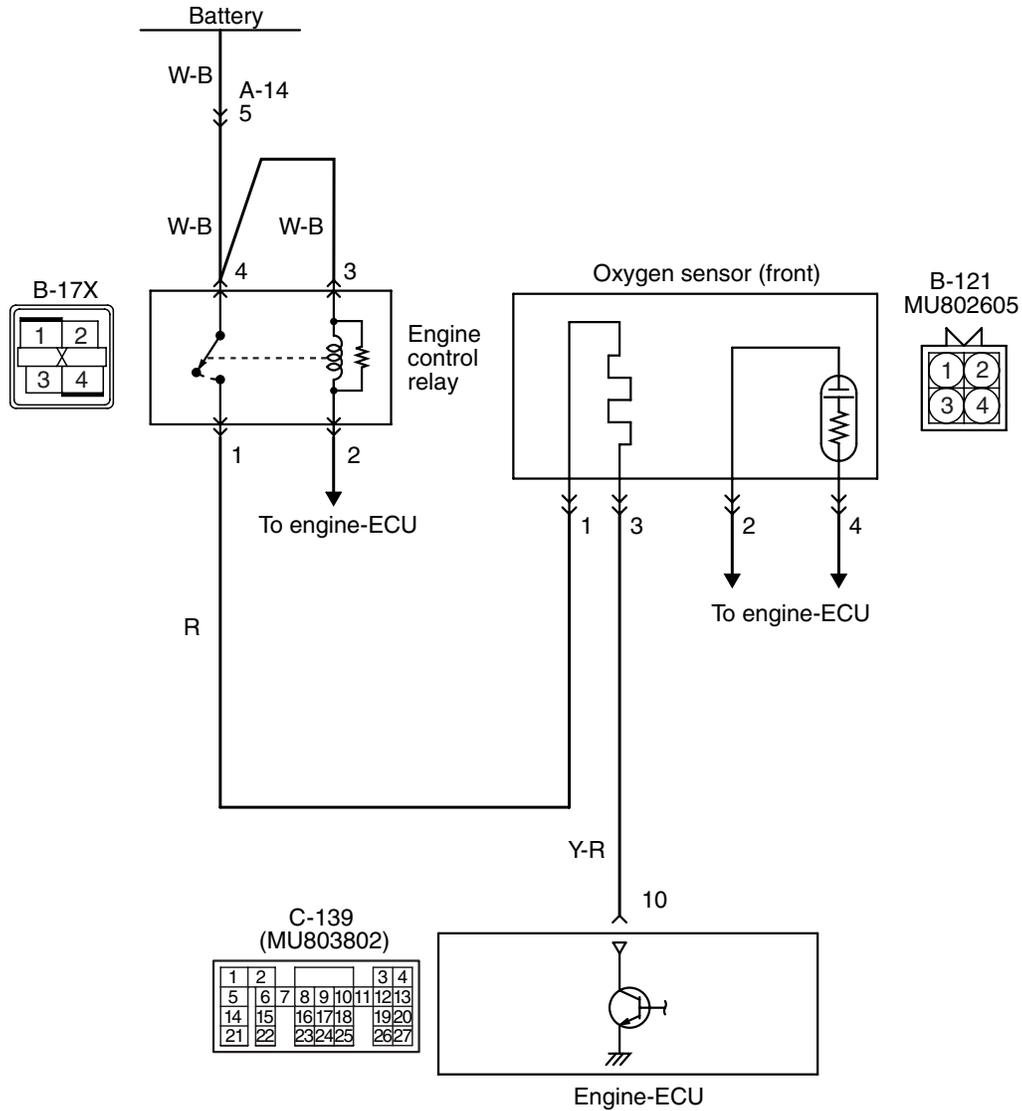
YES : Check and repair harness between B-121 (terminal No. 4) oxygen sensor (front) connector and C-142 (terminal No. 108) engine-ECU connector.

- Check output line for open circuit.

NO : Repair or replace.

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

Oxygen sensor heater (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

AK400806 AB

OPERATION

- Power is supplied to the heater power terminal (terminal No. 1) of the oxygen sensor (front) connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 3) of the oxygen sensor (front) connector is controlled by the power transistor in the engine-ECU (terminal No. 10).

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- The engine coolant temperature is 20°C or higher.
- The oxygen sensor heater: (front) is ON.
- The engine speed of 50 r/min. or more.
- A/C relay: OFF
- Radiator fan: OFF
- The system voltage is 11 – 16 V.

Judging Criterion

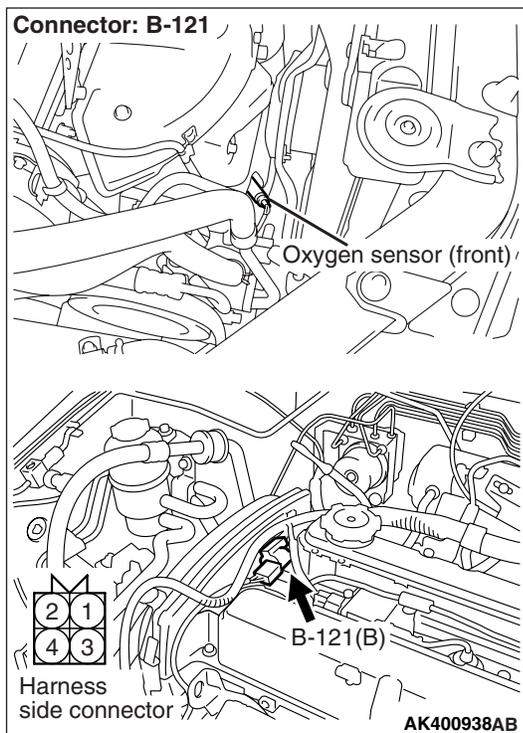
- The heater current of oxygen sensor heater (front) 0.2 A or less or 3.5 A or more for 4 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

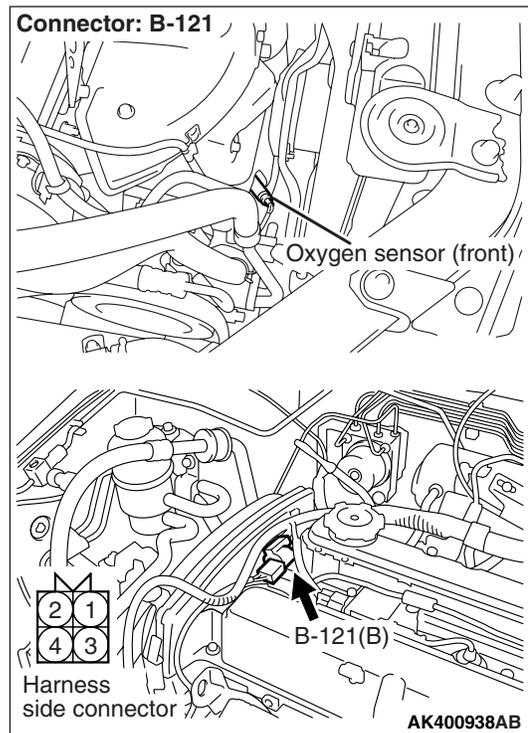


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

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

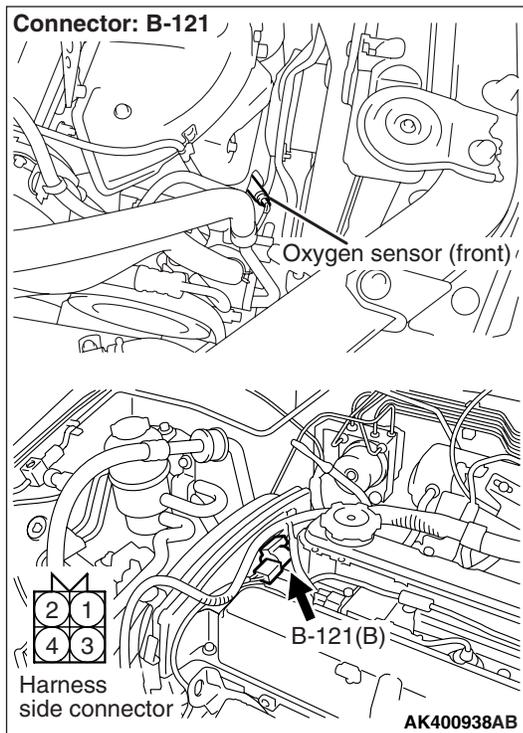


- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 3.
OK: 4.5 – 8.0 Ω

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace oxygen sensor (front).

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

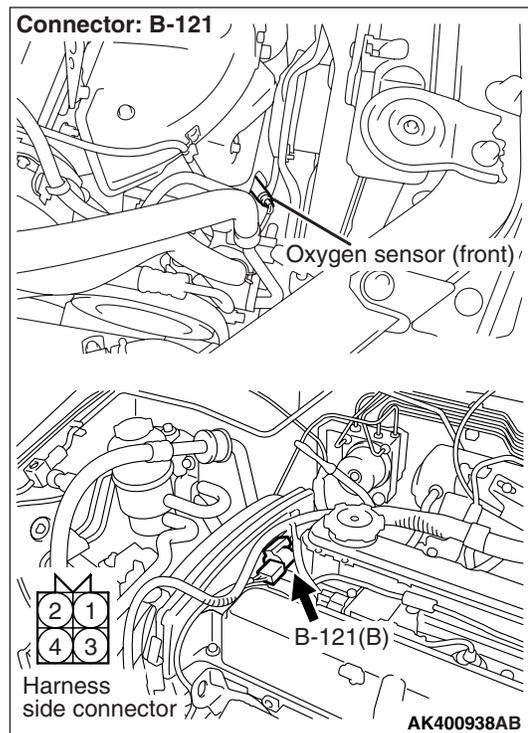
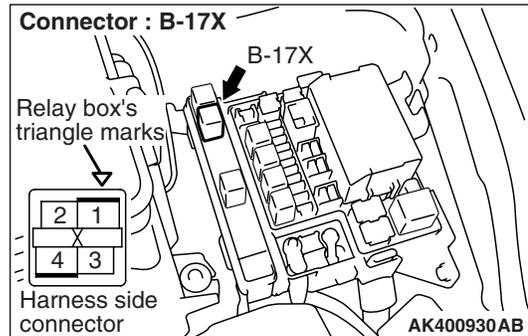
- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

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

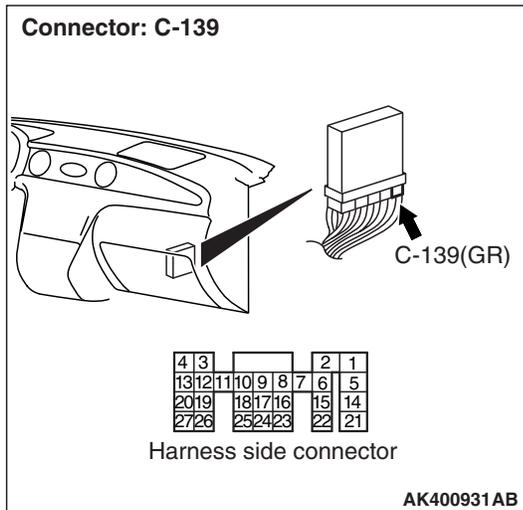
Q: Is the check result normal?

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

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at C-139 engine-ECU connector.



- Measure engine-ECU terminal voltage.
- Ignition switch: "ON"
- Voltage between terminal No. 10 and earth.

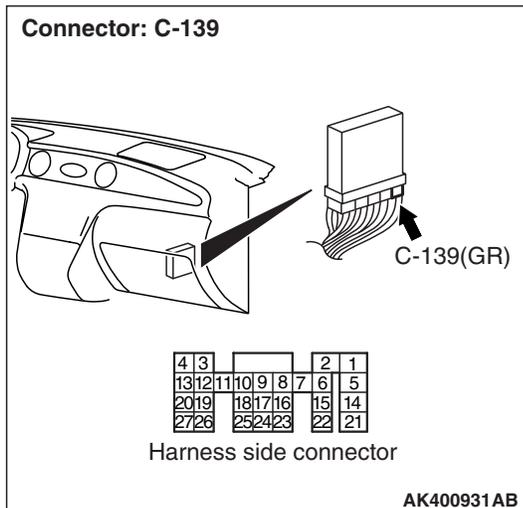
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 6 .

STEP 6. Connector check: C-139 engine-ECU connector

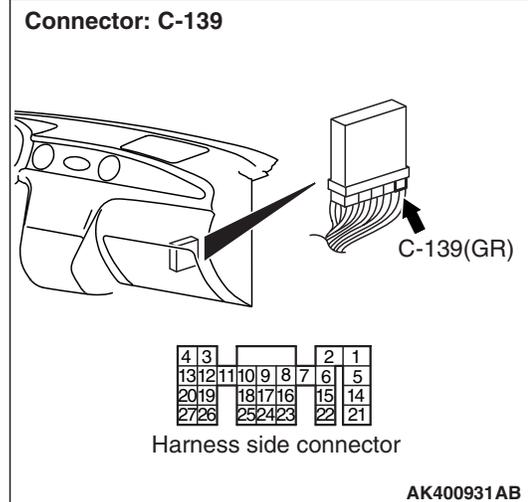
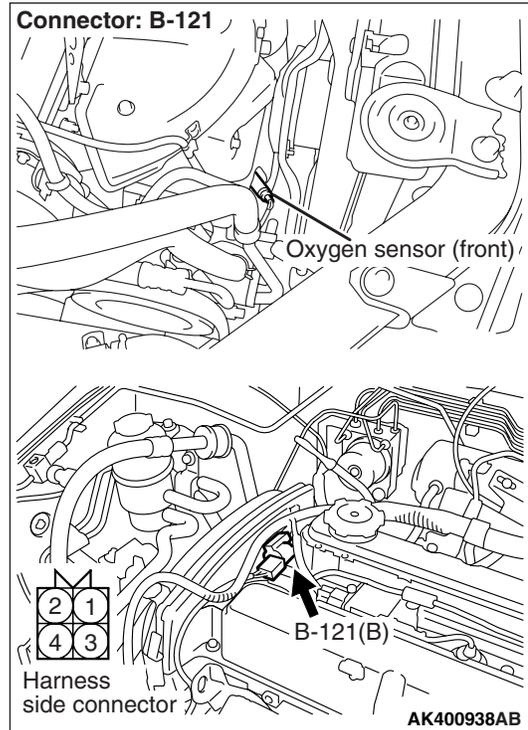


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-121 (terminal No. 3) oxygen sensor connector and C-139 (terminal No. 10) engine-ECU connector.



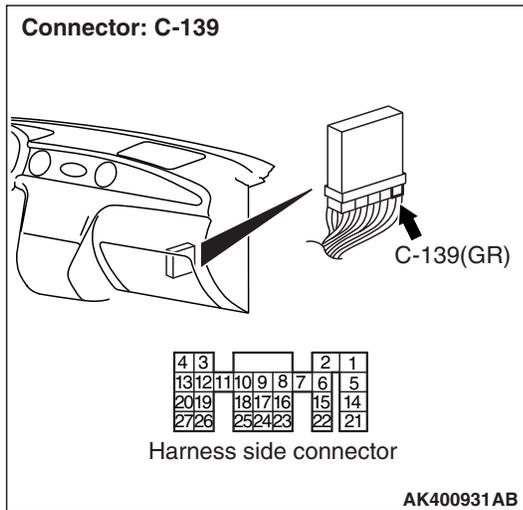
- Check earthing line for open/short circuit.

Q: Is the check result normal?

YES : Replace engine-ECU.

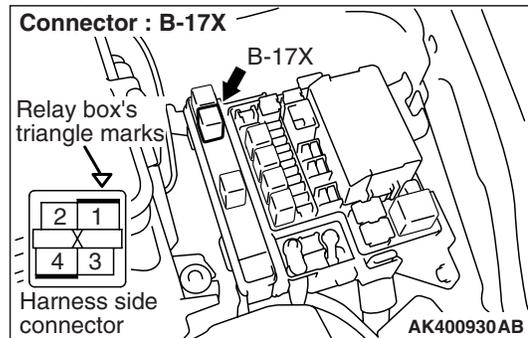
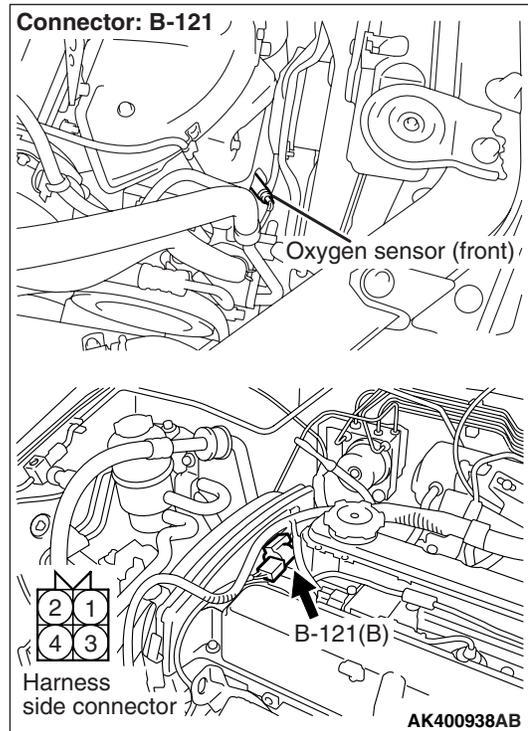
NO : Repair.

STEP 8. Connector check: C-139 engine-ECU connector



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

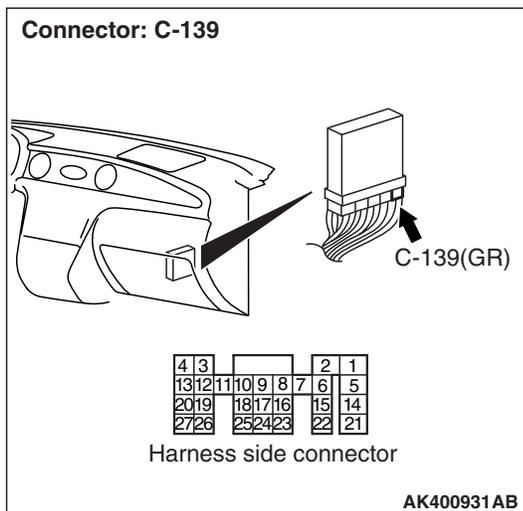
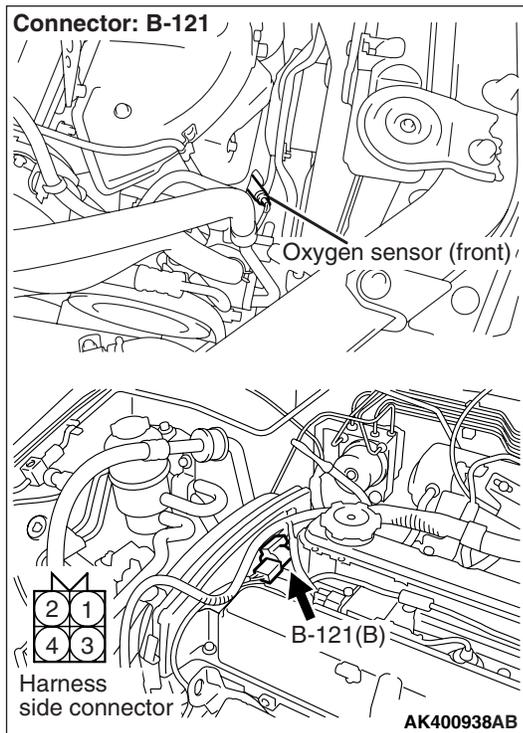
STEP 9. Check harness between B-121 (terminal No. 1) oxygen sensor (front) connector and B-17X (terminal No. 1) engine control relay connector.



- Check power supply line for damage.

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

STEP 10. Check harness between B-121 (terminal No. 3) oxygen sensor (front) connector and C-139 (terminal No. 10) engine-ECU connector.



- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. Check the trouble symptoms.

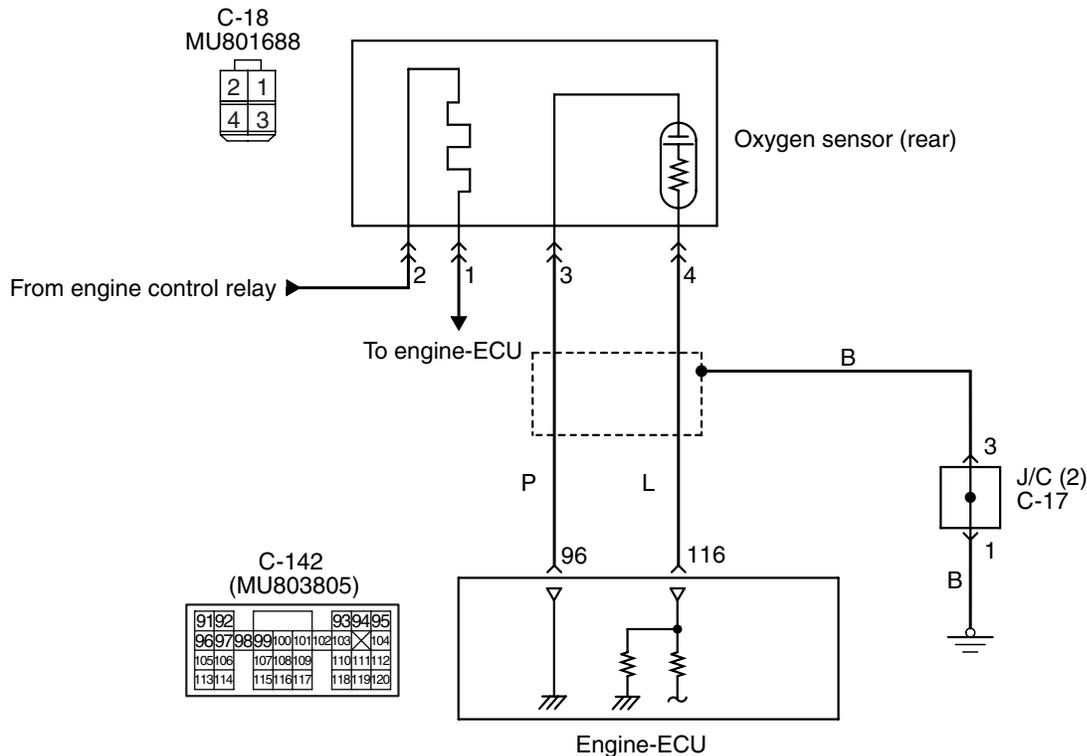
Q: Does trouble symptom persist?

YES : Replace engine-ECU.

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

Code No. P0136: Oxygen Sensor (rear) System

Oxygen sensor (rear) circuit



Wire colour code

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

AK400807AB

OPERATION

- The sensor signal is inputted to the engine-ECU (terminal No. 116) from the oxygen sensor (rear) output terminal (terminal No. 4).
- The oxygen sensor (rear) (terminal No. 3) is earthed with engine-ECU (terminal No. 96).

FUNCTION

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

- In response to the signal, the engine-ECU controls the fuel injection amount so that the air-fuel ratio can be equivalent to the theoretical air-fuel ratio.

TROUBLE JUDGMENT**Check Conditions**

- Above 3 minutes later after the engine has started up.
- The engine coolant temperature is approximately 80°C or higher.
- The volumetric efficiency is 25% or more.
- The engine speed is 1,200 r/min. or more.

Judgment Criterion

- When the oxygen sensor (rear) output voltage is 0.2 V or less, and a power voltage of 5 V is applied to the oxygen sensor (rear) in the engine-ECU, the sensor output voltage is 4.5 V or more.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

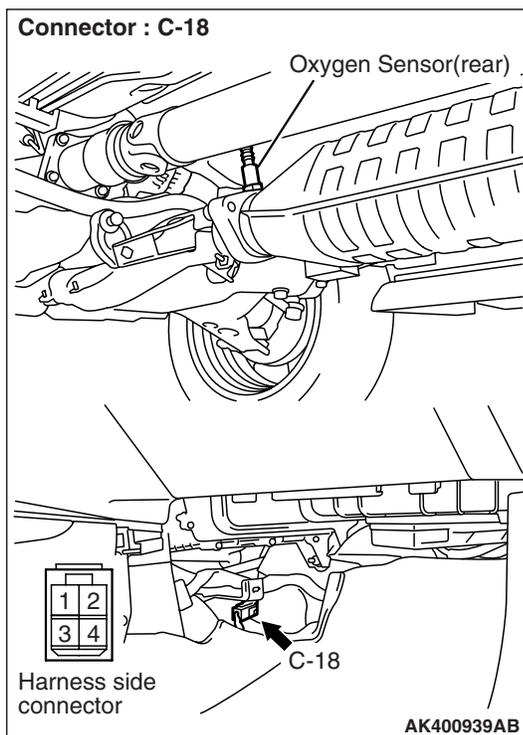
- Refer to Data List Reference Table P.13B-368.
 - Item 59: Oxygen sensor (rear)

Q: Is the check result normal?

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

NO : Go to Step 2 .

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

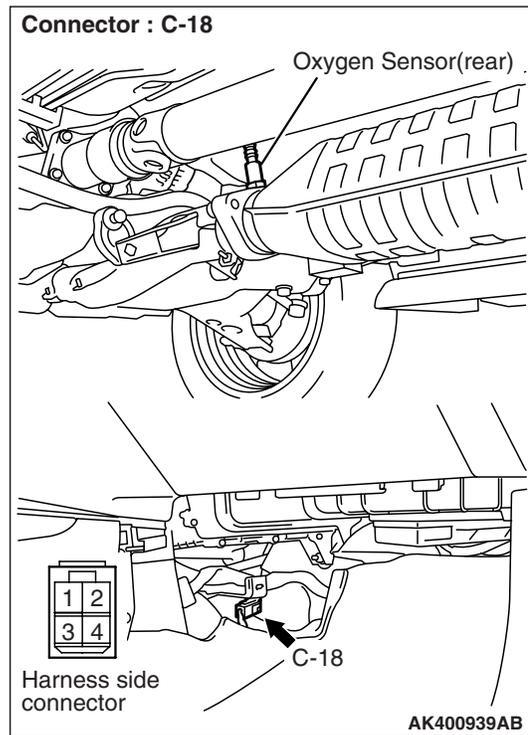


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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



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

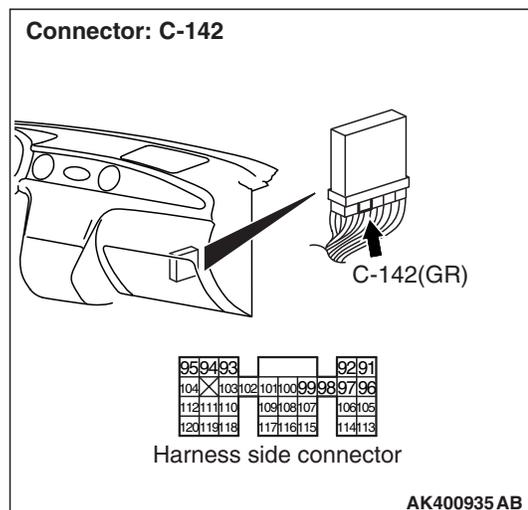
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU connector

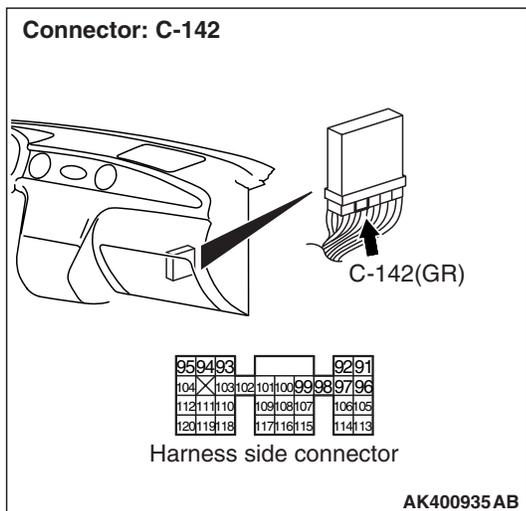
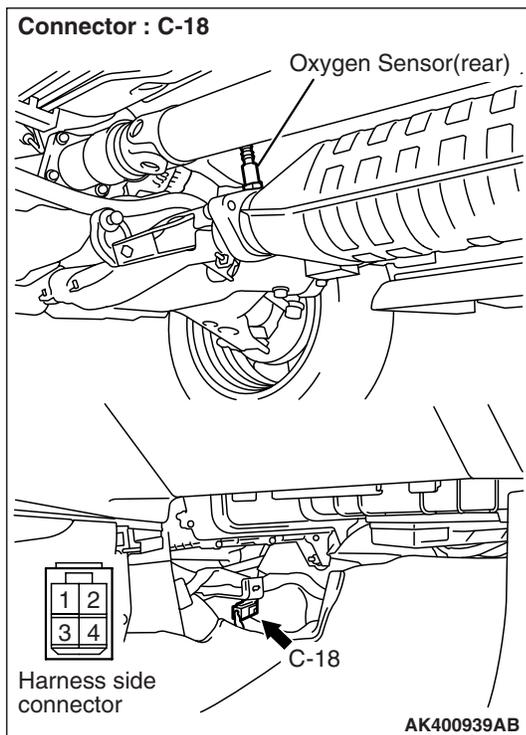


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between C-18 (terminal No. 3) oxygen sensor (rear) connector and C-142 (terminal No. 96) engine-ECU connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

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

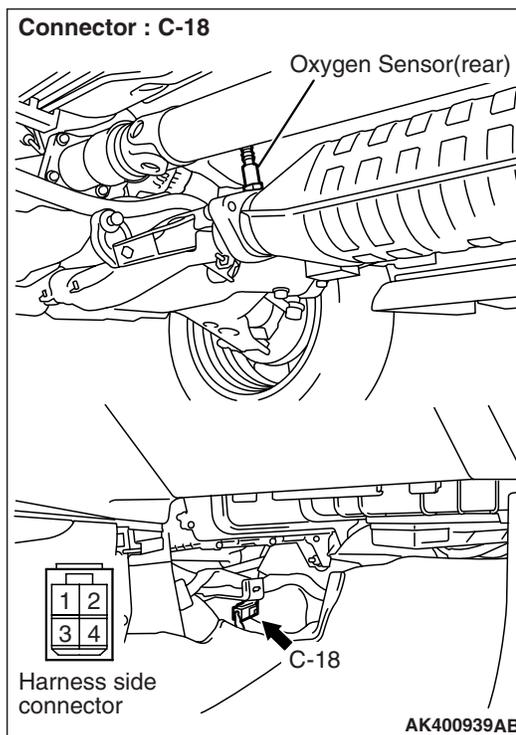
STEP 6. M.U.T.-II/III data list

- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 59: Oxygen sensor (rear)

Q: Is the check result normal?

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

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



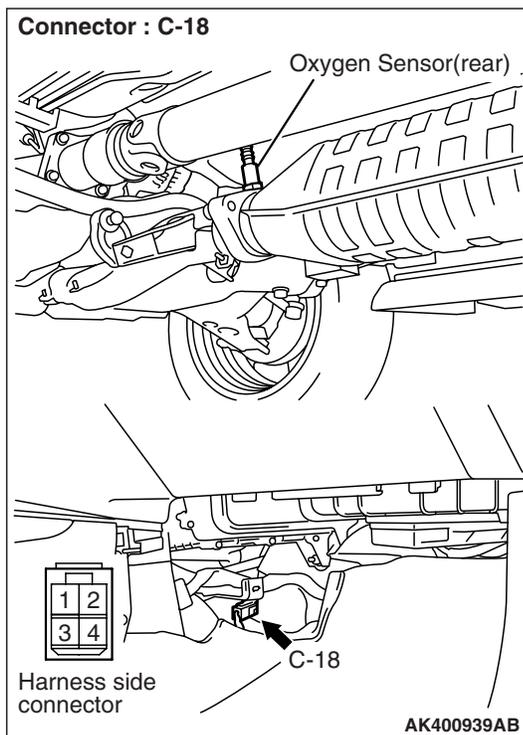
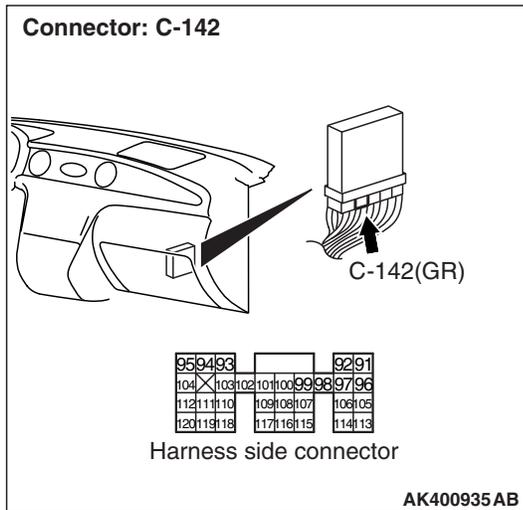
- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: After warm-up
- Ignition switch: "ON"
- Voltage between terminal No. 3 and earth.

OK: 0.5 V or less

Q: Is the check result normal?

- YES :** Go to Step 9 .
NO : Go to Step 8 .

STEP 8. Connector check: C-142 engine-ECU connector



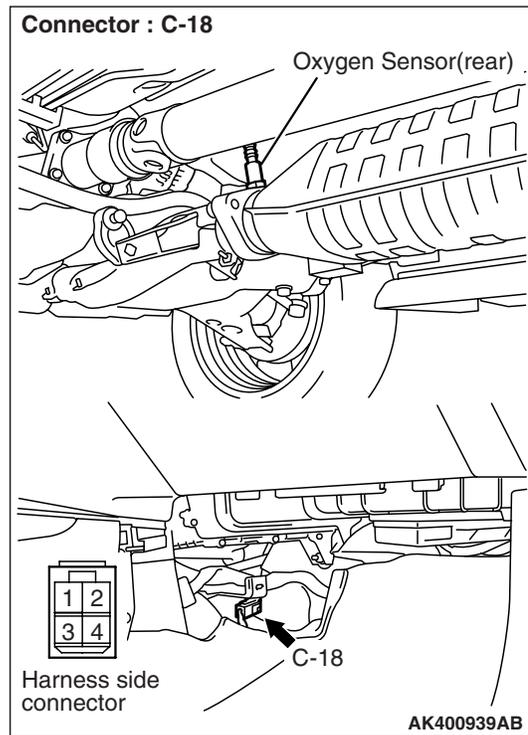
Q: Is the check result normal?

YES : Check and repair harness between C-18 (terminal No. 3) oxygen sensor (rear) connector and C-142 (terminal No. 96) engine-ECU connector.

- Check earthing line for damage.

NO : Repair or replace.

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



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

OK:

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

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 10 .

STEP 10. Check oxygen sensor (rear) itself

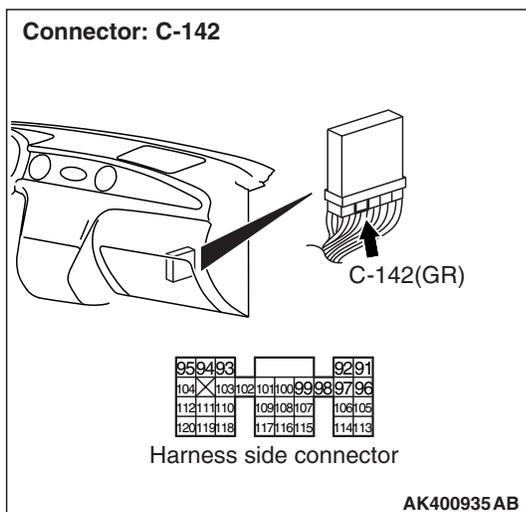
- Check oxygen sensor (rear) itself (Refer to P.13B-398).

Q: Is the check result normal?

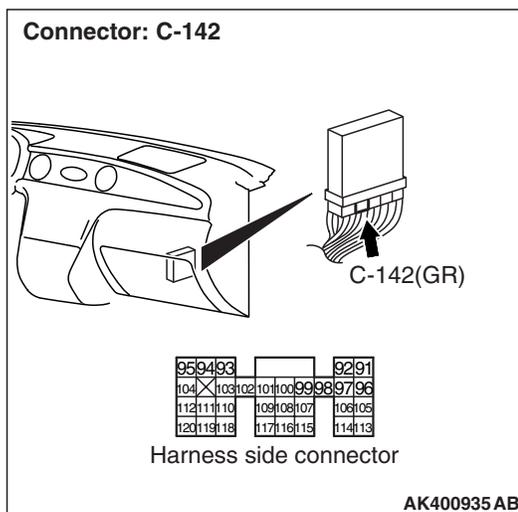
YES : Go to Step 11 .

NO : Replace oxygen (rear) sensor.

STEP 11. Connector check: C-142 engine-ECU connector



STEP 12. Perform voltage measurement at C-142 engine-ECU connector.



- Measure engine-ECU terminal voltage.
- Transmission: Neutral
- Engine: After warm-up
- Voltage between terminal No. 116 and earth.

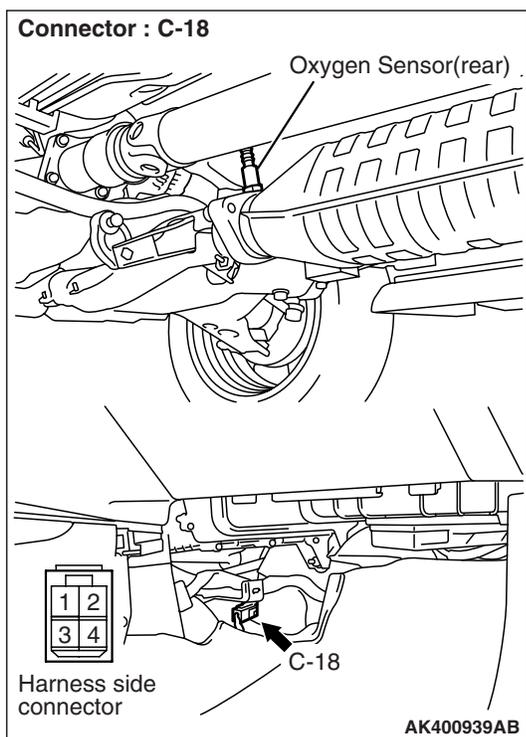
OK:

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

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Go to Step 13 .



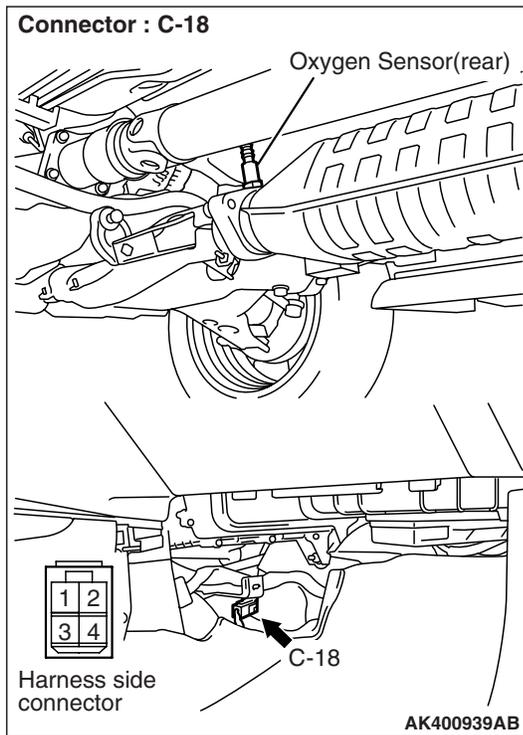
Q: Is the check result normal?

YES : Check and repair harness between C-18 (terminal No. 4) oxygen sensor (rear) connector and C-142 (terminal No. 116) engine-ECU connector.

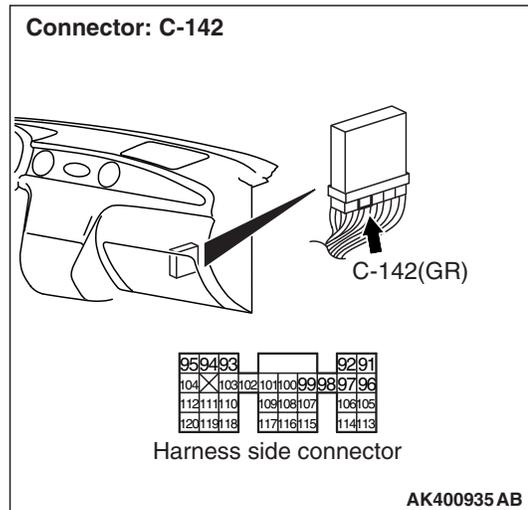
- Check output line for damage.

NO : Repair or replace.

STEP 13. Connector check: C-18 engine-ECU connector



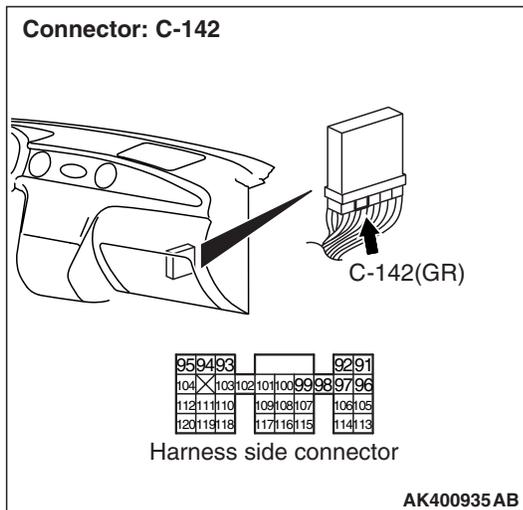
STEP 14. Connector check: C-142 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.



Q: Is the check result normal?

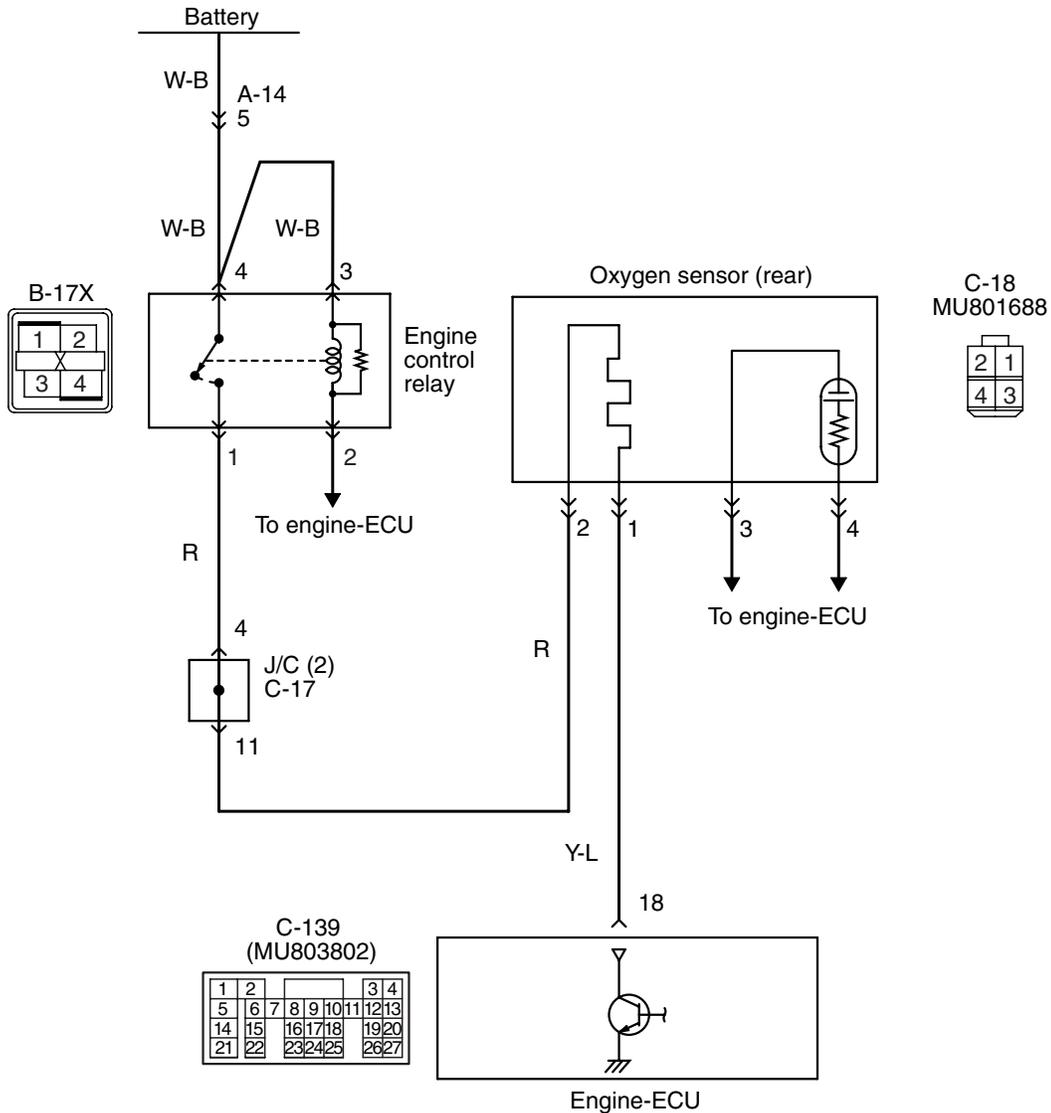
YES : Check and repair harness between C-18 (terminal No. 4) oxygen sensor (rear) connector and C-142 (terminal No. 116) engine-ECU connector.

- Check output line for open circuit.

NO : Repair or replace.

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

Oxygen sensor heater (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

AK400808AB

OPERATION

- Power is supplied to the heater power terminal (terminal No. 2) of the oxygen sensor (rear) connector from the engine control relay (terminal No. 1).
- The heater (terminal No. 1) of the oxygen sensor (rear) connector is controlled by the power transistor in the engine-ECU (terminal No. 18).

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- The engine coolant temperature is 20°C or higher.
- The oxygen sensor heater (rear) is ON.
- The engine speed is 50 r/min. or more.
- A/C relay: OFF
- Radiator fan: OFF
- The system voltage is 11 – 16 V.

Judgment Criterion

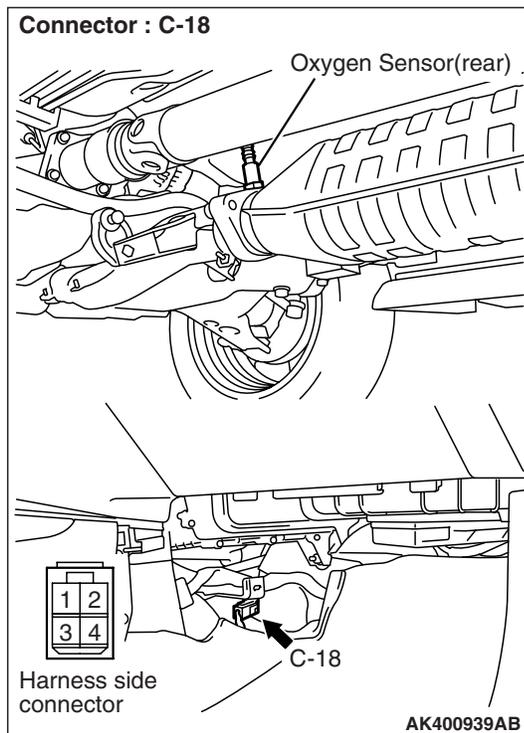
- The heater current of oxygen sensor heater (rear) 0.2 A or less or 3.5 A or more for 4 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

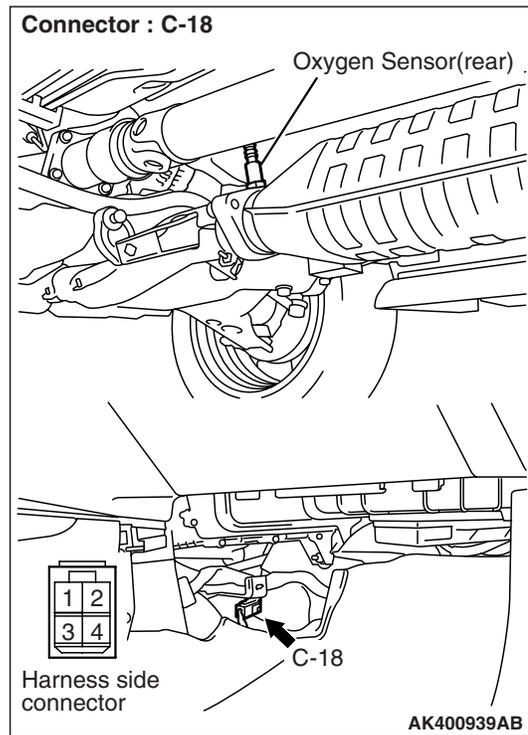


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

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

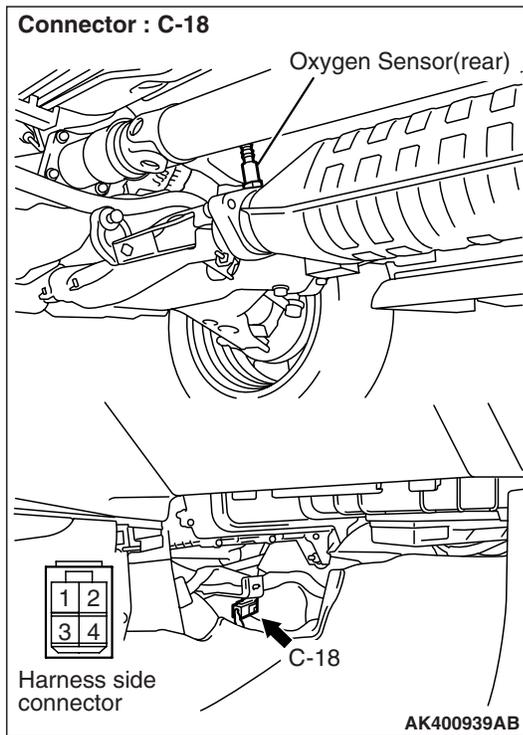


- Disconnect connector, and measure at sensor side.
- Resistance between terminal No. 1 and No. 2.
OK: 11 – 18 Ω

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace oxygen (rear) sensor.

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

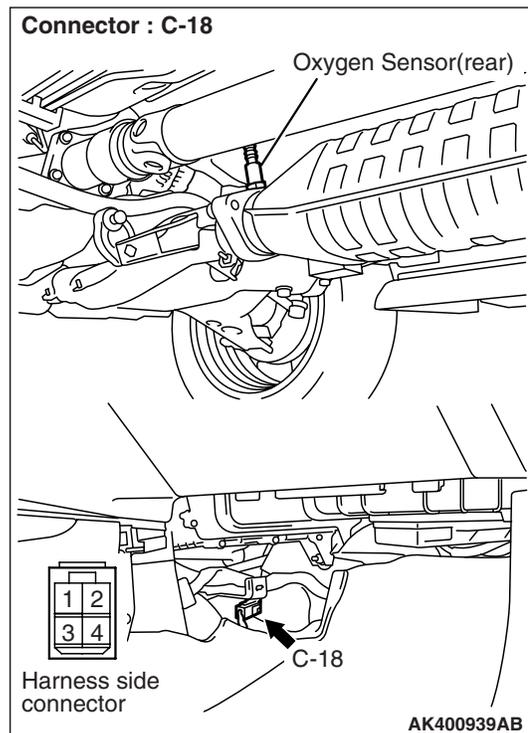
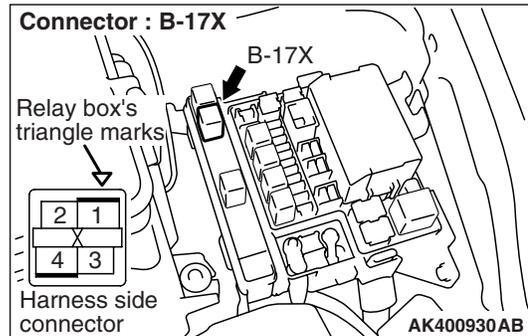
- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 2 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

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

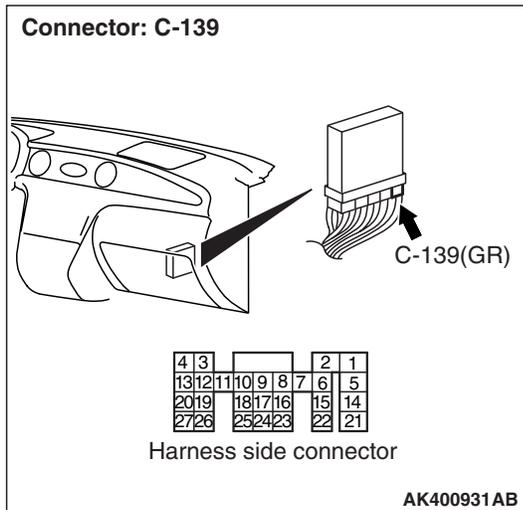
Q: Is the check result normal?

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

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at C-139 engine-ECU connector.



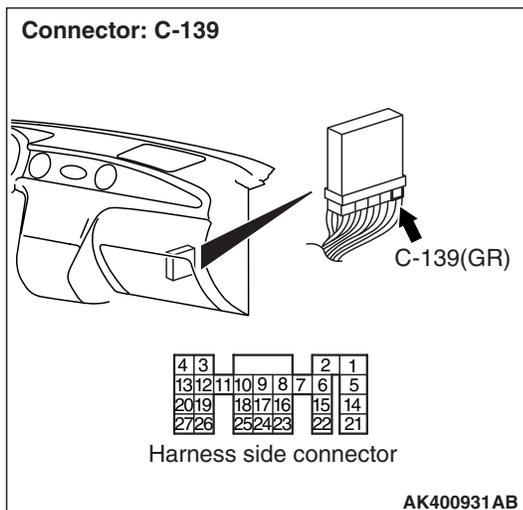
- Measure engine-ECU terminal voltage.
- Ignition switch: "ON"
- Voltage between terminal No. 54 and earth.

OK: System voltage

Q: Is the check result normal?

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

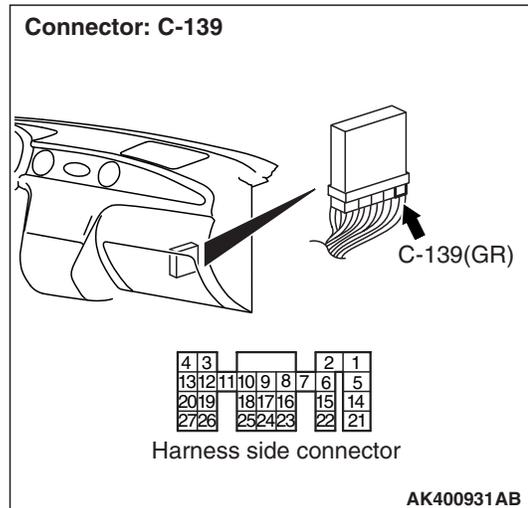
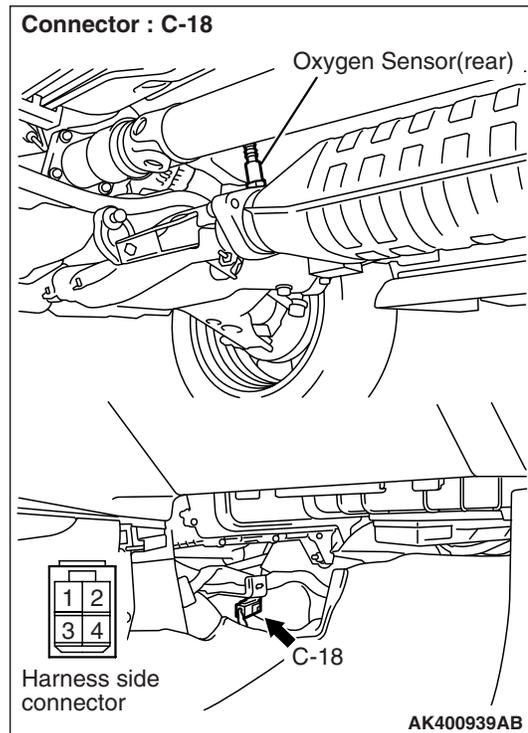
STEP 6. Connector check: C-139 engine-ECU connector



Q: Is the check result normal?

- YES :** Go to Step 7 .
NO : Repair or replace.

STEP 7. Check harness between C-18 (terminal No. 1) oxygen sensor connector and C-139 (terminal No. 18) engine-ECU connector.

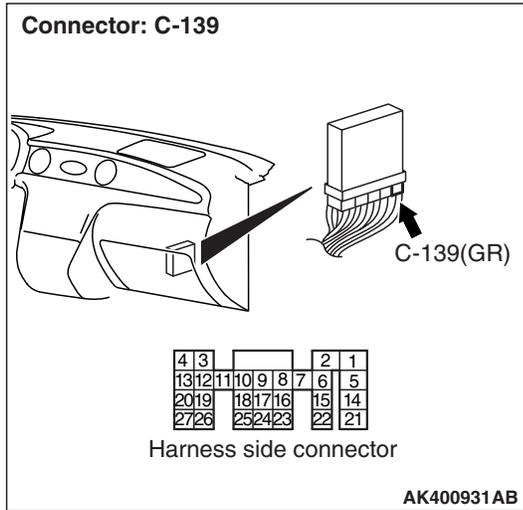


- Check earthing line for open/short circuit.

Q: Is the check result normal?

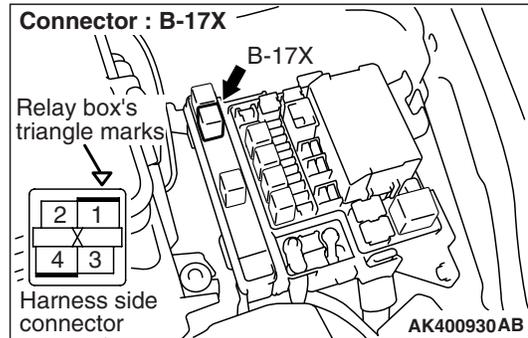
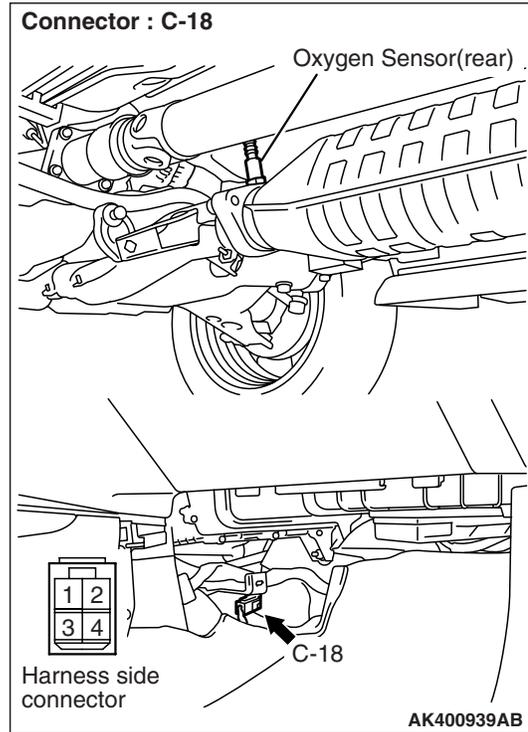
- YES :** Replace engine-ECU.
NO : Repair.

STEP 8. Connector check: C-139 engine-ECU connector



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

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

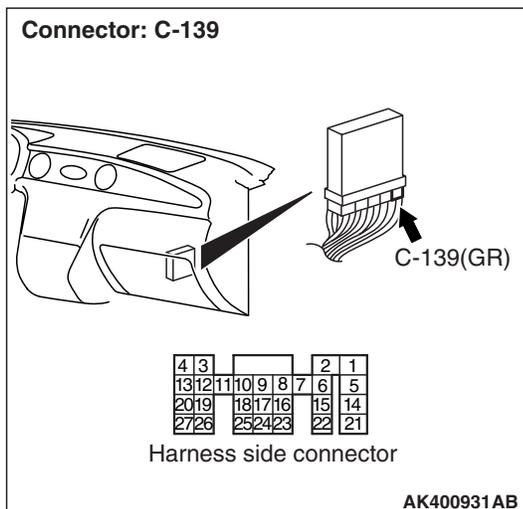
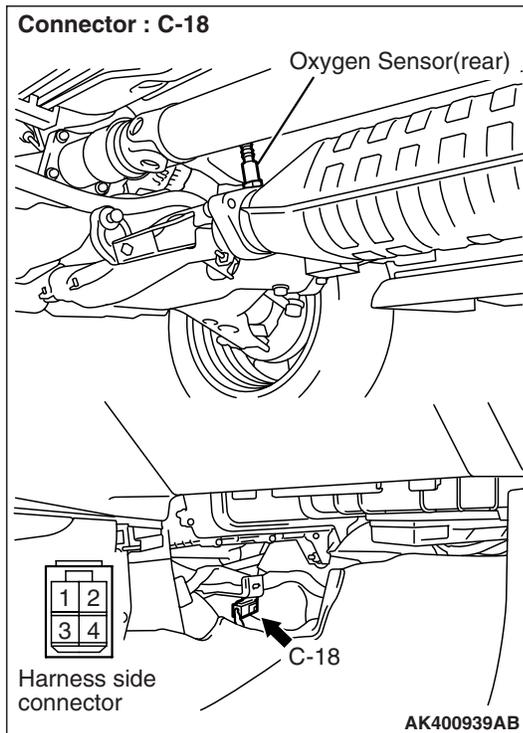


NOTE: Before checking harness, check intermediate connector C-17, and repair if necessary.

- Check power supply line for damage.

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

STEP 10. Check harness between C-18 (terminal No. 1) oxygen sensor (rear) connector and C-139 (terminal No. 18) engine-ECU connector.



- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU.

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

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

- Refer to P0201 injector circuit [P.13B-100](#).
- Refer to P0202 injector circuit [P.13B-104](#).
- Refer to P0203 injector circuit [P.13B-108](#).
- Refer to P0204 injector circuit [P.13B-112](#).

FUNCTION

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

TROUBLE JUDGMENT**Check Condition**

- In learning air-fuel ratio

Judgment Criterion

- Fuel injection amount correction value remains unusually low for more than 5 seconds.

or

- Fuel injection amount correction value remains unusually high for more than 5 seconds.

PROBABLE CAUSE

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

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

Q: Is any other diagnosis code than P0170 output?

YES : Inspection Chart for Diagnosis Code (Refer to [P.13B-20](#)).

NO : Go to Step 2 .

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

- Refer to Data List Reference Table [P.13B-368](#).
 - Item 12: Air flow sensor
 - Item 13: Intake air temperature sensor
 - Item 21: Engine coolant temperature sensor
 - Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 3 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes [P.13B-20](#)).

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

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair.

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

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

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

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13B-390](#)).

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

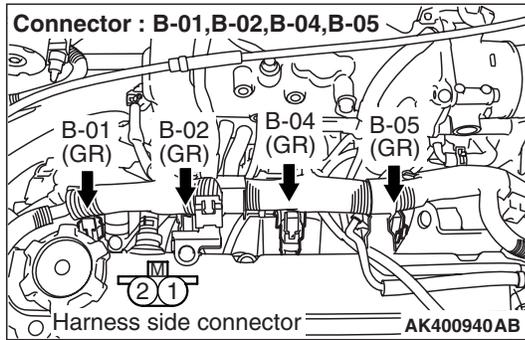
- Refer to Data List Reference Table [P.13B-368](#).
 - Item 11: Oxygen sensor (front)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Check oxygen sensor (front) system (Refer to Code No. P0130 [P.13B-72](#)).

STEP 7. 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: Are the check results normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Check injector itself.

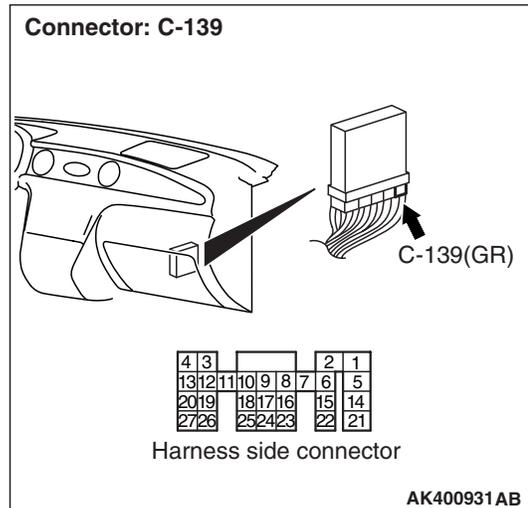
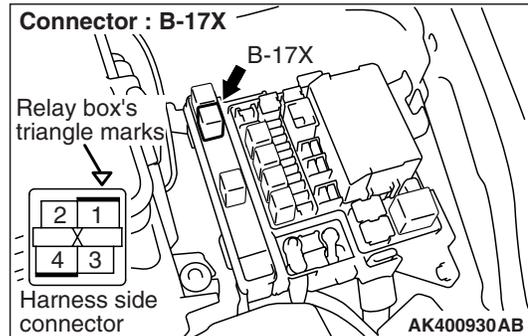
- Check Injector itself (Refer to [P.13B-400](#)).

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace injector.

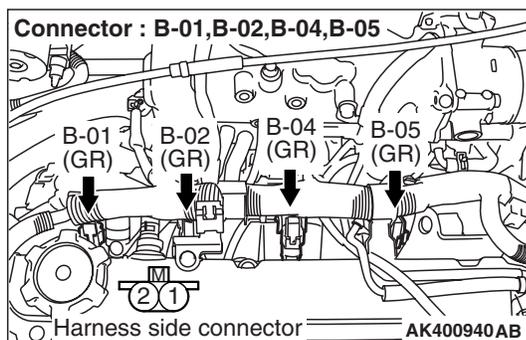
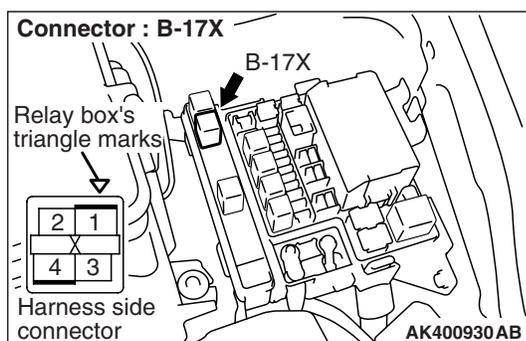
STEP 9. Connector check: B-17X engine control relay connector and C-139 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

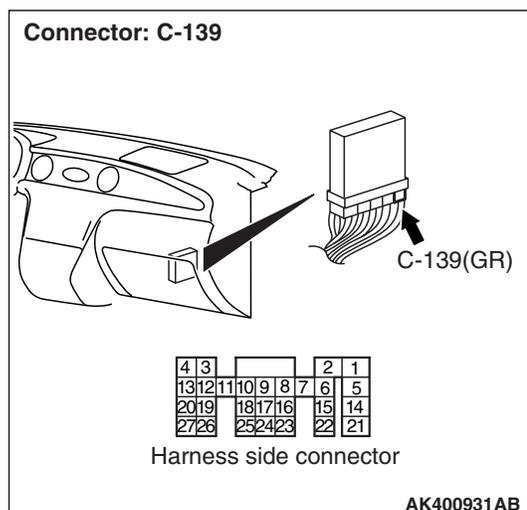
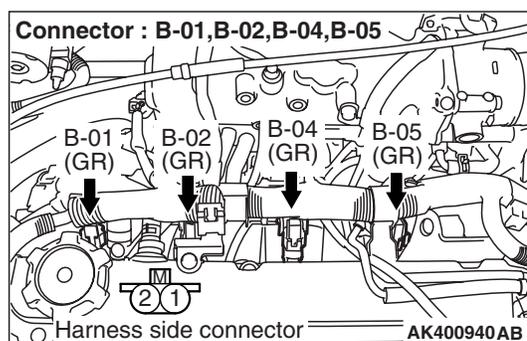
STEP 10. Check harness between B-17X engine control relay connector and injector connector.

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

Q: Are the check results normal?

YES : Go to Step 11 .

NO : Repair.

STEP 11. Check harness between injector connector and C-139 engine-ECU connector.

- Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-139 (terminal No. 1) engine-ECU connector.
- Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-139 (terminal No. 5) engine-ECU connector.
- Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-139 (terminal No. 14) engine-ECU connector.
- Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-139 (terminal No. 21) engine-ECU 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 [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.13B-391](#)).

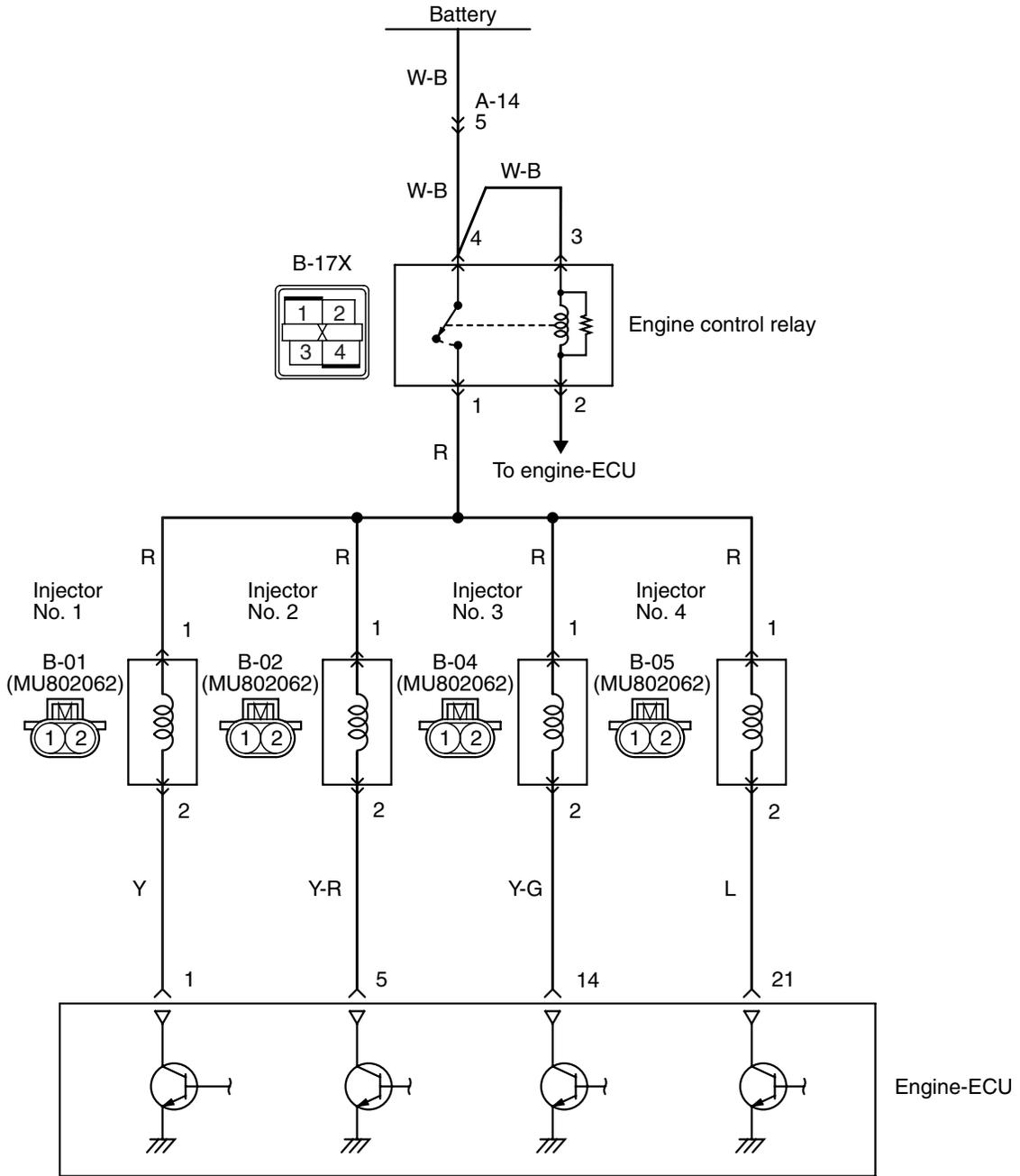
Q: Is the check result normal?

YES : Replace engine-ECU.

NO : Repair.

Code No. P0201: No. 1 Injector System

Injector circuit



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

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

FUNCTION

- The engine-ECU controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT

Check Conditions

- The engine speed is 50 – 1,000 r/min.
- The throttle position sensor output voltage is 1.15 V or less.
- Injector not in forced drive (actuator test) mode.

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

- Item 01: No. 1 injector

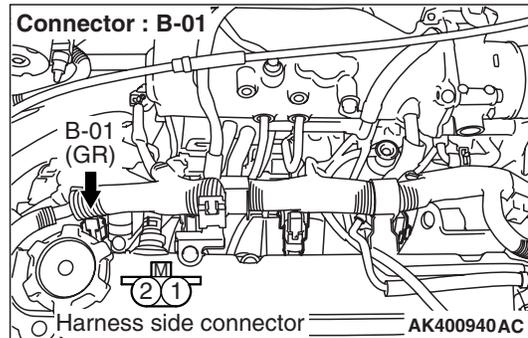
OK: Idling state varies.

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 or replace.

STEP 3. Check No. 1 injector itself.

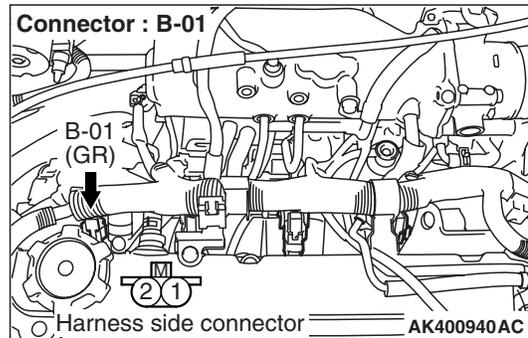
- Check No. 1 Injector itself (Refer to P.13B-400).

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.

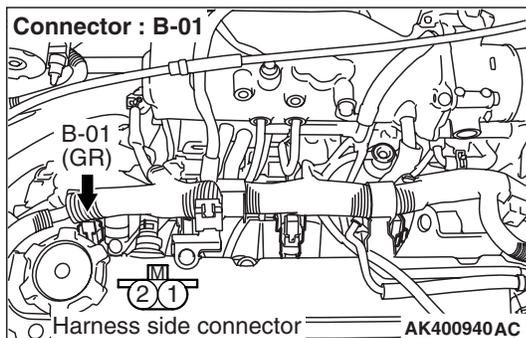
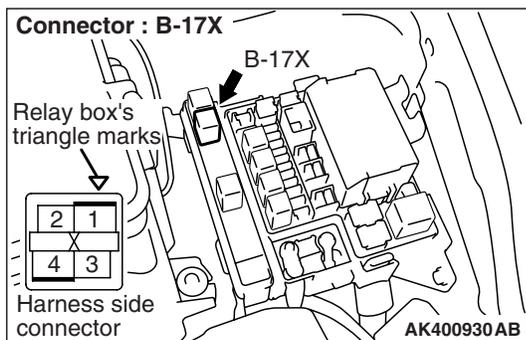
OK: System voltage

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



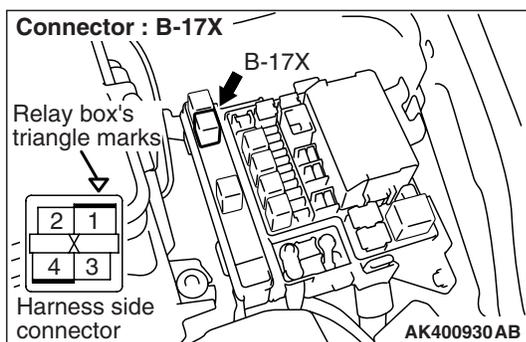
Q: Is the check result normal?

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 or replace.

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

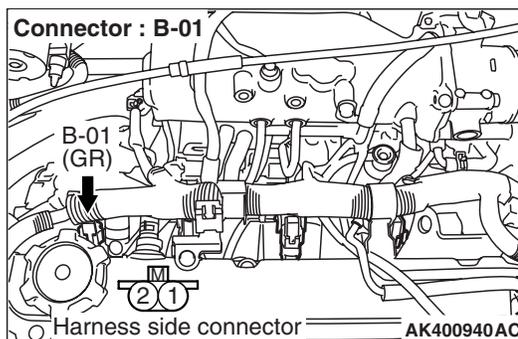
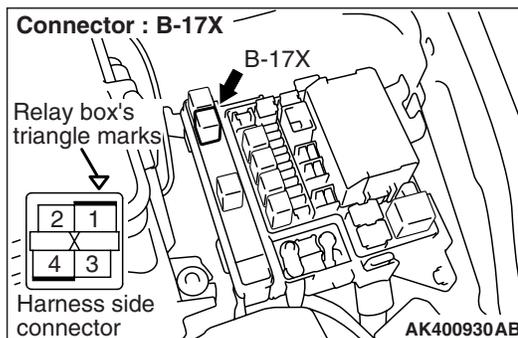


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

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



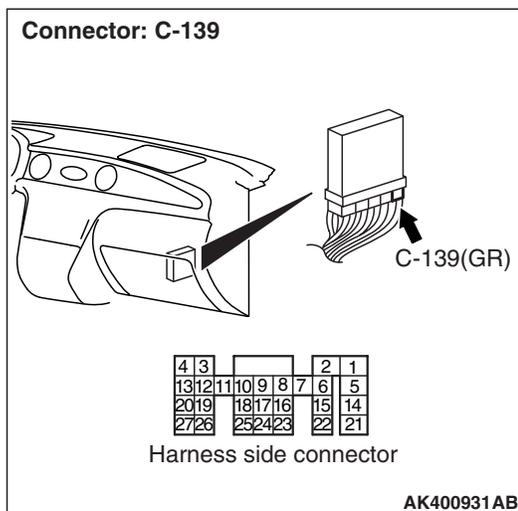
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Connector check: C-139 engine-ECU connector

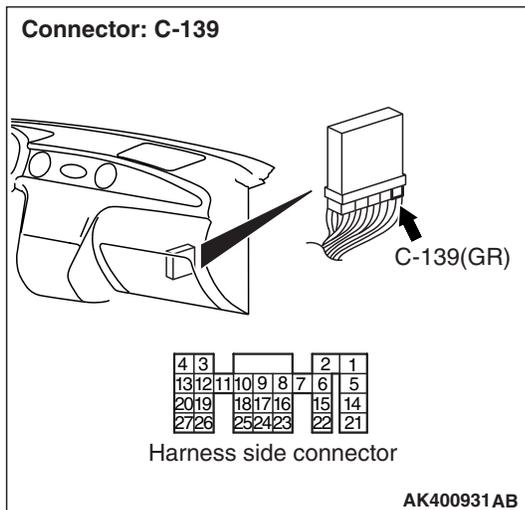
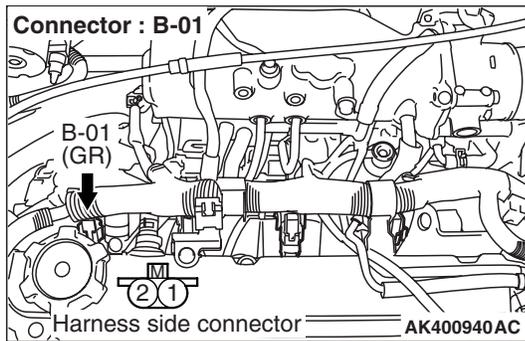


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-139 (terminal No. 1) engine-ECU connector.

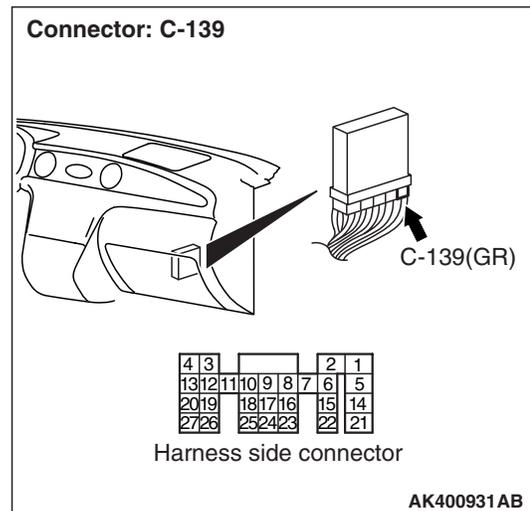


- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Repair.

STEP 10. Perform signal wave pattern measurement at C-139 engine-ECU connector (Using an oscilloscope).



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

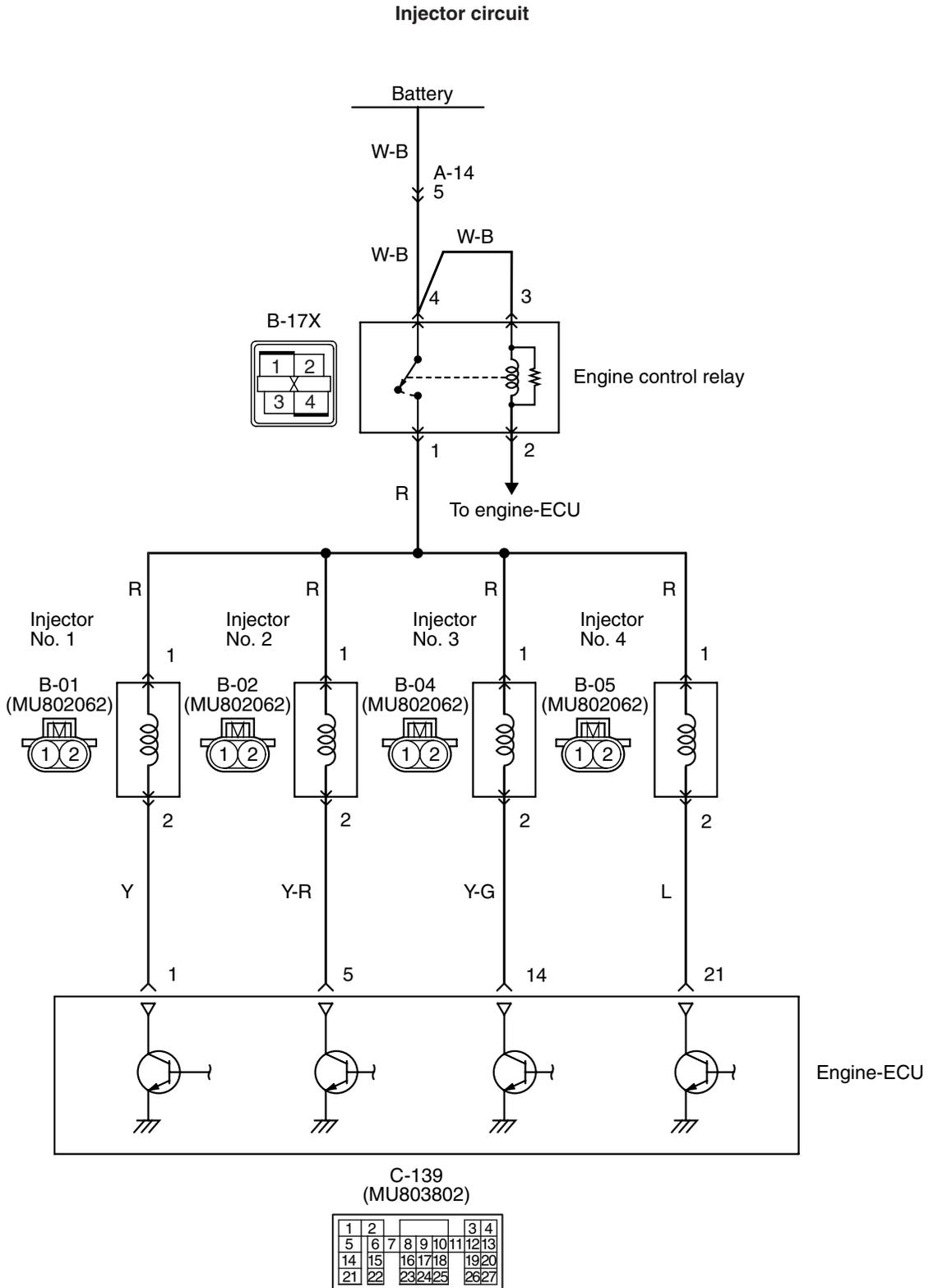
OK: Waveforms should be display on Inspection procedure using an oscilloscope (Refer to P.13B-383).

Q: Is the check result normal?

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

NO : Replace engine-ECU.

Code No. P0202: No. 2 Injector System



Wire colour code

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

OPERATION

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

TROUBLE JUDGMENT

Check Conditions

- The engine speed is 50 – 1,000 r/min.
- The throttle position sensor output voltage is 1.15 V or less.
- Injector not in forced drive (actuator test) mode.

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

- Item 02: No. 2 injector

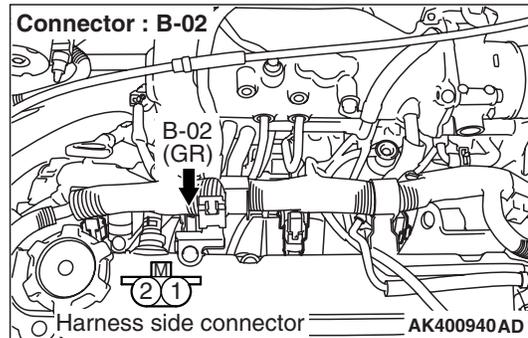
OK: Idling state varies.

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 or replace.

STEP 3. Check No. 2 injector itself.

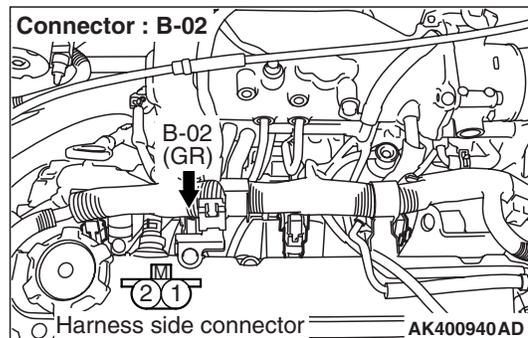
- Check No. 2 Injector itself (Refer to P.13B-400).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No. 2 injector.

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



- Disconnect connector, and measure at harness side.

- Ignition switch: ON

- Voltage between terminal No. 1 and earth.

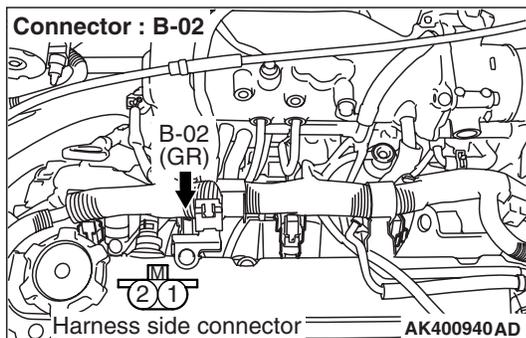
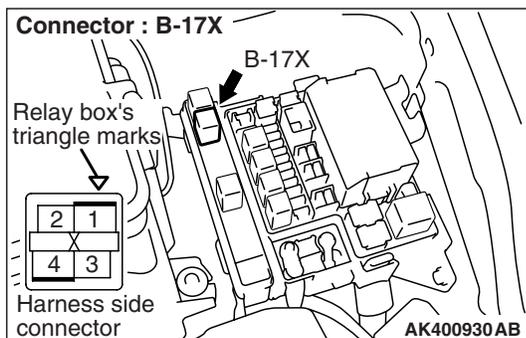
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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



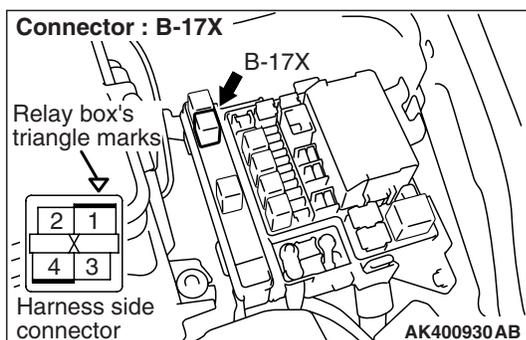
Q: Is the check result normal?

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

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

NO : Repair or replace.

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

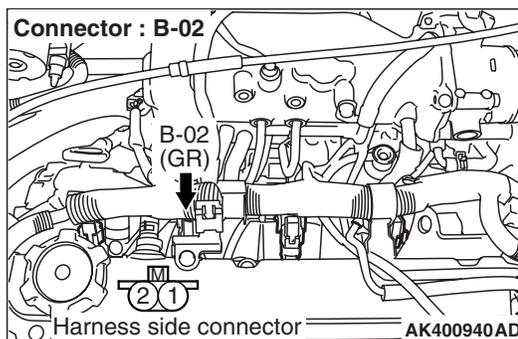
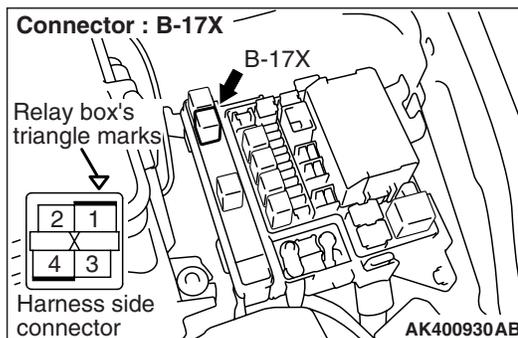


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

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



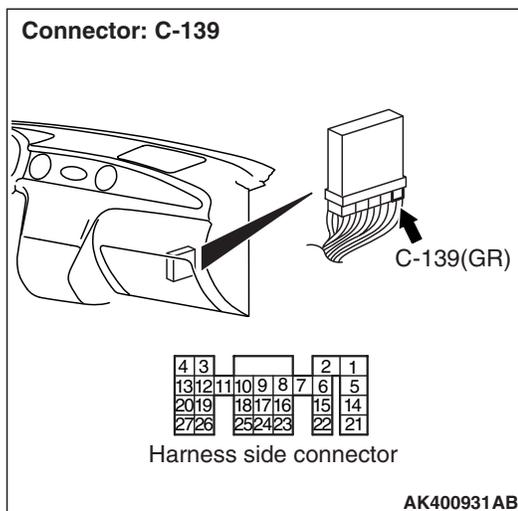
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Connector check: C-139 engine-ECU connector

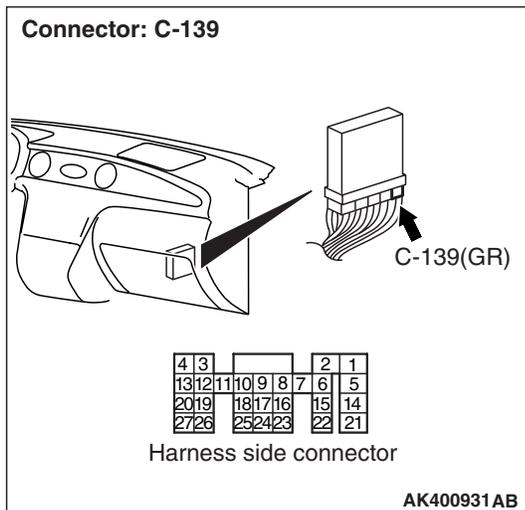
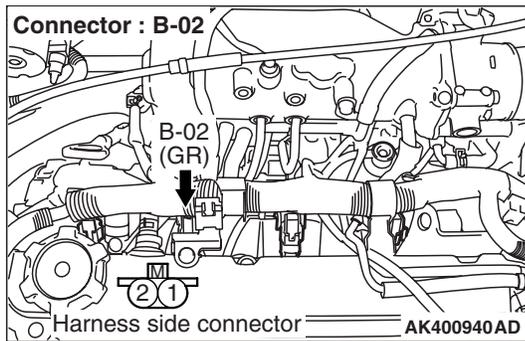


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-139 (terminal No. 5) engine-ECU connector.

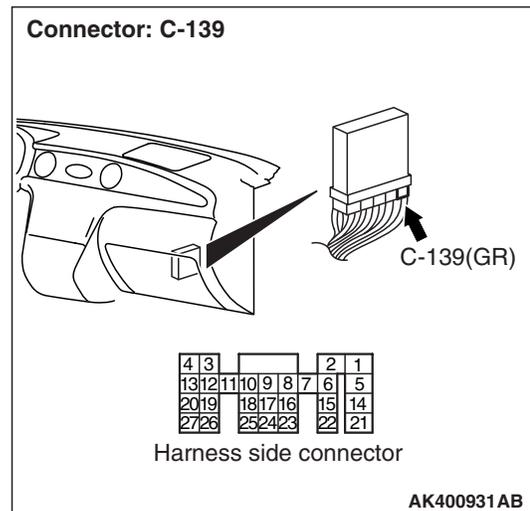


- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Repair.

STEP 10. Perform signal wave pattern measurement at C-139 engine-ECU connector (Using an oscilloscope).



- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 5 and earth.

OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13B-383).

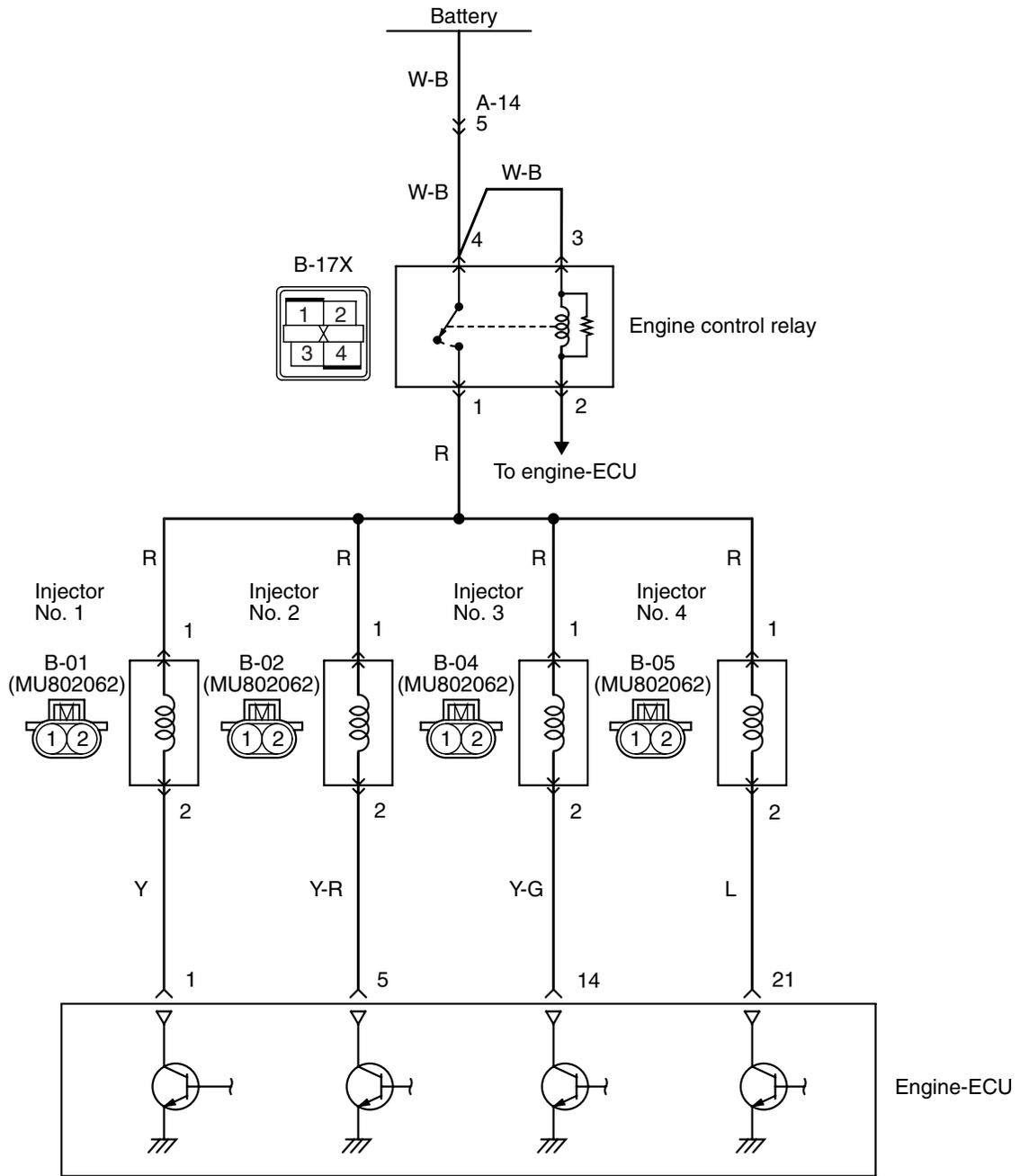
Q: Is the check result normal?

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

NO : Replace engine-ECU.

Code No. P0203: No. 3 Injector System

Injector circuit



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

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

FUNCTION

- The engine-ECU controls the power supply interval of the injector.
- The fuel injection amount of the injector depends on the power supply interval.

TROUBLE JUDGMENT

Check Conditions

- The engine speed is 50 – 1,000 r/min.
- The throttle position sensor output voltage is 1.15 V or less.
- Injector not in forced drive (actuator test) mode.

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

- Item 03: No. 3 injector

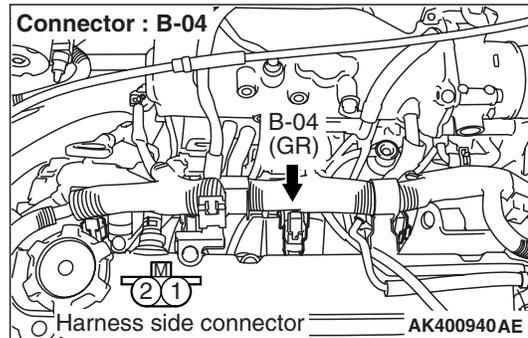
OK: Idling state varies.

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 or replace.

STEP 3. Check No. 3 injector itself.

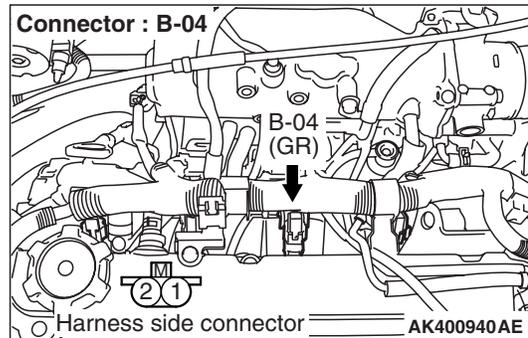
- Check No. 3 Injector itself (Refer to P.13B-400).

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.

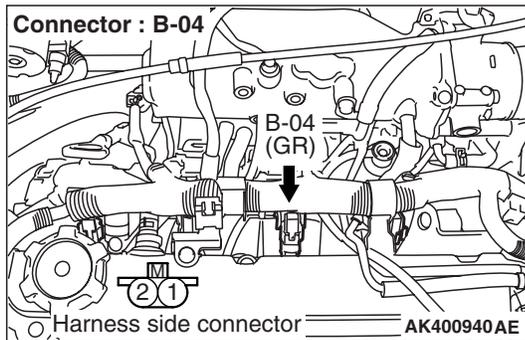
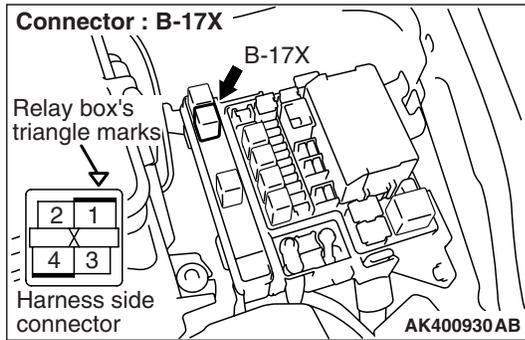
OK: System voltage

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



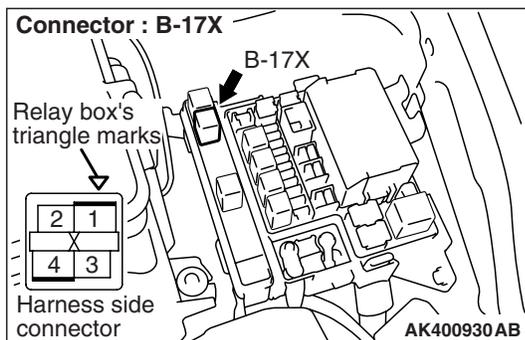
Q: Is the check result normal?

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 or replace.

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

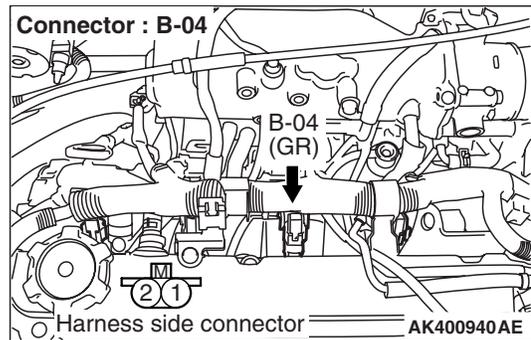
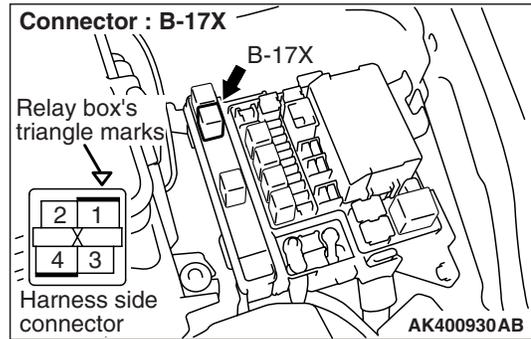


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

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



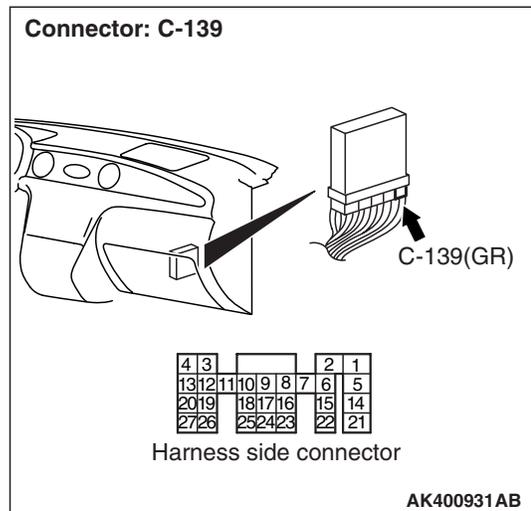
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Connector check: C-139 engine-ECU connector

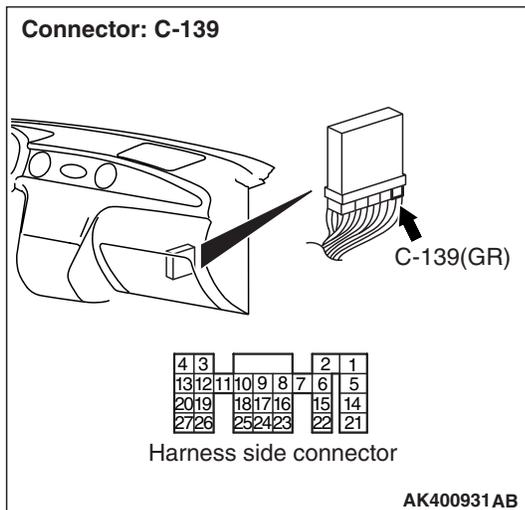
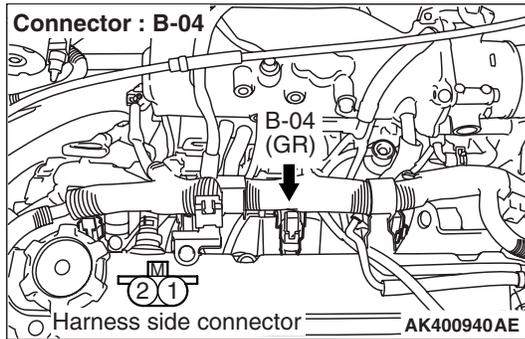


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-139 (terminal No. 14) engine-ECU connector.

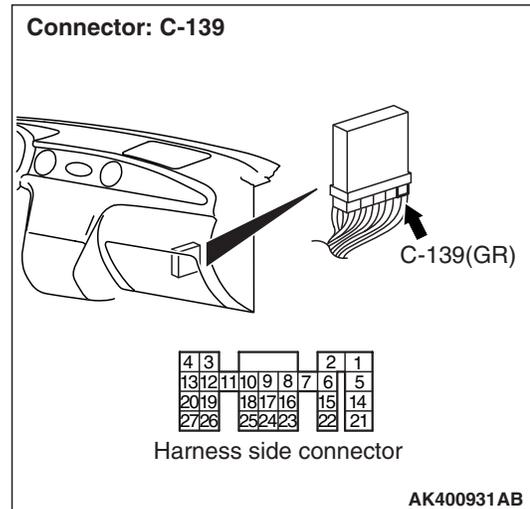


- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .
NO : Repair.

STEP 10. Perform signal wave pattern measurement at C-139 engine-ECU connector (Using on oscilloscope).



- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 14 and earth.

OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13B-383).

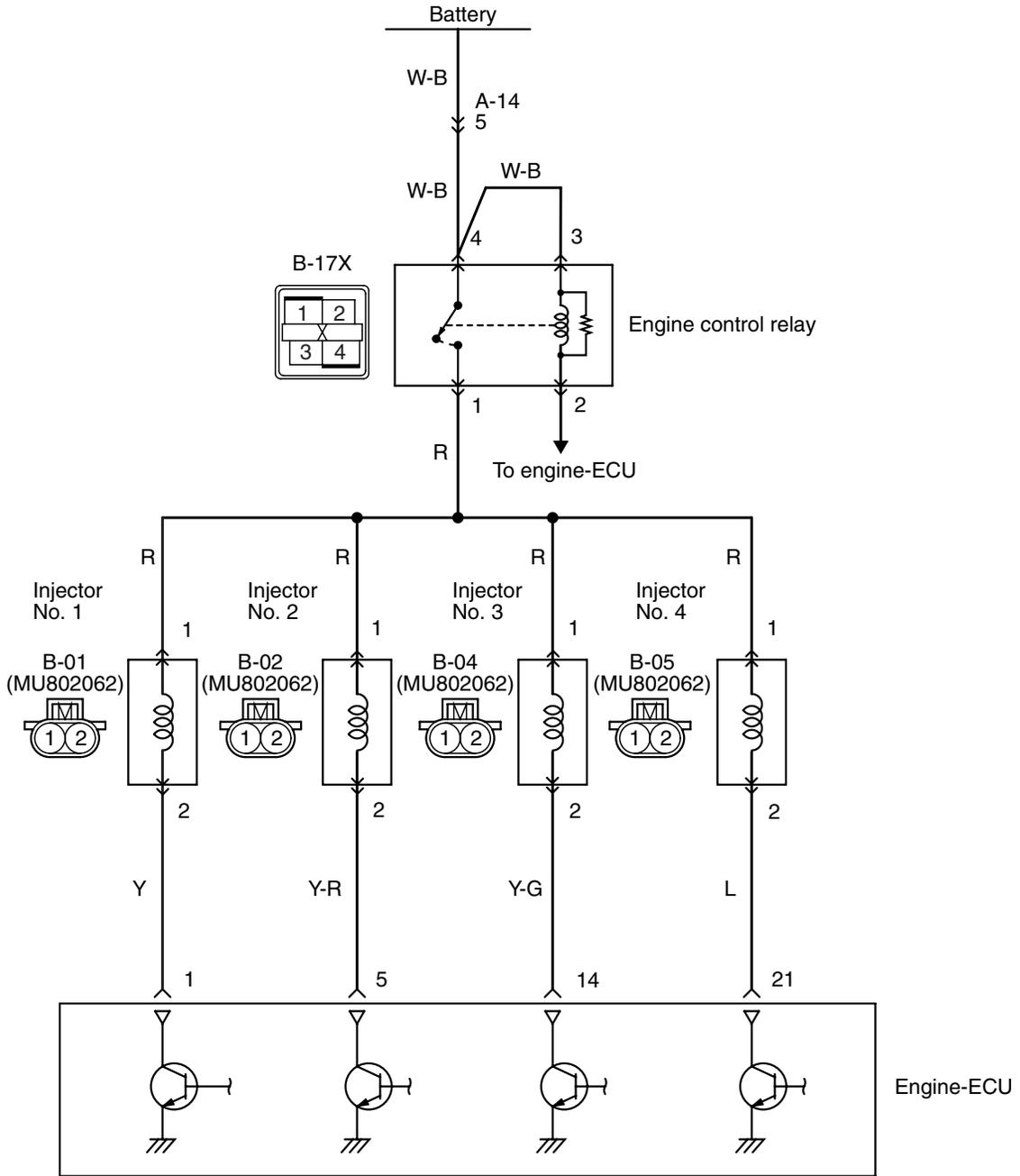
Q: Is the check result normal?

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

NO : Replace engine-ECU.

Code No. P0204: No. 4 Injector System

Injector circuit



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

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

- The engine speed is 50 – 1,000 r/min.
- The throttle position sensor output voltage is 1.15 V or less.
- Injector not in forced drive (actuator test) mode.

Judgment Criteria

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

- Item 04: No. 4 injector

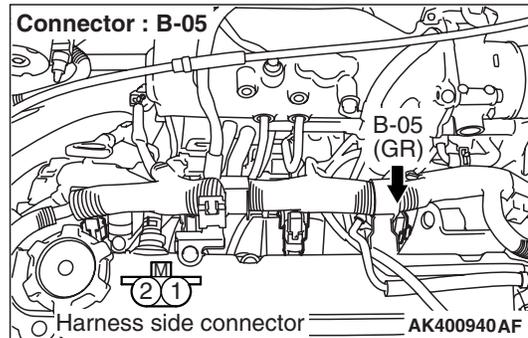
OK: Idling state varies.

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 or replace.

STEP 3. Check No. 4 injector itself.

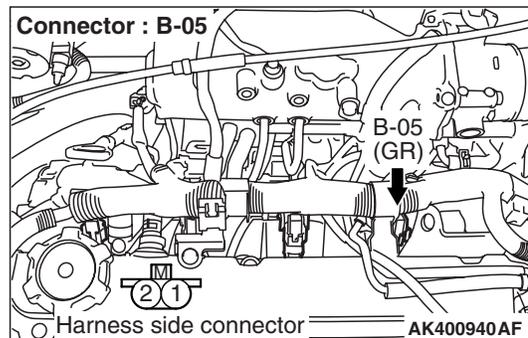
- Check No. 4 Injector (Refer to P.13B-400) itself.

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.

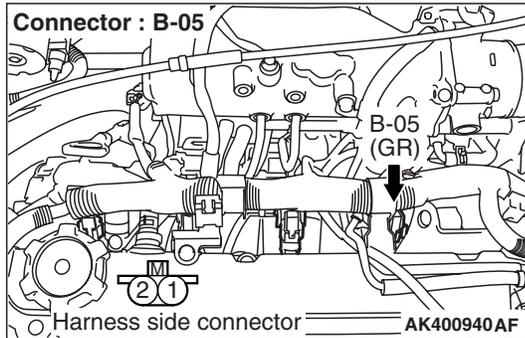
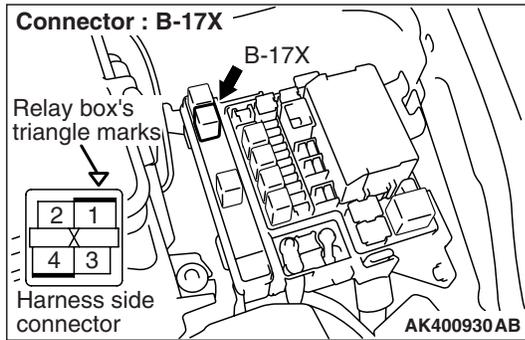
OK: System voltage

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



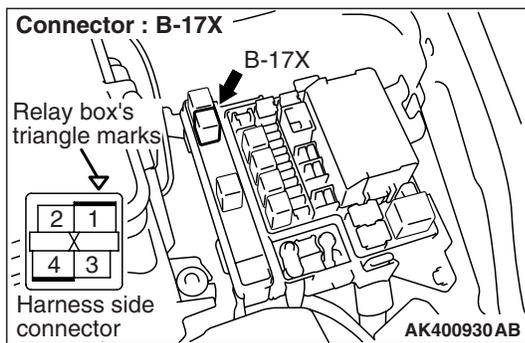
Q: Is the check result normal?

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 or replace.

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

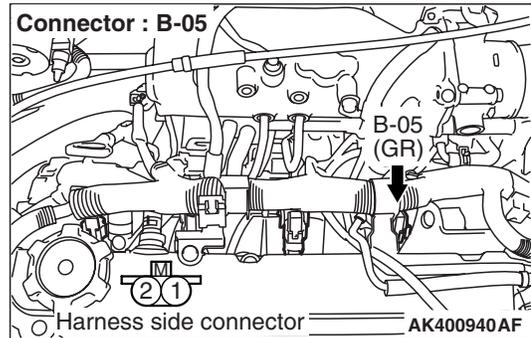
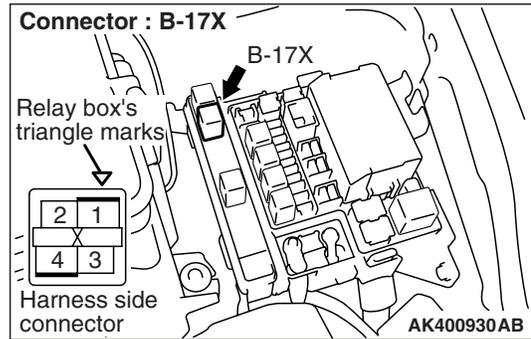


Q: Is the check result normal?

YES : Go to Step 7.

NO : Repair or replace.

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



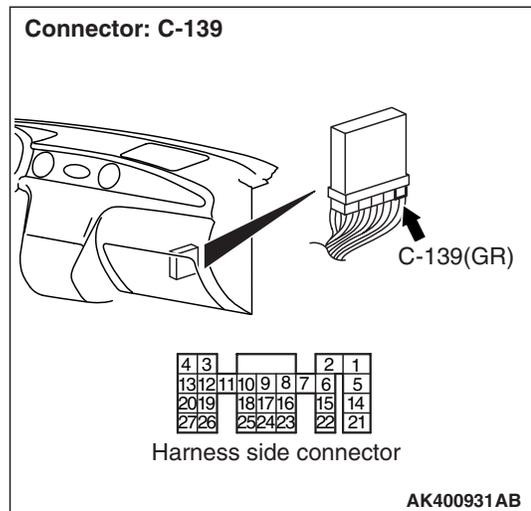
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Connector check: C-139 engine-ECU connector

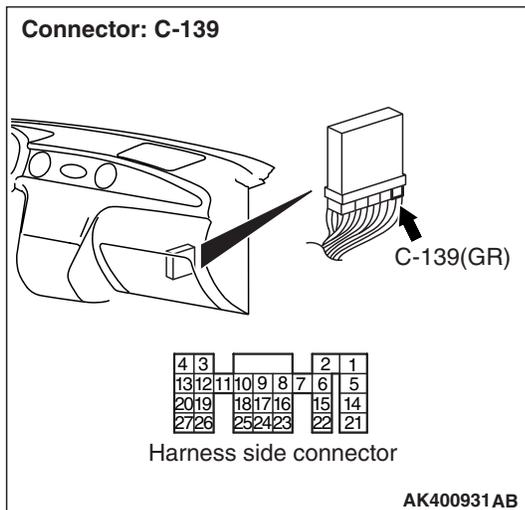
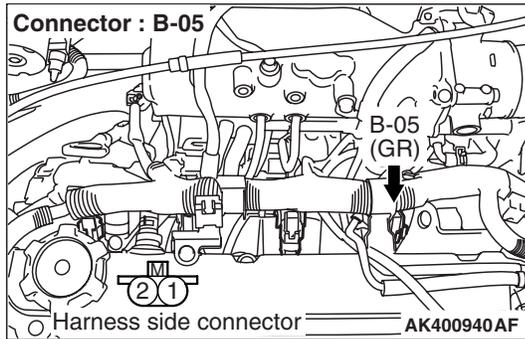


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-139 (terminal No. 21) engine-ECU connector.



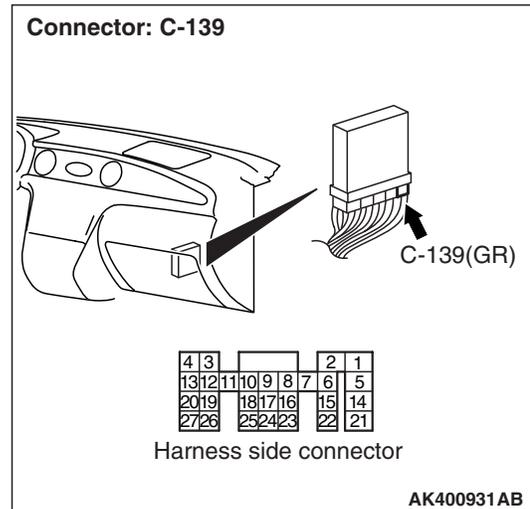
- Check output line for open/short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Perform signal wave pattern measurement at C-139 engine-ECU connector (Using an oscilloscope).



- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 21 and earth.

OK: Waveform should be display on Inspection procedure using an oscilloscope (Refer to P.13B-383).

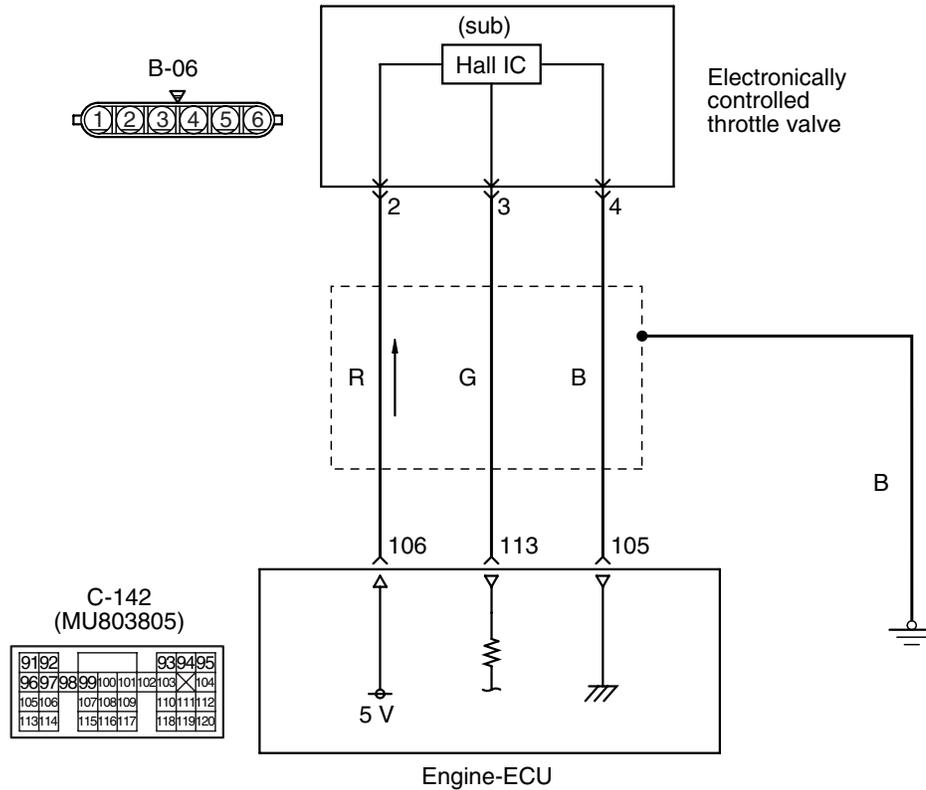
Q: Is the check result normal?

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

NO : Replace engine-ECU.

Code No. 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

AK304122AE

OPERATION

- A power voltage of 5 V is applied to the electronically controlled throttle valve (terminal No. 2) from the engine-ECU (terminal No. 106).
- The power voltage is earthed to the engine-ECU (terminal No. 105) from the electronically controlled throttle valve (terminal No. 4).
- The sensor signal is inputted to the engine-ECU (terminal No. 113) from the electronically controlled throttle valve output terminal (terminal No. 3).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the Engine-ECU.
- The Engine-ECU 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

DIAGNOSIS PROCEDURE

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

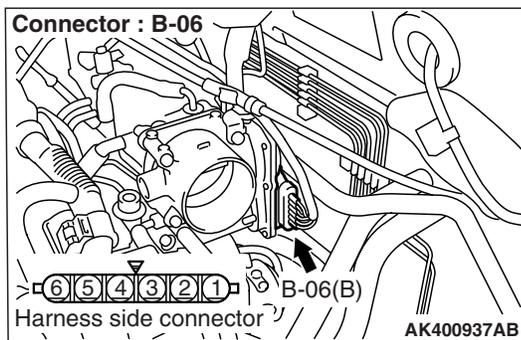
- Refer to Data list reference table P.13B-368.
 - Item 14: Throttle position sensor (sub)

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

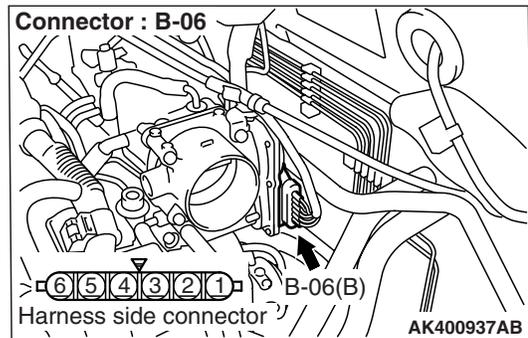


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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. 2 and earth.

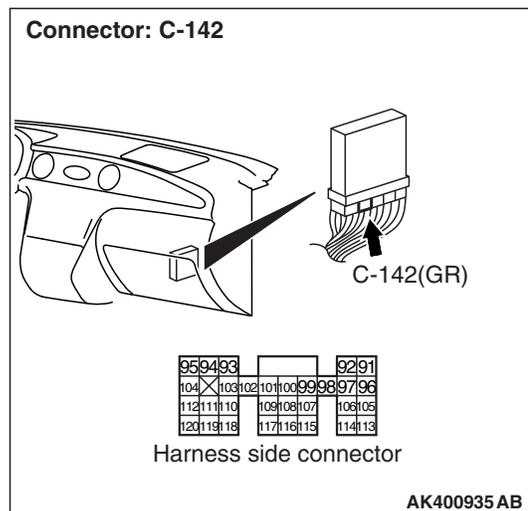
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU connector

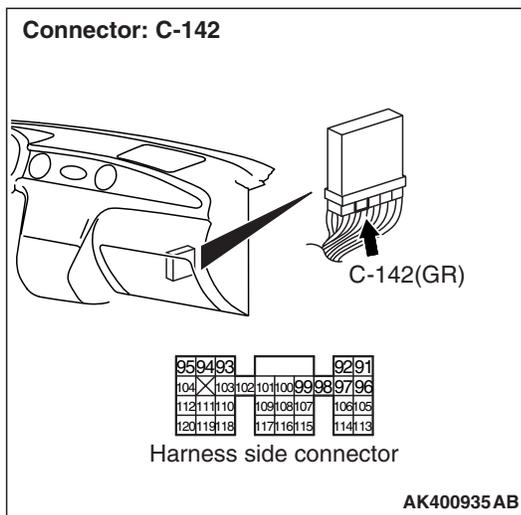
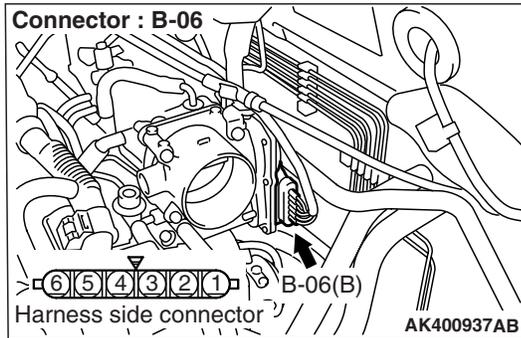


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-142 (terminal No. 106) engine-ECU connector.



- Check power supply line for open/short circuit.

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

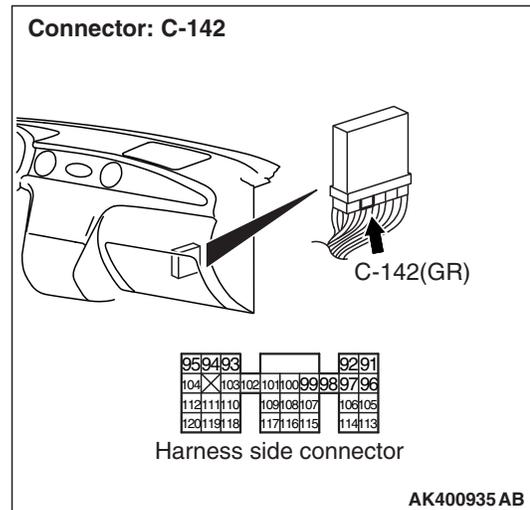
STEP 6. M.U.T.-II/III data list

- Refer to Data List Reference Table P.13B-368.
 - 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.

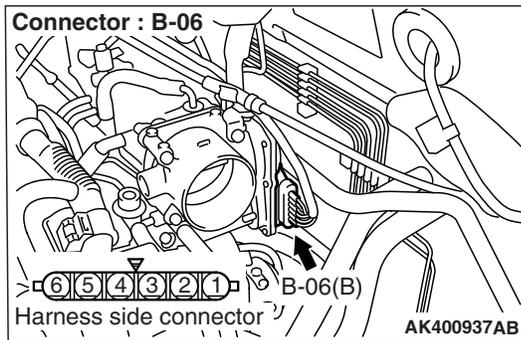
STEP 7. Connector check: C-142 engine-ECU connector



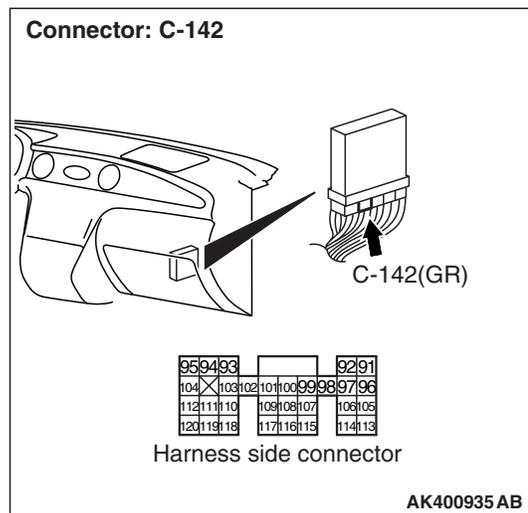
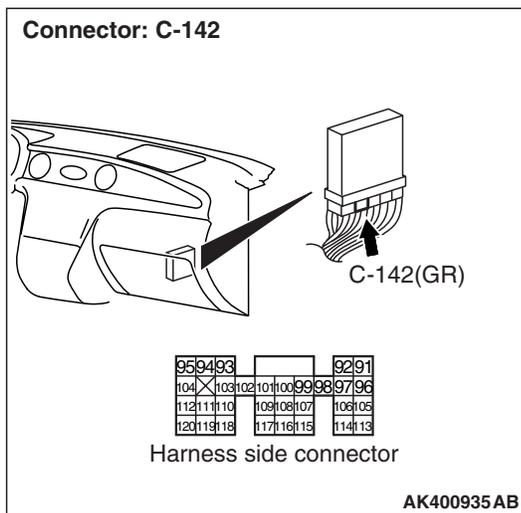
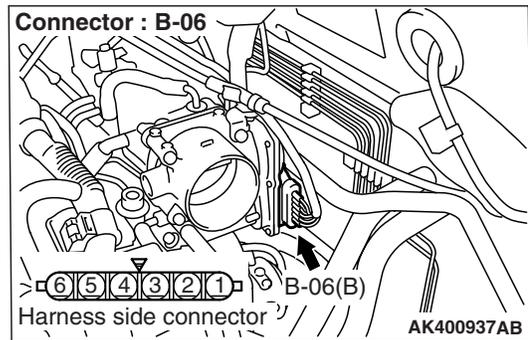
Q: Is the check result normal?

YES : Go to Step 8 .
NO : Repair or replace.

STEP 8. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-142 (terminal No. 106) engine-ECU connector.



STEP 9. Check harness between B-06 (terminal No. 3) electronically controlled throttle valve connector and C-142 (terminal No. 113) engine-ECU 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.

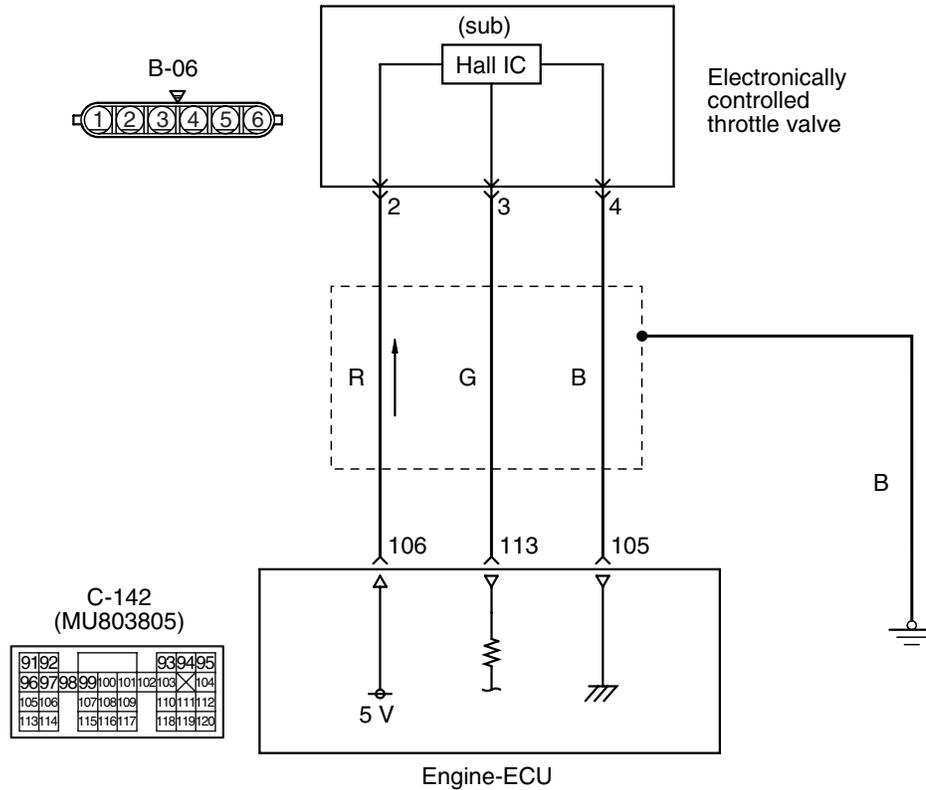
Q: Is the check result normal?

YES : Check end.

NO : Replace engine-ECU.

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

AK304122AE

OPERATION

- A power voltage of 5 V is applied to the electronically controlled throttle valve (terminal No. 2) from the engine-ECU (terminal No. 106).
- The power voltage is earthed to the engine-ECU (terminal No. 105) from the electronically controlled throttle valve (terminal No. 4).
- The sensor signal is inputted to the engine-ECU (terminal No. 113) from the electronically controlled throttle valve output terminal (terminal No. 3).

FUNCTION

- The throttle position sensor converts the throttle valve position into voltage and inputs it into the Engine-ECU.
- The Engine-ECU 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

DIAGNOSIS PROCEDURE

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

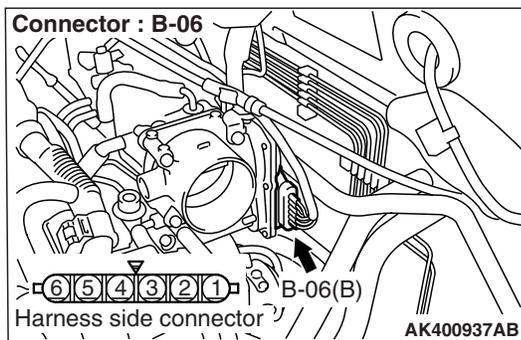
- Refer to Data List Reference Table P.13B-368.
 - Item 14: Throttle position sensor (sub)

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

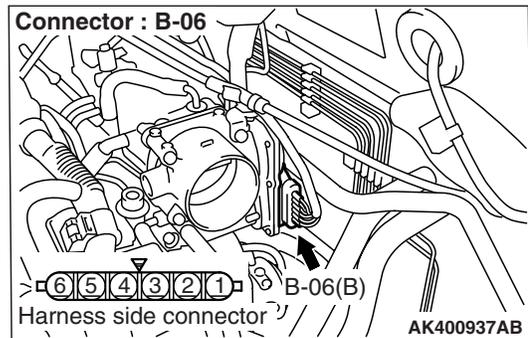


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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



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

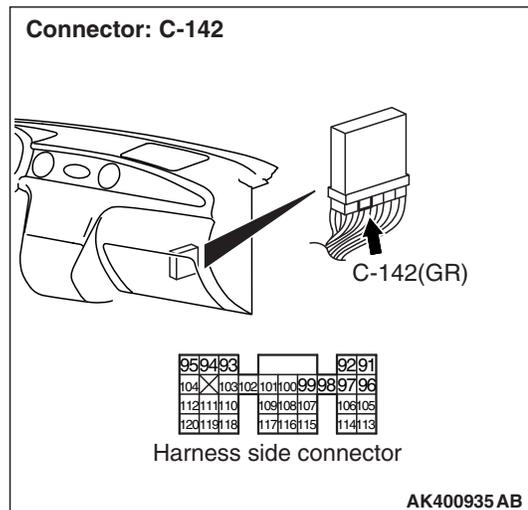
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU connector

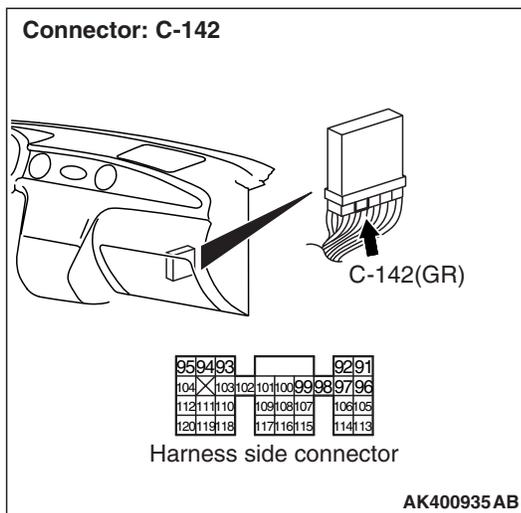
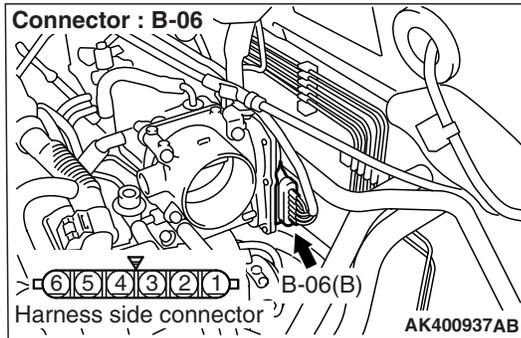


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check harness between B-06 (terminal No. 2) electronically controlled throttle valve connector and C-142 (terminal No. 105) engine-ECU connector.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Repair.

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

- Refer to Data List Reference Table [P.13B-368](#).
a. Item 14: Throttle position sensor (sub)

Q: Is the check result normal?

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

STEP 7. Replace the electronically controlled throttle valve

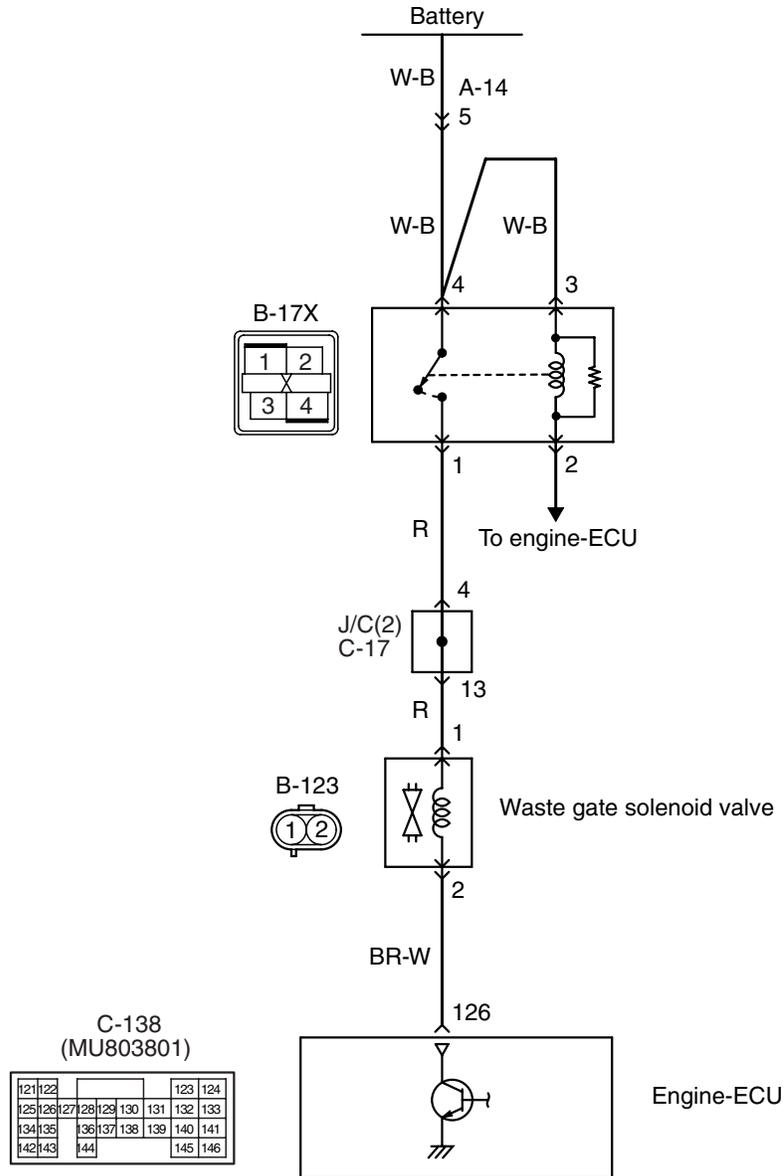
- After replacing the electronically controlled throttle valve, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Check end.
NO : Replace engine-ECU.

Code No. P0243: Waste Gate Solenoid Valve System

Waste gate 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

AK400810AB

OPERATION

- Power is supplied from the engine control relay (terminal No. 1) to the waste gate solenoid valve (terminal No. 1).
- The engine-ECU (terminal No. 126) causes the power transistor in the unit to be ON to supply power to the waste gate solenoid valve (terminal No. 2).

FUNCTION

- In response to a signal from the engine-ECU, the waste gate solenoid valve controls the turbo charge pressure to be introduced into the waste gate actuator of the turbo charger.

TROUBLE JUDGMENT**Check Condition**

- Battery voltage is 10 V or more.

Judgment Criterion

- Surge voltage cannot be detected within 1 seconds from the time when the waste gate solenoid valve has changed from ON to OFF.

PROBABLE CAUSE

- Failed waste gate solenoid valve
- Open/short circuit in waste gate solenoid valve sensor circuit or loose connector contact
- Failed engine-ECU

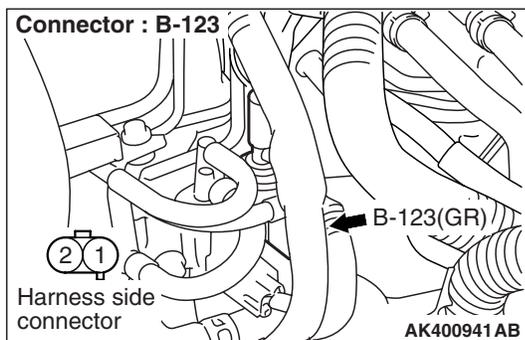
DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-II/III actuator test**

- Item 12: Waste gate solenoid valve
OK: Operating sound can be heard and the valve vibrates.

Q: Is the check result normal?

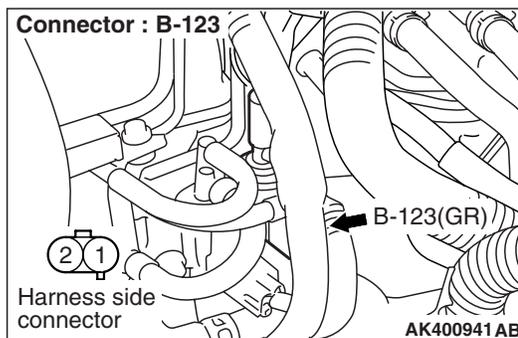
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

NO : Go to Step 2 .

STEP 2. Connector check: B-123 waste gate solenoid valve connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair or replace.

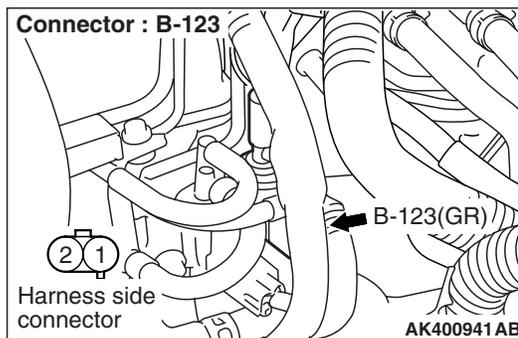
STEP 3. Perform resistance measurement at B-123 waste gate solenoid valve connector.

- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.
OK: 29 – 35 Ω (at 20°C)

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace waste gate solenoid valve.

STEP 4. Perform voltage measurement at B-123 waste gate solenoid valve connector.

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

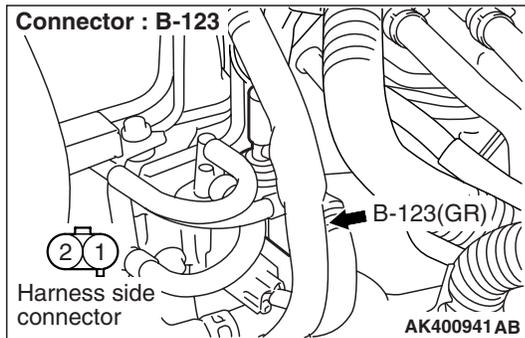
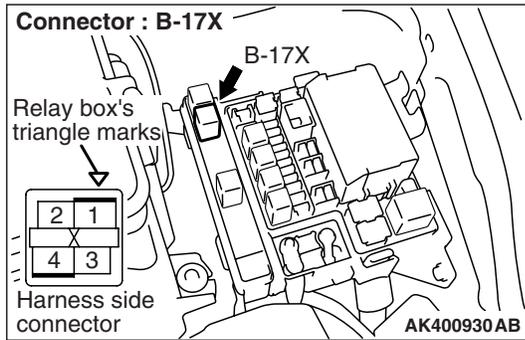
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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



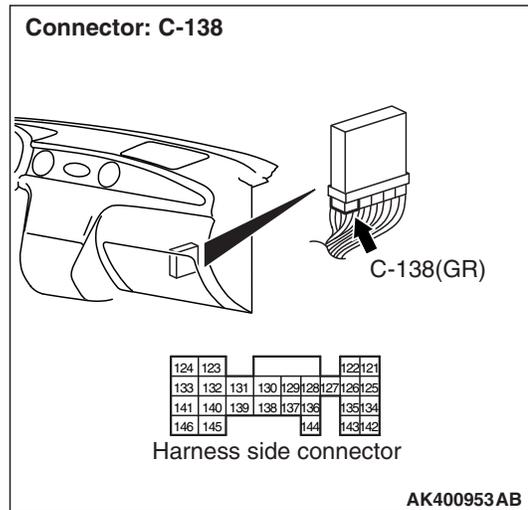
Q: Is the check result normal?

YES : Check intermediate connector C-17, and repair if necessary. If intermediate connector are normal, check and repair harness between B-123 (terminal No. 1) waste gate solenoid valve connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 6. Perform voltage measurement at C-138 engine-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 126 and earth.

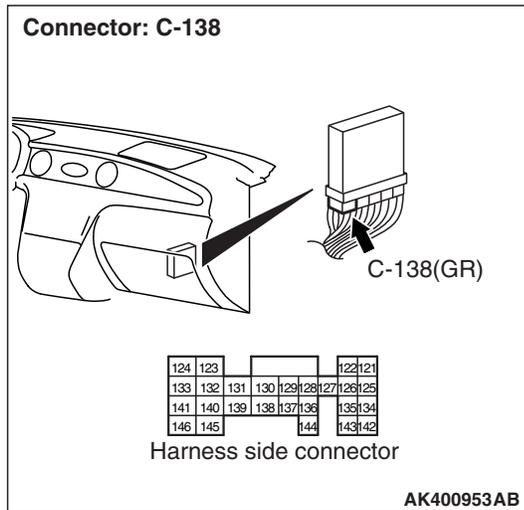
OK: System voltage

Q: Is the check result normal?

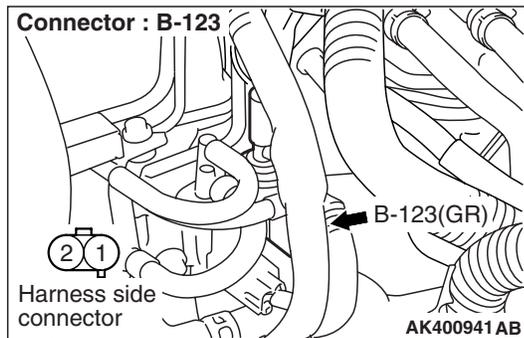
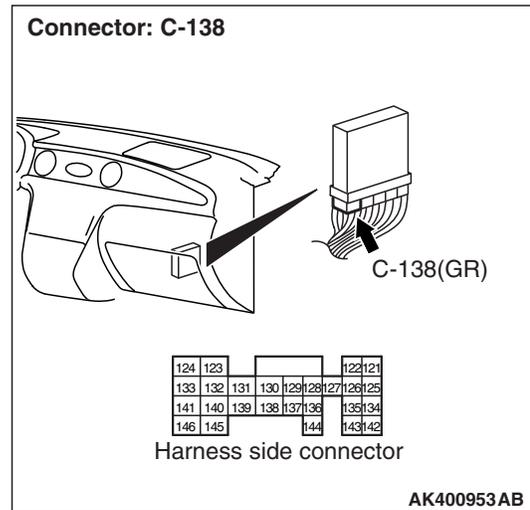
YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Connector check: C-138 engine-ECU connector



STEP 8. Connector check: C-138 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

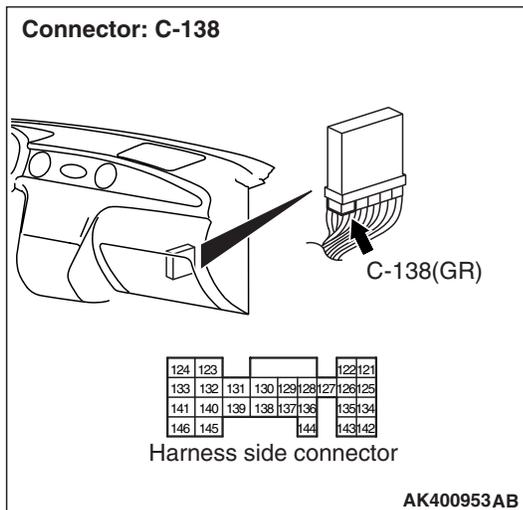
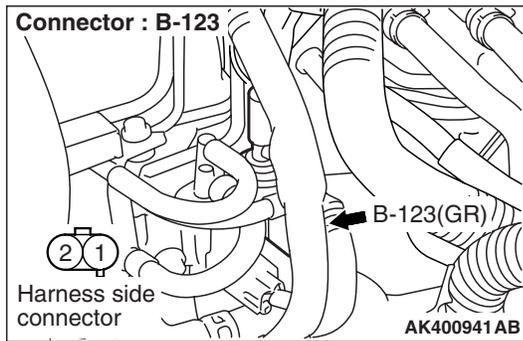
Q: Is the check result normal?

YES : Check and repair harness between B-123 (terminal No. 2) waste gate solenoid valve connector and C-138 (terminal No. 126) engine-ECU connector.

- Check output line for open/short circuit.

NO : Repair or replace.

STEP 9. Check harness between B-123 (terminal No. 2) waste gate solenoid valve connector and C-138 (terminal No. 126) engine-ECU connector.



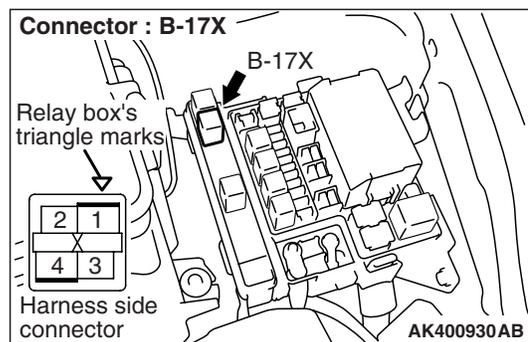
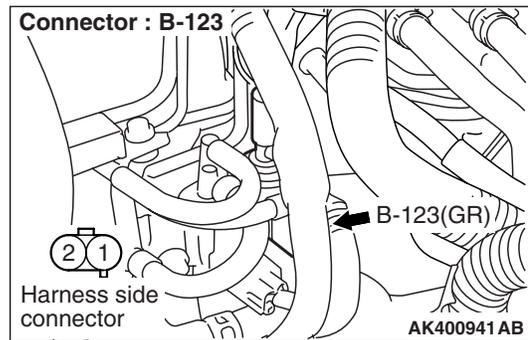
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

STEP 10. Check harness between B-123 (terminal No. 1) waste gate solenoid 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 11 .

NO : Repair.

STEP 11. M.U.T.-II/III actuator test

- Item 12: Waste gate solenoid valve

OK: Operating sound can be heard and the valve vibrates.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use

Troubleshooting/Inspection Service Points

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

NO : Replace engine-ECU.

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

- Refer to P0201 injector circuit [P.13B-100](#).
- Refer to P0202 injector circuit [P.13B-104](#).
- Refer to P0203 injector circuit [P.13B-108](#).
- Refer to P0204 injector circuit [P.13B-112](#).

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

- The engine speed is 500 – 6,500 r/min.
- The engine coolant temperature is –10°C or higher.
- The intake air temperature is –10°C or higher.
- The barometric pressure is 76 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of –0.06 V/10ms to 0.06 V/10ms.

Judgment Criteria

- Misfire has occurred more frequently than allowed during the last 200 revolutions (When the catalyst temperature is higher than 950°C).

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard).

PROBABLE CAUSE

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

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

- Item 22: Crank angle sensor

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

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check crank angle sensor system (Refer to Code No. P0335 [P.13B-145](#)).

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

- Refer to Data list reference table [P.13B-368](#).
 - 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 Codes [P.13B-20](#)).

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

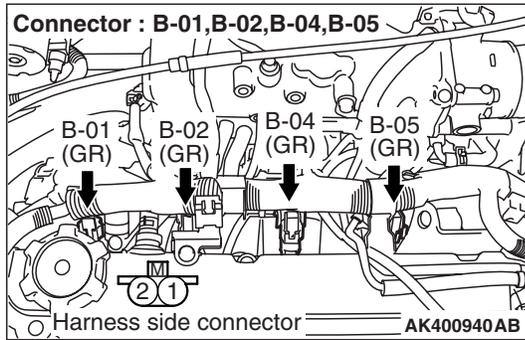
- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check ignition circuit system (Refer to Inspection procedure 30 [P.13B-355](#)).

STEP 4.Connector check: Injector connector



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

Q: Are the check results normal?

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

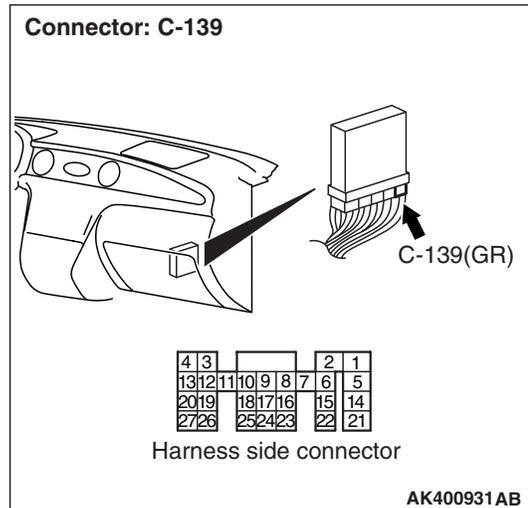
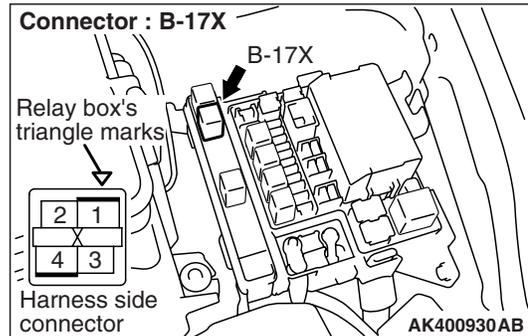
STEP 5.Check injector itself.

- Check Injector itself (Refer to [P.13B-400](#)).

Q: Is the check result normal?

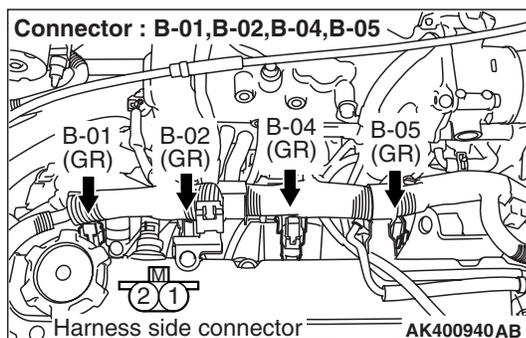
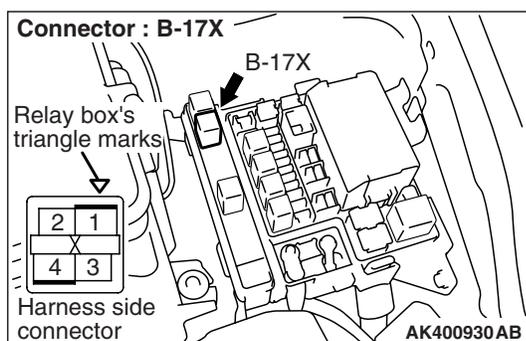
- YES :** Go to Step 6 .
NO : Replace injector.

STEP 6.Connector check: B-17X engine control relay connector and B-139 engine-ECU connector



Q: Is the check result normal?

- YES :** Go to Step 7 .
NO : Repair or replace.

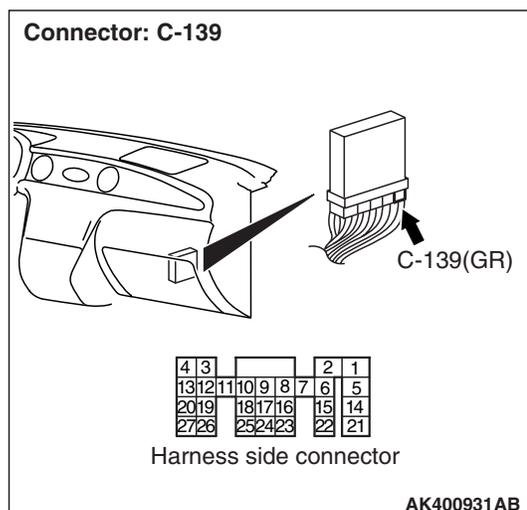
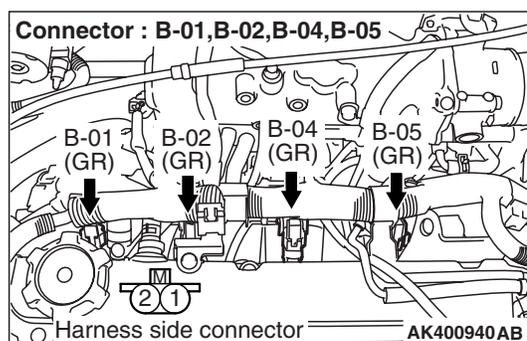
STEP 7. Check harness between B-17X engine control relay connector and injector connector.

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

Q: Are the check results normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Check harness between injector connector and C-139 engine-ECU connector.

- Check harness between B-01 (terminal No. 2) No. 1 injector connector and C-139 (terminal No. 1) engine-ECU connector.
- Check harness between B-02 (terminal No. 2) No. 2 injector connector and C-139 (terminal No. 5) engine-ECU connector.
- Check harness between B-04 (terminal No. 2) No. 3 injector connector and C-139 (terminal No. 14) engine-ECU connector.
- Check harness between B-05 (terminal No. 2) No. 4 injector connector and C-139 (terminal No. 21) engine-ECU connector.
 - Check output line for damage.

Q: Are the check results normal?

YES : Go to Step 9 .

NO : Repair.

STEP 9. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test [P.13B-391](#))

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

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

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

STEP 11. Check for skipped timing belt teeth.

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

STEP 12. Exhaust gas recirculation system check.

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

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

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

OPERATION

- Refer to P0201 injector circuit P.13B-100.

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- The engine speed is 500 – 6,500 r/min.
- The engine coolant temperature is –10°C or higher.
- The intake air temperature is –10°C or higher.
- The barometric pressure is 76 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of –0.06 V/10ms to 0.06 V/10ms.

Judgment Criterion

- Misfire has occurred more frequently than allowed during the last 200 revolutions (When the catalyst temperature is higher than 950°C).

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard).

PROBABLE CAUSE

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

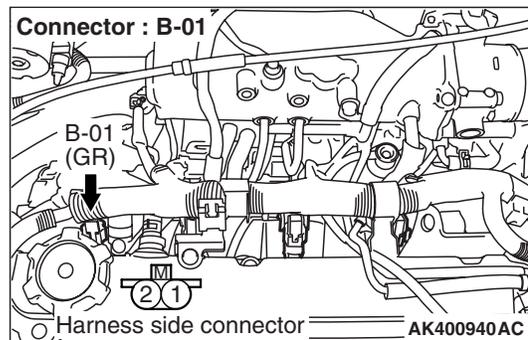
DIAGNOSIS PROCEDURE

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

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

- Q: Is the check result normal?**
YES : Go to Step 2 .
NO : Check ignition Circuit System (Refer to Inspection procedure 30 P.13B-355)

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



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

STEP 3. Check No.1 injector itself.

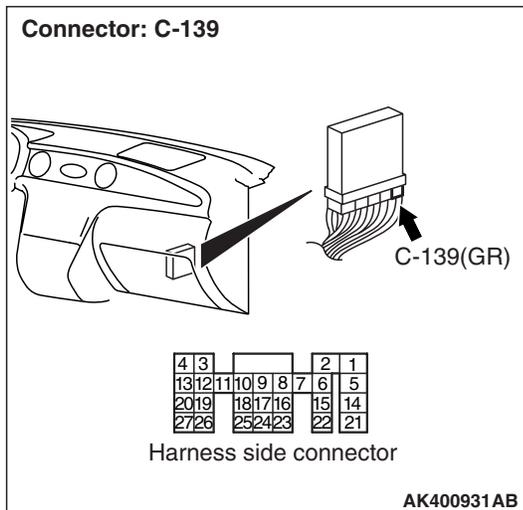
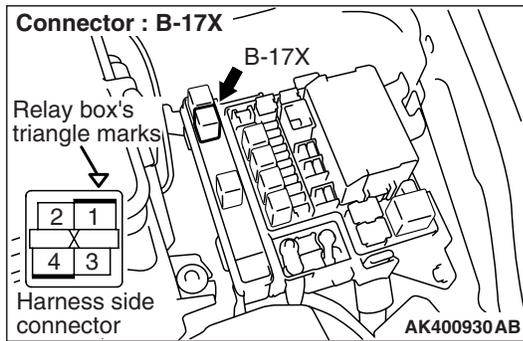
- Check Injector itself (Refer to P.13B-400).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No.1 injector.

STEP 4. Connector check: B-17X engine control relay connector and C-139 engine-ECU connector

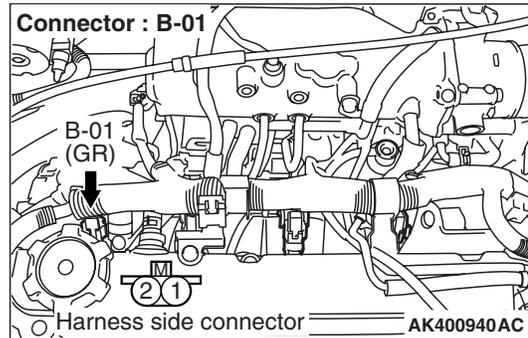
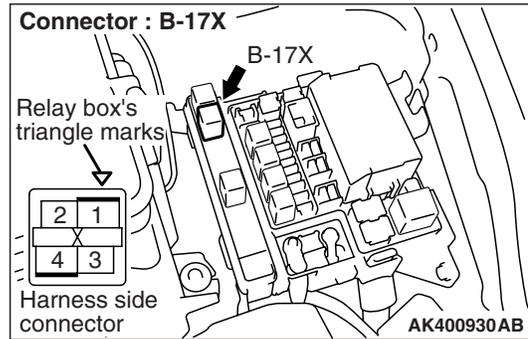


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

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



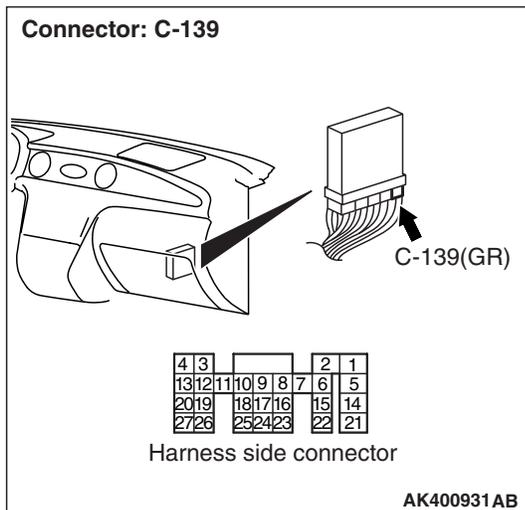
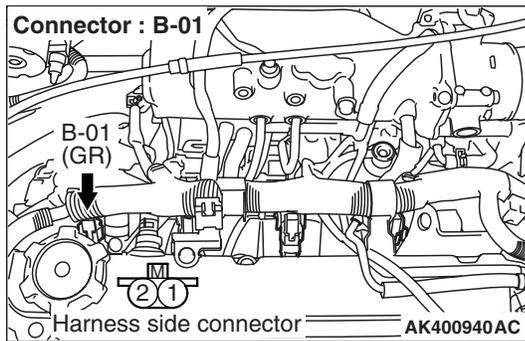
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-01 (terminal No. 2) No.1 injector connector and C-139 (terminal No. 1) engine-ECU connector



- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test P.13B-391).

Q: Is the check result normal?

YES : Replace engine-ECU.

NO : Repair.

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

OPERATION

- Refer to P0202 injector circuit P.13B-104.

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- The engine speed is 500 – 6,500 r/min.
- The engine coolant temperature is –10°C or higher.

- The intake air temperature is –10°C or higher.
- The barometric pressure is 76 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of –0.06 V/10ms to 0.06 V/10ms.

Judgment Criterion

- Misfire has occurred more frequently than allowed during the last 200 revolutions (When the catalyst temperature is higher than 950°C).

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard).

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

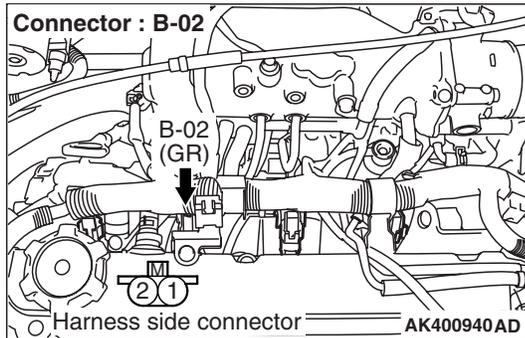
- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-41)

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition circuit system (Refer to Inspection procedure 30 P.13B-355).

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Check No.2 injector itself.

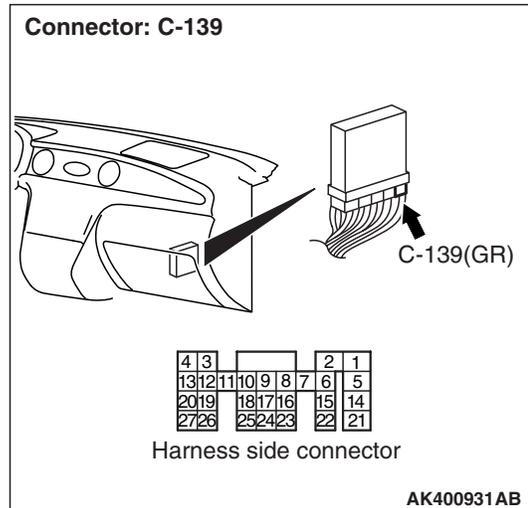
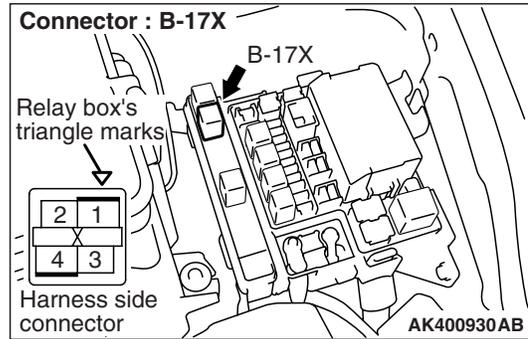
- Check Injector itself (Refer to P.13B-400).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No.2 injector.

STEP 4. Connector check: B-17X engine control relay connector and C-139 engine-ECU connector

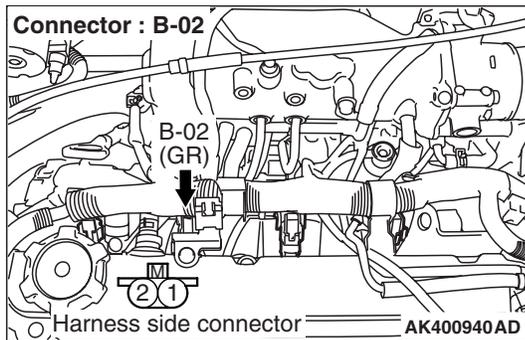
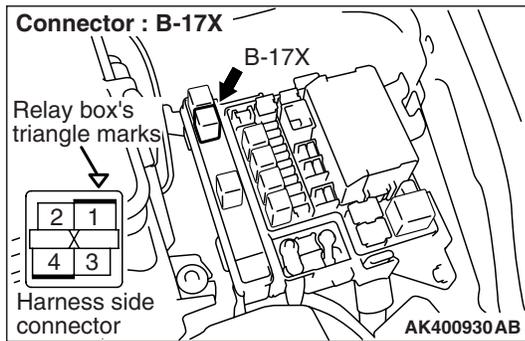


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

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



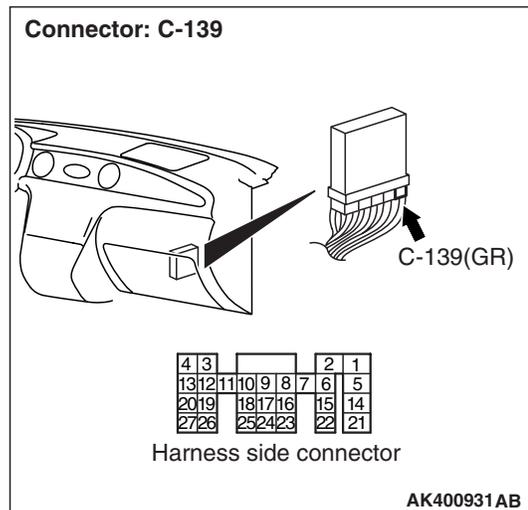
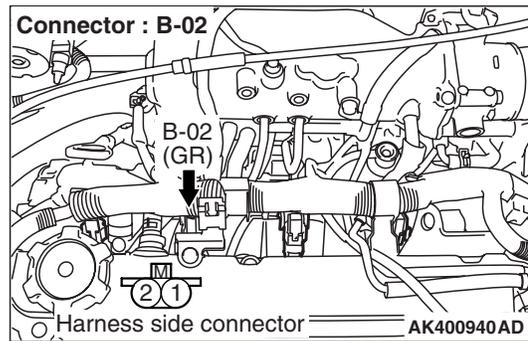
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-02 (terminal No. 2) No.2 injector connector and C-139 (terminal No. 5) engine-ECU connector



- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test [P.13B-391](#))

Q: Is the check result normal?

YES : Replace engine-ECU.

NO : Repair.

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

- Refer to P0203 injector circuit [P.13B-108](#).

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

- The engine speed is 500 – 6,500 r/min.
- The engine coolant temperature is -10°C or higher.
- The intake air temperature is -10°C or higher.
- The barometric pressure is 76 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of $-0.06\text{ V}/10\text{ms}$ to $0.06\text{ V}/10\text{ms}$.

Judgment Criterion

- Misfire has occurred more frequently than allowed during the last 200 revolutions (When the catalyst temperature is higher than 950°C).

or

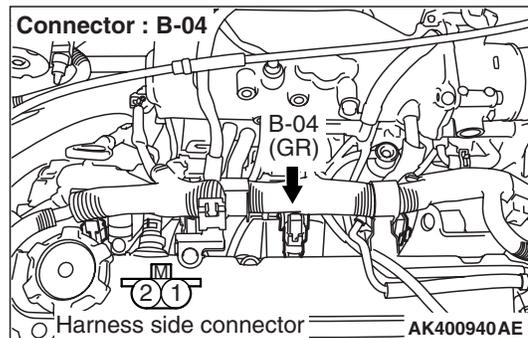
- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard).

PROBABLE CAUSE

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

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

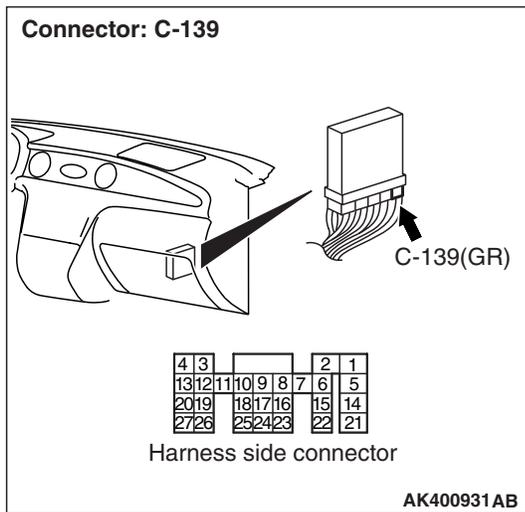
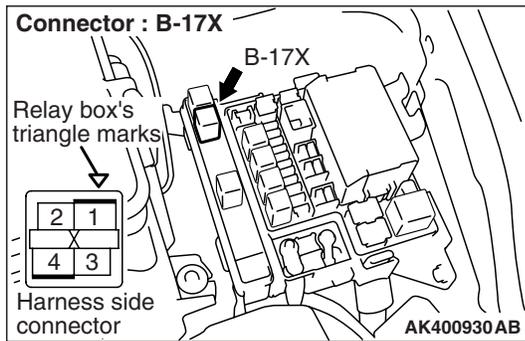
- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-41](#))

Q: Is the check result normal?**YES :** Go to Step 2 .**NO :** Check ignition circuit system (Refer to Inspection procedure 30 [P.13B-355](#)).**STEP 2. Connector check: B-04 No.3 injector connector****Q: Is the check result normal?****YES :** Go to Step 3 .**NO :** Repair or replace.**STEP 3. Check No.3 injector itself.**

- Check Injector itself (Refer to [P.13B-400](#)).

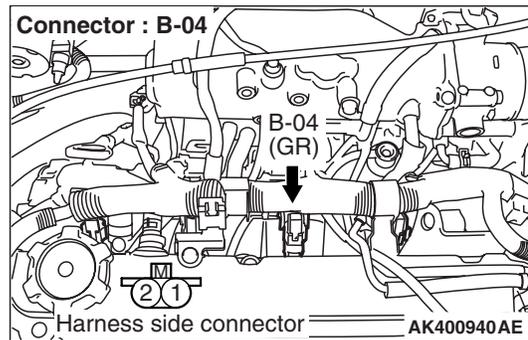
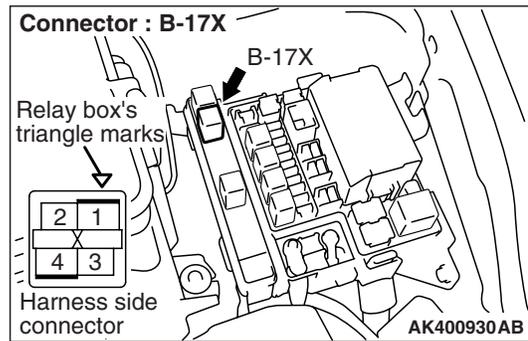
Q: Is the check result normal?**YES :** Go to Step 4 .**NO :** Replace No.3 injector.

STEP 4. Connector check: B-17X engine control relay connector and C-139 engine-ECU connector



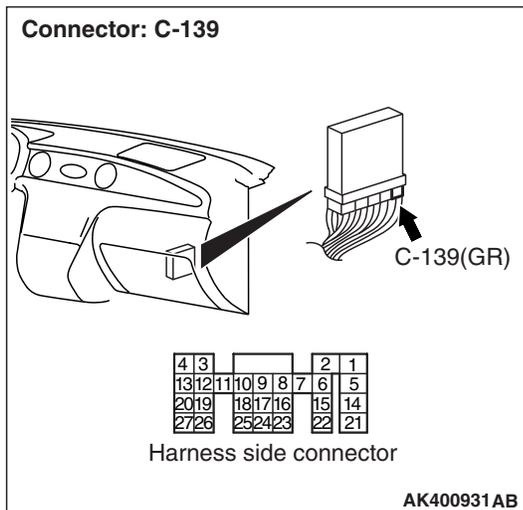
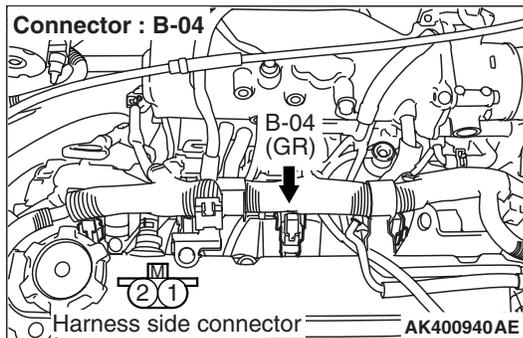
Q: Is the check result normal?
YES : Go to Step 5 .
NO : Repair or replace.

STEP 5. Check harness between B-17X (terminal No. 1) engine control relay connector and B-04 (terminal No. 1) No.3 injector connector.



- Check power supply line for damage.

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

STEP 6. Check harness between B-04 (terminal No. 2) No.3 injector connector and C-139 (terminal No. 14) engine-ECU connector

- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test [P.13B-391](#))

Q: Is the check result normal?

YES : Replace engine-ECU.

NO : Repair.

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

- Refer to P0204 injector circuit [P.13B-112](#).

FUNCTION

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

TROUBLE JUDGMENT**Check Conditions**

- The engine speed is 500 – 6,500 r/min.
- The engine coolant temperature is -10°C or higher.

- The intake air temperature is -10°C or higher.
- The barometric pressure is 76 kPa or more.
- The volumetric efficiency is 30 – 55%.
- The adaptive learning has been completed with the vane that generates the crankshaft position signals.
- During the engine operation except the shift change or low speed driving and rapid acceleration and deceleration, also intermittent operation of air compressor (A/C: within the 3 seconds after changing to ON from OFF or to OFF from ON).
- The throttle deviation is within the range of -0.06 V/10ms to 0.06 V/10ms.

Judgment Criterion

- Misfire has occurred more frequently than allowed during the last 200 revolutions (When the catalyst temperature is higher than 950°C).

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard).

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

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

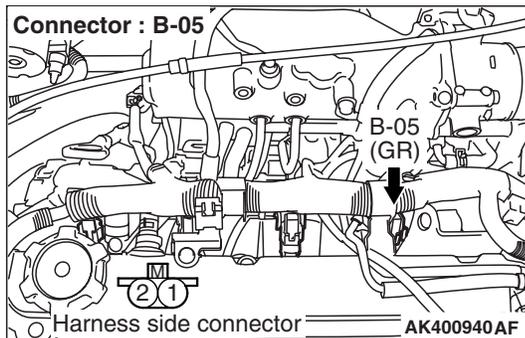
- Check ignition secondary voltage waveform (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-41)

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check ignition Circuit System (Refer to Inspection procedure 30 P.13B-355).

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



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Check No.4 injector itself.

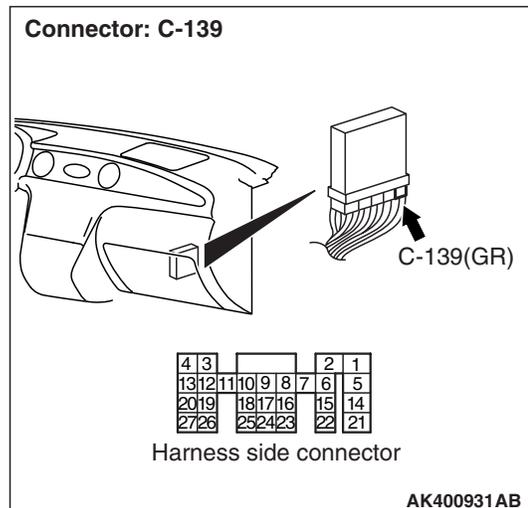
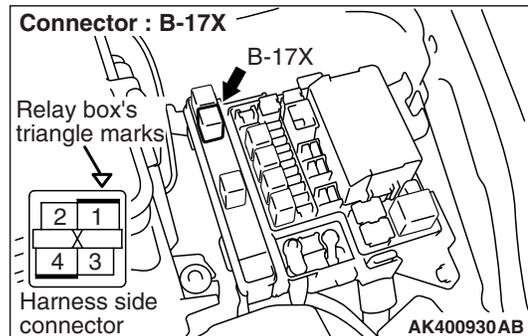
- Check Injector itself (Refer to P.13B-400).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace No.4 injector.

STEP 4. Connector check: B-17X engine control relay connector and C-139 engine-ECU connector

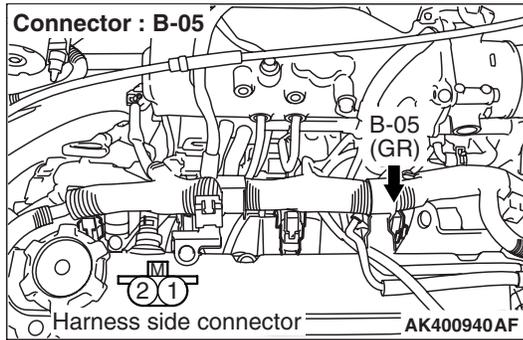
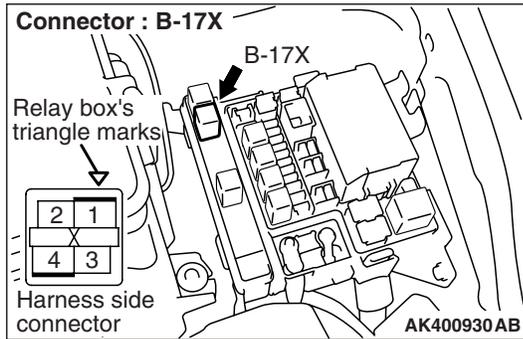


Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

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



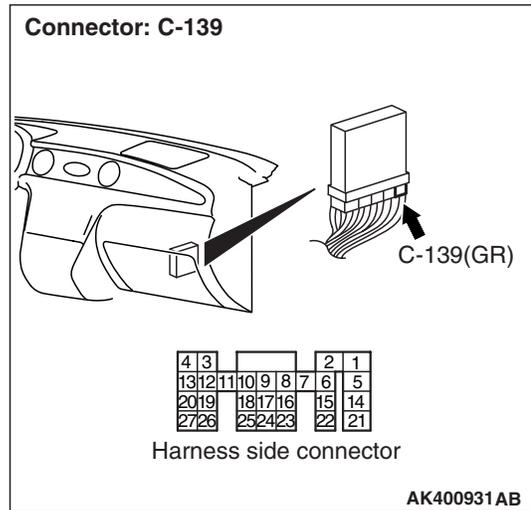
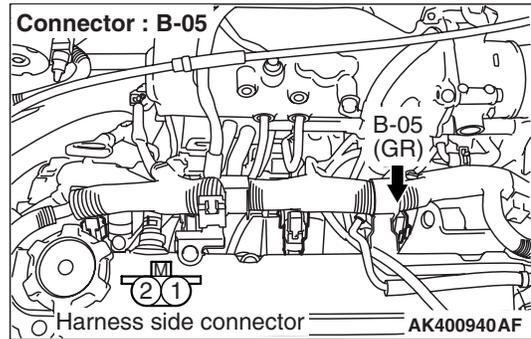
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check harness between B-05 (terminal No. 2) No.4 injector connector and C-139 (terminal No. 21) engine-ECU connector.



- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7. Fuel pressure measurement.

- Fuel pressure measurement (Refer to fuel pressure test [P.13B-391](#))

Q: Is the check result normal?

YES : Replace engine-ECU.

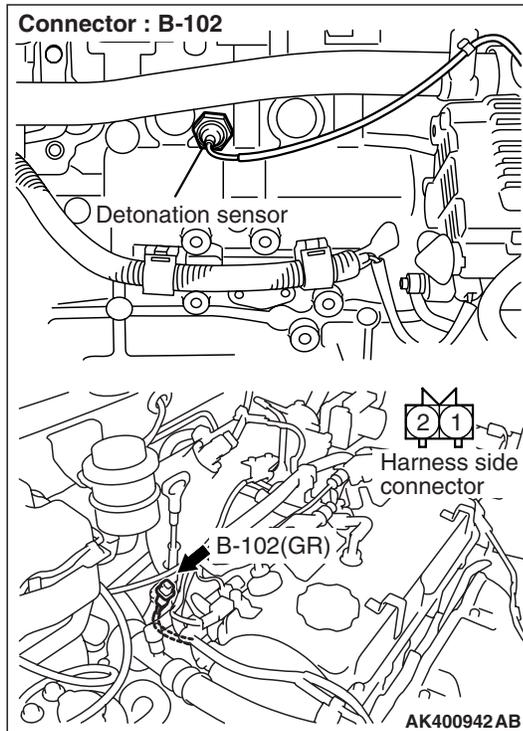
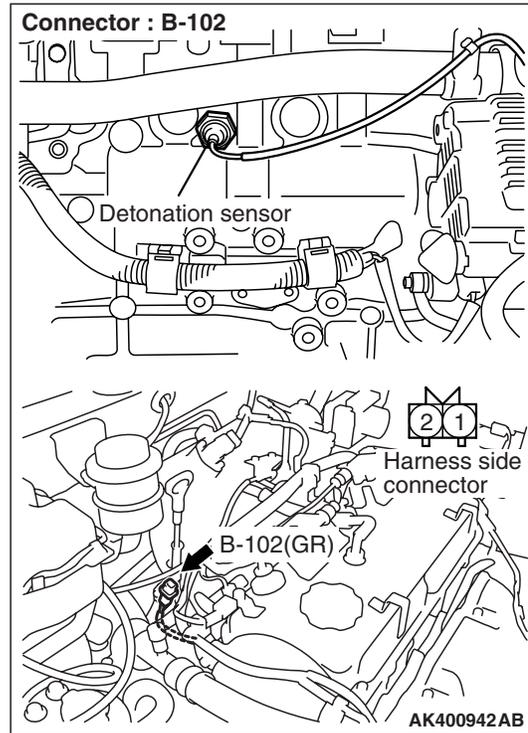
NO : Repair.

Judgment Criterion

- The change amount of the detonation sensor output voltage (the detonation sensor peak voltage in every half a turn of the crankshaft) is below 0.06 V or less in 200 consecutive times.

PROBABLE CAUSE

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

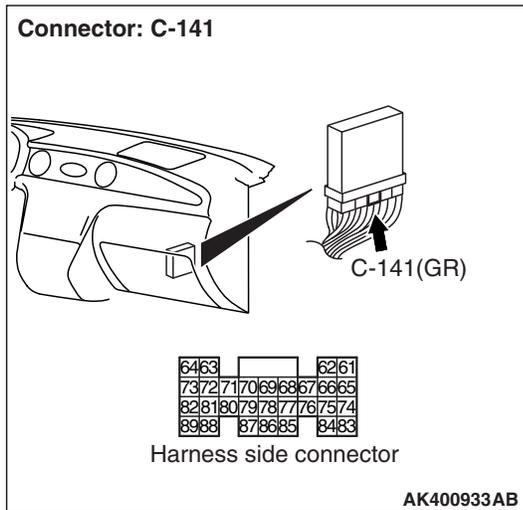
DIAGNOSIS PROCEDURE**STEP 1. Connector check: B-102 detonation sensor connector****Q: Is the check result normal?****YES :** Go to Step 2 .**NO :** Repair or replace.**STEP 2. Perform resistance measurement at B-102 detonation sensor connector.**

- 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.

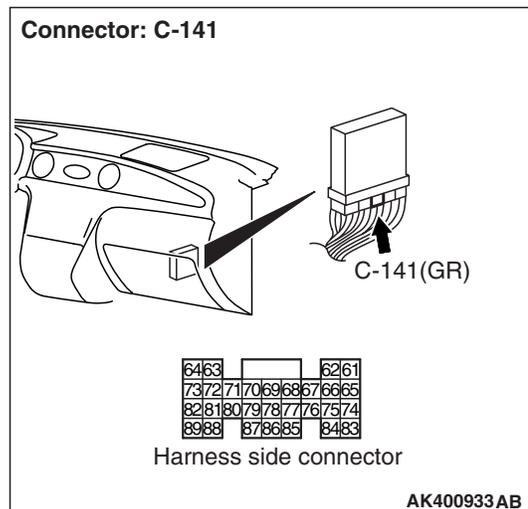
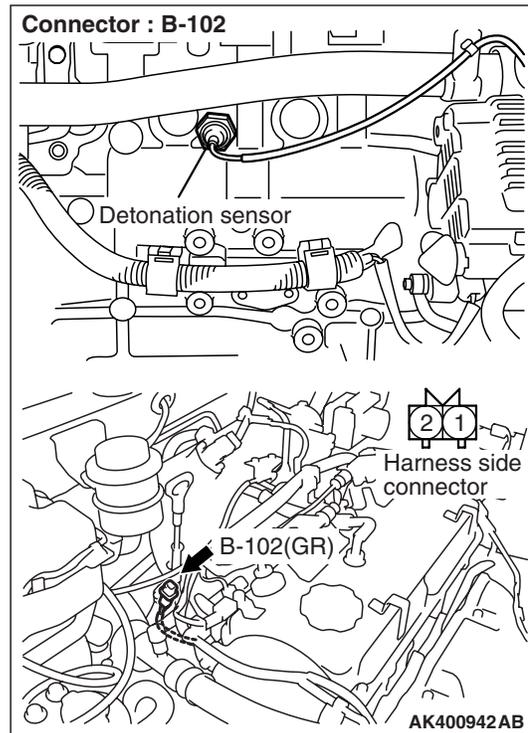
- Check earthing line for open circuit and damage.

STEP 3. Connector check: C-141 engine-ECU connector



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

STEP 4. Check harness between B-102 (terminal No. 1) detonation sensor connector and C-141 (terminal No. 89) engine-ECU connector.



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

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

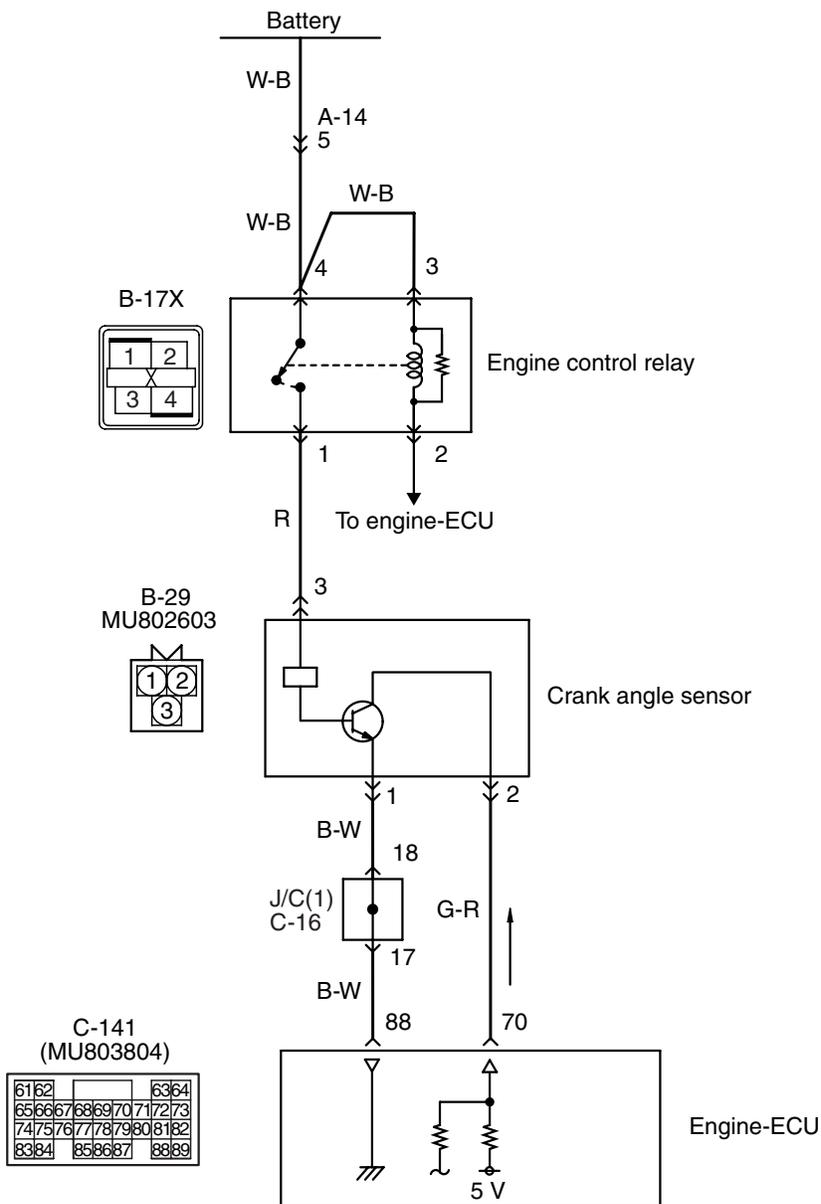
STEP 5. Check the trouble symptoms.**Q: Does trouble symptom persist?****YES :** Go to Step 6 .**NO :** Intermittent malfunction (Refer to GROUP
00 – How to Use
Troubleshooting/Inspection Service Points
[P.00-6](#)).**STEP 6. Replace detonation sensor.**

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

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

Code No. P0335: Crank Angle Sensor System

Crank angle sensor circuit



Wire colour code

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

OPERATION

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

FUNCTION

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

TROUBLE JUDGMENT**Check Condition**

- Engine in cranking state.

Judgment Criterion

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

PROBABLE CAUSE

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

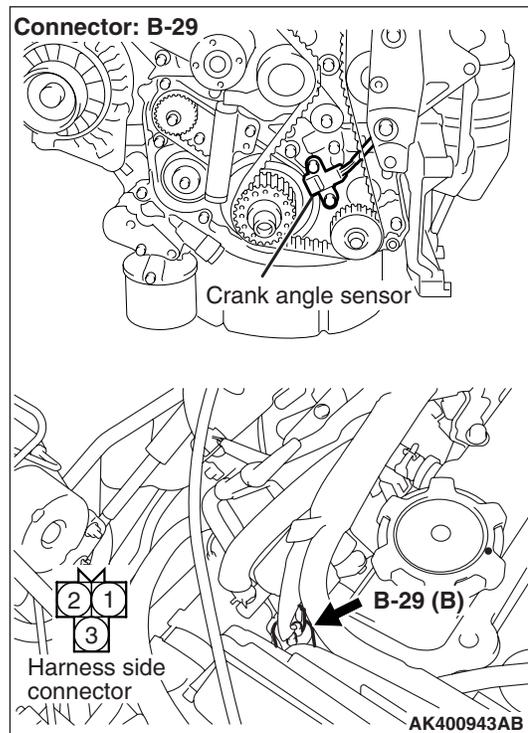
DIAGNOSIS PROCEDURE**STEP 1. M.U.T.-II/III data list**

- Refer to Data List Reference Table [P.13B-368](#).
 - Item 22: Crank angle sensor

Q: Is the check result normal?

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

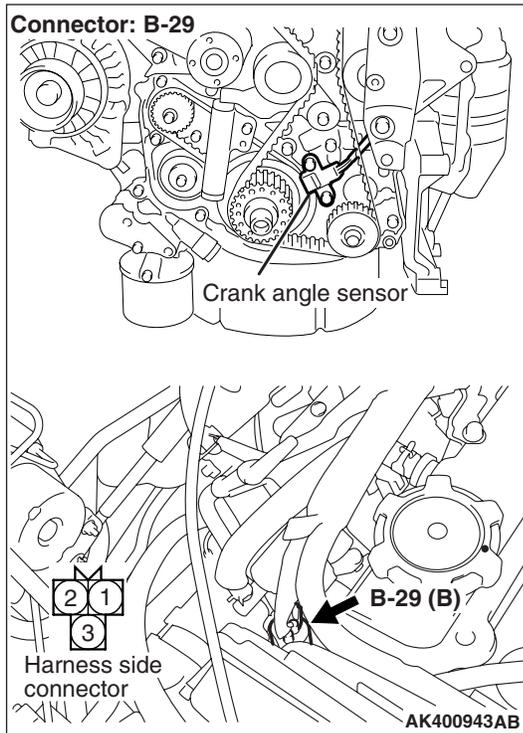
NO : Go to Step 2 .

STEP 2. Connector check: B-29 crank angle sensor connector**Q: Is the check result normal?**

YES : Go to Step 3 .

NO : Repair or replace.

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



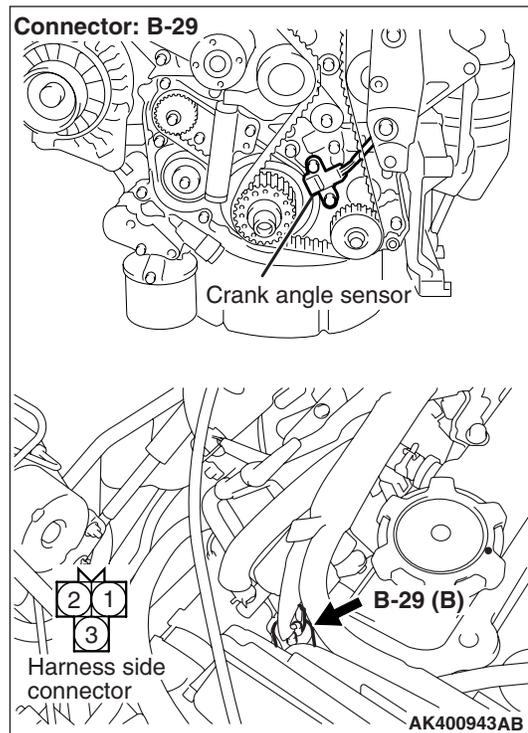
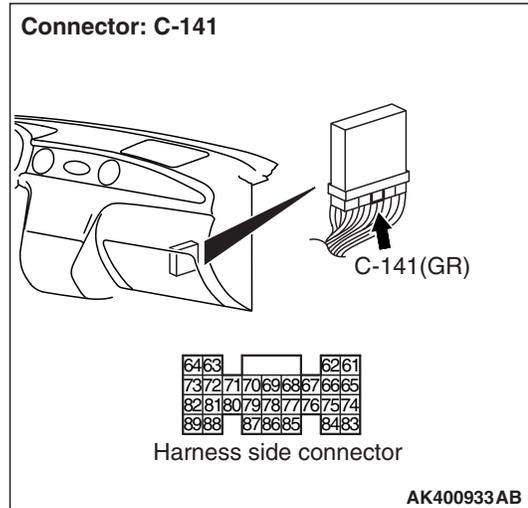
- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 2 and earth.
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 4 .

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



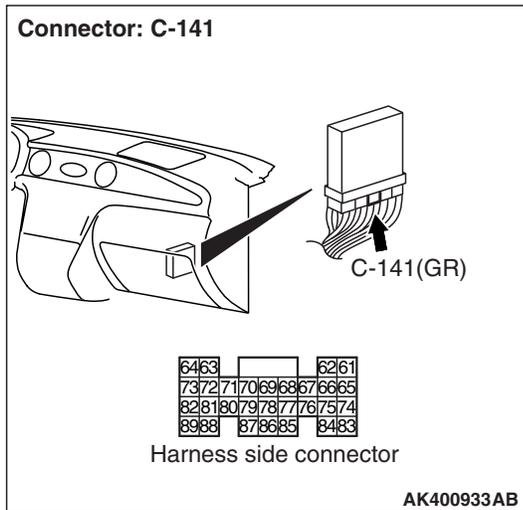
- Measure engine-ECU terminal voltage.
- Disconnect B-29 crank angle sensor connector.
- Ignition switch: "ON"
- Voltage between terminal No. 70 and earth.
OK: 4.9 – 5.1 V

Q: Is the check result normal?

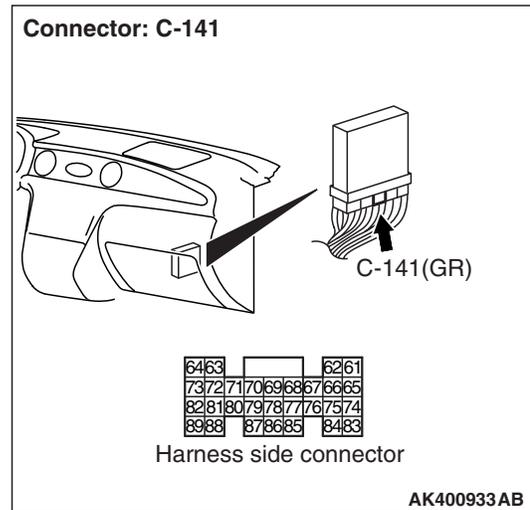
YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: C-141 engine-ECU connector



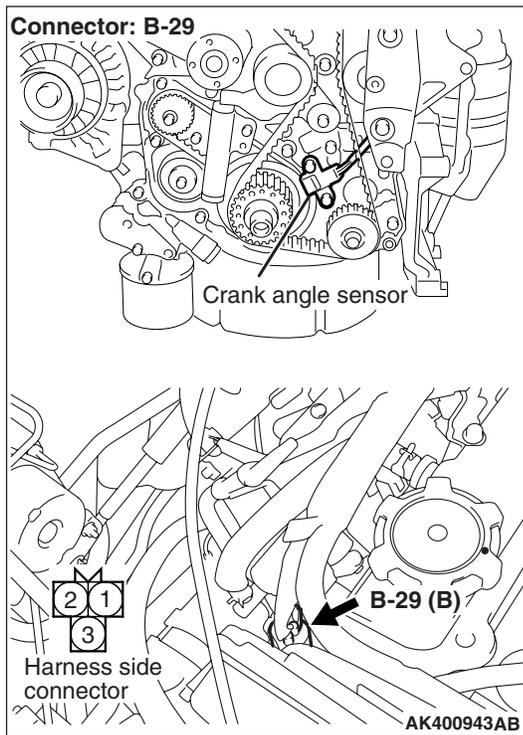
STEP 6. Connector check: C-141 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.



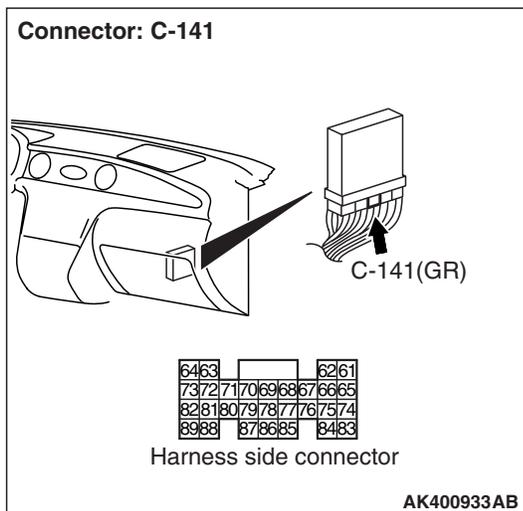
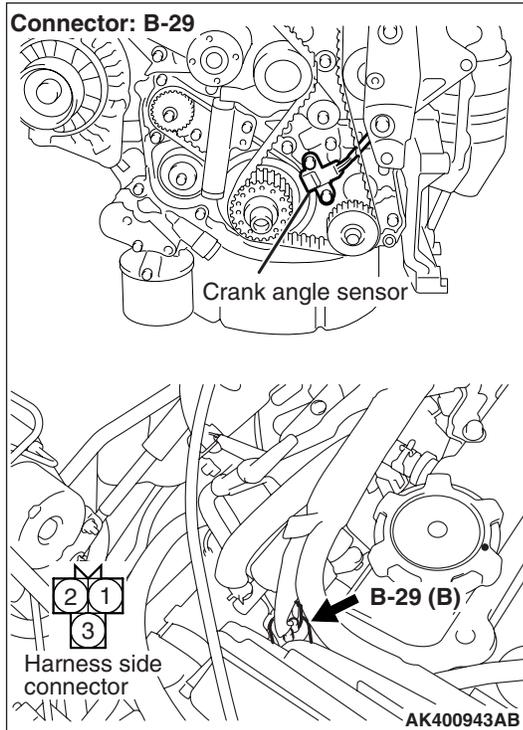
Q: Is the check result normal?

YES : Check and repair harness between B-29 (terminal No. 2) crank angle sensor connector and C-141 (terminal No. 70) engine-ECU connector.

- Check output line for open circuit.

NO : Repair or replace.

STEP 7. Check harness between B-29 (terminal No. 2) crank angle sensor connector and C-141 (terminal No. 70) engine-ECU connector.



- Check output line for short circuit.

Q: Is the check result normal?

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

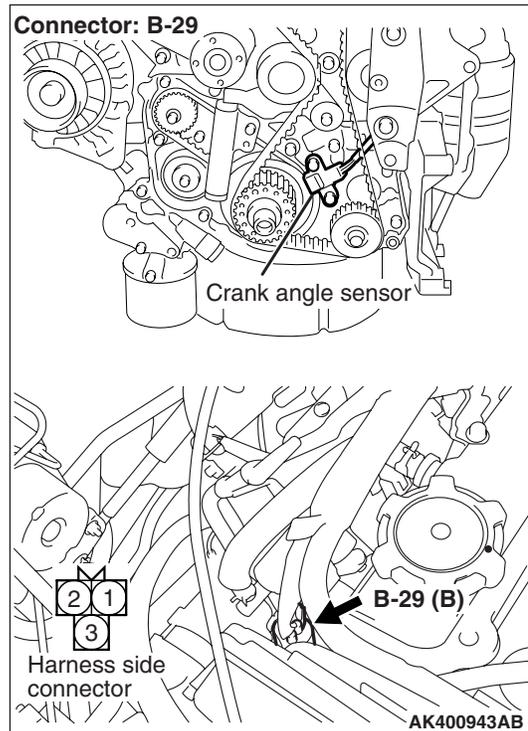
STEP 8. M.U.T.-II/III data list

- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 22: Crank angle sensor

Q: Is the check result normal?

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

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



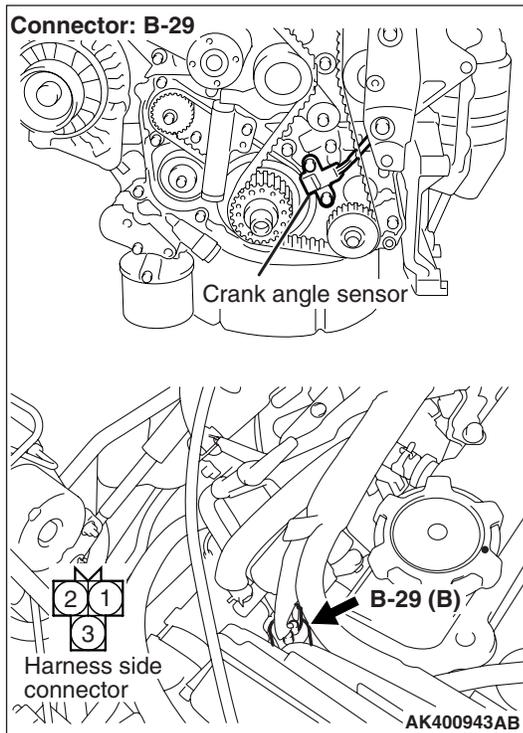
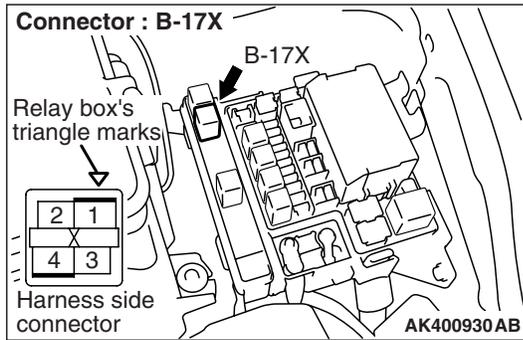
- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?

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

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



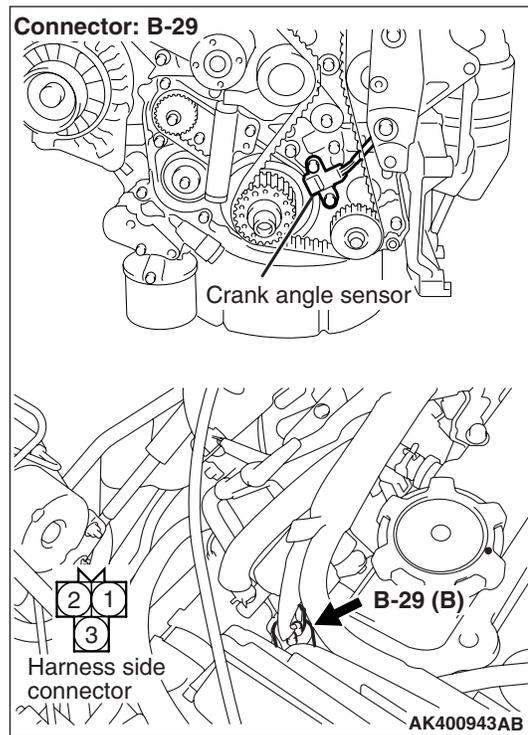
Q: Is the check result normal?

YES : Check and repair harness between B-29 (terminal No. 3) crank angle sensor connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

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



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

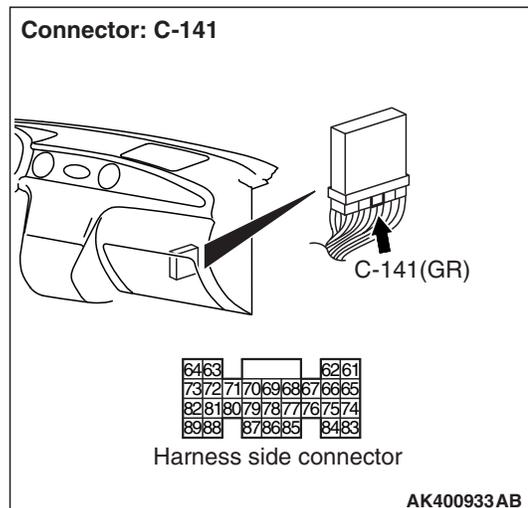
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Go to Step 12 .

STEP 12. Connector check: C-141 engine-ECU connector

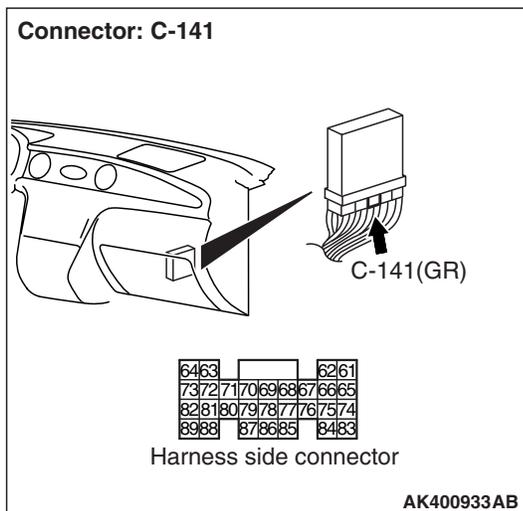
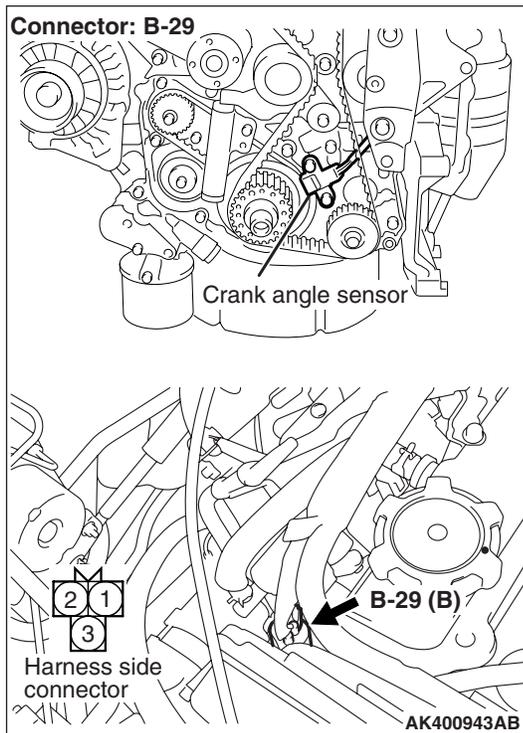


Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair or replace.

STEP 13. Check harness between B-29 (terminal No. 1) crank angle sensor connector and C-141 (terminal No. 88) engine-ECU connector.



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

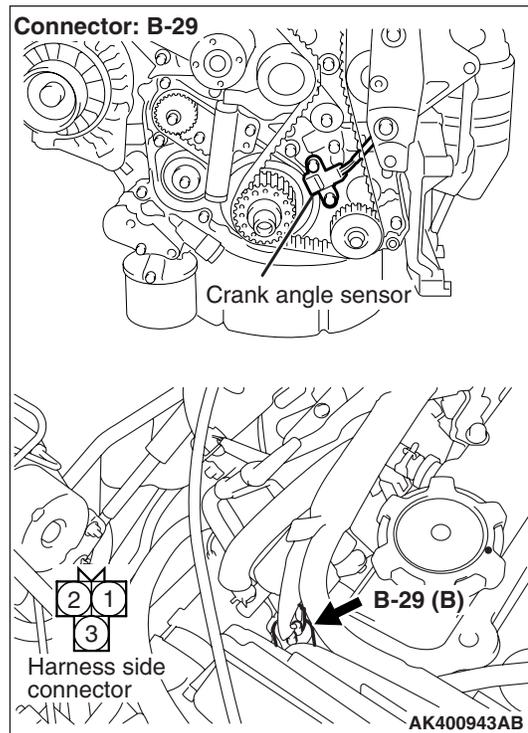
- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 14. Perform output wave pattern measurement at B-29 crank angle sensor connector (Using oscilloscope).



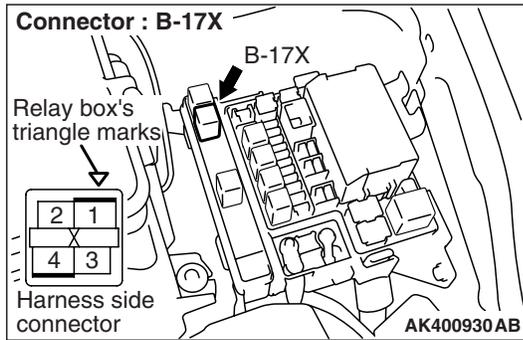
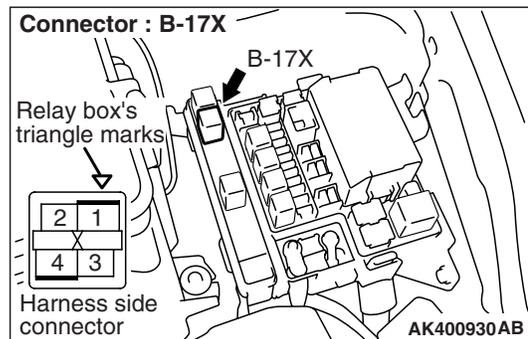
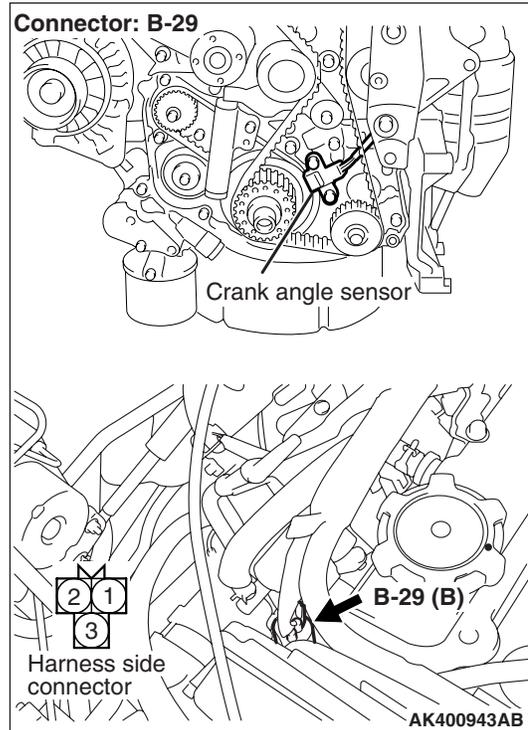
- Use special tool test harness (MD998478) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 2 and earth.

OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13B-383), 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 .

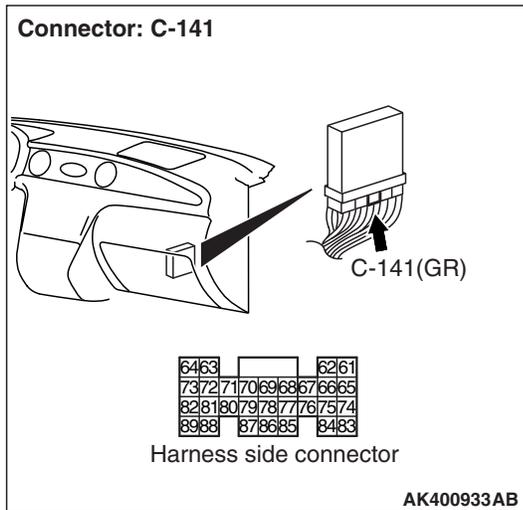
NO : Go to Step 15 .

STEP 15. Connector check: B-17X engine control relay connector**Q: Is the check result normal?****YES :** Go to Step 16 .**NO :** Repair or replace.**STEP 16. Check harness between B-29 (terminal No. 3) crank angle sensor connector and B-17X (terminal No. 1) engine control relay connector.**

- Check power supply line for damage.

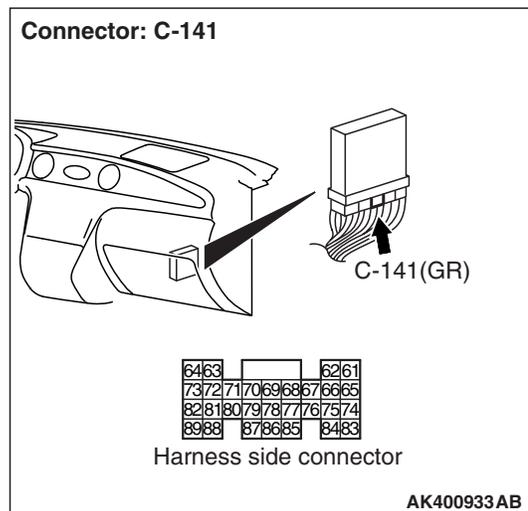
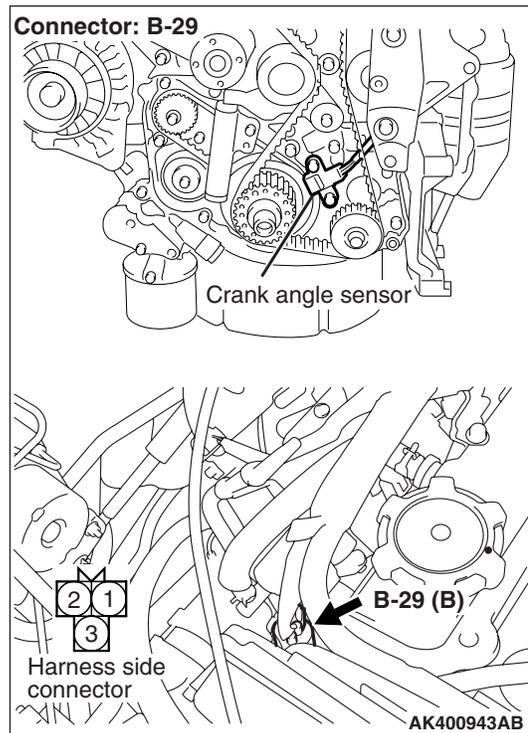
Q: Is the check result normal?**YES :** Go to Step 17 .**NO :** Repair.

STEP 17. Connector check: C-141 engine-ECU connectors



Q: Is the check result normal?
YES : Go to Step 18 .
NO : Repair or replace.

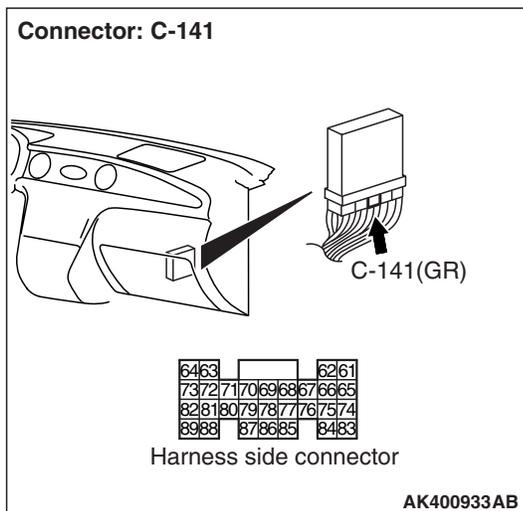
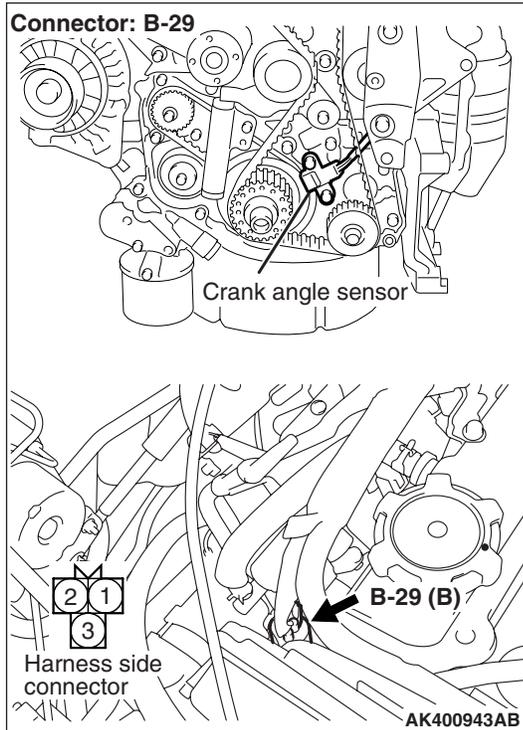
STEP 18. Check harness between B-29 (terminal No. 2) crank angle sensor connector and C-141 (terminal No. 70) engine-ECU connector.



- Check output line for damage.

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

STEP 19. Check harness between B-29 (terminal No. 1) crank angle sensor connector and C-141 (terminal No. 88) engine-ECU connector.



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

- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair.

STEP 20. Check the crankshaft sensing blade

Q: Is the check result normal?

YES : Go to Step 21 .

NO : Replace the crankshaft sensing blade.

STEP 21: M.U.T.-II/III data list

- Refer to Data List Reference Table [P.13B-368](#).
 - Item 22: Crank angle sensor

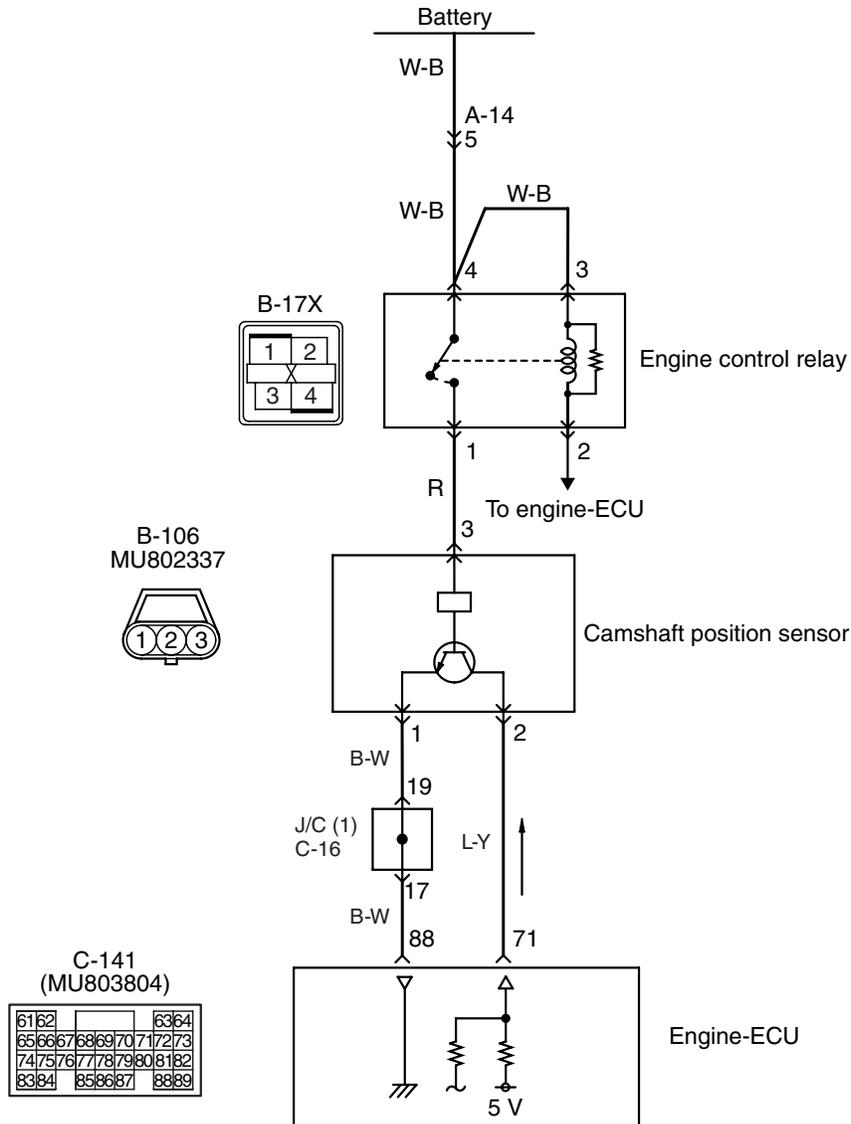
Q: Is the check result normal?

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



AK400813 AB

OPERATION

- Power is supplied to the camshaft position sensor (terminal No. 3) from the engine control relay (terminal No. 1) and is earthed to the engine-ECU (terminal No. 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 (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.

TROUBLE JUDGMENT

Check Conditions

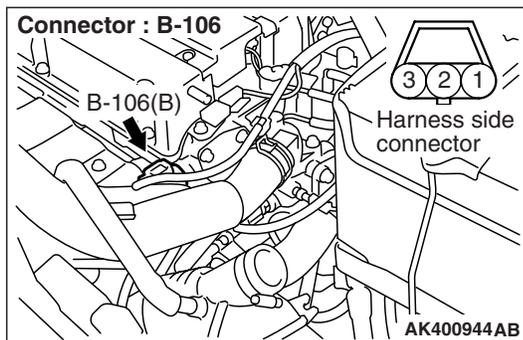
- Ignition switch: "ON"
- Engine speed of 50 r/min. or more.

Judgment Criterion

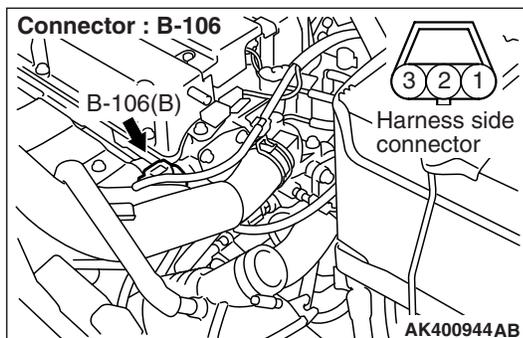
- The sensor output voltage remains unchanged (no pulse signal is inputted) for 2 seconds.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE**STEP 1. Connector check: B-106 camshaft position sensor connector****Q: Is the check result normal?**

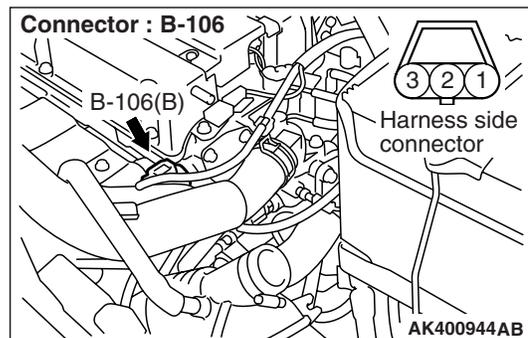
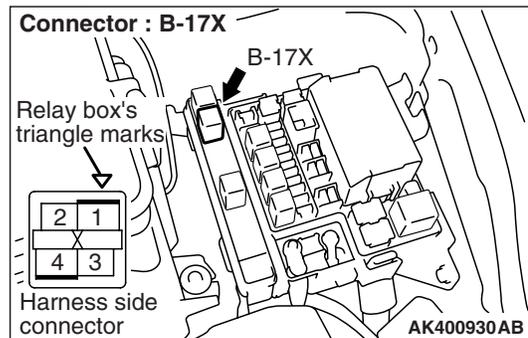
- YES :** Go to Step 2 .
NO : Repair or replace.

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?**

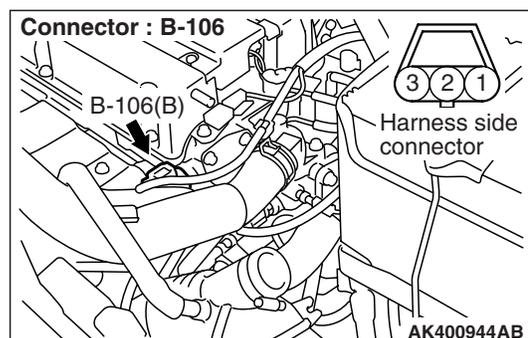
- YES :** Go to Step 4 .
NO : Go to Step 3 .

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 or replace.

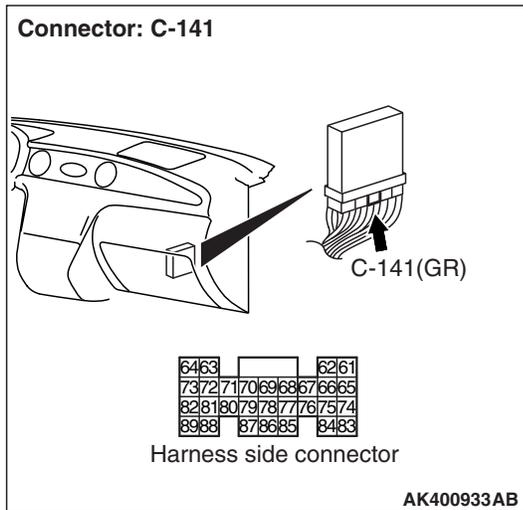
STEP 4. Perform voltage measurement at B-106 camshaft position sensor connector.

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

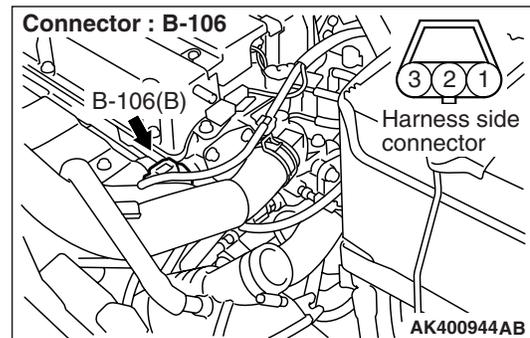
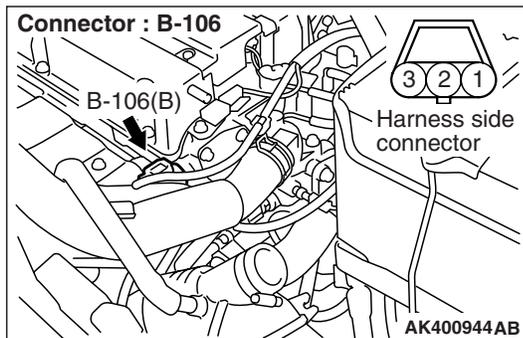
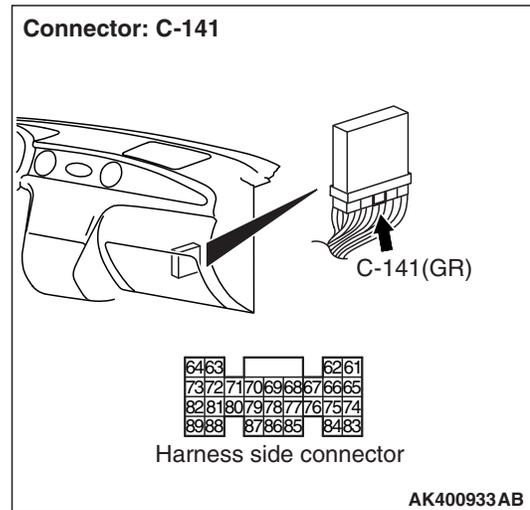
OK: 4.9 – 5.1 V**Q: Is the check result normal?**

- YES :** Go to Step 10 .
NO : Go to Step 5 .

STEP 5. Perform voltage measurement at C-141 engine-ECU connector.



STEP 6. Connector check: C-141 engine-ECU connector



- Measure engine-ECU 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 .

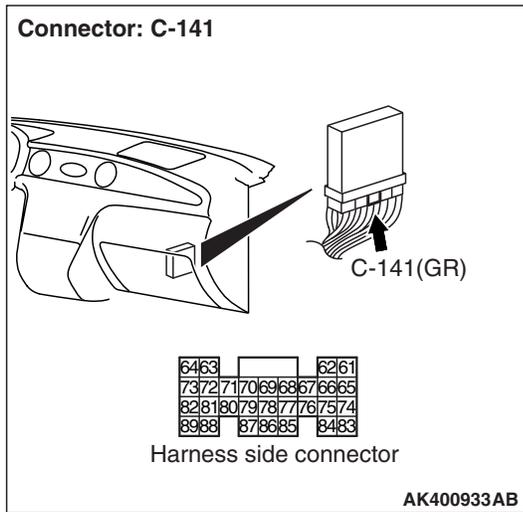
Q: Is the check result normal?

YES : Check and repair harness between B-106 (terminal No. 2) camshaft position sensor connector and C-141 (terminal No. 71) engine-ECU connector.

- Check output line for open circuit.

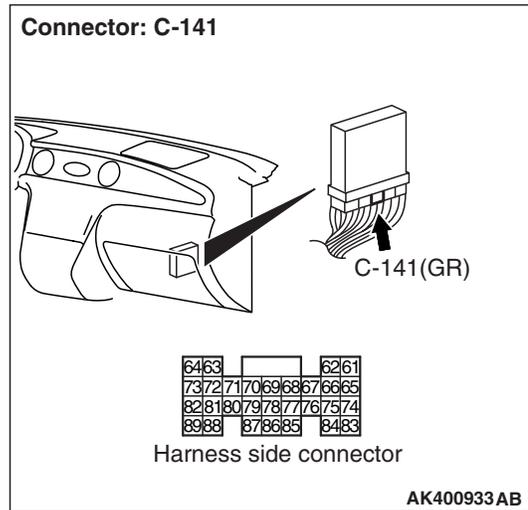
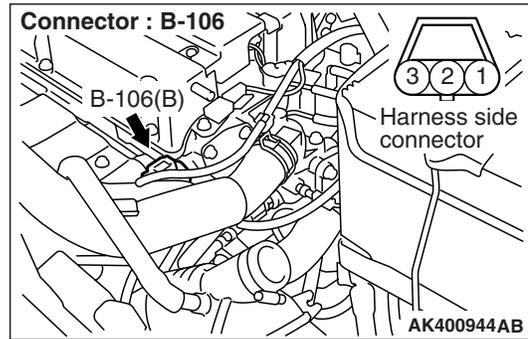
NO : Repair or replace.

STEP 7. Connector check: C-141 engine-ECU connector



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

STEP 8. Check harness between B-106 (terminal No. 2) camshaft position sensor connector and C-141 (terminal No. 71) engine-ECU connector.



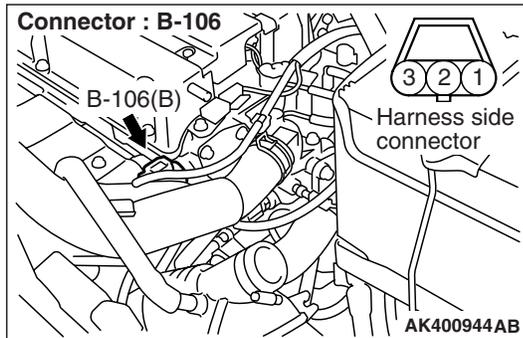
- Check output line for short circuit.

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

STEP 9. Check the trouble symptoms.

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

STEP 10. Perform resistance measurement at B-106 camshaft position sensor connector.



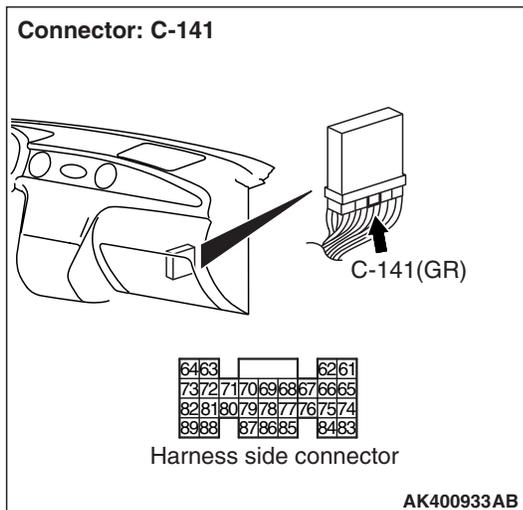
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 11 .

STEP 11. Connector check: C-141 engine-ECU connector

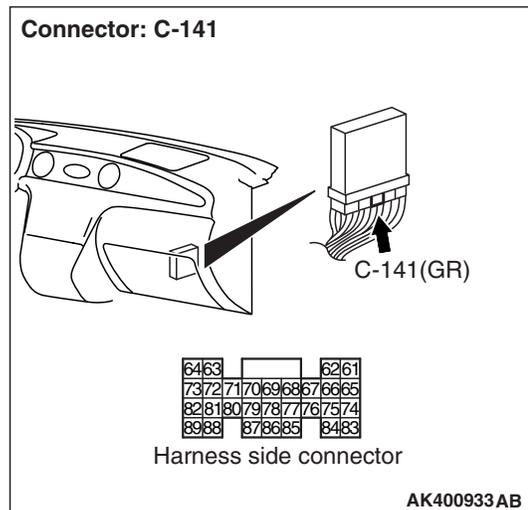
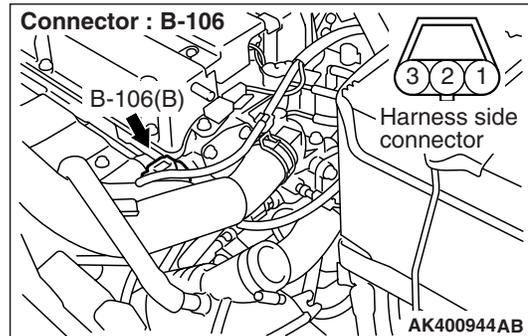


Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace.

STEP 12. Check harness between B-106 (terminal No. 1) camshaft position sensor connector and C-141 (terminal No. 88) engine-ECU connector.



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

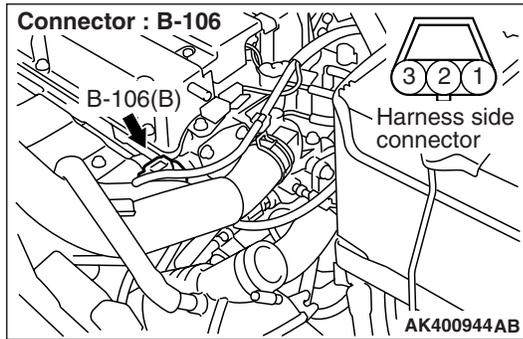
- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair.

STEP 13. Perform output wave pattern measurement at B-106 camshaft position sensor connector (Using oscilloscope).



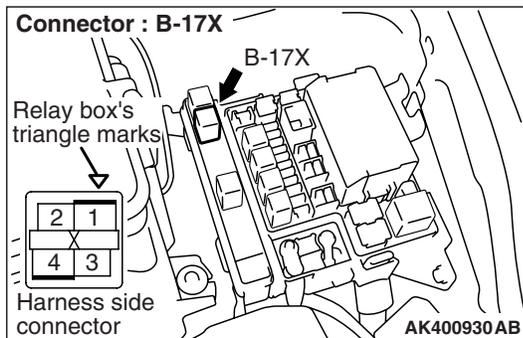
- Use special tool test harness (MB991709) to connect connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 2 and earth.

OK: Waveforms should be displayed on Inspection procedure using an oscilloscope (Refer to P.13B-383), 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 .

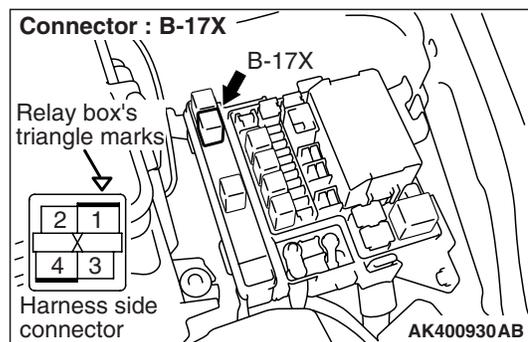
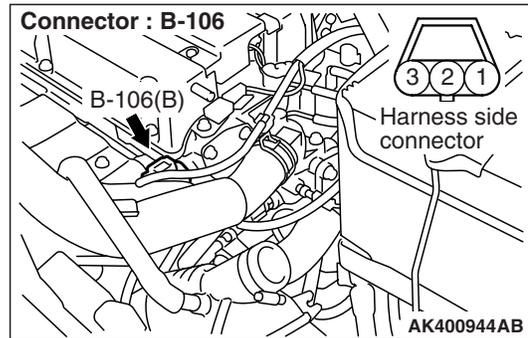
STEP 14. Connector check: B-17X engine control relay connector.



Q: Is the check result normal?

- YES :** Go to Step 15 .
- NO :** Repair or replace.

STEP 15. Check harness between B-106 (terminal No. 3) camshaft position sensor connector and B-17X (terminal No. 1) engine control relay connector.

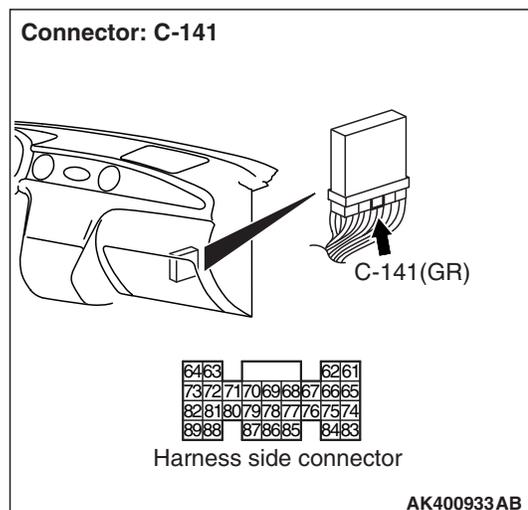


- Check power supply line for damage.

Q: Is the check result normal?

- YES :** Go to Step 16 .
- NO :** Repair.

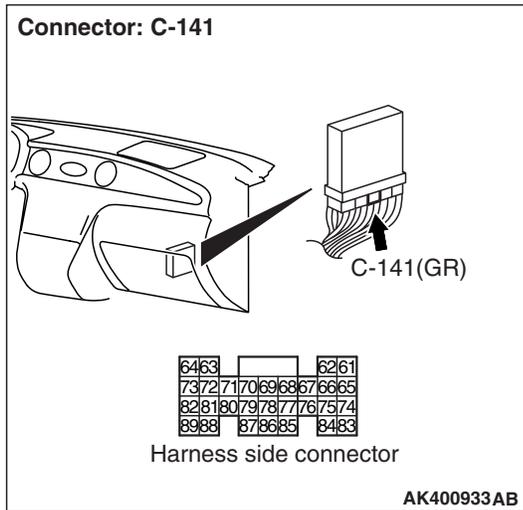
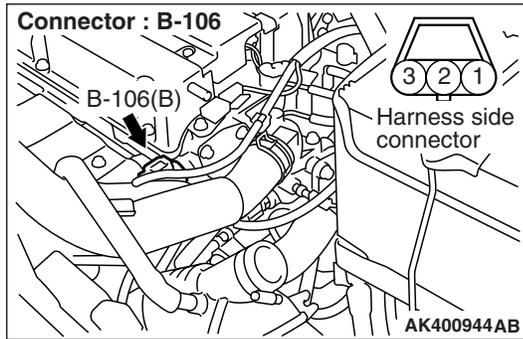
STEP 16. Connector check: C-141 engine-ECU connectors



Q: Is the check result normal?

- YES :** Go to Step 17 .
- NO :** Repair or replace.

STEP 17. Check harness between B-106 (terminal No. 2) camshaft position sensor connector and C-141 (terminal No. 71) engine-ECU connector.



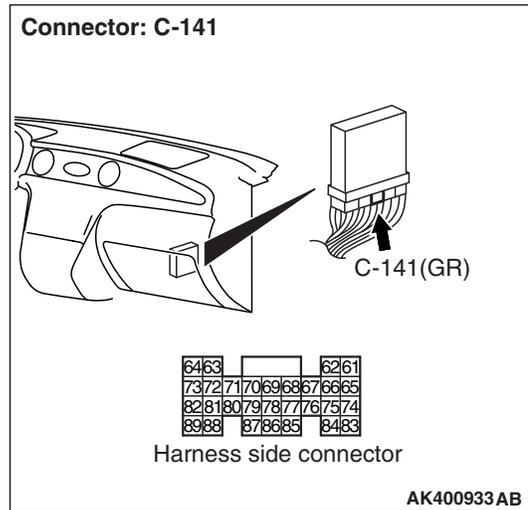
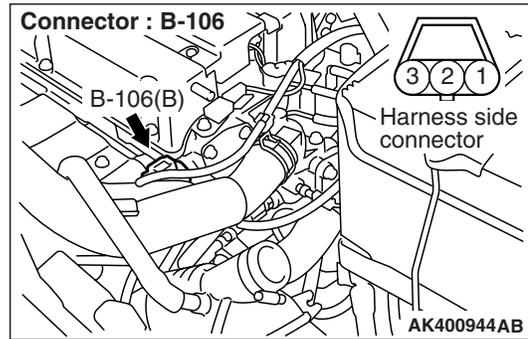
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair.

STEP 18. Check harness between B-106 (terminal No. 1) camshaft position sensor connector and C-141 (terminal No. 88) engine-ECU connector.



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

- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Repair.

STEP 19. Check camshaft position sensing cylinder.

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Replace camshaft position sensing cylinder.

STEP 20. Check the trouble symptoms.

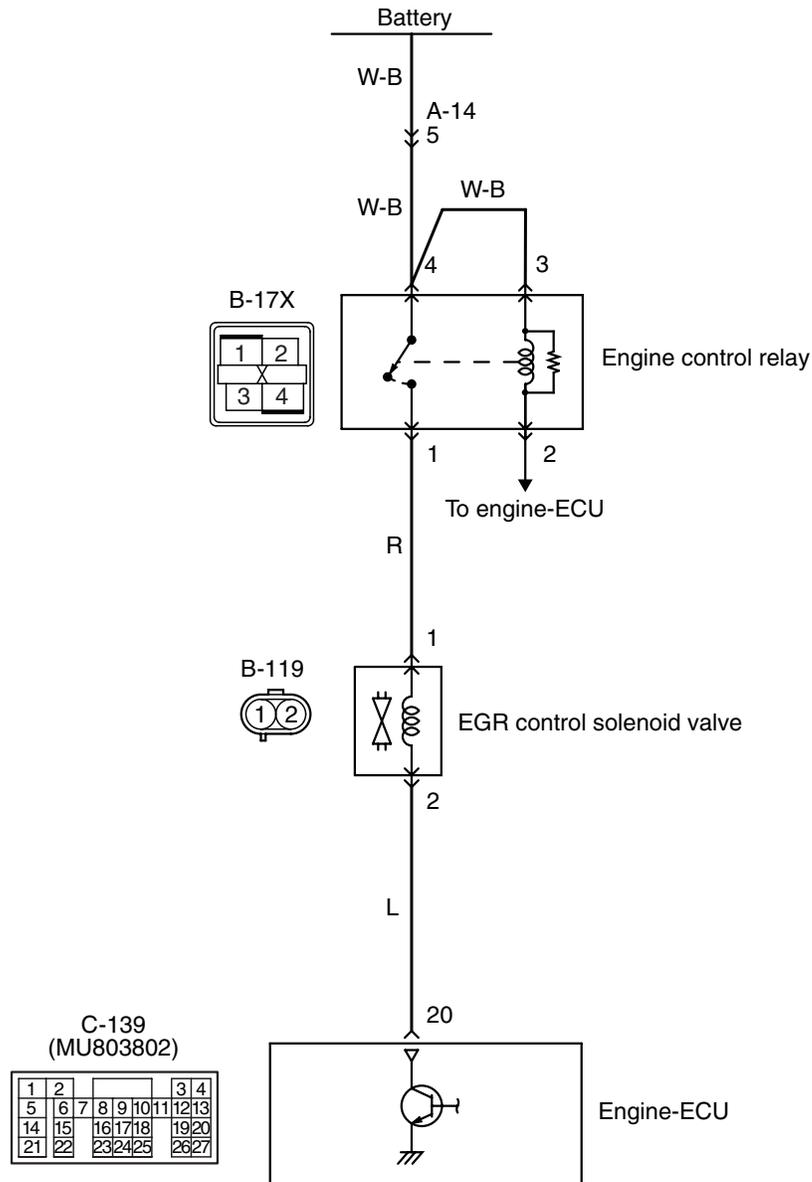
Q: Does trouble symptom persist?

YES : Replace camshaft position sensor.

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

Code No. P0403: Exhaust Gas Recirculation (EGR) Control Solenoid Valve

EGR control solenoid valve circuit



Wire colour code

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

AK400814 AB

OPERATION

- Power is supplied to the EGR control solenoid valve (terminal No. 1) from the engine control relay (terminal No. 1).
- The engine-ECU (terminal No. 20) makes the power transistor in the unit be in "ON", and that makes currents go on the EGR control solenoid valve (terminal No. 2).

FUNCTION

- In response to the signal from the engine-ECU, the EGR control solenoid valve controls the operation of the EGR valve.

TROUBLE JUDGMENT

Check Condition

- The battery voltage is 10 V or more.

Judgment Criterion

- When the EGR control solenoid valve is turned to "LOCK" (OFF) position from "ON" position, none of solenoid coil surge voltage (system voltage of +2 V) is detected.

PROBABLE CAUSE

- Failed EGR control solenoid valve
- Open/short circuit in EGR control solenoid valve circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

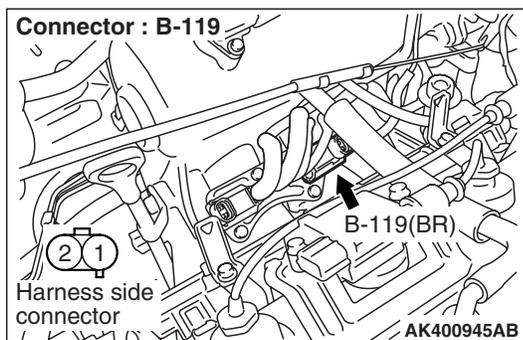
- Item 10: EGR control solenoid valve
OK: Operating sound can be heard and the valve vibrates.

Q: Is the check result normal?

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

NO : Go to Step 2 .

STEP 2. Connector check: B-119 EGR control solenoid valve connector

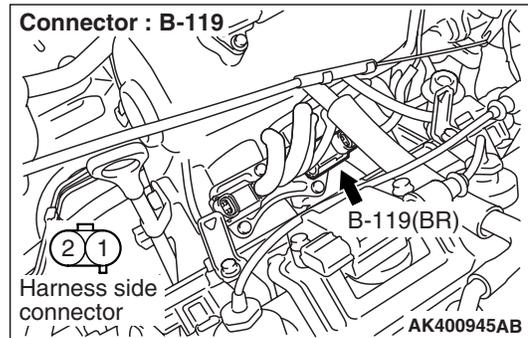


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform resistance measurement at B-119 EGR control solenoid valve connector.



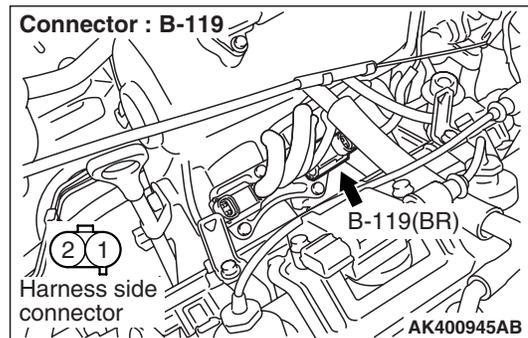
- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.
OK: 29 – 35 Ω (at 20°C)

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace EGR control solenoid valve.

STEP 4. Perform voltage measurement at B-119 EGR control solenoid valve connector.



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

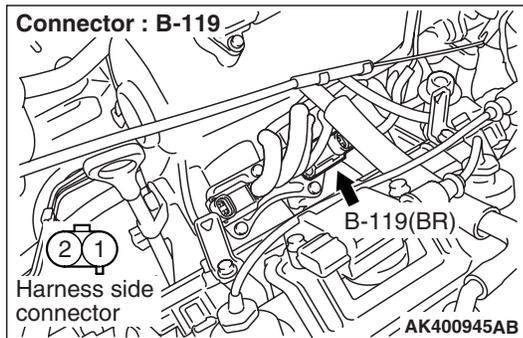
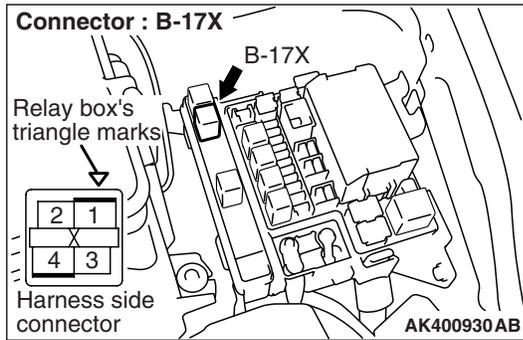
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 5 .

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



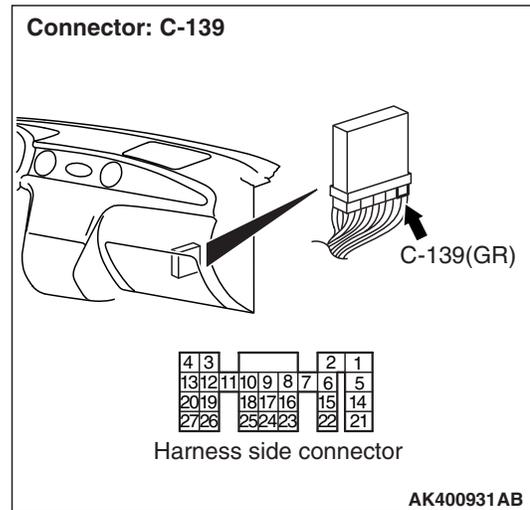
Q: Is the check result normal?

YES : Check and repair harness between B-119 (terminal No. 1) EGR control solenoid valve connector and B-17X (terminal No. 1) engine control relay connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 6. Perform voltage measurement at C-139 engine-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 20 and earth.

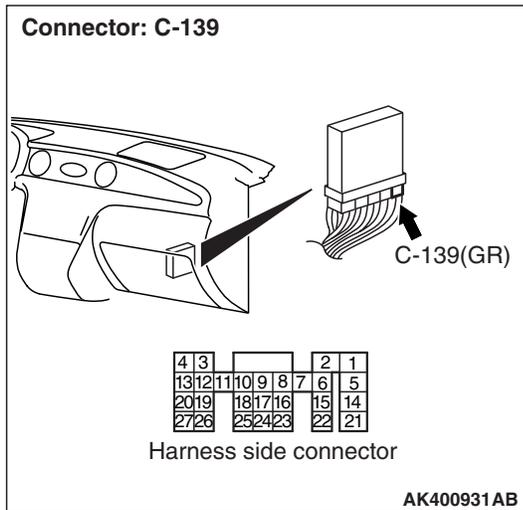
OK: System voltage

Q: Is the check result normal?

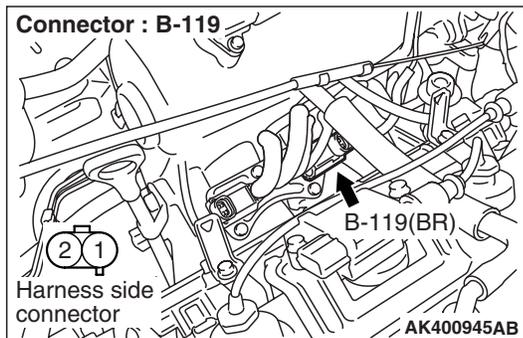
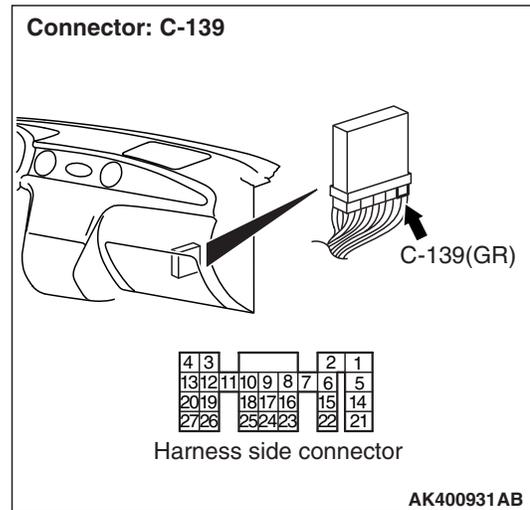
YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Connector check: C-139 engine-ECU connector



STEP 8. Connector check: C-139 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

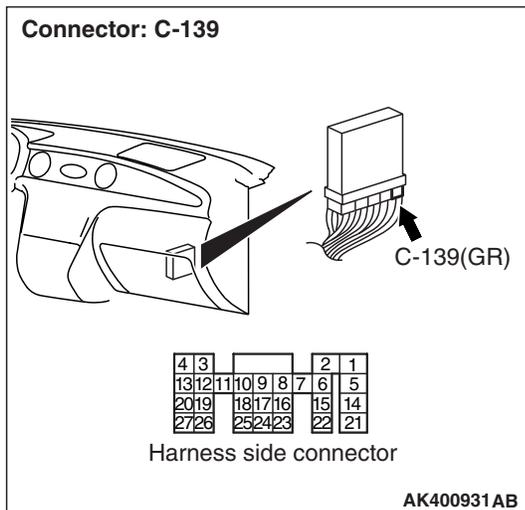
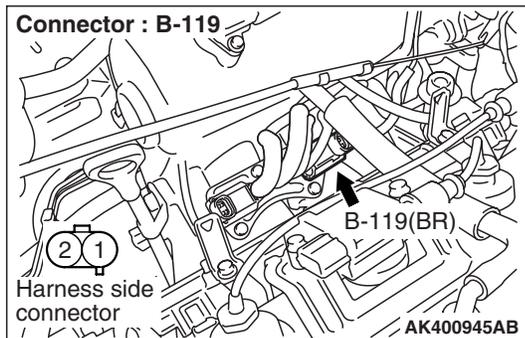
Q: Is the check result normal?

YES : Check and repair harness between B-119 (terminal No. 2) EGR control solenoid valve connector and C-139 (terminal No. 20) engine-ECU connector.

- Check output line for open/short circuit.

NO : Repair or replace.

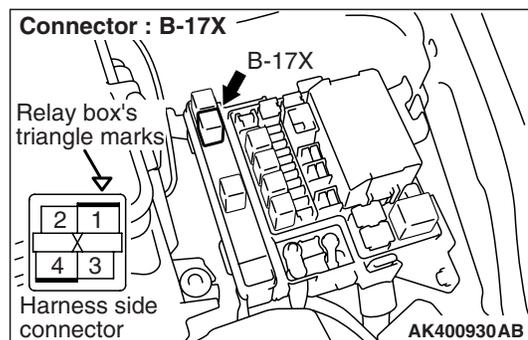
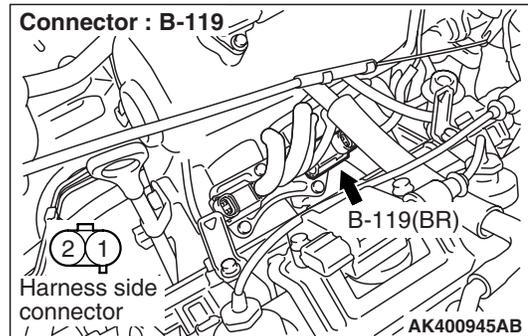
STEP 9. Check harness between B-119 (terminal No. 2) EGR control solenoid valve connector and C-139 (terminal No. 20) engine-ECU connector.



- Check output line for damage.

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

STEP 10. Check harness between B-119 (terminal No. 1) EGR control solenoid valve connector and B-17X (terminal No. 1) engine control relay connector.



- Check power supply line for damage.

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

STEP 11. M.U.T.-II /III actuator test

- Item 10: EGR control solenoid valve
OK: Operating sound can be heard and the valve vibrates.

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).
NO : Replace engine-ECU.

Code No. P0421: Warm up Catalyst Malfunction

FUNCTION

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

TROUBLE JUDGMENT

Check Conditions

- The engine speed is 3,000 r/min. or less.
- The accelerator pedal is fully depressed.
- Airflow sensor output is 8 g/s or higher.
- 3 seconds or longer has elapsed after the above-mentioned conditions have been met.
- Engine running, intake air temperature is -10°C or higher.
- Under the closed-loop control.
- Vehicle speed is 1.5 km/h or more.
- The engine-ECU monitors for this condition for 7 cycles of 10 seconds each during the drive cycle.
- Short-term fuel trim is higher than -25% or lower than $+25\%$.
- Accumulated air flow sensor output is 2,931 g or higher.

Judgment Criterion

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

PROBABLE CAUSE

- Catalytic converter deteriorated
- Failed oxygen sensor (front)
- Failed oxygen sensor (rear)
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

Q: Is the check result normal?

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

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

- Refer to Data List Reference Table [P.13B-368](#).
 - Item 11: Oxygen sensor (front)
 - Item 59: Oxygen sensor (rear)

Q: Is the check result normal?

- YES** : Go to Step 3 .
- NO** : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data valve (Refer to Inspection Chart for Diagnosis Codes [P.13B-20](#)).

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

- Item 11: Oxygen sensor (front)
 - OK: 0 – 0.4 and 0.6 – 1.0 volt should alternate 15 times or more within 10 seconds (engine speed at 2,000 r/min.).**

Q: Is the check result normal?

- YES** : Go to Step 4 .
- NO** : Replace the oxygen sensor (front).

STEP 4. Replace the oxygen sensor (rear).

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

Q: Is the check result normal?

- YES** : Check end.
- NO** : Go to Step 5 .

STEP 5. Replace the catalytic converter.

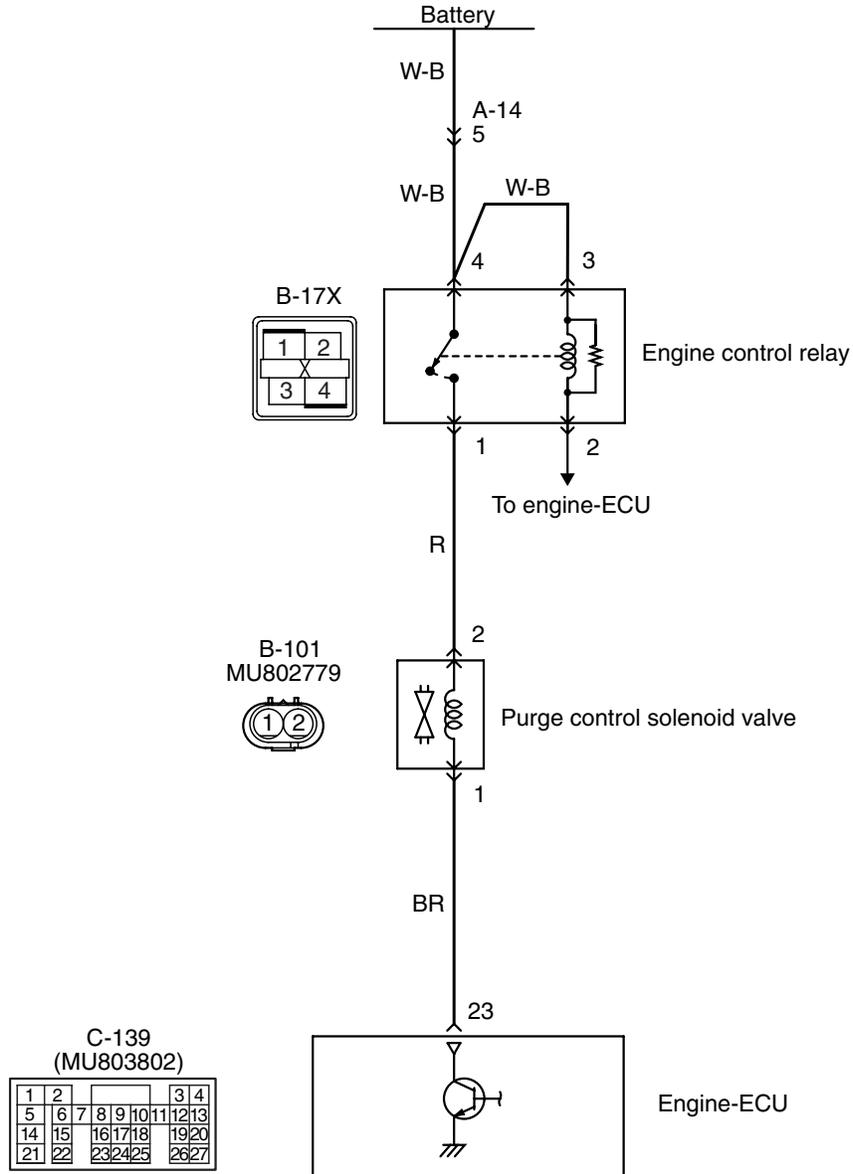
- After replacing the catalytic converter, re-check the trouble symptoms.

Q: Is the check result normal?

- YES** : Check end.
- NO** : Replacing engine-ECU.

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

AK400815 AB

OPERATION

- Power is supplied to the purge control solenoid valve (terminal No. 2) from the engine control relay (terminal No. 1).
- The engine-ECU (terminal No. 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, the purge control solenoid valve controls the flow rate of the purge air to be introduced into the surge tank.

TROUBLE JUDGMENT

Check Conditions

- Ignition switch: "ON"
- The battery voltage is 10 V or more.

Judgment Criterion

- The surge voltage (system voltage +2 V) of solenoid coil is not detected when the purge control solenoid valve is turned to OFF 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

DIAGNOSIS PROCEDURE

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

- Item 08: Purge control solenoid valve

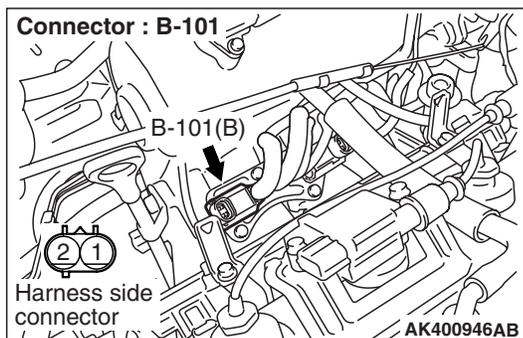
OK: Operating sound can be heard and the valve vibrates

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

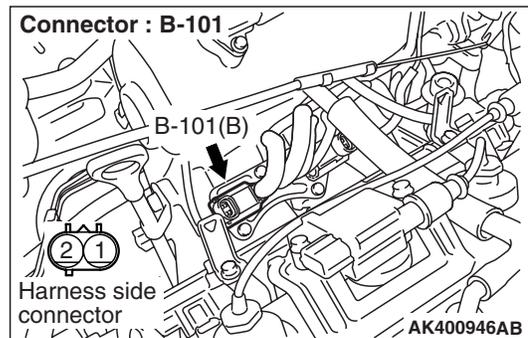


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3: Perform resistance measurement at B-101 purge control solenoid valve connector.



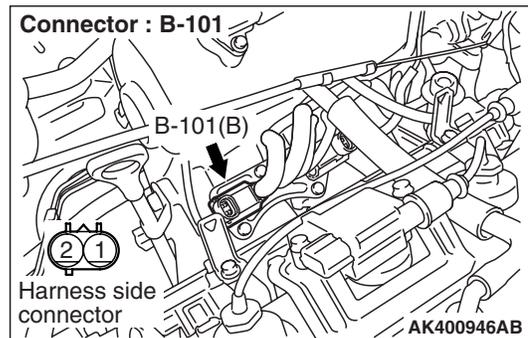
- Disconnect connector, and measure at solenoid valve side.
- Resistance between terminal No. 1 and No. 2.
OK: 30 – 34 Ω (at 20°C)

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.



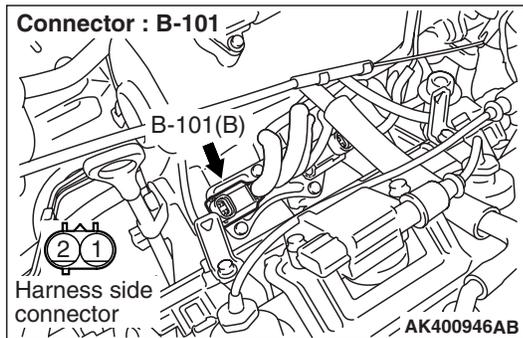
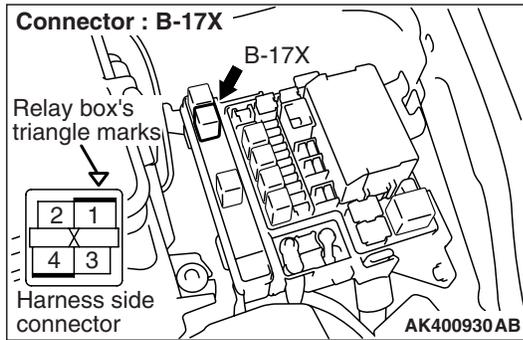
- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 2 and earth.
OK: System voltage

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.



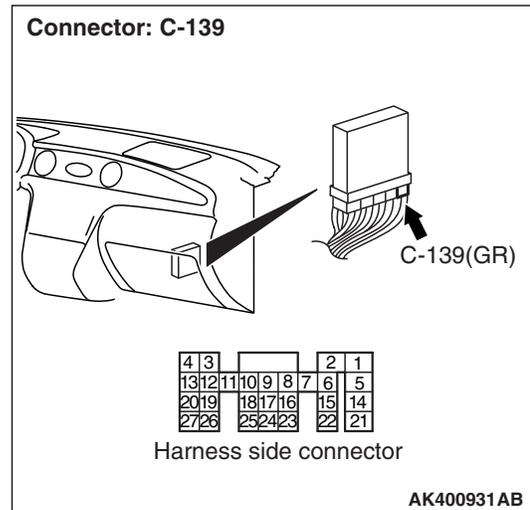
Q: Is the check result normal?

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 or replace.

STEP 6. Perform voltage measurement at C-139 engine-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 23 and earth.

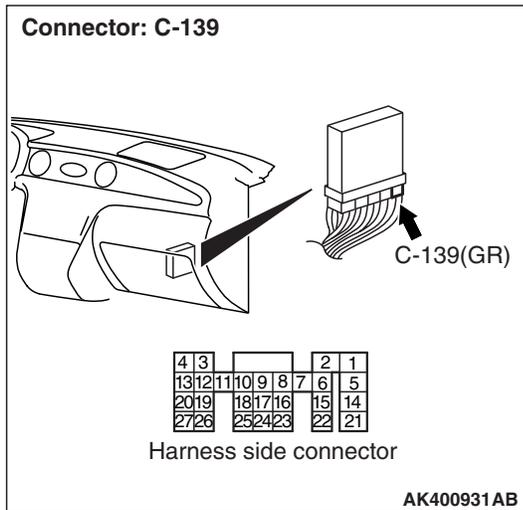
OK: System voltage

Q: Is the check result normal?

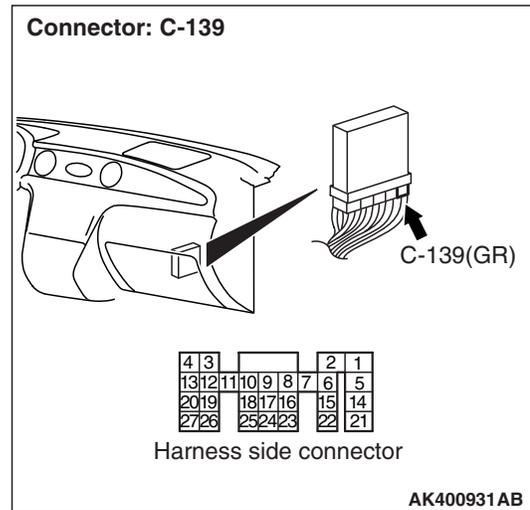
YES : Go to Step 8 .

NO : Go to Step 7 .

STEP 7. Connector check: C-139 engine-ECU connector



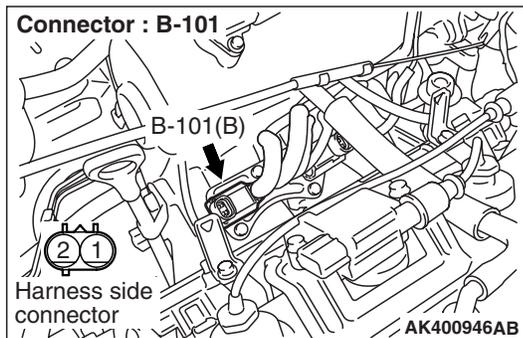
STEP 8. Connector check: C-139 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.



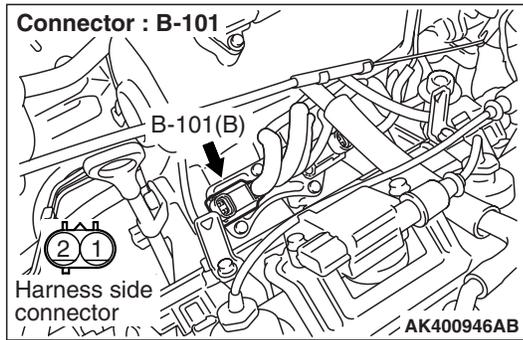
Q: Is the check result normal?

YES : Check and repair harness between B-101 (terminal No. 1) purge control solenoid valve connector and C-139 (terminal No. 23) engine-ECU connector.

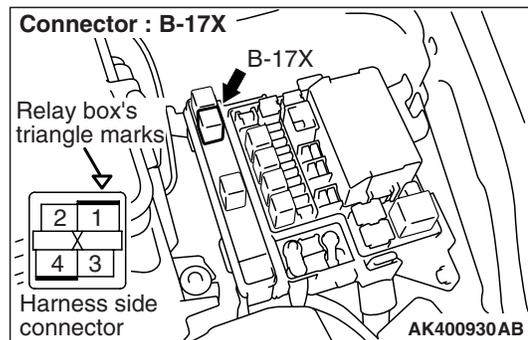
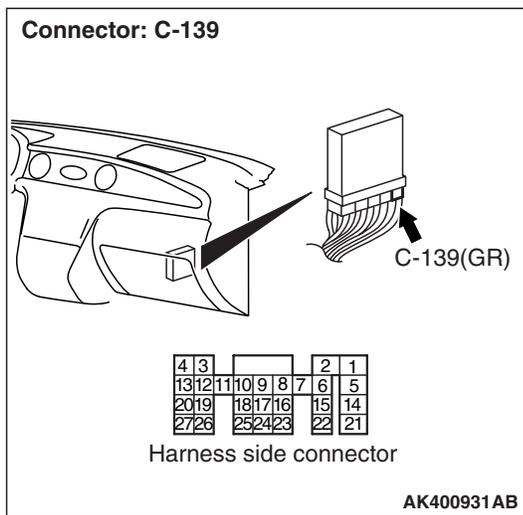
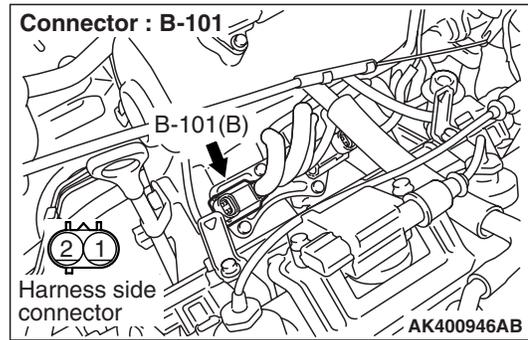
- Check output line for open/short circuit.

NO : Repair or replace.

STEP 9. Check harness between B-101 (terminal No. 1) purge control solenoid valve connector and C-139 (terminal No. 23) engine-ECU 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 supply line for damage.

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

STEP 11. M.U.T.-II/III actuator test

- Item 08: purge control solenoid valve
OK: Operating sound can be heard and the valve vibrates.

Q: Is the check result normal?
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).
NO : Replace engine-ECU.

TROUBLE JUDGMENT**Check Conditions**

- 2 seconds later after the engine has started up.
- The engine speed is 2,000 – 4,000 r/min.
- The volumetric efficiency is 60 – 80%.

Judgment Criterion

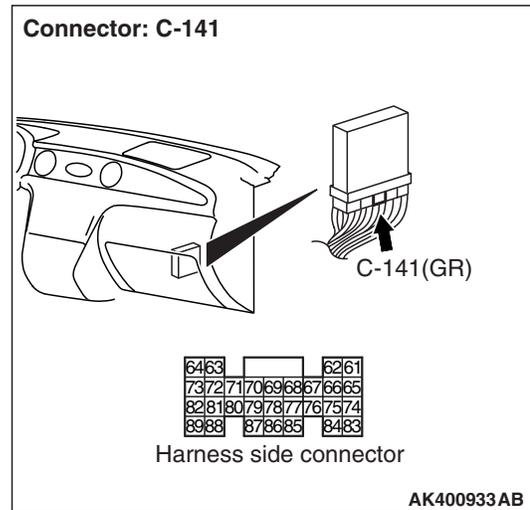
- The sensor output voltage remains unchanged (no pulse signal is inputted) for 2 seconds.

PROBABLE CAUSE

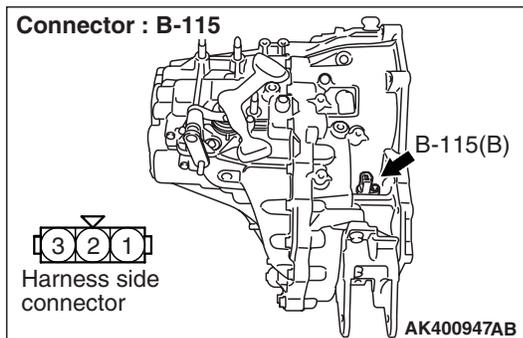
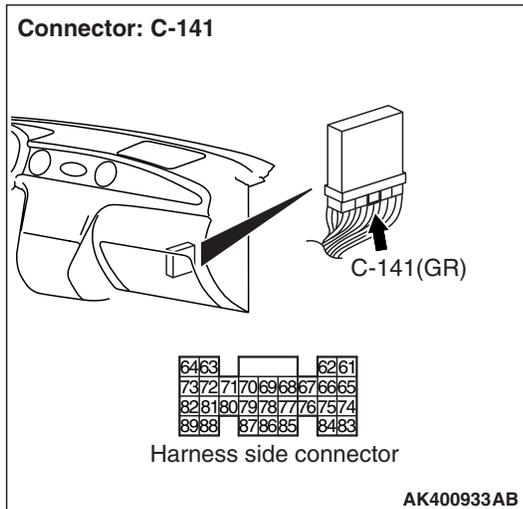
- Failed Vehicle speed sensor
- Open/short circuit in vehicle speed sensor circuit or loose connector contact
- Failed engine-ECU

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 [P.54A-57](#)).**STEP 2. M.U.T.-II/III data list**

- Refer to Data List Reference Table [P.13B-368](#).
 - 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 or replace.

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 B-19 and C-16, and repair if necessary.

- Check output line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Check the trouble symptoms.

Q: Does trouble symptom persist?

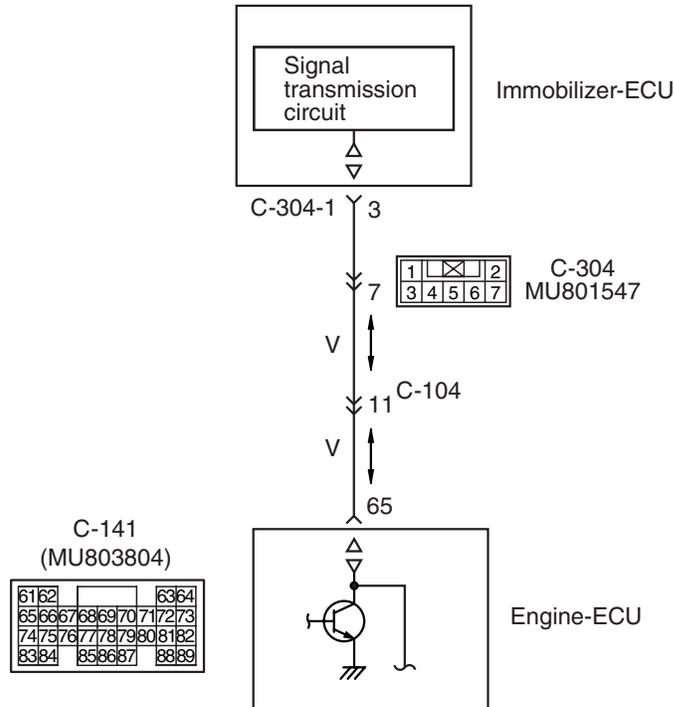
YES : Replacing engine-ECU.

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

Troubleshooting/Inspection Service Points P.00-6).

Code No. P0513: Immobilizer System

Immobilizer-ECU circuit



Wire colour code

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

AK400817AB

OPERATION

- The signals are sent and received between engine-ECU (terminal No. 65) and immobilizer-ECU (terminal No. 7).

FUNCTION

- Engine-ECU sends or receives the control signals to or from immobilizer-ECU to certify the ignition key.

NOTE:

- If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
- This code may be displayed when registering the key encrypted code.

TROUBLE JUDGMENT

Check Condition

- Ignition switch: "ON"

Judgment Criterion

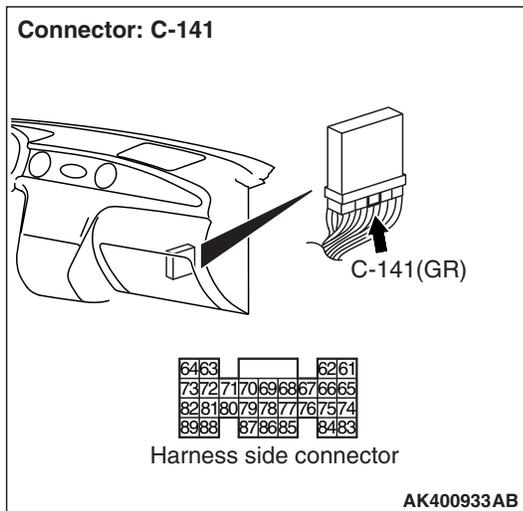
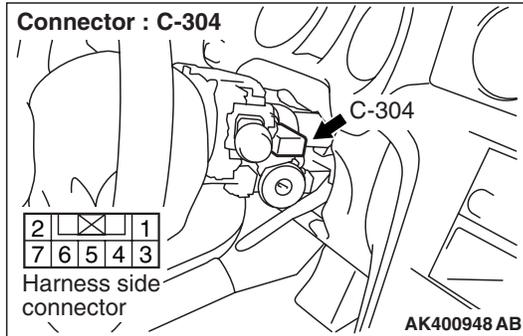
- When the communication error between the engine-ECU and the immobilizer-ECU continues for 2 seconds or more.

PROBABLE CAUSE

- Open/short circuit in immobilizer system circuit or loose connector contact
- Failed immobilizer-ECU
- Failed engine-ECU

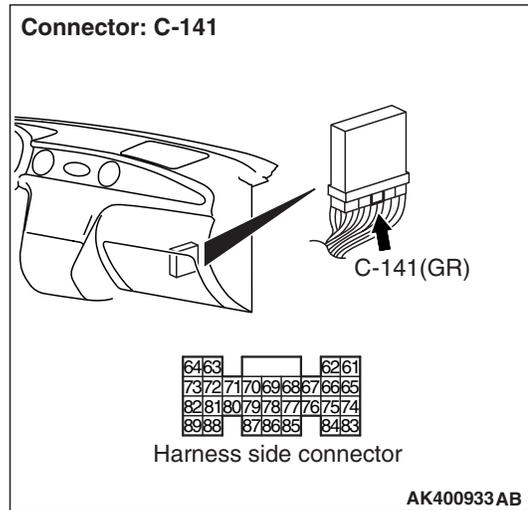
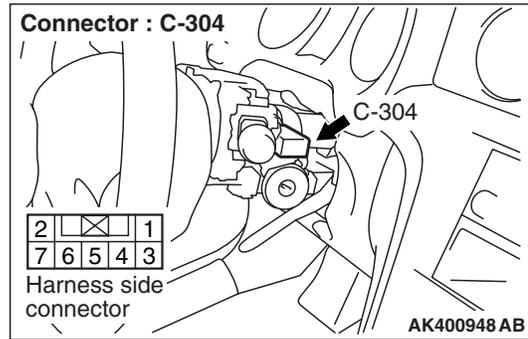
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-304 immobilizer-ECU connector and C-141 engine-ECU connector



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

STEP 2. Check harness between C-304 (terminal No. 7) immobilizer-ECU connector and C-141 (terminal No. 65) engine-ECU connector.



NOTE: Before checking harness, check intermediate connector C-104, and repair if necessary.

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

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

STEP 3. Check the trouble symptoms.

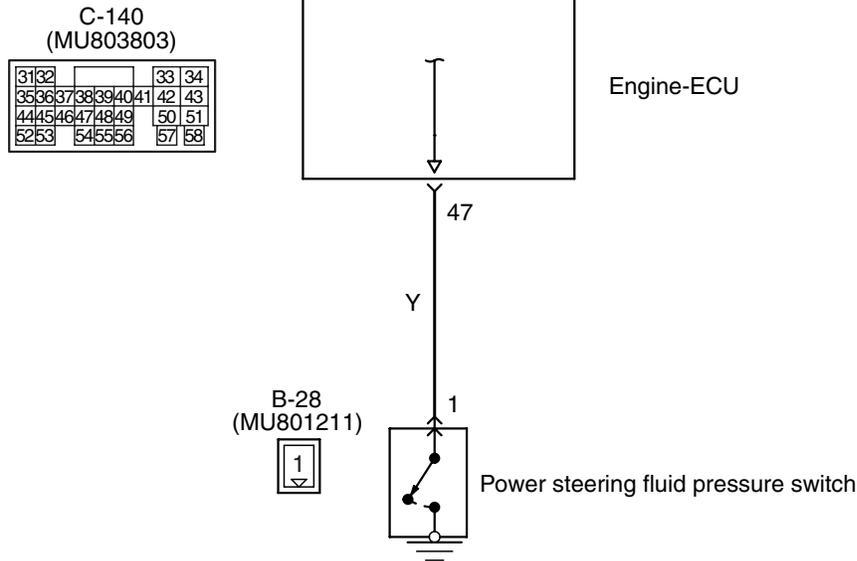
Q: Does trouble symptom persist?
YES : Go to Step 4 .
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 4. After replacing the immobilizer-ECU, re-check the trouble symptoms.

Q: Does trouble symptom persist?
YES : Replace engine-ECU.
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

AK400818 AB

CONDITION

- The battery voltage is applied to the power steering fluid pressure switch (terminal No. 1) from the engine-ECU (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. When the power steering fluid pressure switch "ON" signal (a large load on the power steering fluid pump) is inputted, the engine-ECU provides the idle-up control.

TROUBLE JUDGMENT**Check Conditions**

- The intake air temperature is -10°C or higher.
- The engine coolant temperature is 30°C or higher.
- Drive for 4 seconds or more with the vehicle speed is 50 km/h or more. Stop the vehicle (vehicle speed is 1.5 km/h or less). Repeat 10 times is more.

Judgment Criterion

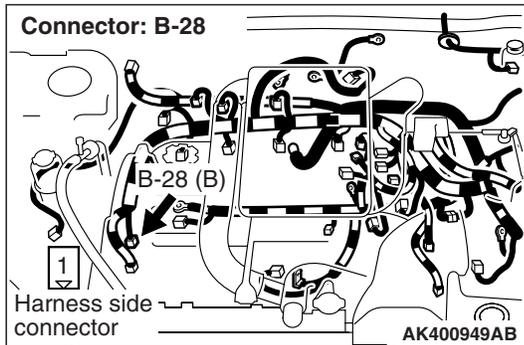
- The power steering fluid pressure switch remains in "ON" position.

PROBABLE CAUSE

- Failed power steering fluid pressure switch
- Open/short circuit in power steering fluid pressure switch circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-28 power steering fluid pressure switch connector

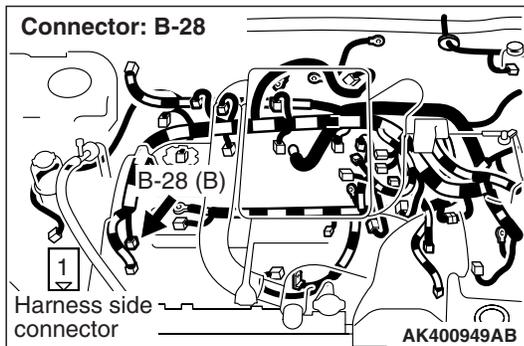


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

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.

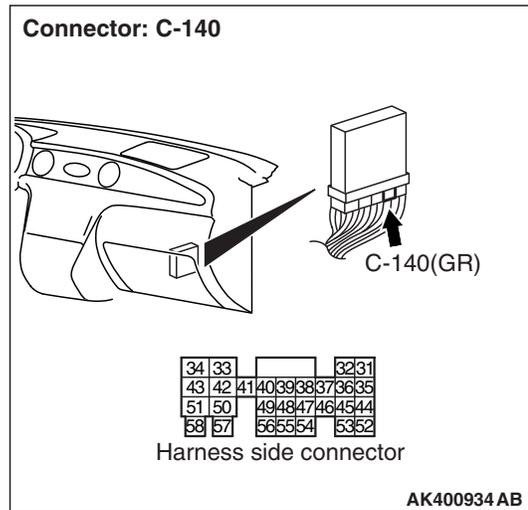
OK: System voltage

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 connector.



- Measure engine-ECU terminal voltage.
- Ignition switch: "ON"
- Voltage between terminal No. 47 and earth.

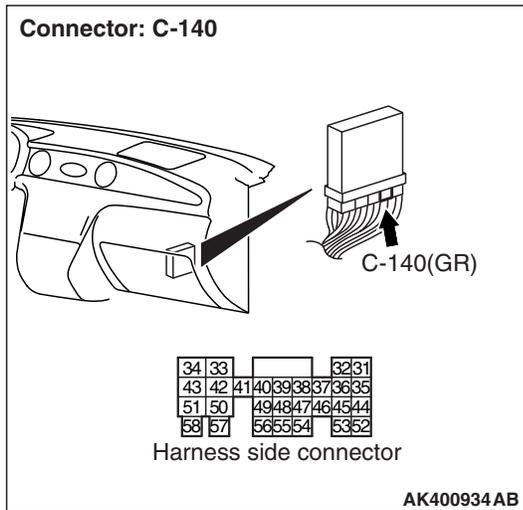
OK: System voltage

Q: Is the check result normal?

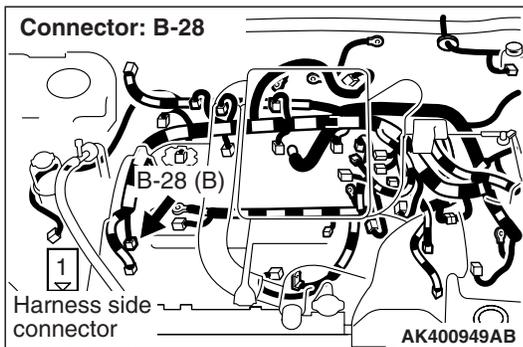
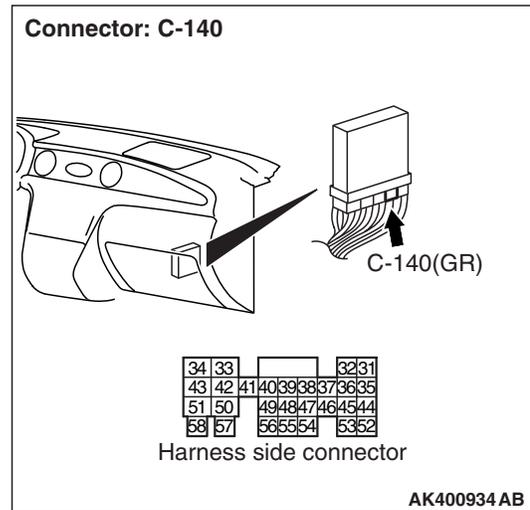
YES : Go to Step 4 .

NO : Go to Step 5 .

STEP 4. Connector check: C-140 engine-ECU connector



STEP 5. Connector check: C-140 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

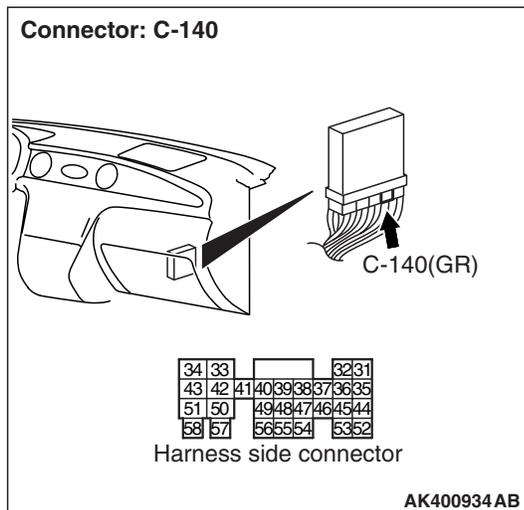
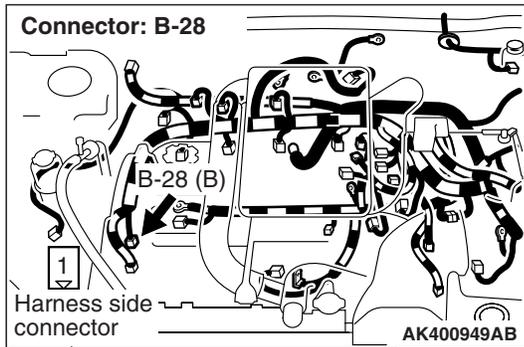
Q: Is the check result normal?

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 connector.

- Check output line for open circuit.

NO : Repair or replace.

STEP 6. Check harness between B-28 (terminal No. 1) power steering fluid pressure switch connector and C-140 (terminal No. 47) engine-ECU connector.



- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

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

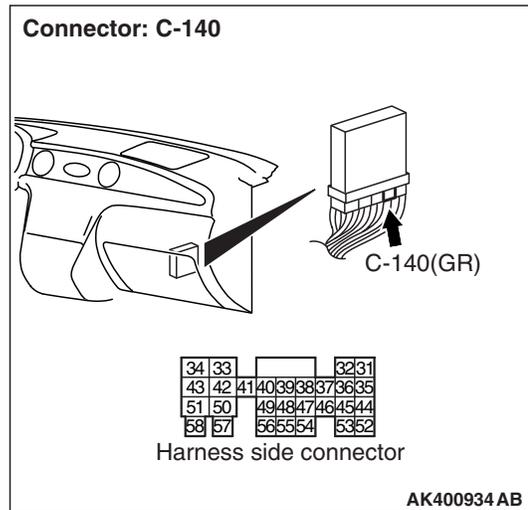
- Refer to Data List Reference Table [P.13B-368](#).
 - Item 27: Power steering fluid pressure switch

Q: Is the check result normal?

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

NO : Replace engine-ECU.

STEP 8. Perform voltage measurement at C-140 engine-ECU connector.



- Measure engine-ECU terminal voltage.
- Engine: Idling
- Voltage between terminal No. 47 and earth.

OK:

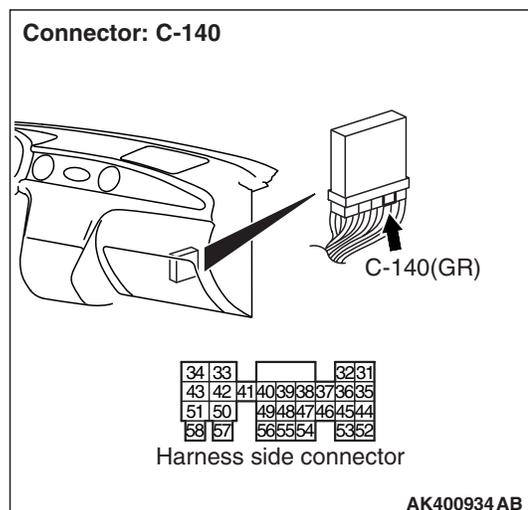
**System voltage (Steering wheel: Stationary)
1 V or less (Steering wheel: Turned)**

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 9 .

STEP 9. Connector check: C-140 engine-ECU connector

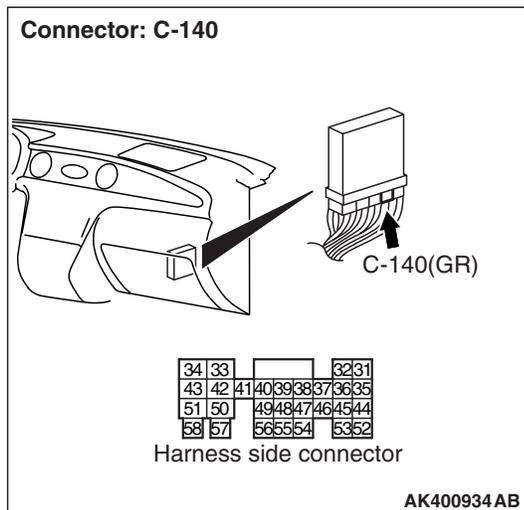
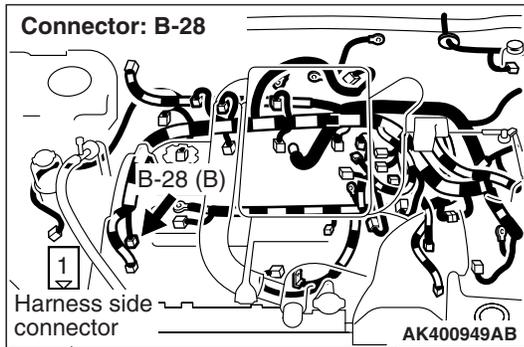


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. Check harness between B-28 (terminal No. 1) power steering fluid pressure switch connector and C-140 (terminal No. 47) engine-ECU connector.

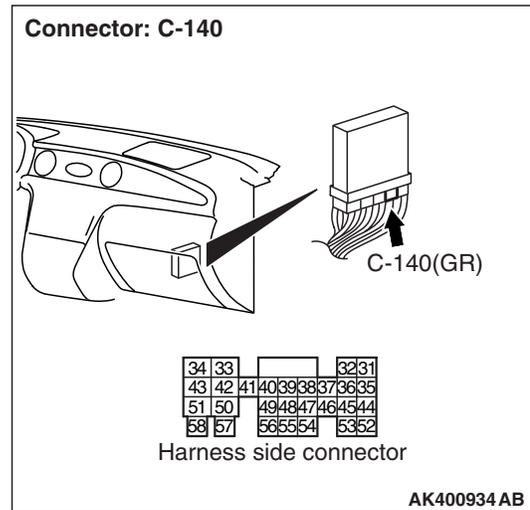


- Check output line for damage.

Q: Is the check result normal?

YES : Replace power steering fluid pressure switch.
NO : Repair.

STEP 11. Connector check: C-140 engine-ECU connector

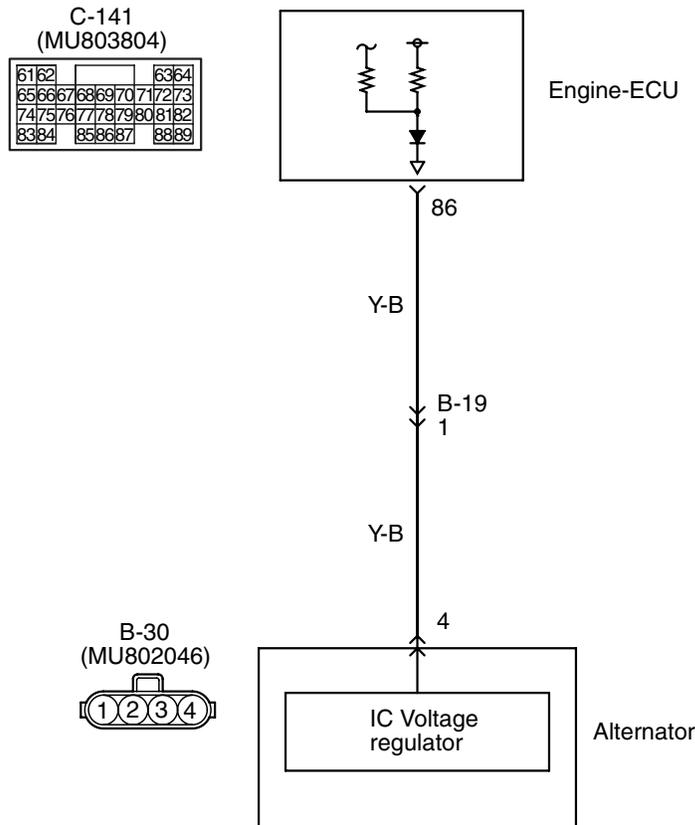


Q: Is the check result normal?

YES : Go to Step 7 .
NO : Repair or replace.

Code No. P0622: Alternator FR Terminal System

Alternator FR terminal 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

AK400819 AB

OPERATION

- The energized state of the alternator field coil is inputted from the alternator (terminal No. 4) to the engine-ECU (terminal No. 86).

FUNCTION

- A signal of the power supply duty ratio for the alternator field coil is inputted to the engine-ECU.
- In response to the signal, the engine-ECU detects the alternator output current and controls the idling speed according to the output current (electric load).

TROUBLE JUDGMENT

Check Condition

- Engine speed is 50 r/min or more.

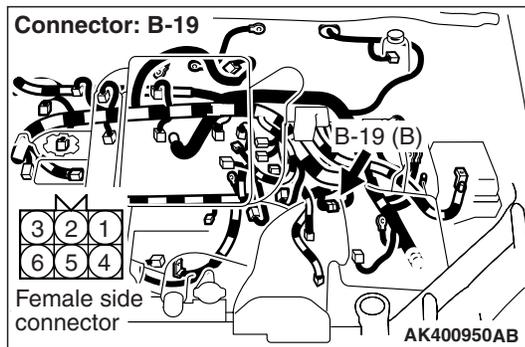
Judgment Criterion

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

PROBABLE CAUSE

- Open circuit in alternator FR terminal circuit
- Failed engine-ECU

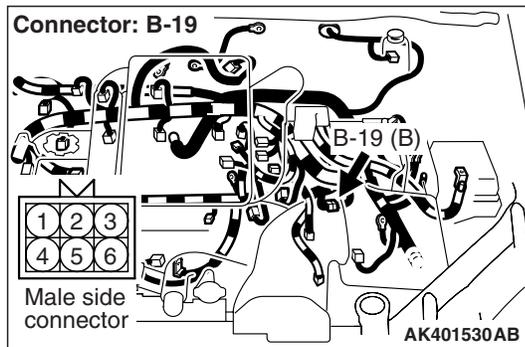
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-19 intermediate connector

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform voltage measurement at B-19 intermediate connector.

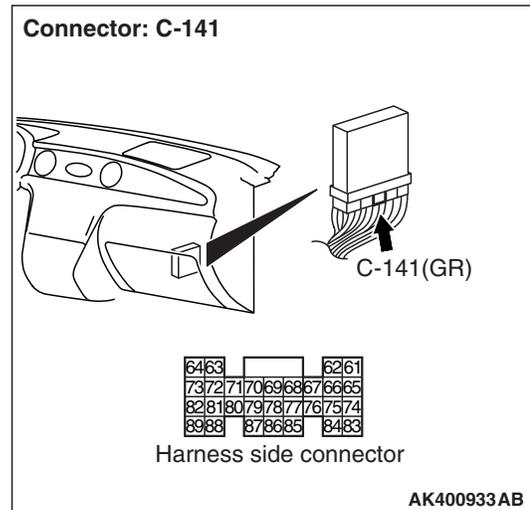
- Disconnect connector, and measure at male connector side.
- Ignition switch: "ON"
- Voltage between terminal No. 1 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Go to Step 3 .

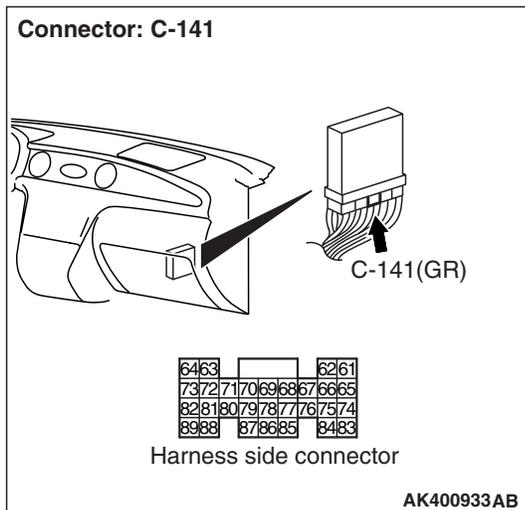
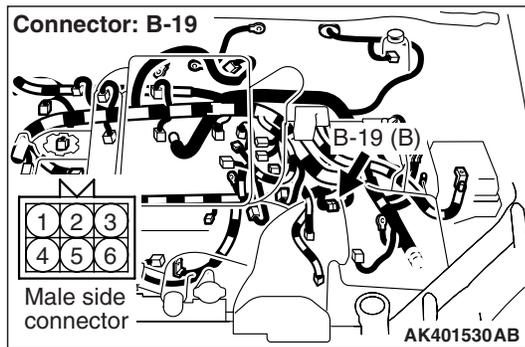
STEP 3. Connector check: C-141 engine-ECU connector

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between B-19 (terminal No. 1) intermediate connector and C-141 (terminal No. 86) engine-ECU connector.



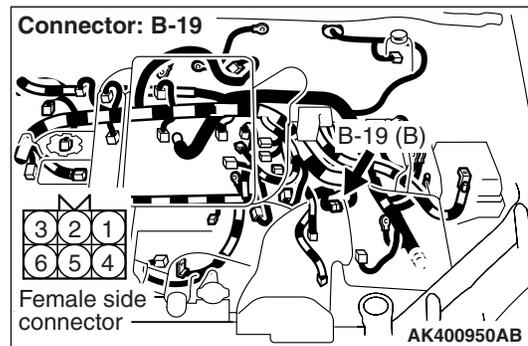
- Check output line for short circuit.

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

STEP 5. Check the trouble symptoms.

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

STEP 6. Perform voltage measurement at B-19 intermediate connector.

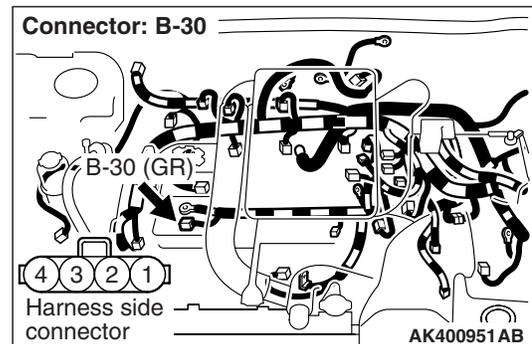


- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Ignition switch: "ON"
- Voltage between terminal No. 1 and earth.

OK: System voltage

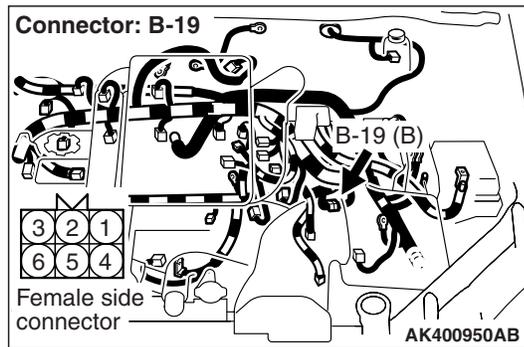
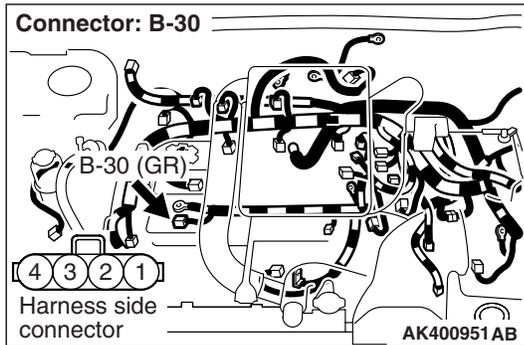
Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 7 .

STEP 7. Connector check: B-30 alternator connector



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

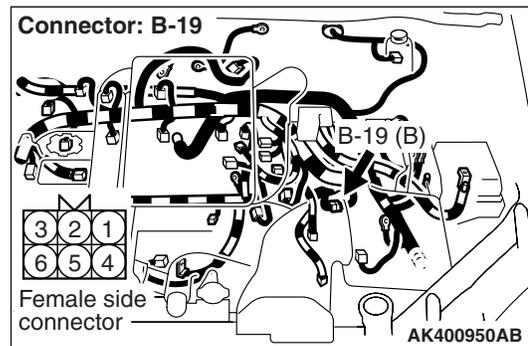
STEP 8. Check harness between B-30 (terminal No. 4) alternator connector and B-19 (terminal No. 1) intermediate connector.



- Check output line for short circuit.

Q: Is the check result normal?
YES : Replace alternator.
NO : Repair.

STEP 9. Perform voltage measurement at B-19 intermediate connector.

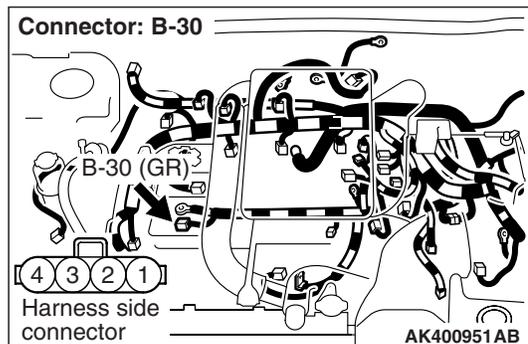


- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Engine: Idle after warm-up
- Transmission: Neutral
- Radiator fan: Inactive
- Voltage between terminal No. 1 and earth.

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

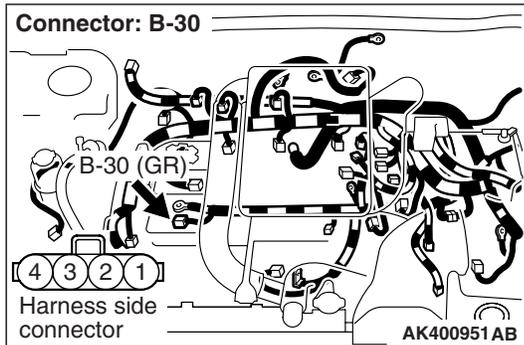
Q: Is the check result normal?
YES : Go to Step 5 .
NO : Go to Step 10 .

STEP 10. Connector check: B-30 alternator connector

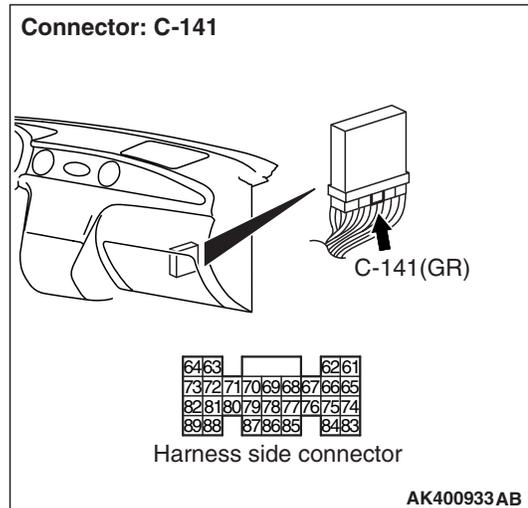
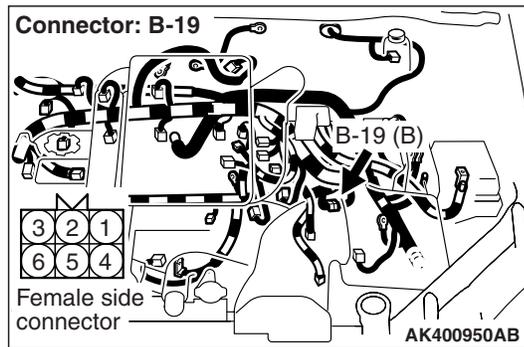
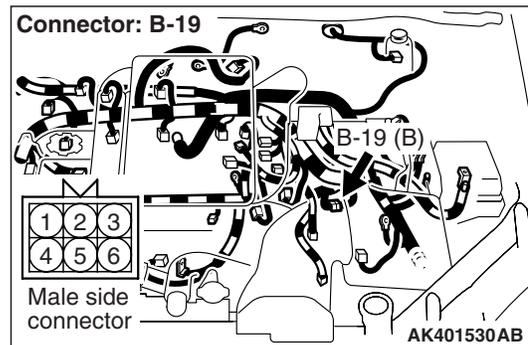


Q: Is the check result normal?
YES : Go to Step 11 .
NO : Repair or replace.

STEP 11. Check harness between B-30 (terminal No. 4) alternator connector and B-19 (terminal No. 1) intermediate connector.



STEP 12. Check harness between B-19 (terminal No. 1) intermediate connector and C-141 (terminal No. 86) engine-ECU connector.



- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

STEP 13. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace alternator.

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

DTC P0638: Throttle Valve Control Servo Circuit Range/Performance Problem**OPERATION**

- Refer to P2101 – Throttle valve control servo circuit P.13B-210.

FUNCTION

- engine-ECU 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.

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

- Refer to Data list reference table P.13B-368.
 - 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.

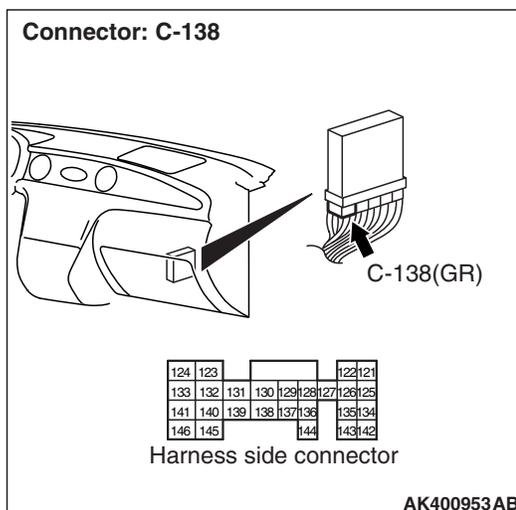
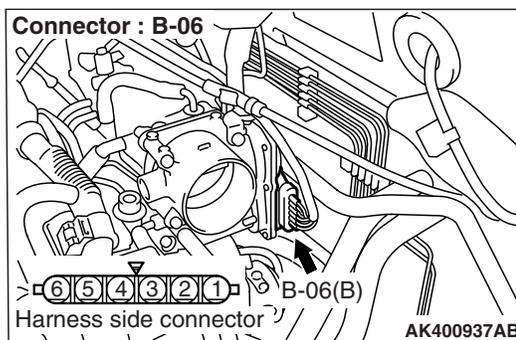
STEP 2. Check the throttle valve control servo itself.

- 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 .

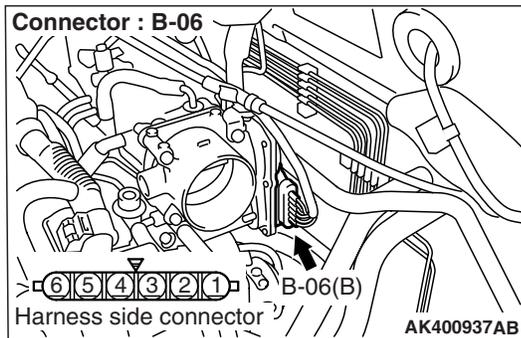
NO : Replace electronically controlled throttle valve.

STEP 3. Connector check: B-06 electronically controlled throttle valve connector and C-138 engine-ECU connector**Q: Is the check result normal?**

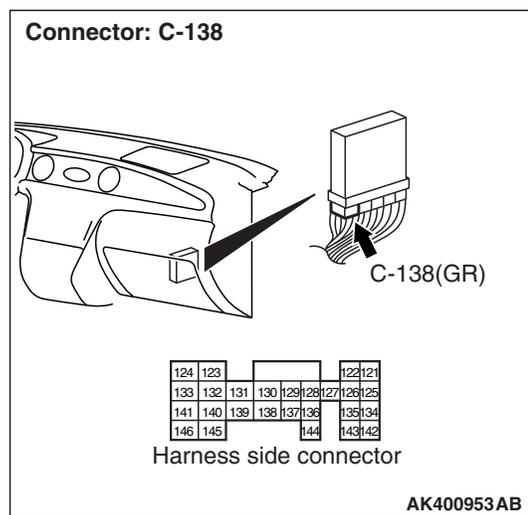
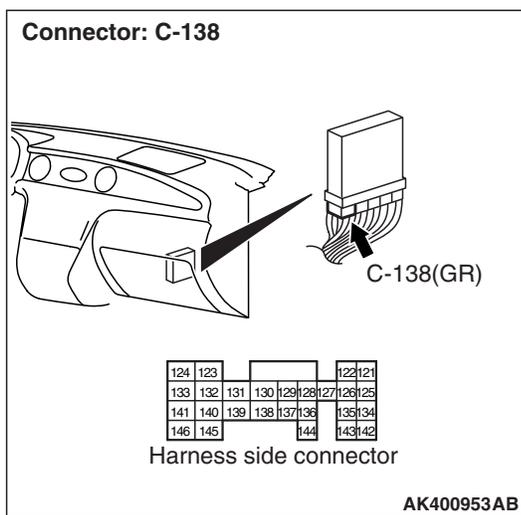
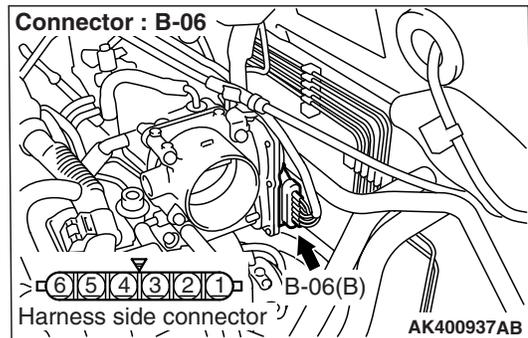
YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between B-06 (terminal No. 6) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU connector.



STEP 5. Check harness between B-06 (terminal No. 5) electronically controlled throttle valve connector and C-138 (terminal No. 141) engine-ECU connector.



- Check output line for short circuit and damage.

Q: Is the check result normal?

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

- 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.
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 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

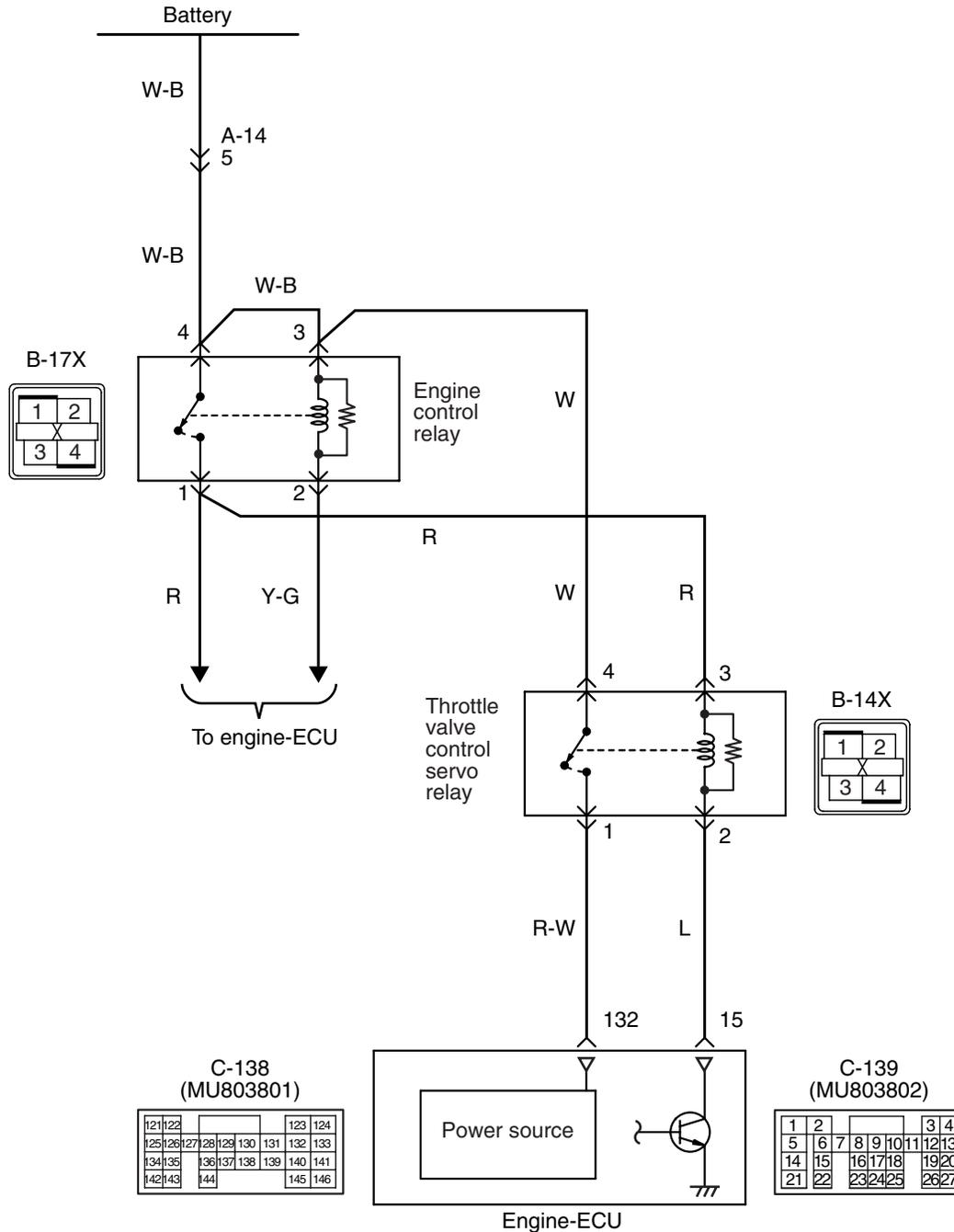
- Failed engine-ECU

DIAGNOSIS

STEP 1. Check the trouble symptoms.**Q: Does trouble symptom persist?****YES** : Replace engine-ECU.**NO** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

DTC P0657: Throttle Valve Control Servo Relay Circuit Malfunction

Throttle valve control servo 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: Grey
R: Red P: Pink V: Violet

AK400820AB

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 (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 (terminal No. 132).

FUNCTION

- When the ignition switch ON signal is input into the engine-ECU, the engine-ECU turns ON the Throttle valve control servo.

TROUBLE JUDGMENT

Check Condition

- Ignition switch is in "ON" position.

Judgement Criteria

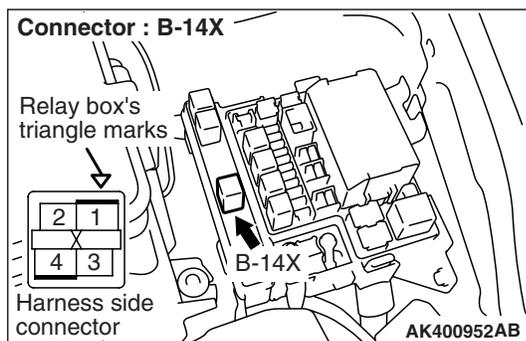
- The power line voltage of the electronic controlled throttle system is 4.0 V or less for 1 second.

PROBALE CAUSE

- Failed throttle valve return spring
- Open/short circuit in throttle valve control servo circuit or loose connector contact.
- Failed engine-ECU

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 or replace.

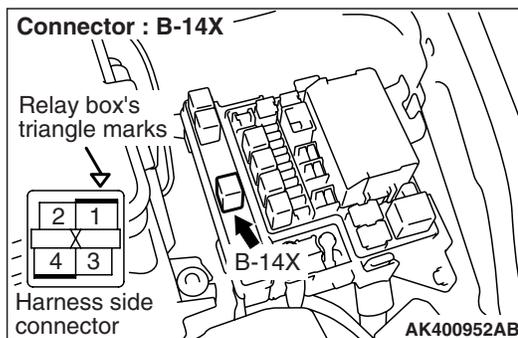
STEP 2. Check throttle valve control servo relay itself.

- 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

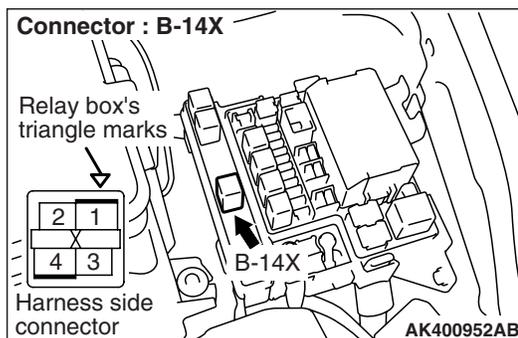
Q: Is the check result normal?

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.



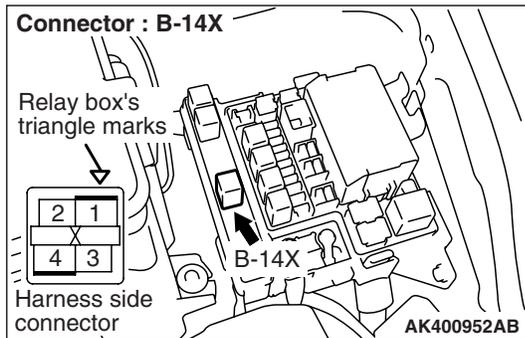
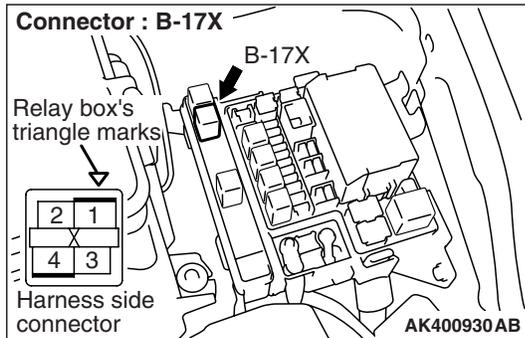
- Remove relay, and measure at relay box side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

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



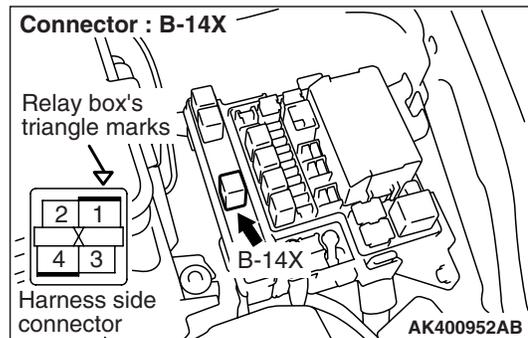
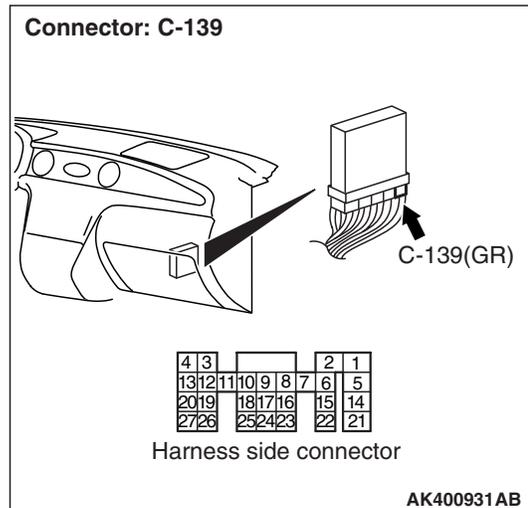
Q: Is the check result normal?

YES : Check 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 or replace.

STEP 6. Perform voltage measurement at C-139 engine-ECU connector.



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

OK: System voltage

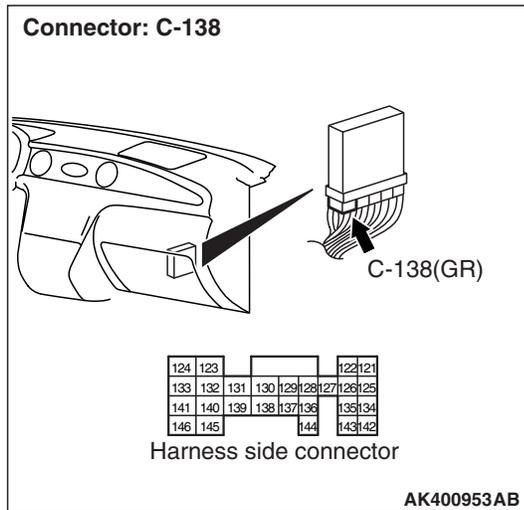
Q: Is the check result normal?

YES : Check and repair harness between B-14X (terminal No. 2) throttle valve control servo relay connector and C-139 (terminal No. 15) engine-ECU connector.

- Check earthing line for open/short circuit.

NO : Go to Step 7 .

STEP 7. Perform voltage measurement at C-138 engine-ECU connector.



- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 132 and earth.

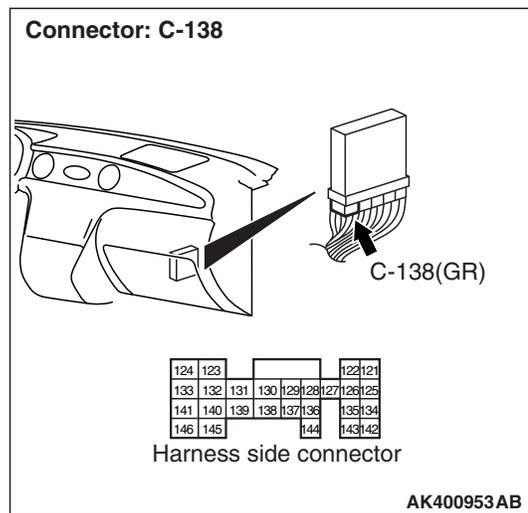
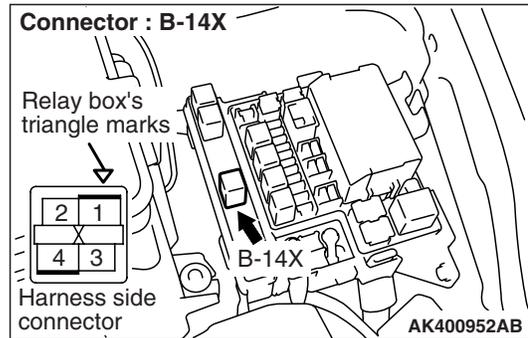
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 8 .

STEP 8. Check harness between B-14X (terminal No. 1) throttle valve control servo relay connector and C-138 (terminal No. 132) engine-ECU connector.



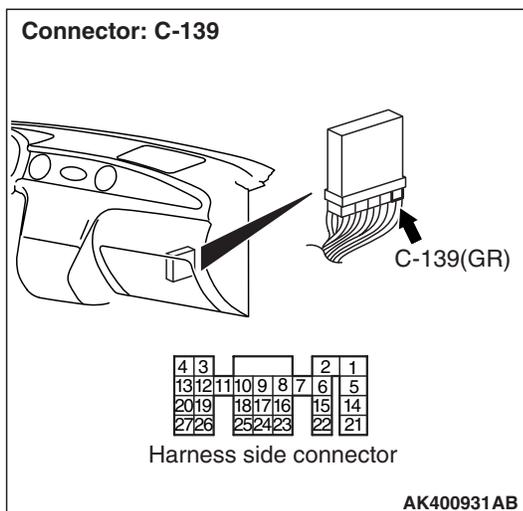
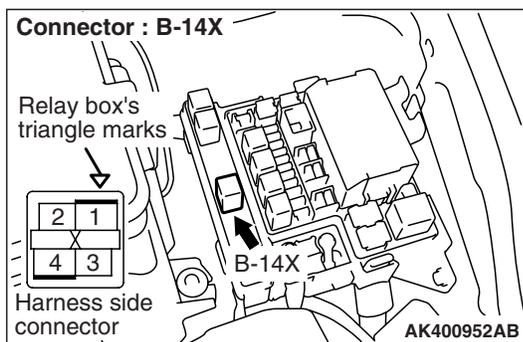
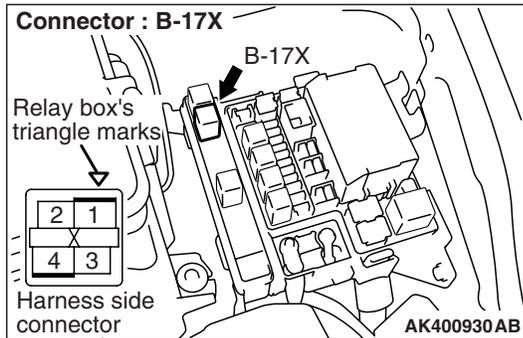
- Check output line for open/short circuit.

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.



- Check output line for damage.

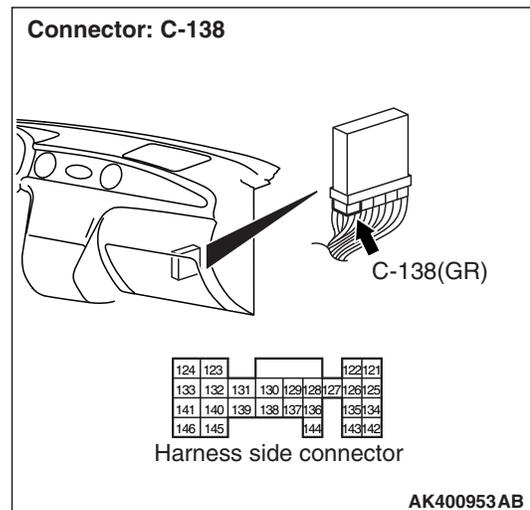
Q: Is the check result normal?

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 connector.

- Check earthing line for open/short circuit.

NO : Repair.

STEP 10. Connector check: C-138 engine-ECU connector

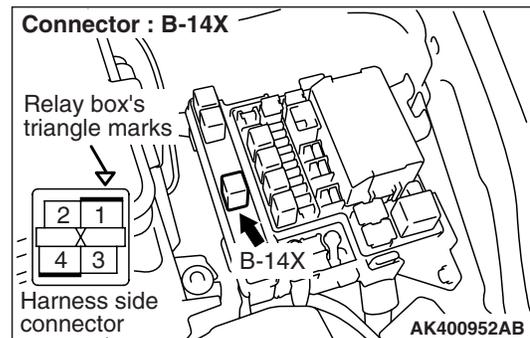


Q: Is the check result normal?

YES : Go to Step 11 .

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

STEP 11. Check and repair harness between B-14X (terminal No. 4) throttle valve control servo relay connector and battery.



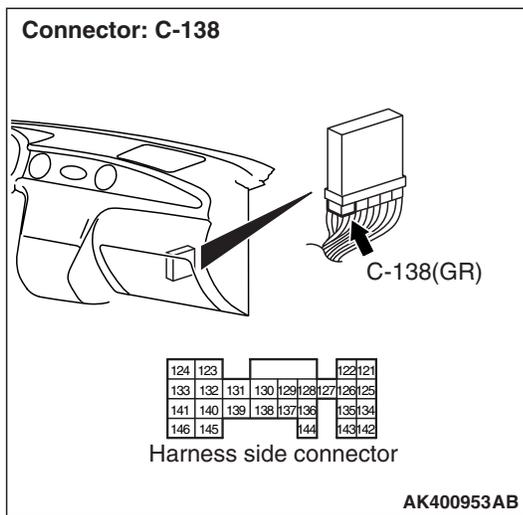
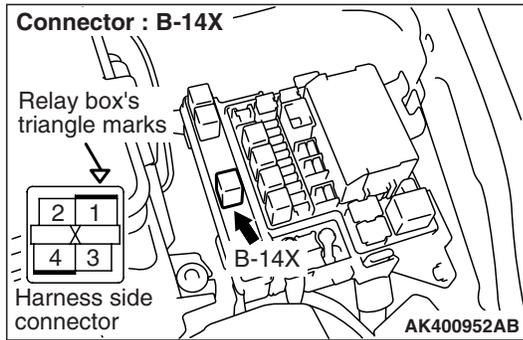
- Check power supply line for damage.

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).

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 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.

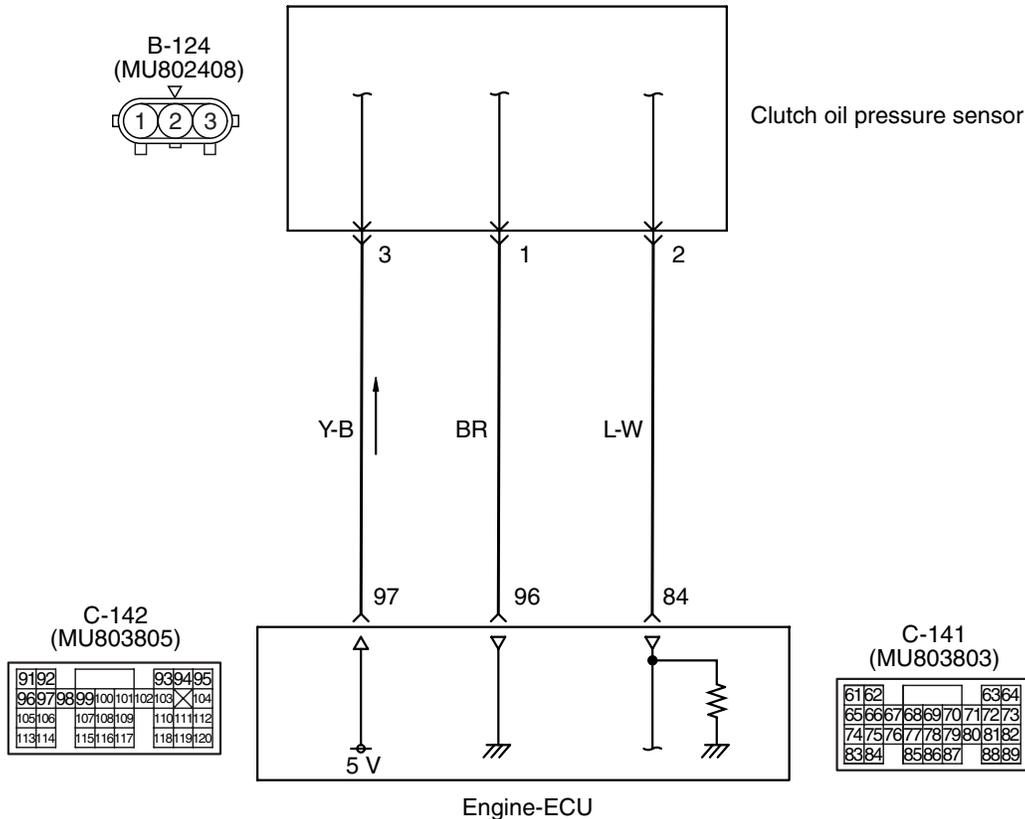
Q: Does trouble symptom persist?

YES : Replace engine-ECU.

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

Code No. P0805: Clutch Oil Pressure Sensor System

Clutch oil 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

AK400916AB

OPERATION

- A power voltage of 5 V is applied to the clutch oil pressure sensor power terminal (terminal No. 3) from the engine-ECU (terminal No. 97) and earthed to the engine-ECU (terminal No. 96) from the clutch oil pressure sensor (terminal No. 2)
- The sensor signal is inputted to the engine-ECU (terminal No. 101) from the clutch position sensor output terminal (terminal No. 1).

FUNCTION

- The clutch oil pressure sensor converts the clutch position into a voltage signal and inputs the signal to the engine-ECU.
- In response to the signal, the engine-ECU corrects the fuel injection amount, etc.

TROUBLE JUDGMENT

Check Condition

- Ignition switch: ON
- Engine speed of 50 r/min or more.

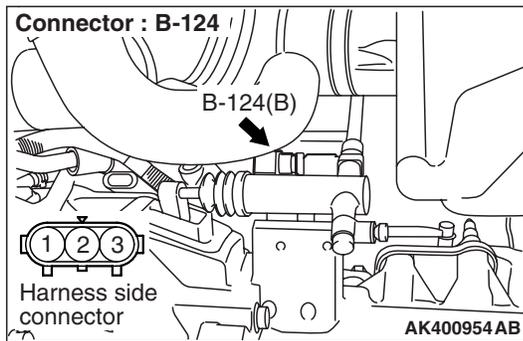
Judgment Criterion

- The misjudgment for the clutch connecting/disconnecting is not detected at all.

PROBABLE CAUSE

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

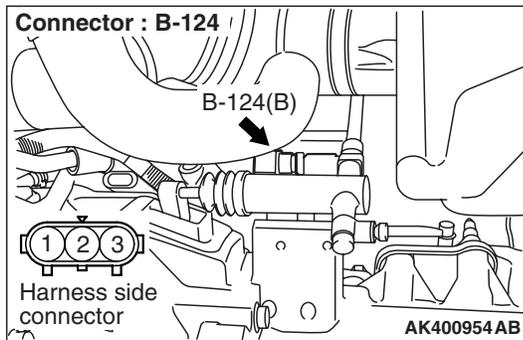
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-124 clutch oil pressure sensor connector.

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform voltage measurement at B-124 clutch oil pressure sensor connector.

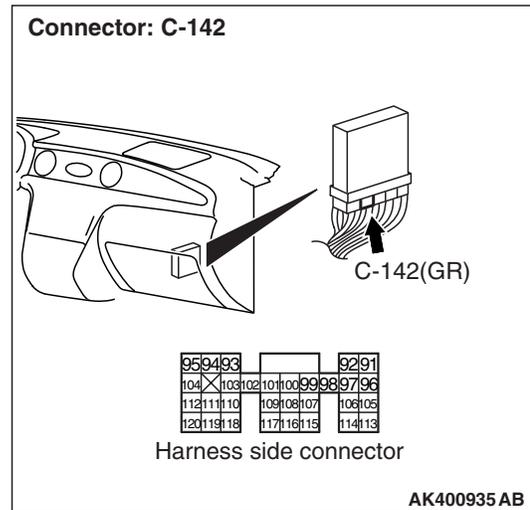
- Disconnect and measure at harness side.
- Ignition switch: ON.
- Voltage between terminal No. 3 and earth.

OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 3 .

STEP 3. Perform voltage measurement at C-142 engine-ECU connector.

- Measure engine-ECU terminal voltage.
- Ignition switch: ON.
- Voltage between terminal No. 97 and earth.

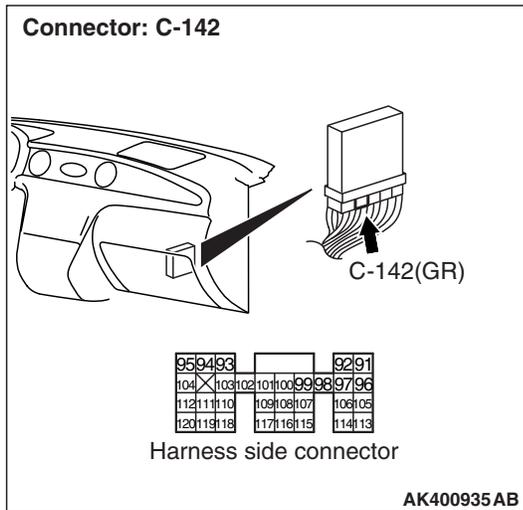
OK: 4.9 – 5.1 V

Q: Is the check result normal?

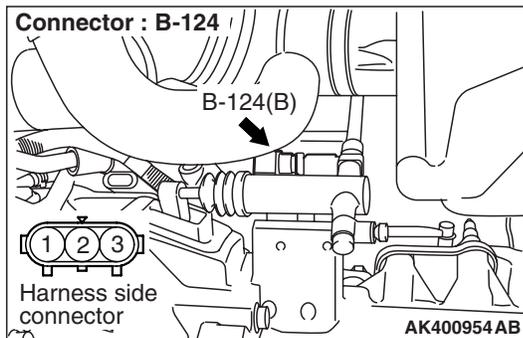
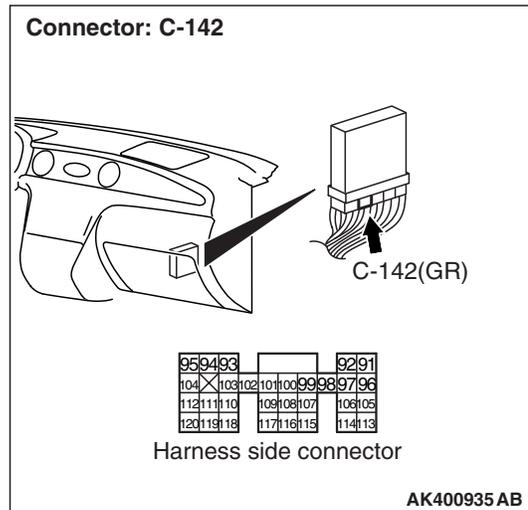
YES : Go to Step 4 .

NO : Go to Step 5 .

STEP 4. Connector check: C-142 engine-ECU connector



STEP 5. Connector check: C-142 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 6 .

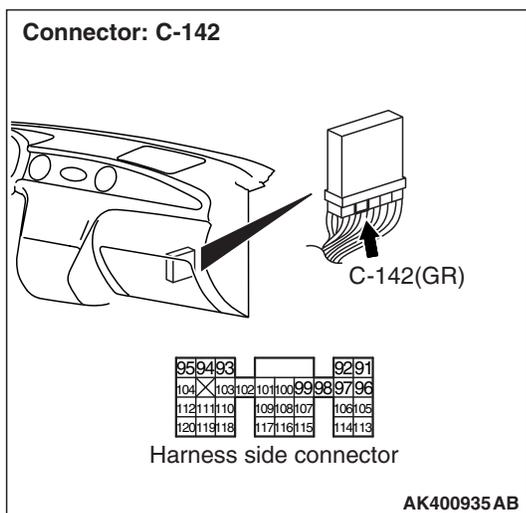
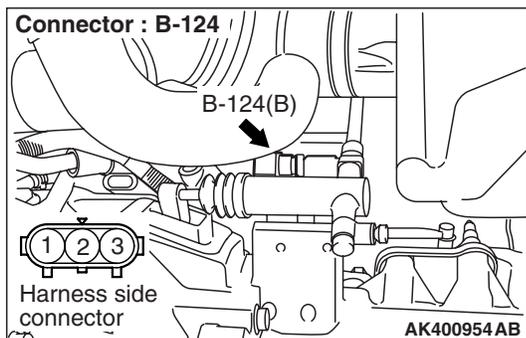
NO : Repair or replace.

Q: Is the check result normal?

YES : Check and repair harness between B-124 (terminal No. 3) clutch oil pressure sensor connector and C-142 (terminal No. 97) engine-ECU connector.

NO : Repair or replace.

STEP 6. Check harness between B-124 (terminal No. 3) clutch oil pressure sensor connector and C-142 (terminal No. 97) engine-ECU connector.



- Check power supply line for short circuit.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

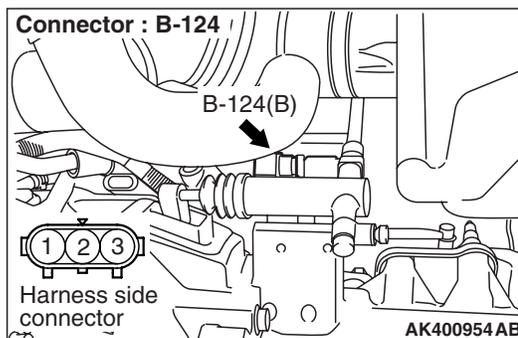
STEP 7. Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU.

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

STEP 8. Perform resistance measurement at B-124 clutch oil pressure sensor connector.



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

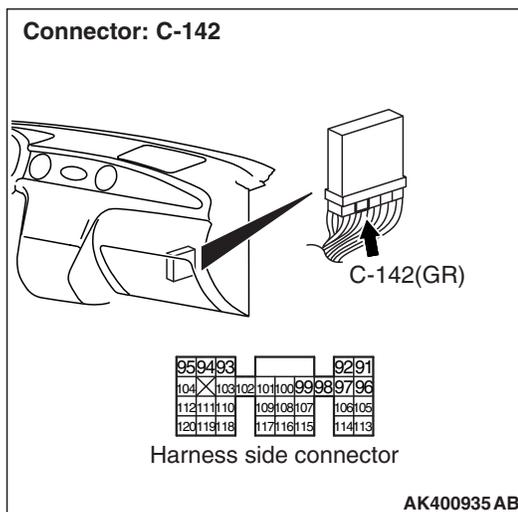
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 9 .

STEP 9. Connector check: C-142 engine-ECU connector

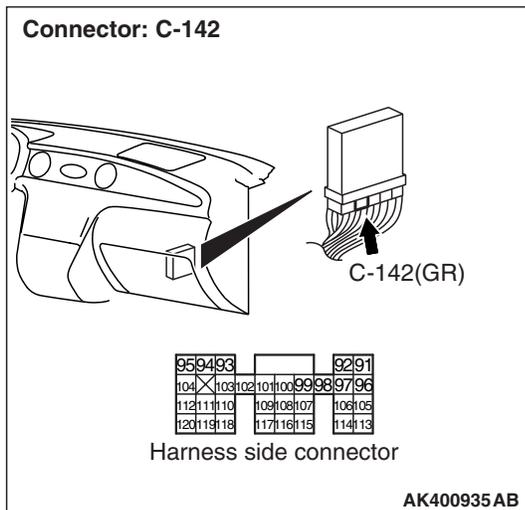
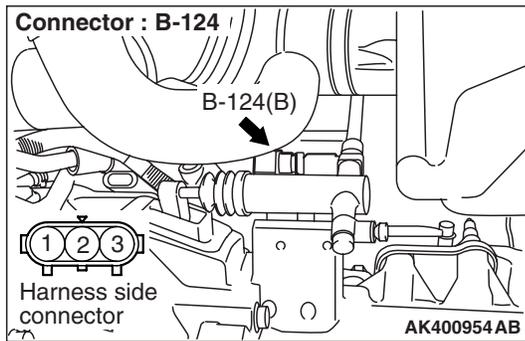


Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.

STEP 10. Check harness between B-124 (terminal No. 2) clutch oil pressure sensor connector and C-142 (terminal No. 96) engine-ECU connector.



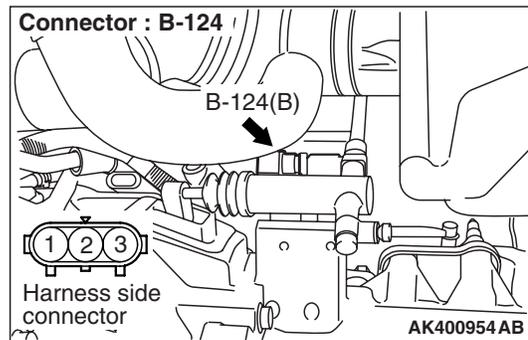
- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 11. Perform voltage measurement at B-124 clutch oil pressure sensor connector.



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

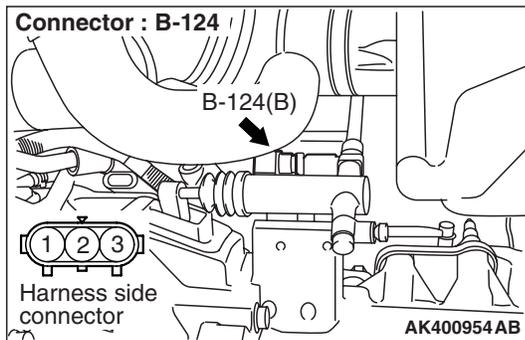
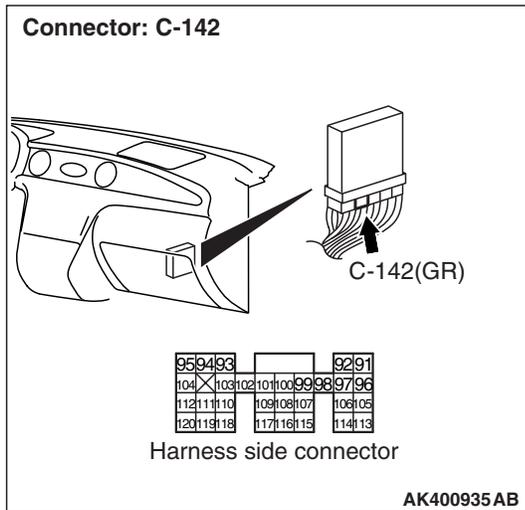
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 12 .

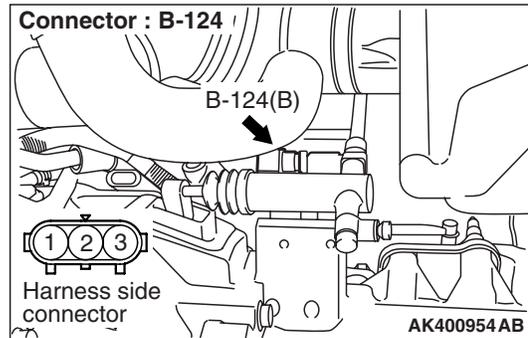
STEP 12. Connector check: C-142 engine-ECU connector.



Q: Is the check result normal?

- YES :**
- Check and repair harness between B-124 (terminal No. 3) clutch oil pressure sensor connector and C-142 (terminal No. 97) engine-ECU connector.
 - Check power supply line for damage.
- NO :** Repair or replace

STEP 13. Perform voltage measurement at B-124 clutch oil pressure sensor connector.



- Use special tool test harness (MB991658) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 2 and earth.

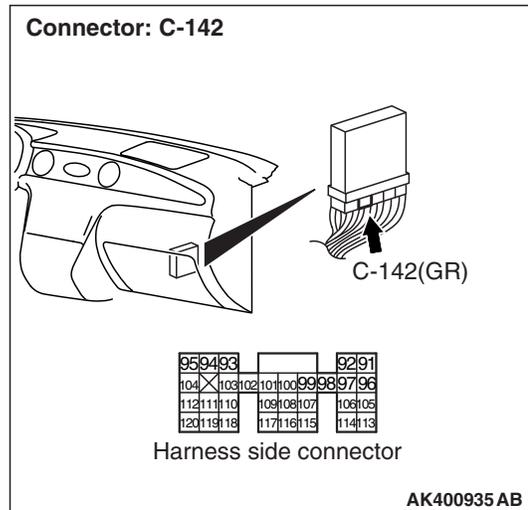
OK:

Release the clutch pedal: 1.3 V or less
Depress the clutch pedal: 1.9 V or more

Q: Is the check result normal?

- YES :** Go to Step 16 .
NO : Go to Step 14 .

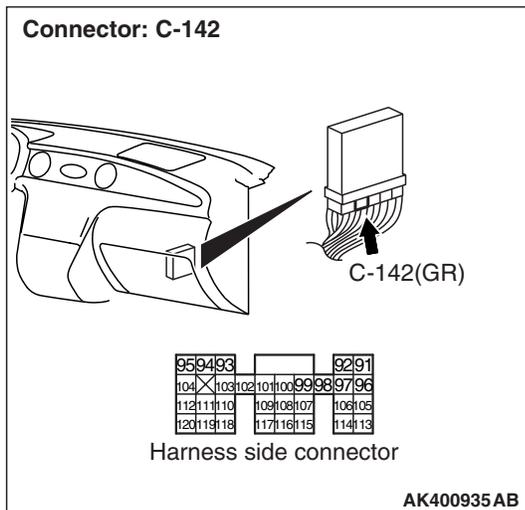
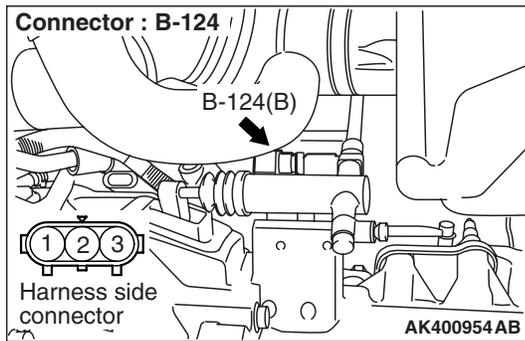
STEP 14. Connector check: C-142 engine-ECU connector.



Q: Is the check result normal?

- YES :** Go to Step 15 .
NO : Repair or replace.

STEP 15. Check harness between B-124 (terminal No. 2) clutch oil pressure sensor connector and C-142 (terminal No. 84) engine-ECU connector.



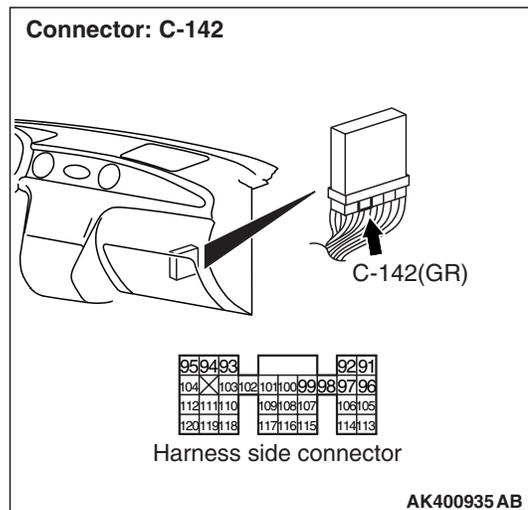
- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Replace clutch oil pressure sensor

NO : Repair.

STEP 16. Perform voltage measurement at C-142 engine-ECU connector.



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

OK:

Release the clutch pedal: 1.3 V or less

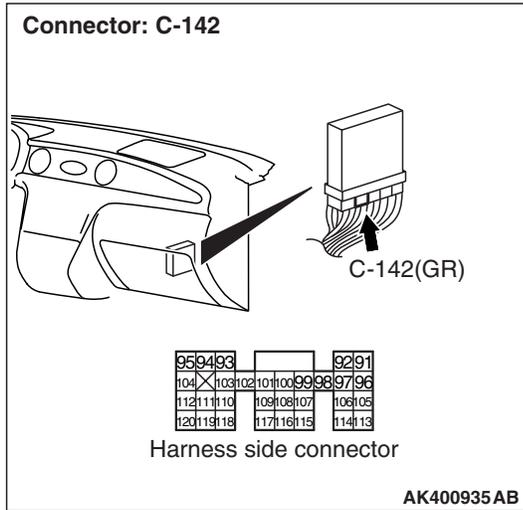
Depress the clutch pedal: 1.9 V or more

Q: Is the check result normal?

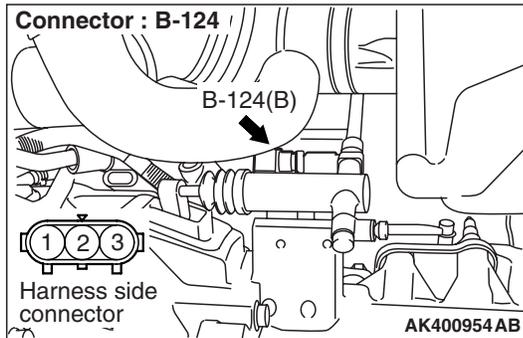
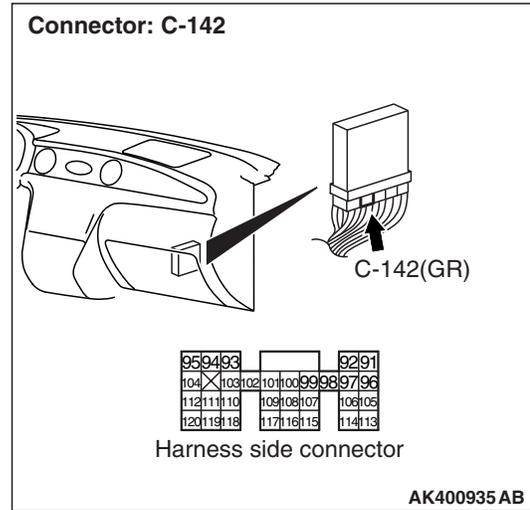
YES : Go to Step 18 .

NO : Go to Step 17 .

STEP 17. Connector check: C-142 engine-ECU connector.



STEP 18. Connector check: C-142 engine-ECU connector.



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

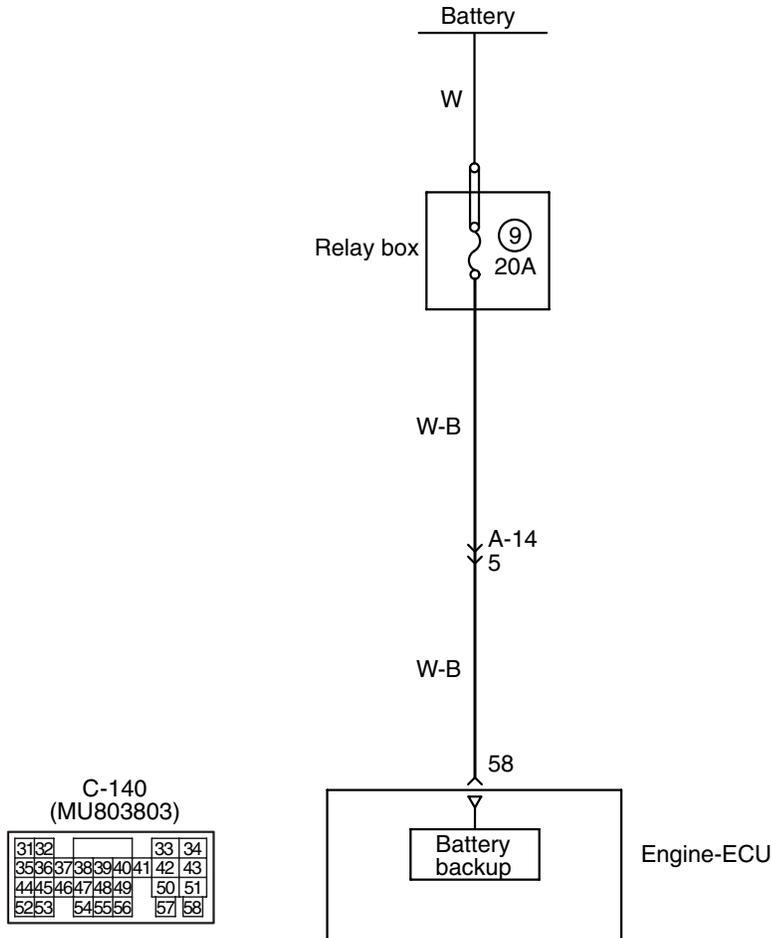
Q: Is the check result normal?
YES :

- Check and repair harness between B-124 (terminal No. 2) clutch oil pressure sensor connector and C-142 (terminal No. 84) engine-ECU connector.
- Check output line for open circuit and damage.

NO : Repair or replace

Code No. P1603: Battery Back-up Line System

Battery backup circuit



Wire colour code

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

AK400821AB

OPERATION

- Power is directly supplied to the engine-ECU (terminal No. 58) from the battery.

FUNCTION

- The engine-ECU is check the open circuit of battery back-up line.

TROUBLE JUDGMENT

Check Condition

- Ignition switch: "ON"

Judgment Criterion

- The battery back-up line voltage 6 V or less.

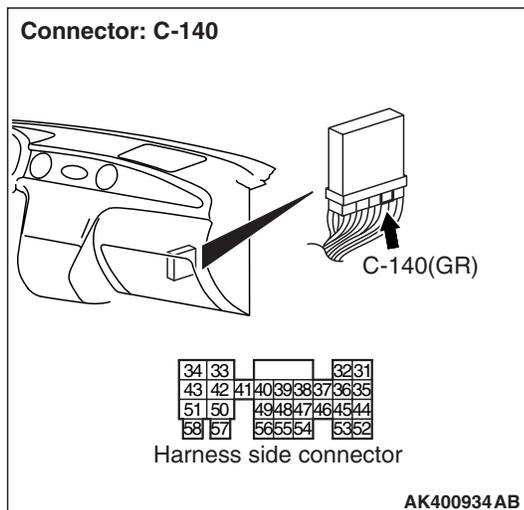
PROBABLE CAUSE

- Open/short circuit in battery back-up line circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

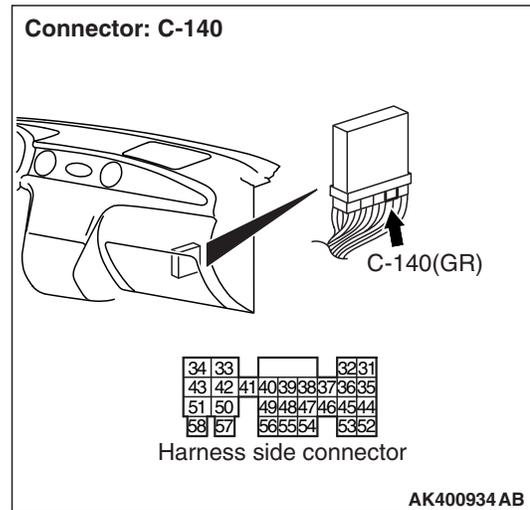
- Temporarily place the ignition switch in "LOCK" (OFF) position, and 10 seconds after that, place it in "ON" position again.

Q: Is the diagnosis code P1603 set?**YES** : Go to Step 2 .**NO** : Intermittent malfunction (Refer to GROUP 00 – How to use Troubleshooting/Inspection Service Points [P.00-6](#)).**STEP 2. Perform voltage measurement at C-140 engine-ECU connector.**

- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 58 and earth.

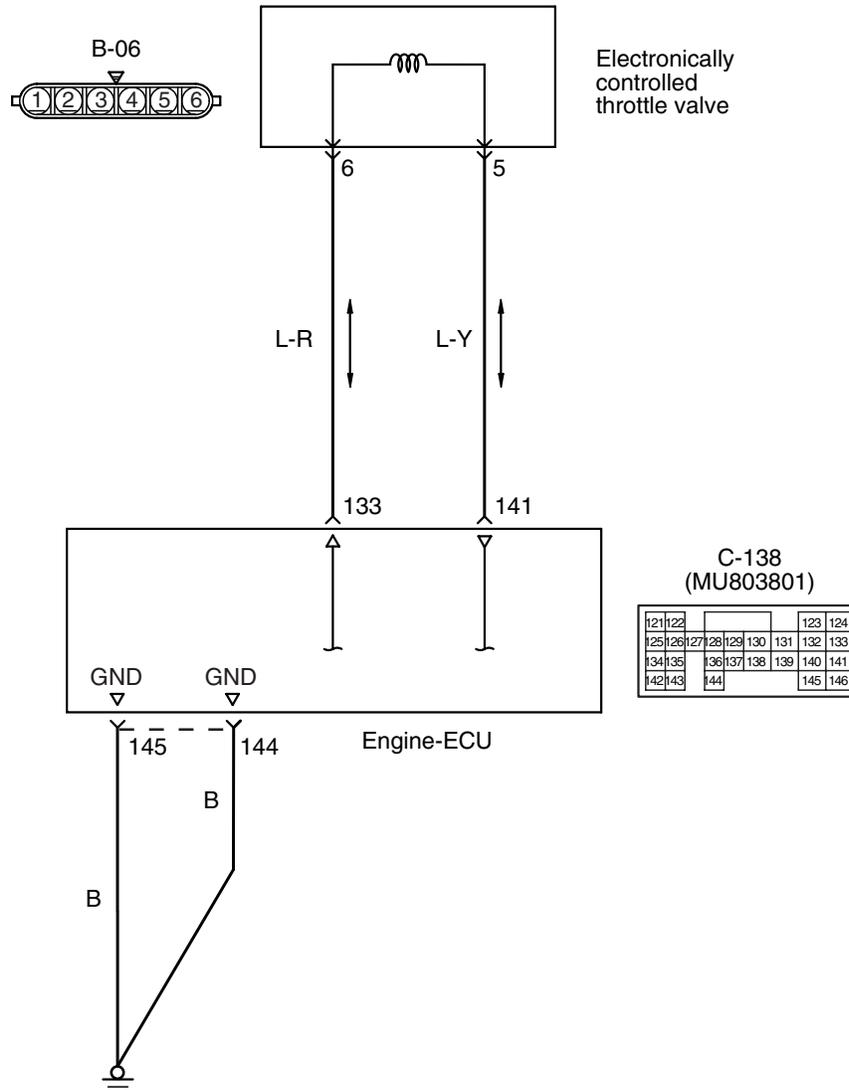
OK: System voltage**Q: Is the check result normal?****YES** : Go to Step 3 .**NO** : Check intermediate connector A-14, and repair if necessary. If intermediate connector is normal, check and repair harness between battery and C-140 (terminal No. 58) engine-ECU connector.

- Check power supply line for open/short circuit.

STEP 3. Connector check: C-140 engine-ECU connector**Q: Is the check result normal?****YES** : Go to Step 4 .**NO** : Repair or replace.**STEP 4. Check the trouble symptoms.****Q: Does trouble symptom persist?****YES** : Replace engine-ECU.**NO** : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).

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

AK304136AC

OPERATION

- Controls the current that is applied from the engine-ECU (terminals No. 133, No. 141) to the electronically controlled throttle valve (terminals No. 5, No. 6).

FUNCTION

- Engine-ECU 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

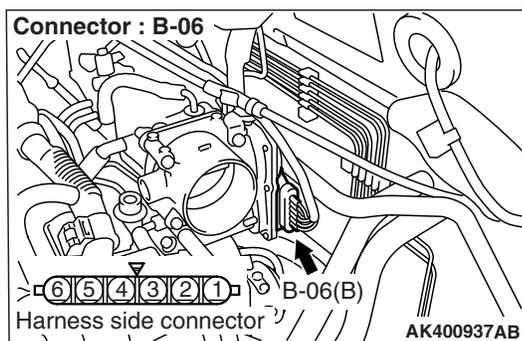
- Throttle actuator control motor current is 0.1 A or less for 0.72 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo circuit or lose connector contact.
- Failed engine-ECU

DIAGNOSIS PROCEDURE

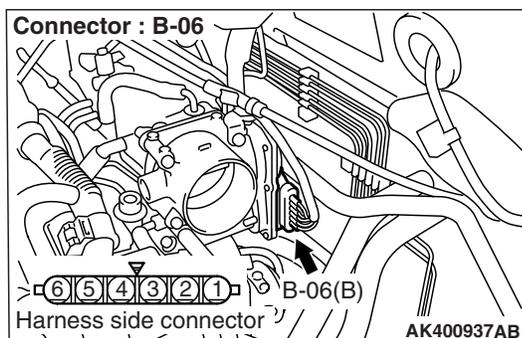
STEP 1. Connector check: B-06 electronically controlled throttle valve connector



Q: Is the check result normal?

- YES : Go to Step 2 .
NO : Repair or replace.

STEP 2. Perform resistance measurement at B-06 electronically controlled throttle valve connector.

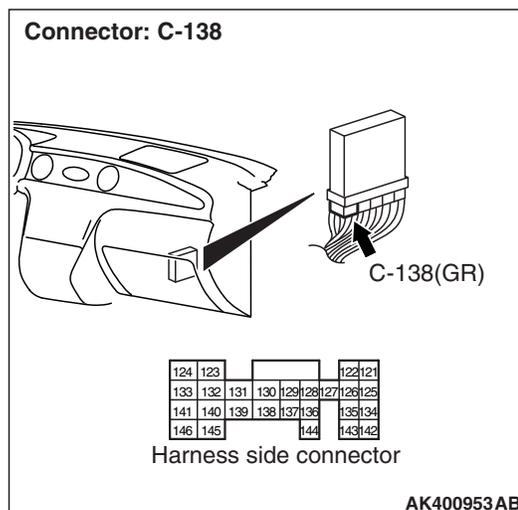


- Disconnect connector, and measure at electronically controlled throttle valve side.
- Resistance between terminal No. 5 and No. 6.
OK: 0.3 – 80 k Ω (at 20°C)

Q: Is the check result normal?

- YES : Go to Step 3 .
NO : Replace throttle body assembly.

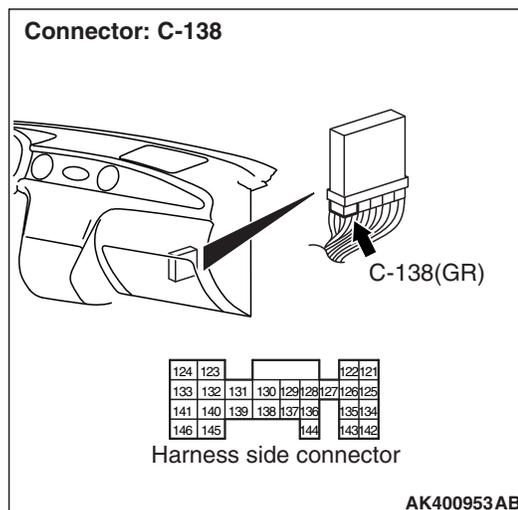
STEP 3. Connector check: C-138 engine-ECU connector



Q: Is the check result normal?

- YES : Go to Step 4 .
NO : Repair or replace.

STEP 4. Perform resistance measurement at C-138 engine-ECU connector.

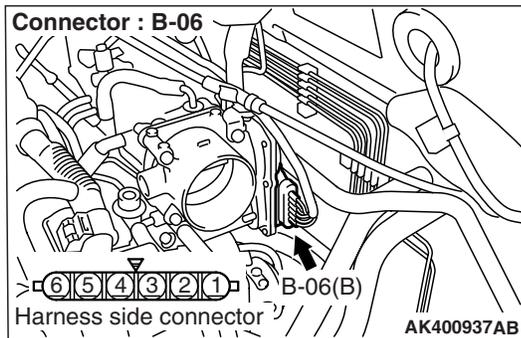


- Disconnect connector and measure at harness side.
- Resistance between terminal No. 144 and earth or terminal No. 145 and earth.
OK: Continuity (2 Ω or less)

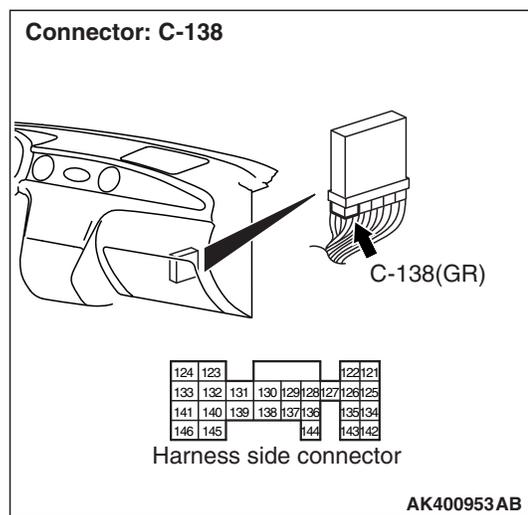
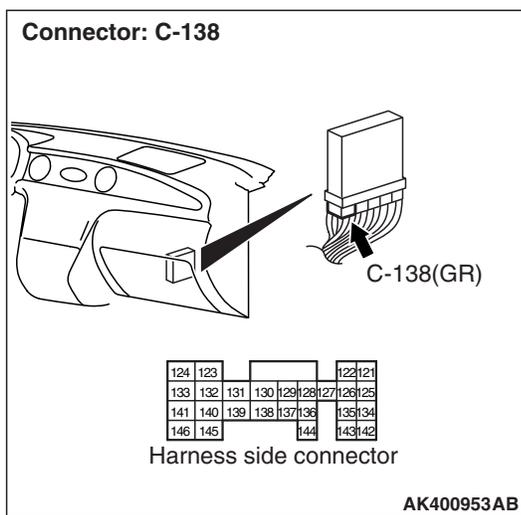
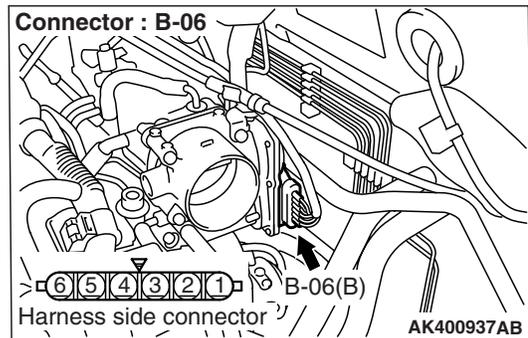
Q: Is the check result normal?

- YES : Go to Step 5 .
NO : Check harness between C-138 (terminal No. 144 or No. 145) engine-ECU and earth.

STEP 5. Check harness between B-06 (terminal No. 6) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU connector.



STEP 6. Check harness between B-06 (terminal No. 5) electronically controlled throttle valve connector and C-138 (terminal No. 141) engine-ECU connector.



- Check output line for short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6 .
NO : Repair.

- 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.

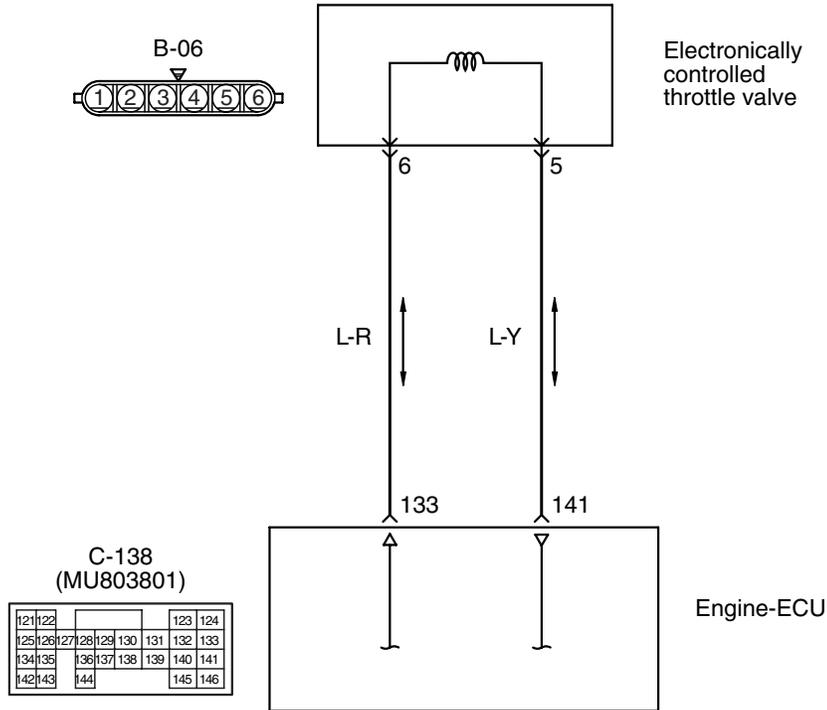
Q: Is the check result normal?

YES : Replace engine-ECU.

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



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

AK304137AE

OPERATION

- Controls the current that is applied from the engine-ECU (terminals No. 133, No. 141) to the electronically controlled throttle valve (terminals No. 5, No. 6).

FUNCTION

- Engine-ECU check whether the throttle valve control servo magneto failed.

TROUBLE JUDGMENT

Check Condition

- Battery positive voltage is 8.3 V or higher.

Judgement Criteria

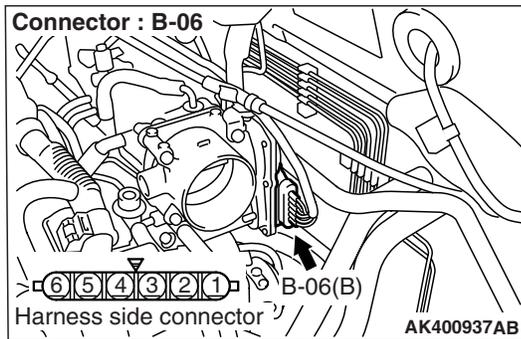
- The coil temperature of the throttle actuator control motor is 180°C or higher for 0.8 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Open/short circuit in throttle valve control servo circuit or lose connector contact.
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronically controlled throttle valve connector

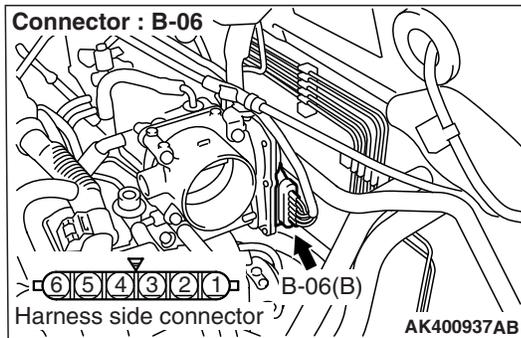


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

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. 5 and No. 6.

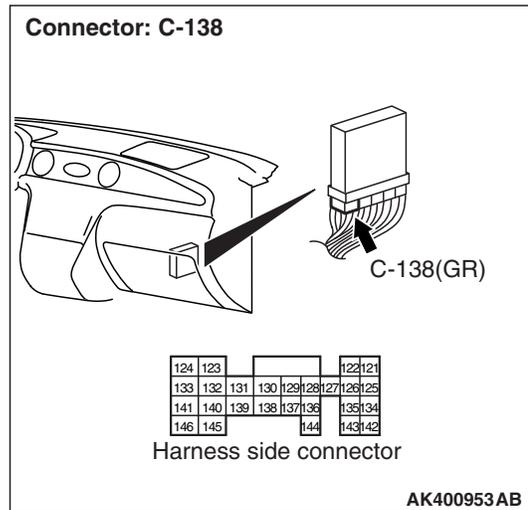
OK: 0.3 – 80 k Ω (at 20 °C)

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace throttle body assembly.

STEP 3. Connector check: C-138 engine-ECU connector

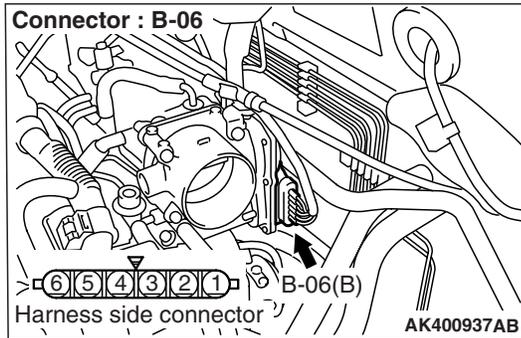


Q: Is the check result normal?

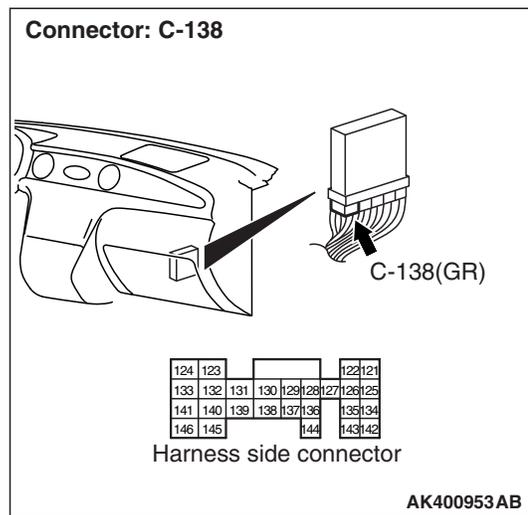
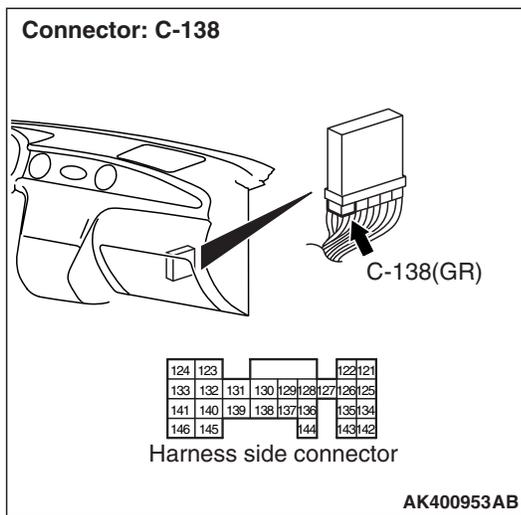
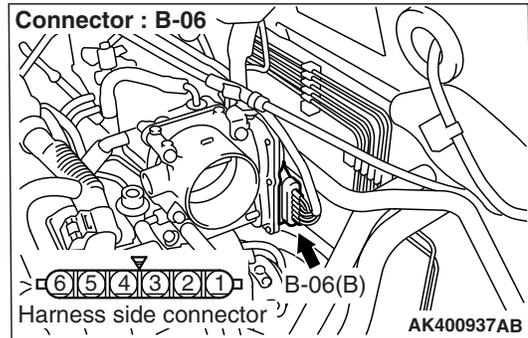
YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between B-06 (terminal No. 6) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU connector.



STEP 5. Check harness between B-06 (terminal No. 5) electronically controlled throttle valve connector and C-138 (terminal No. 141) engine-ECU connector.



- Check output line for short circuit and damage.

Q: Is the check result normal?

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

- Check output line for short circuit and damage.

Q: Is the check result normal?

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

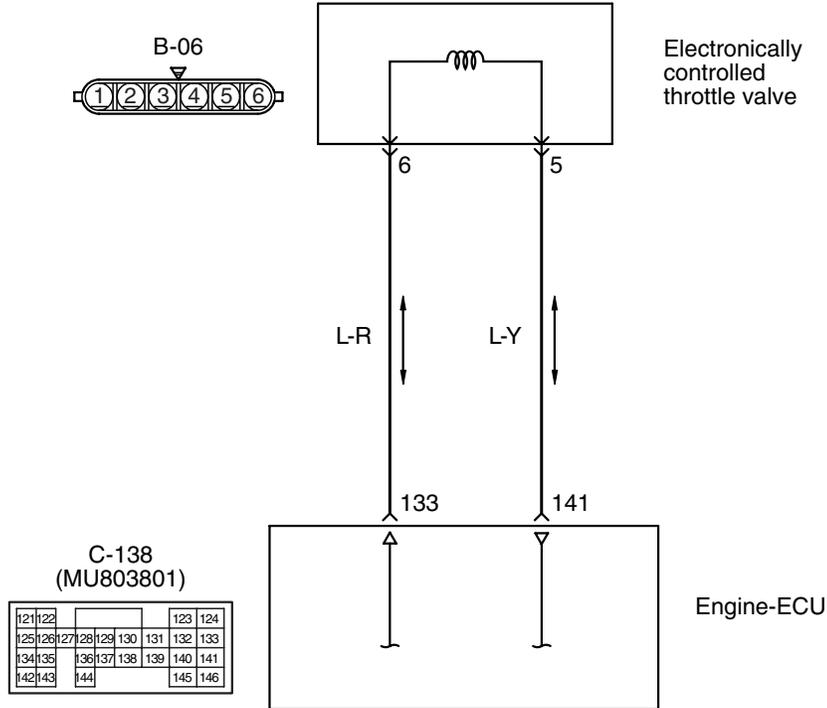
STEP 6. Check the trouble symptoms.

Q: Is the check result normal?

- YES :** Replace engine-ECU.
- 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

AK304137AE

OPERATION

- Controls the current that is applied from the engine-ECU (terminals No. 133, No. 141) to the electronically controlled throttle valve (terminals No. 5, No. 6).

FUNCTION

- Engine-ECU 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.

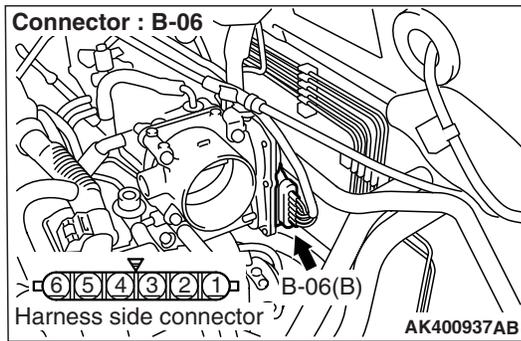
Judgement Criteria

- 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

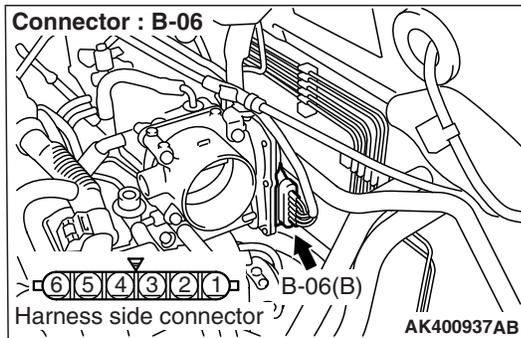
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronically controlled throttle valve connector

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Perform resistance measurement at B-06 electronically controlled throttle valve connector.

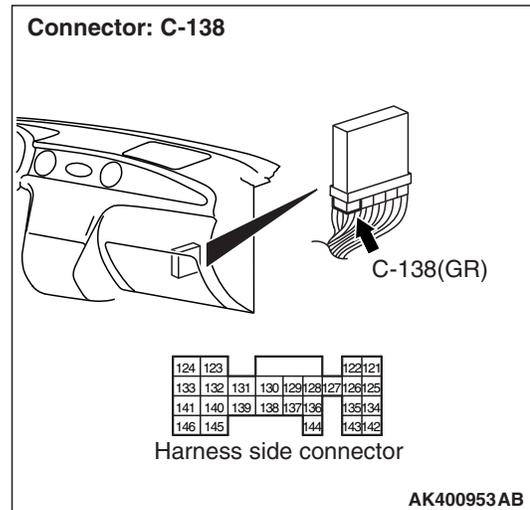
- Disconnect connector, and measure at electronically controlled throttle valve side.
- Resistance between terminal No. 5 and No. 6.

OK: 0.3 – 80 Ω (at 20 °C)

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace throttle body assembly.

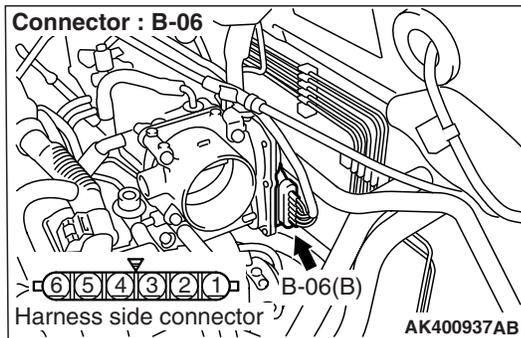
STEP 3. Connector check: C-138 engine-ECU connector

Q: Is the check result normal?

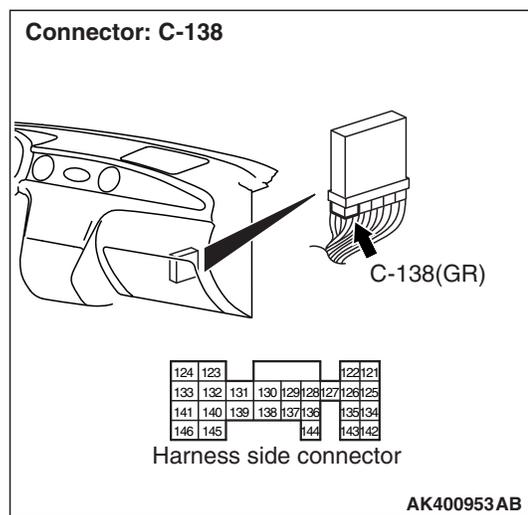
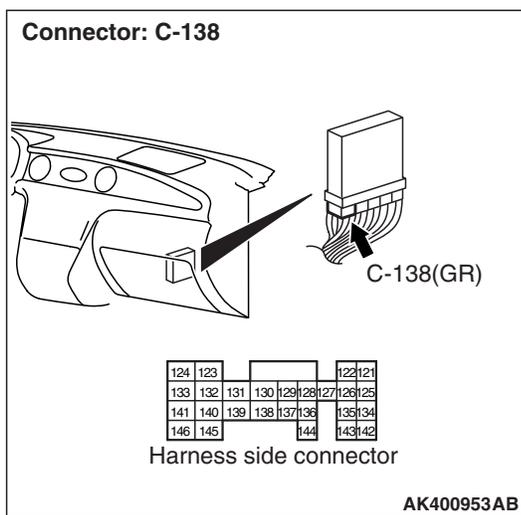
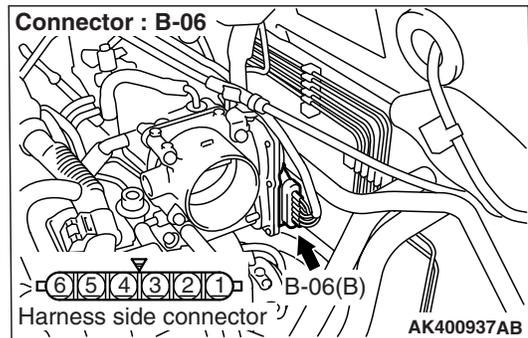
YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between B-06 (terminal No. 6) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU connector.



STEP 5. Check harness between B-06 (terminal No. 5) electronically controlled throttle valve connector and C-138 (terminal No. 141) engine-ECU 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.

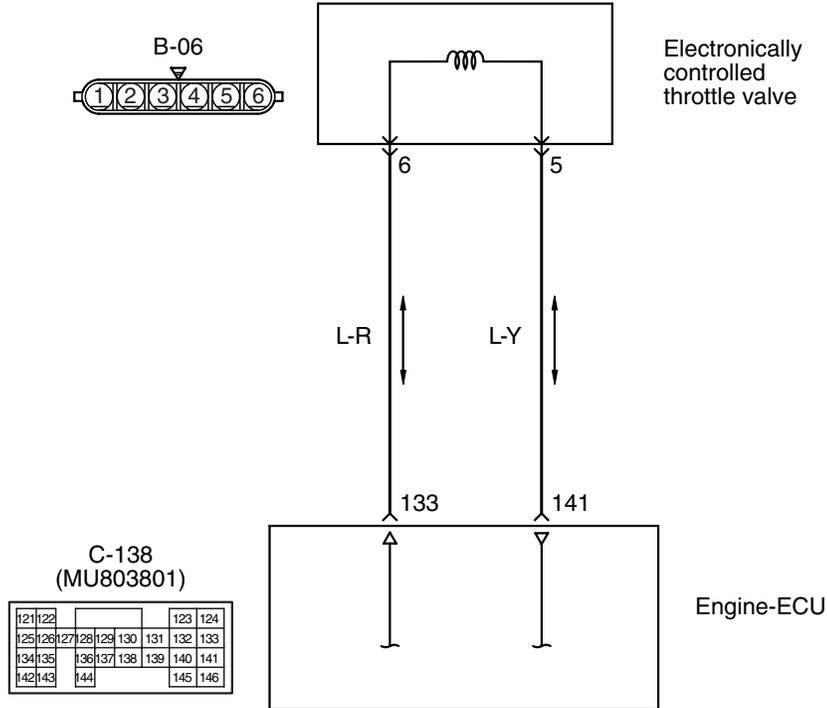
STEP 6. Check the trouble symptoms.

Q: Is the check result normal?

YES : Replace engine-ECU.
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

AK304137AE

OPERATION

- Controls the current that is applied from the engine-ECU (terminals No. 133, No. 141) to the electronically controlled throttle valve (terminals No. 5, No. 6).

FUNCTION

- Engine-ECU 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

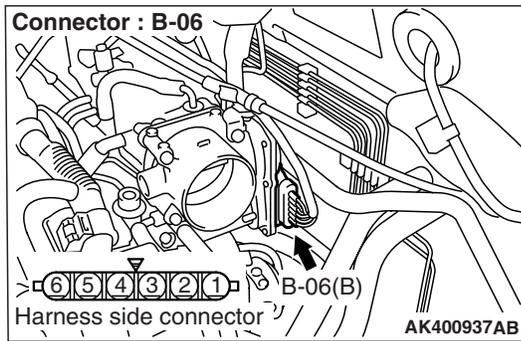
- Throttle actuator control motor current is 8 A or higher for 0.8 second.

PROBABLE CAUSE

- Failed throttle valve control servo.
- Short circuit in throttle valve control servo circuit or loose connector contact.
- Failed engine-ECU

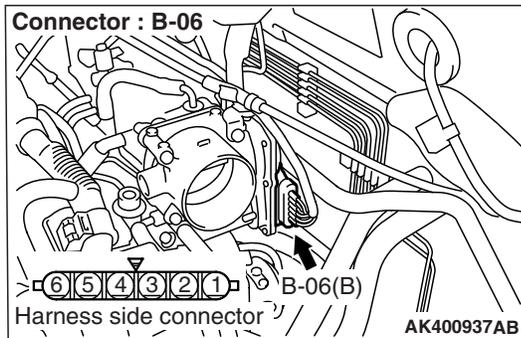
DIAGNOSIS PROCEDURE

STEP 1. Connector check: B-06 electronically controlled throttle valve connector



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

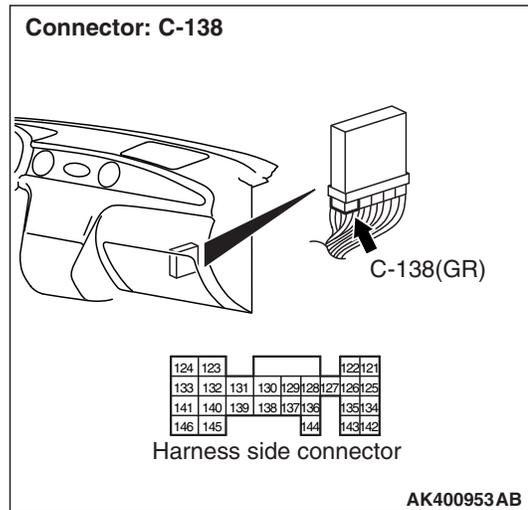
STEP 2. Perform resistance measurement at B-06 electronically controlled throttle valve connector.



- Disconnect connector, and measure at electronically controlled throttle valve side.
- Resistance between terminal No. 5 and No. 6.
OK: 0.3 – 80 Ω (at 20°C)

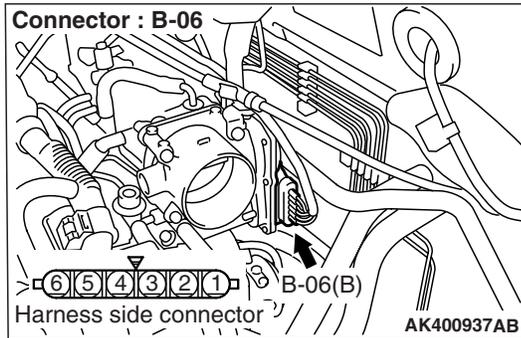
- Q: Is the check result normal?**
YES : Go to Step 3 .
NO : Replace the throttle body assembly.

STEP 3. Connector check: C-138 engine-ECU connector

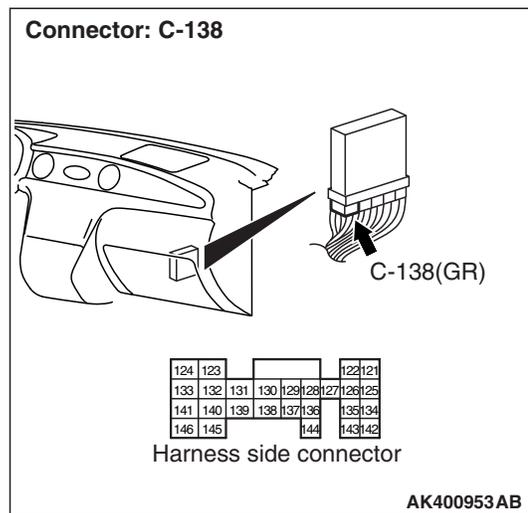
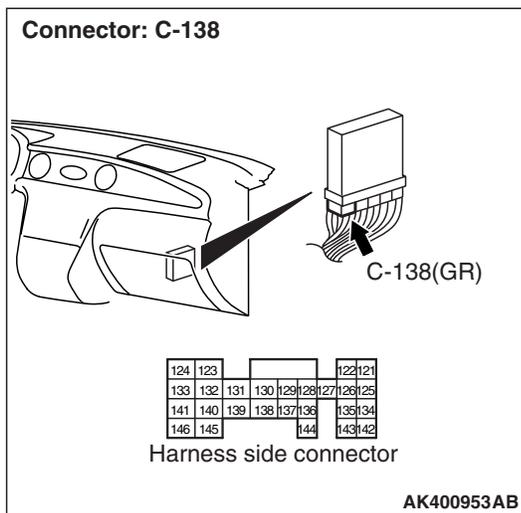
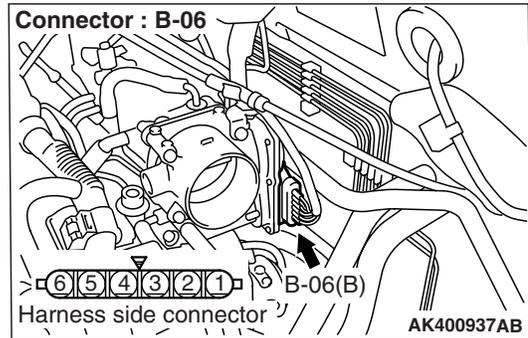


- Q: Is the check result normal?**
YES : Go to Step 4 .
NO : Repair or replace.

STEP 4. Check harness between B-06 (terminal No. 6) electronically controlled throttle valve connector and C-138 (terminal No. 133) engine-ECU connector.



STEP 5. Check harness between B-06 (terminal No. 5) electronically controlled throttle valve connector and C-138 (terminal No. 141) engine-ECU 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.
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.13B-222.
- Refer to inspection procedure 31 accelerator pedal position switch circuit P.13B-362.

FUNCTION

- Engine-ECU 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

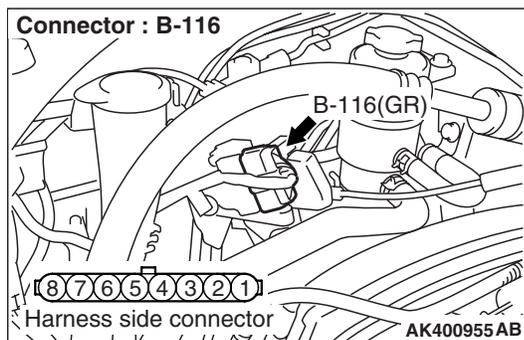
- Accelerator pedal position sensor (main) output voltage is 1.88 V or higher for 1 second.

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

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 or replace.

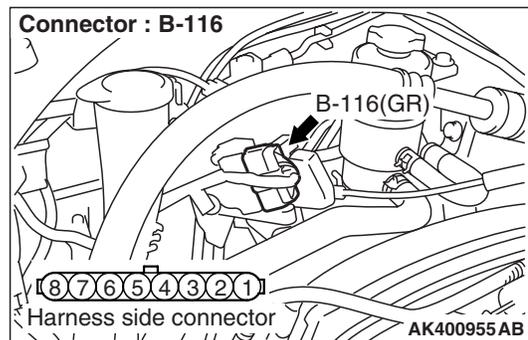
STEP 2. Check accelerator pedal position sensor itself.

- 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.



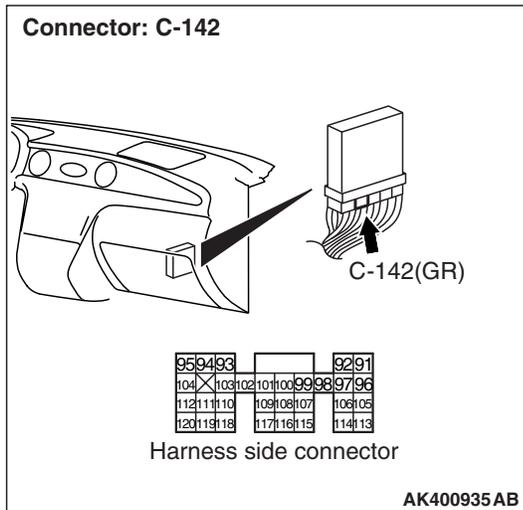
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

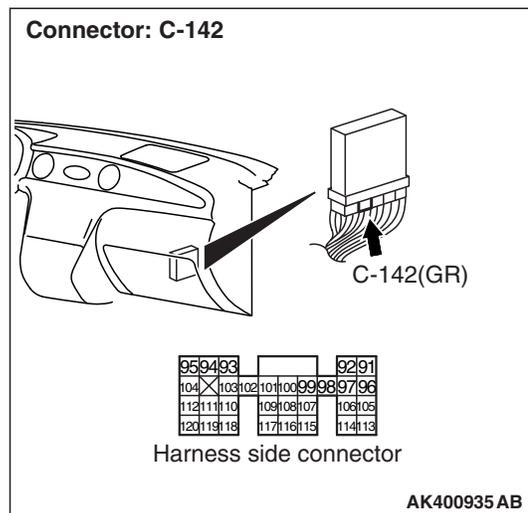
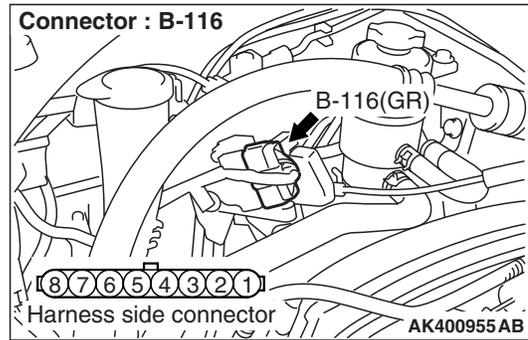
- YES :** Go to Step 7 .
NO : Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU connector



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

STEP 5. Check harness between B-116 (terminal No. 1) accelerator pedal position sensor connector and C-142 (terminal No. 91) engine-ECU 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.

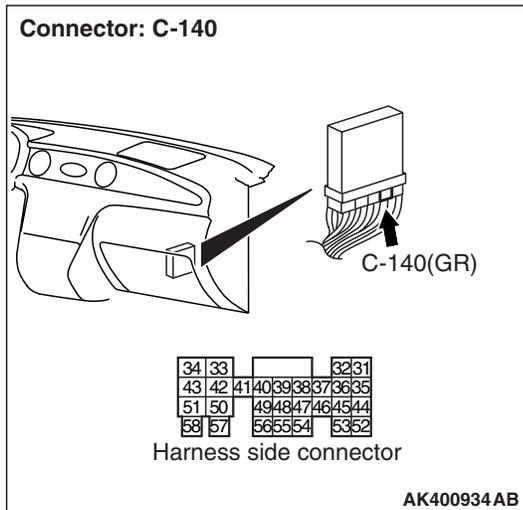
Q: Does trouble symptom persist?
YES : Replace engine-ECU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Trouble shooting/Inspection Service Points [P.00-6](#)).

STEP 7. Check accelerator pedal position switch itself.

- Check accelerator pedal position switch itself (Refer to [P.13B-397](#)).

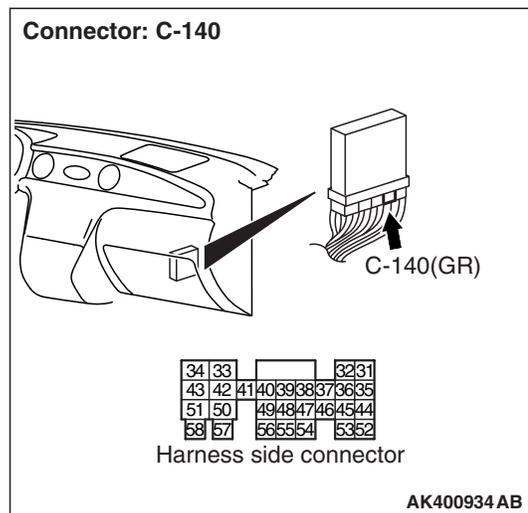
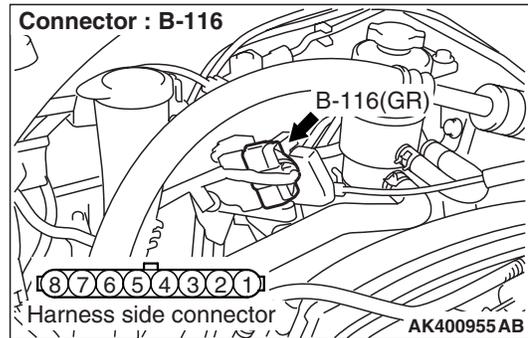
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Replace accelerator pedal position sensor.

STEP 8. Connector check: C-140 engine-ECU connector



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

STEP 9. Check harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU connector.

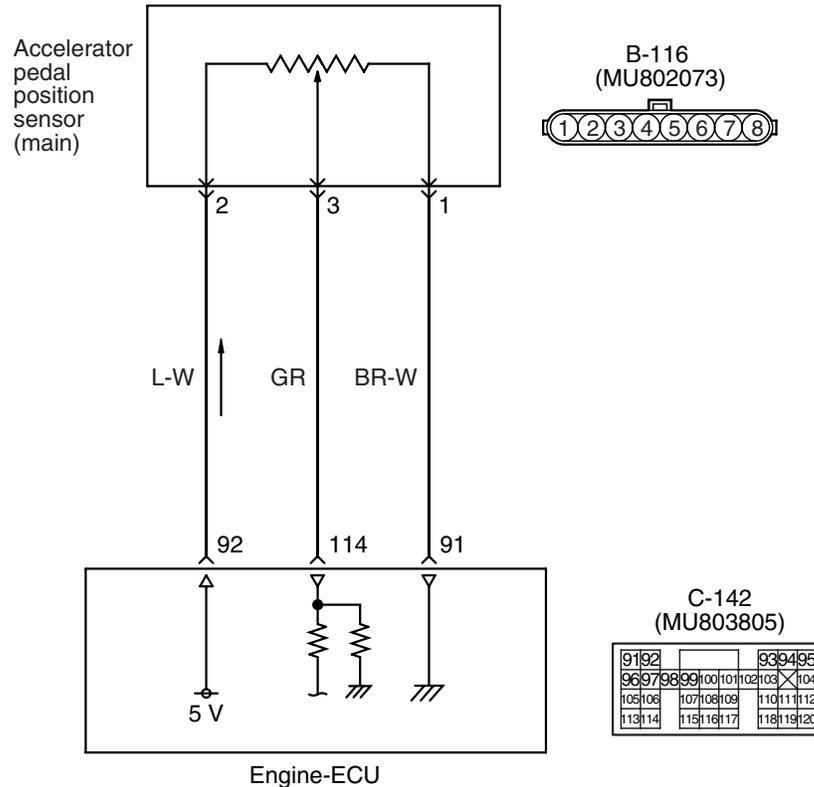


- Check power supply line for short circuit.

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

AK304133AD

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 2) from the engine-ECU (terminal No. 92).
- The power voltage is earthed to the engine-ECU (terminal No. 91) from the accelerator pedal position sensor (terminal No. 1).
- The sensor signal is inputted to the engine-ECU (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 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

DIAGNOSIS PROCEDURE

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

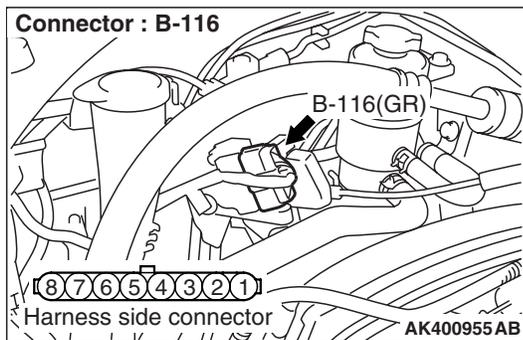
- Refer to Data List Reference Table P.13B-368.
 - Item 78: Accelerator pedal position sensor (main)

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 or replace.

STEP 3. Check accelerator pedal position sensor itself.

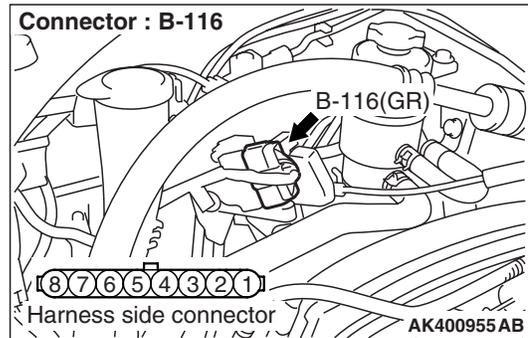
- Check accelerator pedal position sensor itself (Refer to P.13C-431).

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.

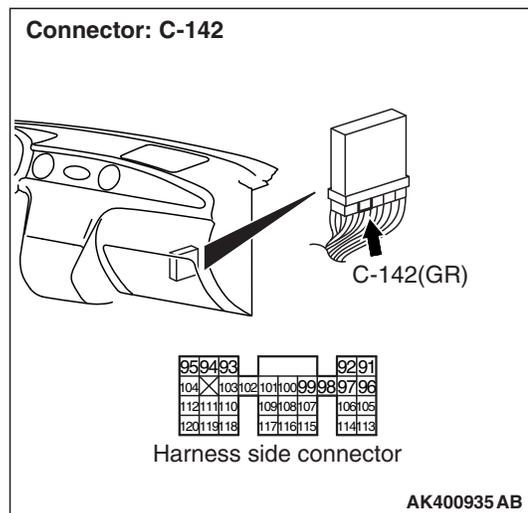
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 5 .

STEP 5. Connector check: C-142 engine-ECU connector

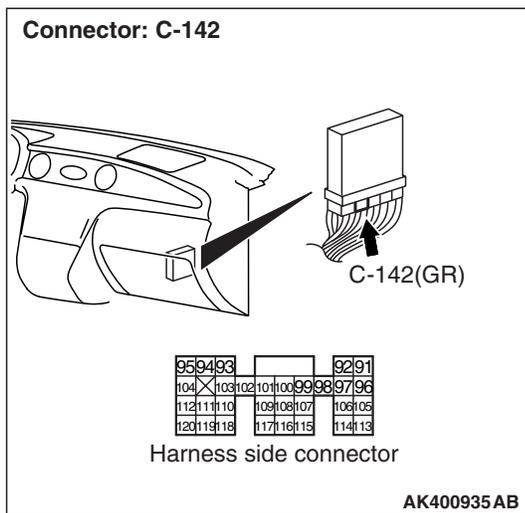
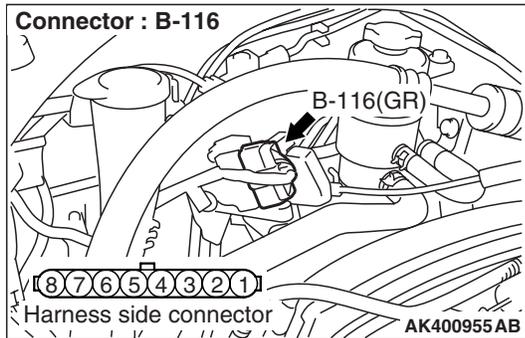


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check harness between B-116 (terminal No. 2) accelerator pedal position sensor connector and C-142 (terminal No. 92) engine-ECU connector.



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

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

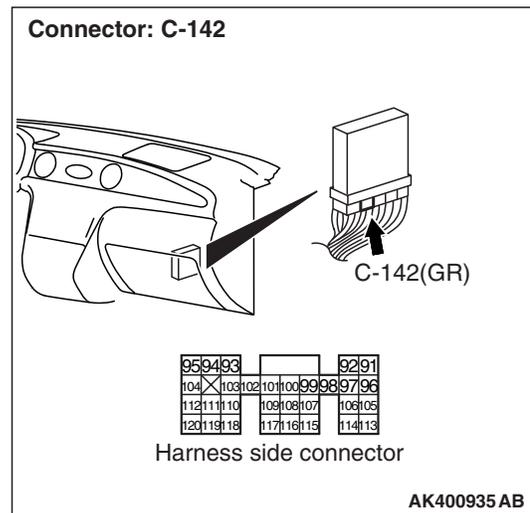
- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

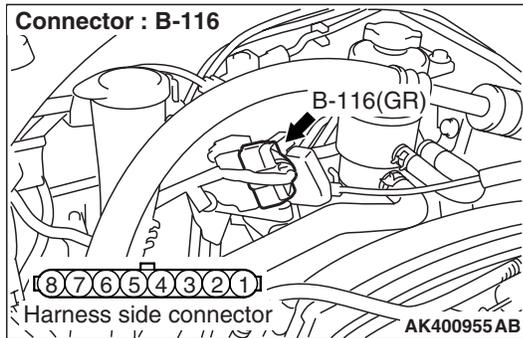
NO : Replace engine-ECU.

STEP 8. Connector check: C-142 engine-ECU connector

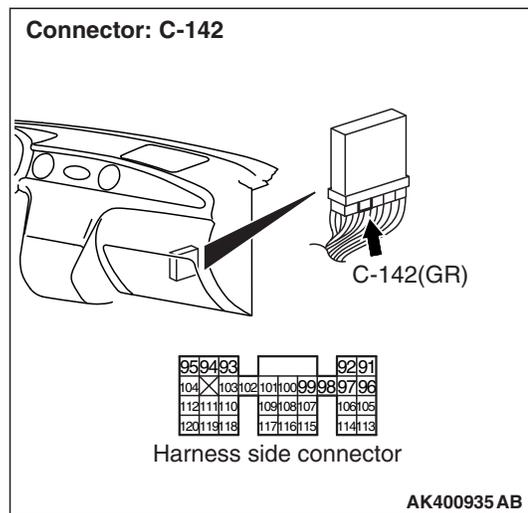
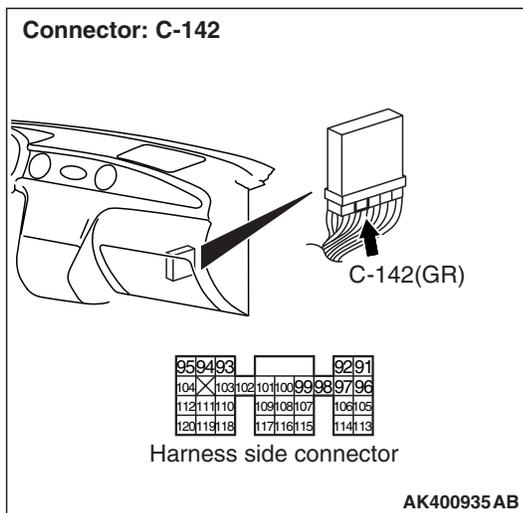
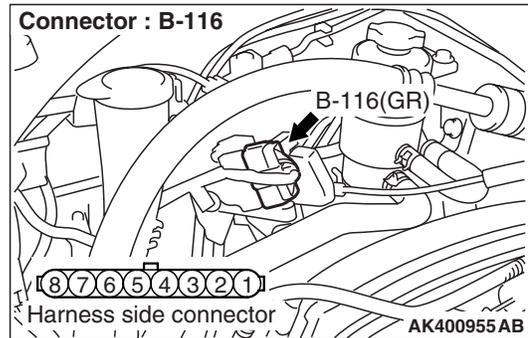


Q: Is the check result normal?
YES : Go to Step 9 .
NO : Repair or replace.

STEP 9. Check harness between B-116 (terminal No. 2) accelerator pedal position sensor connector and C-142 (terminal No. 92) engine-ECU connector.



STEP 10. Check harness between B-116 (terminal No. 3) accelerator pedal position sensor connector and C-142 (terminal No. 114) engine-ECU connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

- Check earthing line for damage.

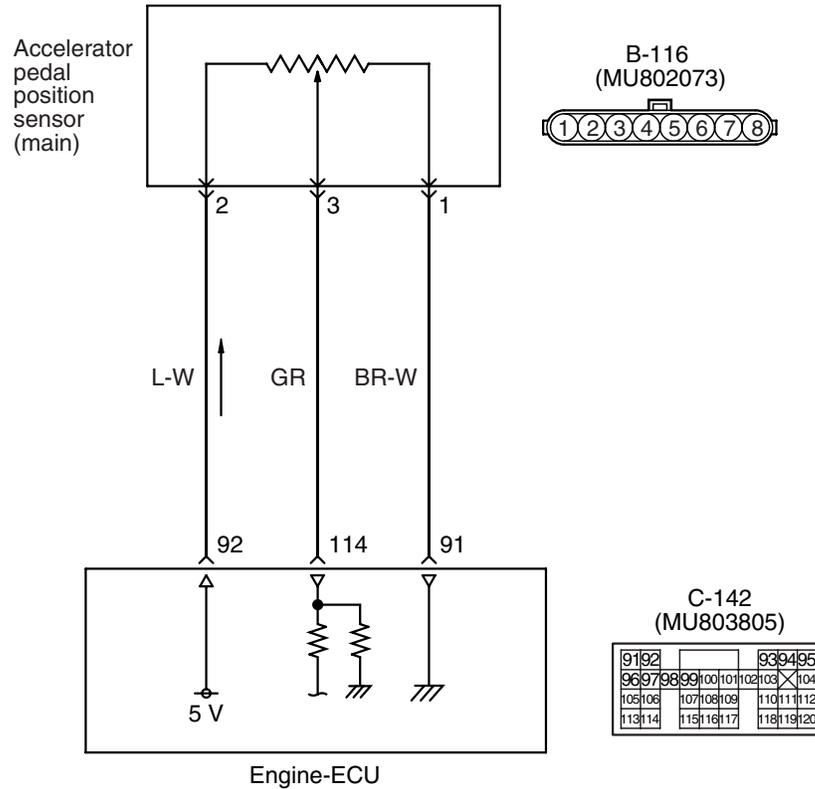
Q: Is the check result normal?

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

AK304133AD

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 2) from the engine-ECU (terminal No. 92).
- The power voltage is earthed to the engine-ECU (terminal No. 91) from the accelerator pedal position sensor (terminal No. 1).
- The sensor signal is inputted to the engine-ECU (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 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

DIAGNOSIS PROCEDURE

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

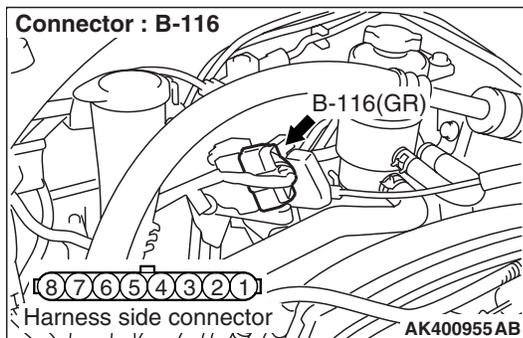
- Refer to Data List Reference Table [P.13B-368](#).
 - Item 78: Accelerator pedal position sensor (main)

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 or replace.

STEP 3. Check accelerator pedal position sensor itself.

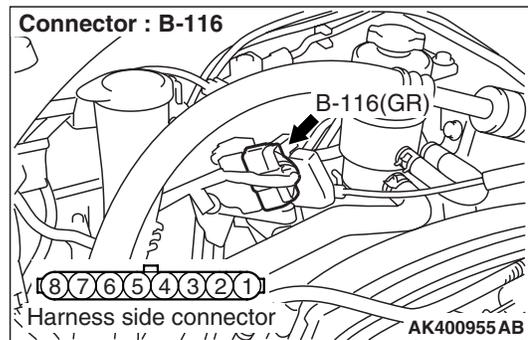
- Check accelerator pedal position sensor itself (Refer to [P.13C-431](#)).

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

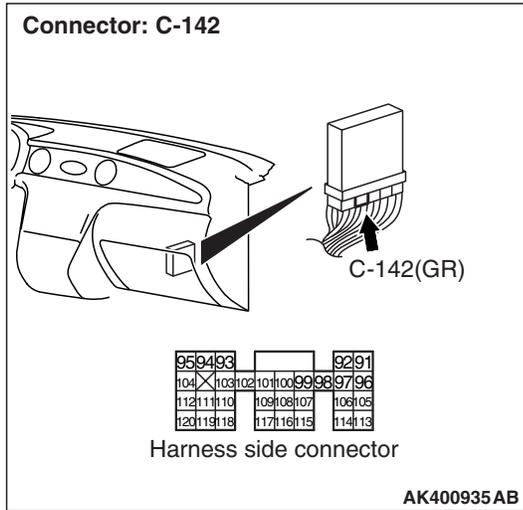
- Refer to Data list reference table [P.13B-368](#).
 - Item 78: Accelerator pedal position sensor (main)

Q: Is the check result normal?

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

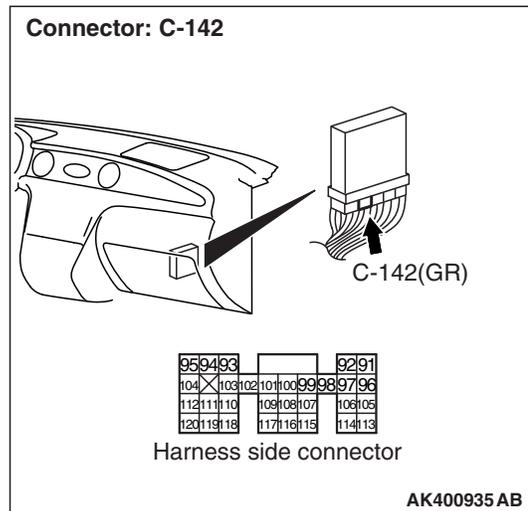
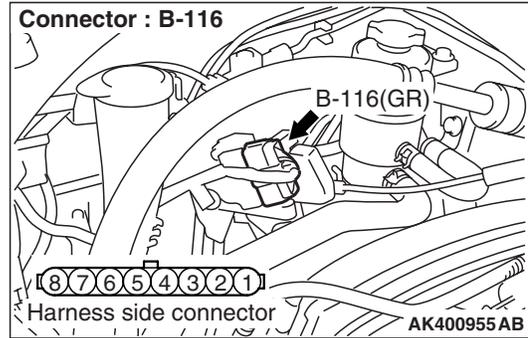
NO : Replace engine-ECU.

STEP 6. Connector check: C-142 engine-ECU connector



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

STEP 7. Check harness between B-116 (terminal No. 1) accelerator pedal position sensor connector and C-142 (terminal No. 91) engine-ECU 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.13B-232.
- Refer to Inspection Procedure 31: Accelerator Pedal Position Switch Circuit P.13B-362.

FUNCTION

- Engine-ECU 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

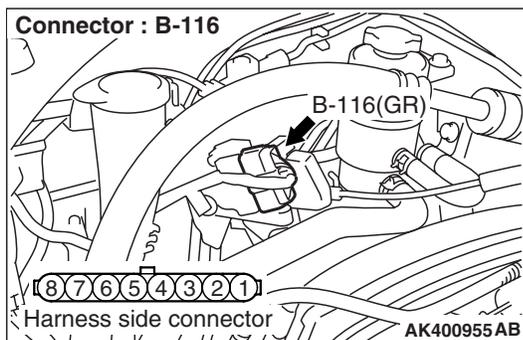
- Accelerator pedal position sensor (sub) output voltage is 2.5 V or higher for 1 second.

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

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 or replace.

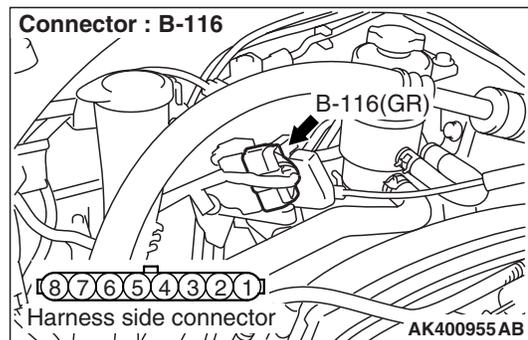
STEP 2. Check accelerator pedal position sensor itself.

- 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.



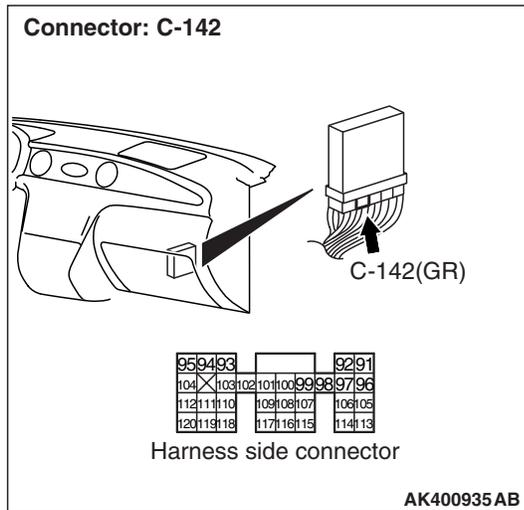
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 7 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

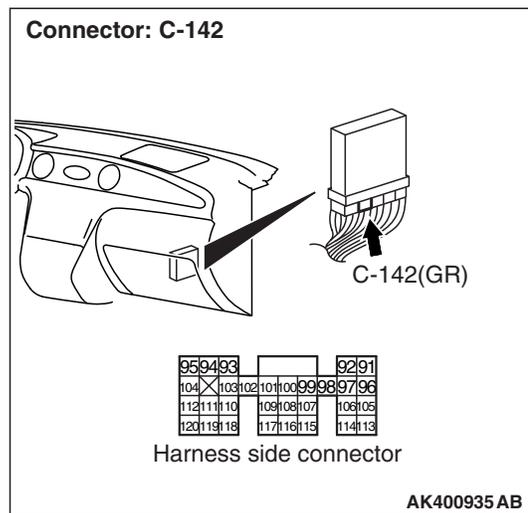
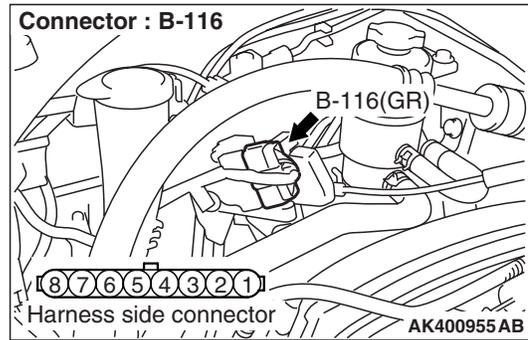
- YES :** Go to Step 7 .
- NO :** Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU connector



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

STEP 5. Check harness between B-116 (terminal No. 7) accelerator pedal position sensor connector and C-142 (terminal No. 96) engine-ECU 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.

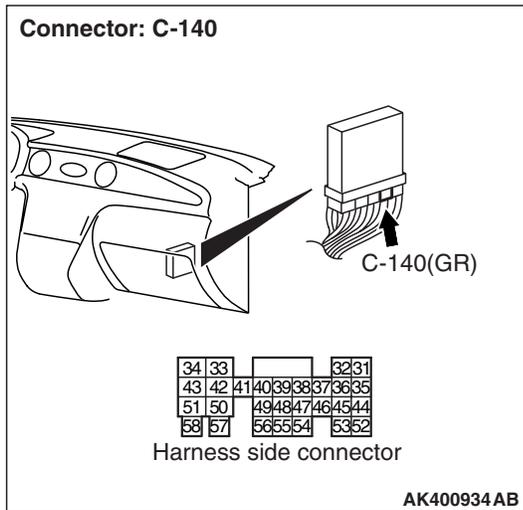
Q: Does trouble symptom persist?
YES : Replace engine-ECU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Trouble shooting/Inspection Service Points [P.00-6](#)).

STEP 7. Check accelerator pedal position switch itself.

- Check accelerator pedal position switch itself (Refer to [P.13B-397](#)).

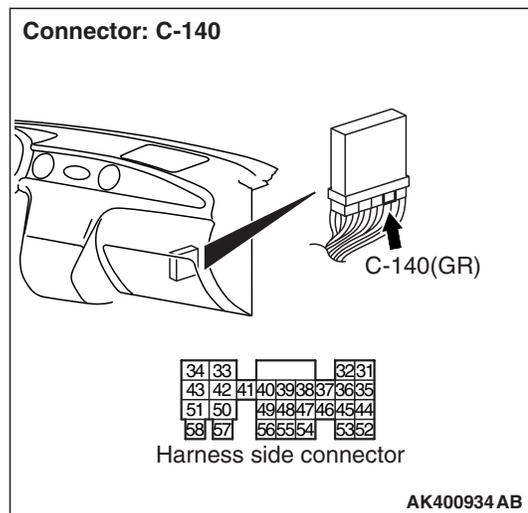
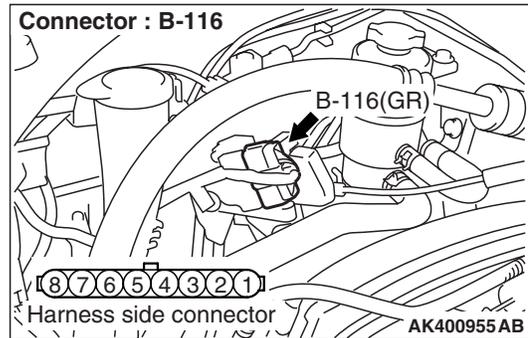
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Replace accelerator pedal position sensor.

STEP 8. Connector check: C-140 engine-ECU connector



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

STEP 9. Check harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU connector.

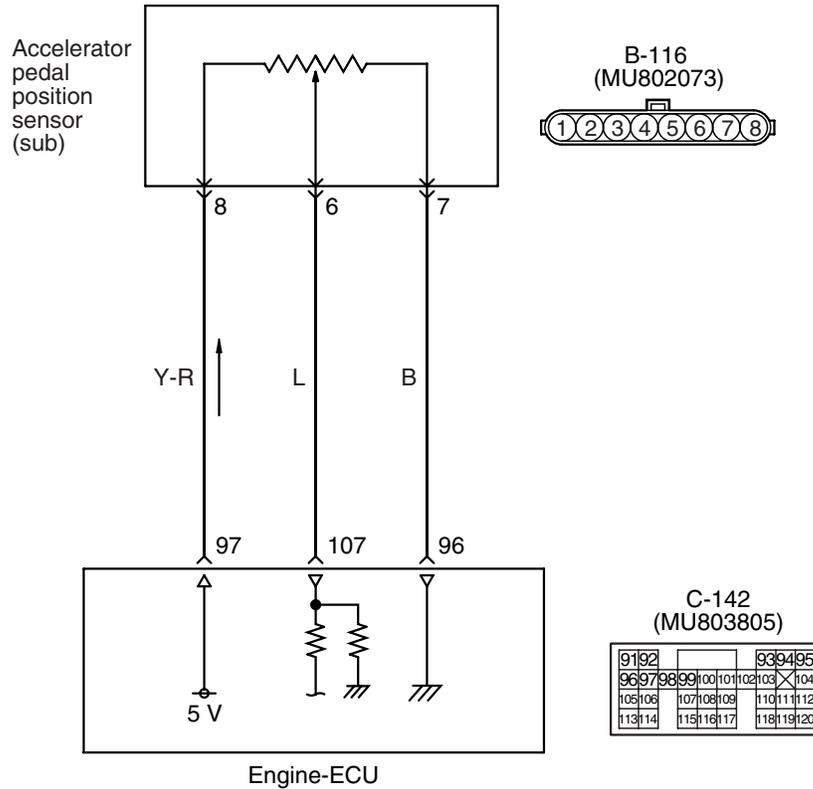


- Check power supply line for short circuit.

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



AK304133AE

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 8) from the engine-ECU (terminal No. 97).
- The power voltage is earthed to the engine-ECU (terminal No. 96) from the accelerator pedal position sensor (terminal No. 7).
- The sensor signal is inputted to the engine-ECU (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 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

DIAGNOSIS PROCEDURE

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

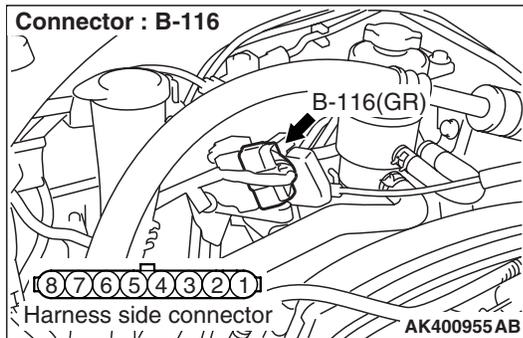
- Refer to Data List Reference Table P.13B-368.
 - Item 77: Accelerator pedal position sensor (sub)

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 or replace.

STEP 3. Check accelerator pedal position sensor itself.

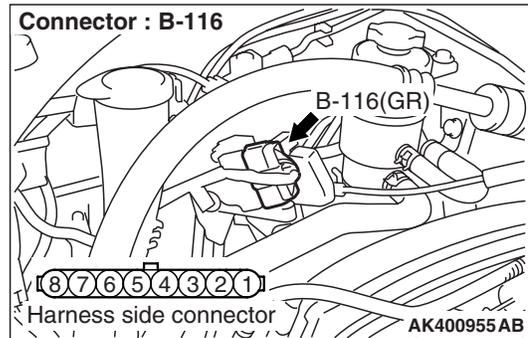
- Check accelerator pedal position sensor itself (Refer to P.13C-431).

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.

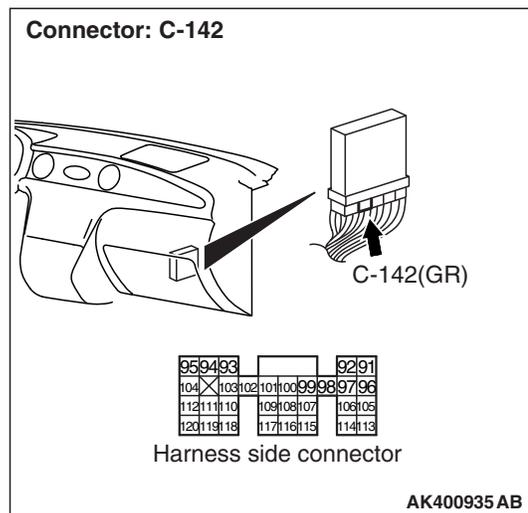
OK: 4.9 – 5.1 V

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Go to Step 5 .

STEP 5. Connector check: C-142 engine-ECU connector

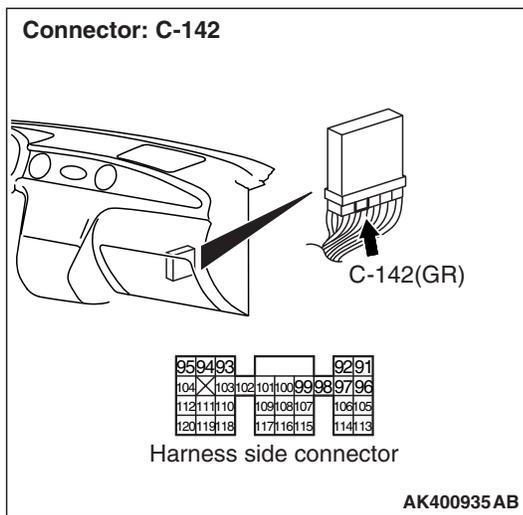
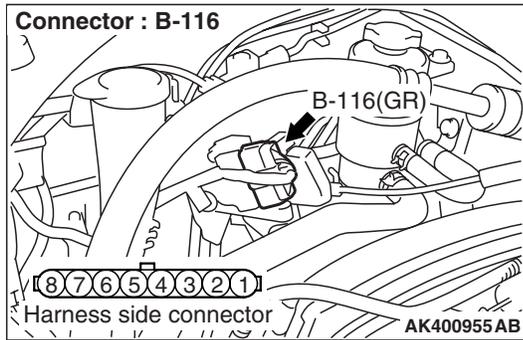


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check harness between B-116 (terminal No. 8) accelerator pedal position sensor connector and C-142 (terminal No. 97) engine-ECU connector.



- Check power supply line for open/short circuit.

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

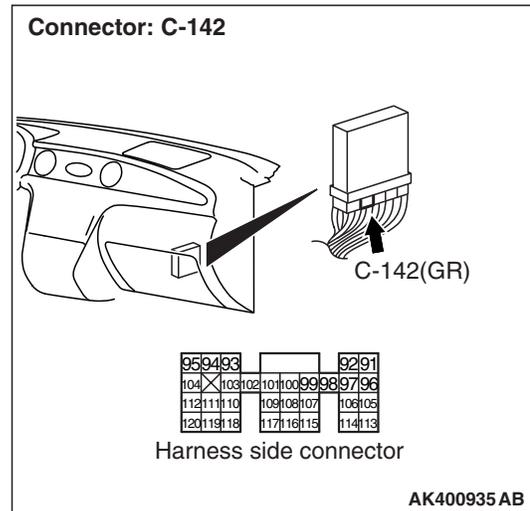
STEP 7. M.U.T.-II/III data list

- Refer to Data List Reference Table [P.13B-368](#).
 - Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

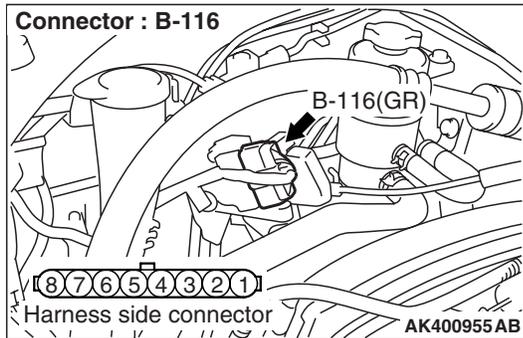
YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points [P.00-6](#)).
NO : Replace engine-ECU.

STEP 8. Connector check: C-142 engine-ECU connector

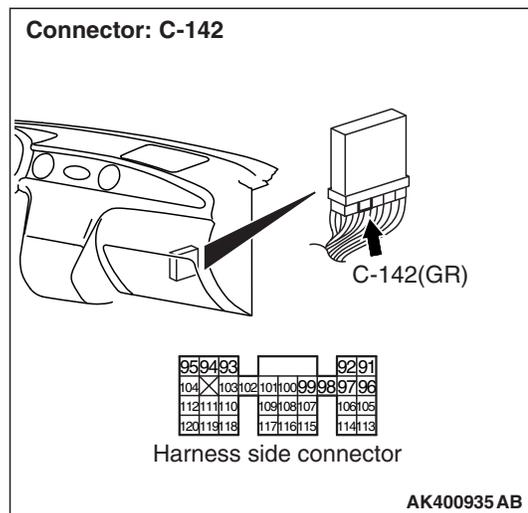
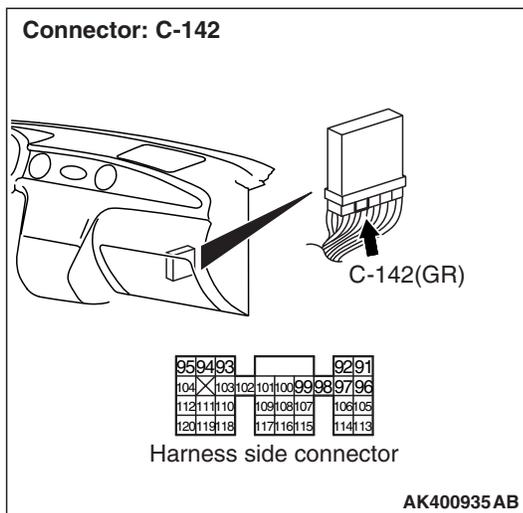
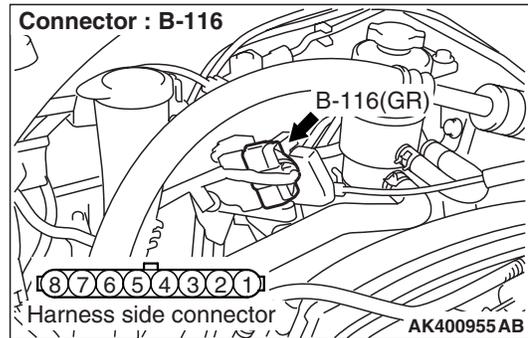


Q: Is the check result normal?
YES : Go to Step 9 .
NO : Repair or replace.

STEP 9. Check harness between B-116 (terminal No. 8) accelerator pedal position sensor connector and C-142 (terminal No. 97) engine-ECU connector.



STEP 10. Check harness between B-116 (terminal No. 6) accelerator pedal position sensor connector and C-142 (terminal No. 107) engine-ECU connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair.

- Check earthing line for damage.

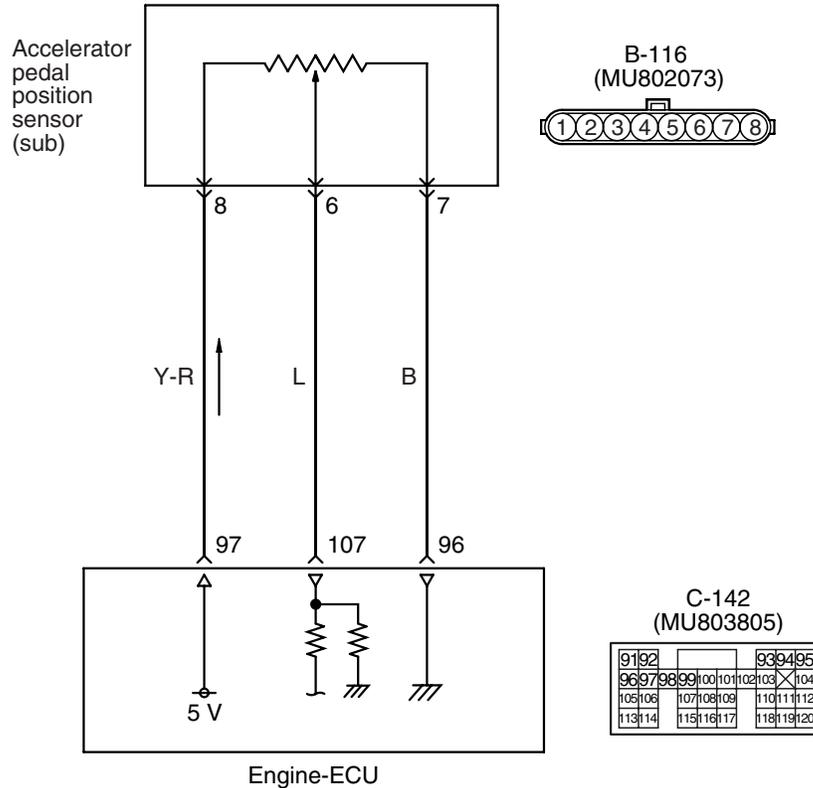
Q: Is the check result normal?

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

AK304133AE

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position sensor (terminal No. 8) from the engine-ECU (terminal No. 97).
- The power voltage is earthed to the engine-ECU (terminal No. 96) from the accelerator pedal position sensor (terminal No. 7).
- The sensor signal is inputted to the engine-ECU (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 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

DIAGNOSIS PROCEDURE

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

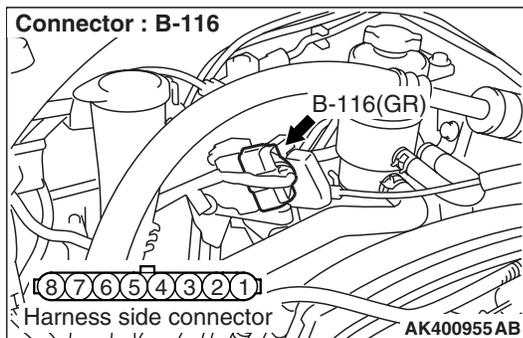
- Refer to Data List Reference Table [P.13B-368](#).
 - Item 77: Accelerator pedal position sensor (sub)

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 or replace.

STEP 3. Check accelerator pedal position sensor itself.

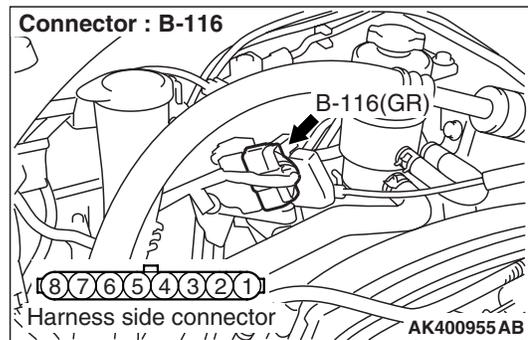
- Check accelerator pedal position sensor itself (Refer to [P.13C-431](#)).

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

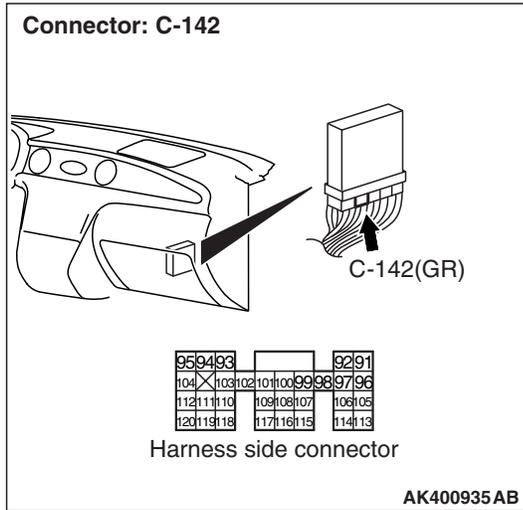
- Refer to Data list reference table [P.13B-368](#).
 - Item 77: Accelerator pedal position sensor (sub)

Q: Is the check result normal?

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

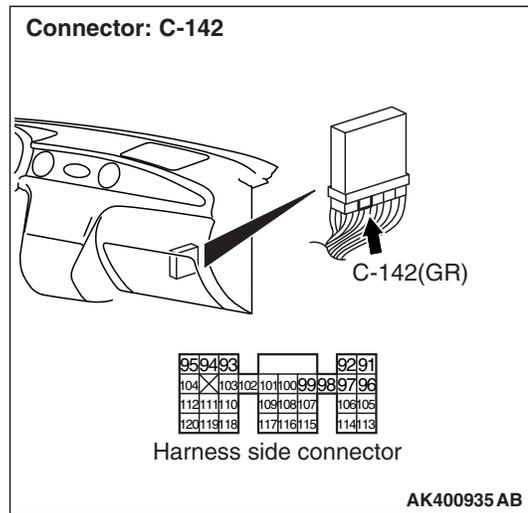
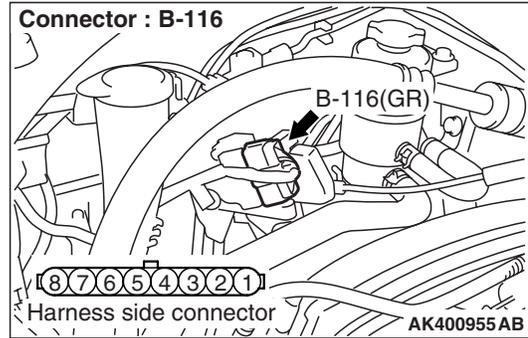
NO : Replace engine-ECU.

STEP 6. Connector check: C-142 engine-ECU connector



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

STEP 7. Check harness between B-116 (terminal No. 7) accelerator pedal position sensor connector and C-142 (terminal No. 96) engine-ECU 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.13B-61.
- Refer to Code No. P0222: Throttle Position Sensor (sub) Circuit Low Input P.13B-116.

FUNCTION

- engine-ECU 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

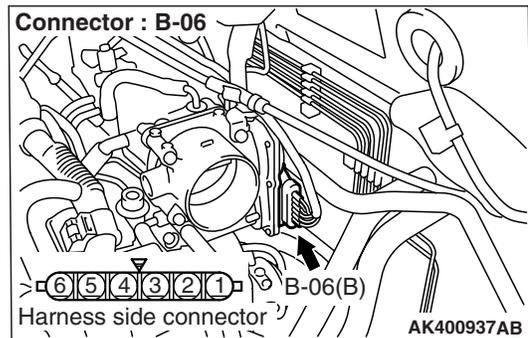
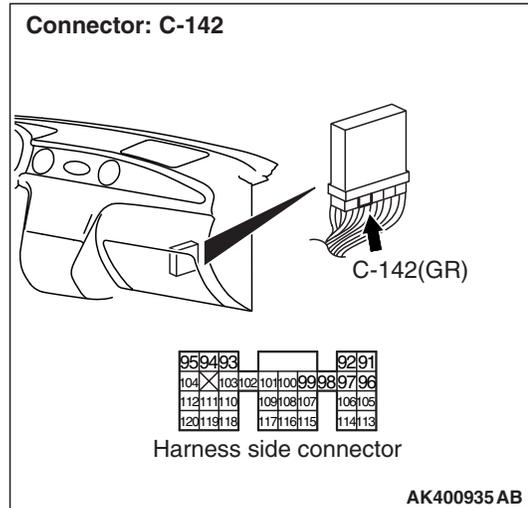
V^{**} : throttle position sensor (sub) output voltage.

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 connector and B-06 electronically controlled throttle valve connector

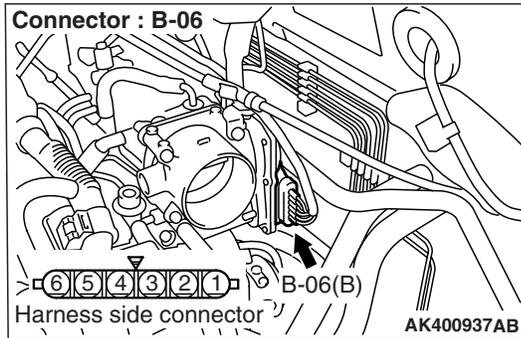


Q: Is the check result normal?

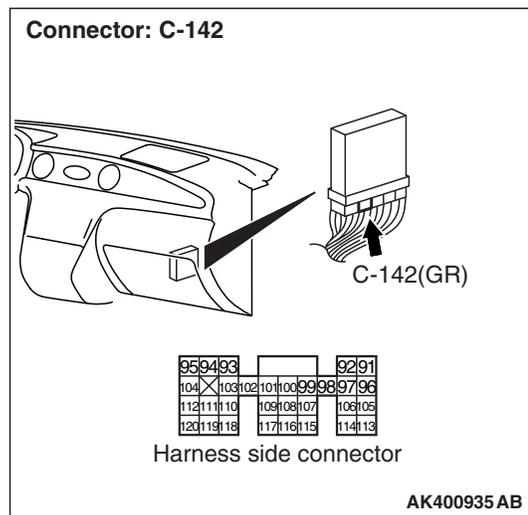
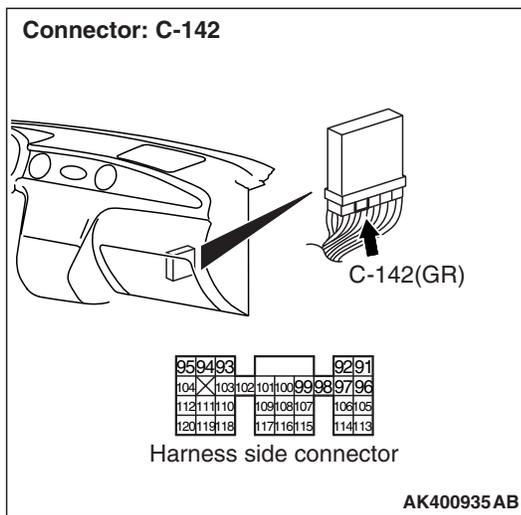
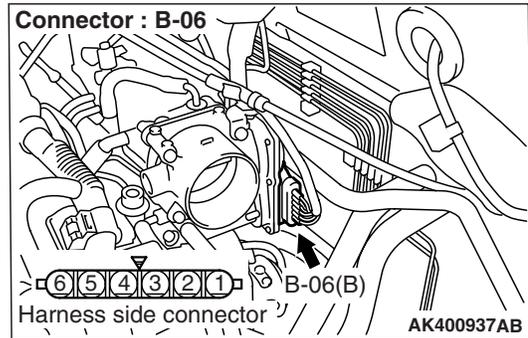
YES : Go to Step 2 .

NO : Repair or replace.

STEP 2. Check harness between B-06 (terminal No. 1) electronically controlled throttle valve connector and C-142 (terminal No. 115) engine-ECU connector.



STEP 3. Check harness between B-06 (terminal No. 3) electronically controlled throttle valve connector and C-142 (terminal No. 113) engine-ECU 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.
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.13B-222.
- Refer to Code No. P2127: Accelerator Pedal Position Sensor (sub) Circuit Low Input P.13B-232.

FUNCTION

- Engine-ECU 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

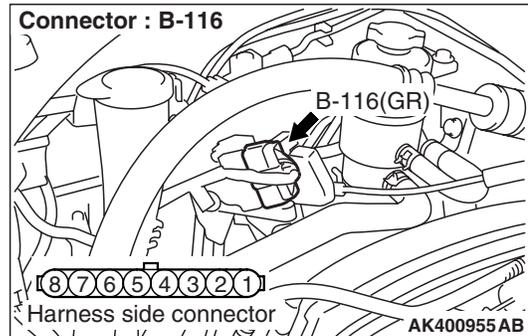
- Accelerator pedal position sensor (sub) output voltage minus Accelerator pedal position sensor (main) output voltage is 1 volt or higher for 1 second.
- Accelerator pedal position sensor (main) output voltage minus Accelerator pedal position sensor (sub) output voltage is 1 volt or higher for 0.2 seconds.

PROBABLE CAUSE

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

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 or replace.

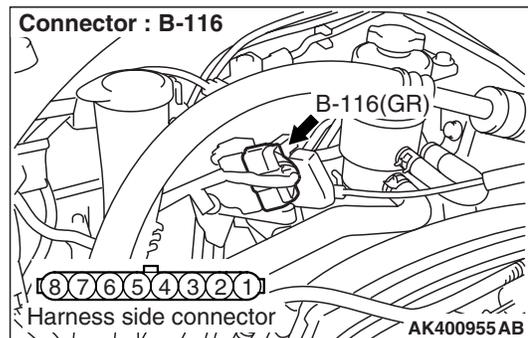
STEP 2. Check accelerator pedal position sensor itself.

- 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.



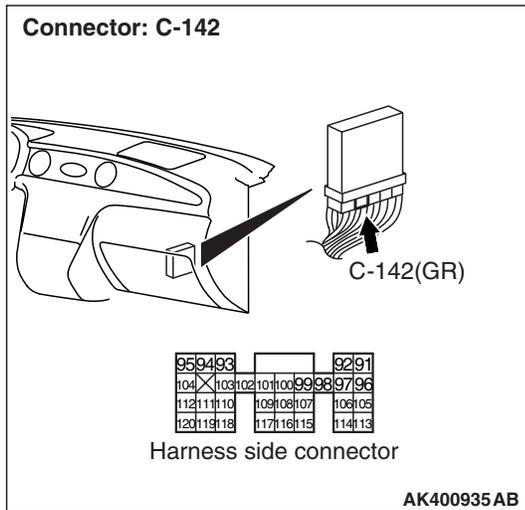
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

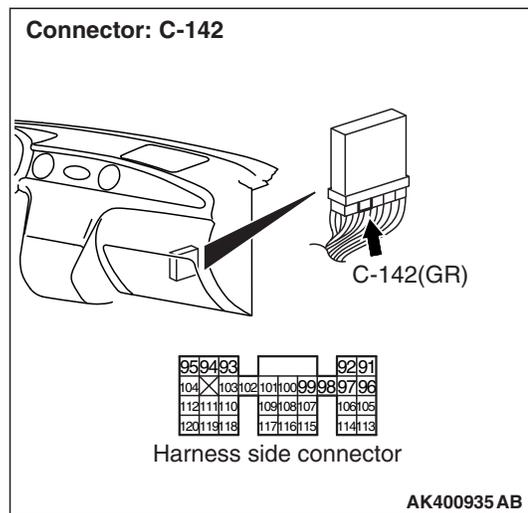
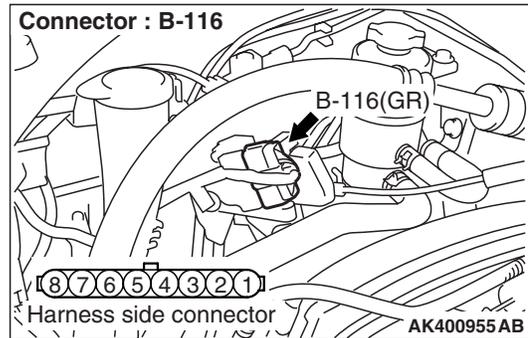
- YES :** Go to Step 7 .
- NO :** Go to Step 4 .

STEP 4. Connector check: C-142 engine-ECU connector



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

STEP 5. Check harness between B-116 (terminal No. 1) accelerator pedal position sensor connector and C-142 (terminal No. 91) engine-ECU connector.



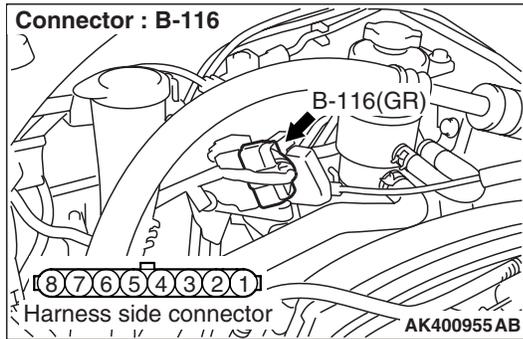
- Check earthing line for damage.

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.
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.



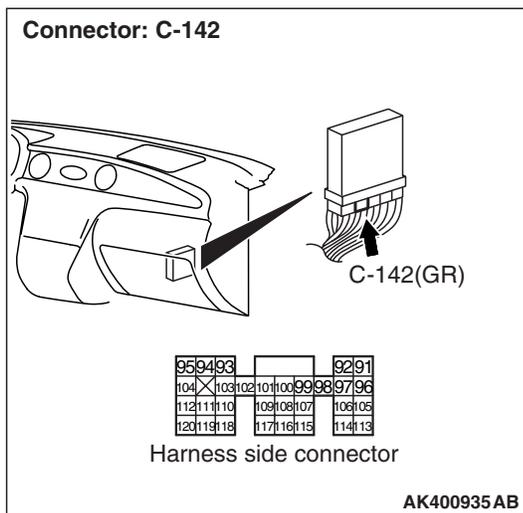
- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 7 and earth.
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Go to Step 8 .

STEP 8. Connector check: C-142 engine-ECU connector

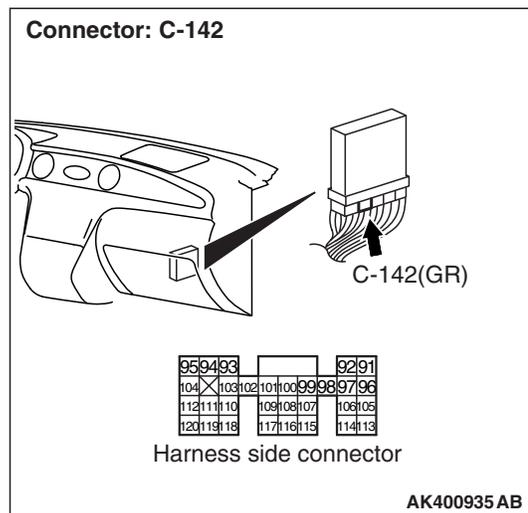
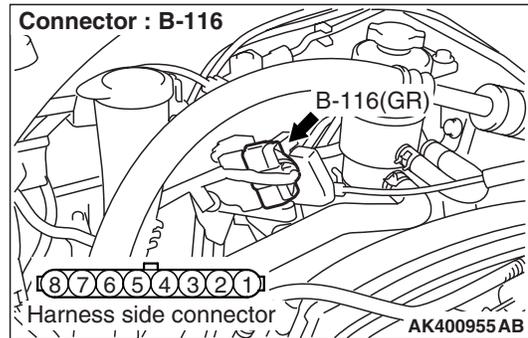


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check harness between B-116 (terminal No. 7) accelerator pedal position sensor connector and C-142 (terminal No. 96) engine-ECU connector.



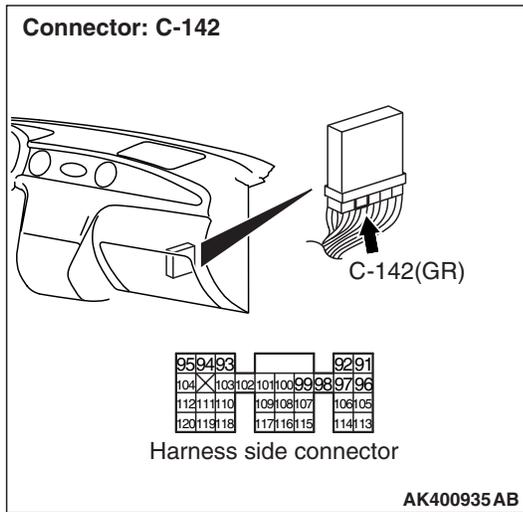
- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 6 .

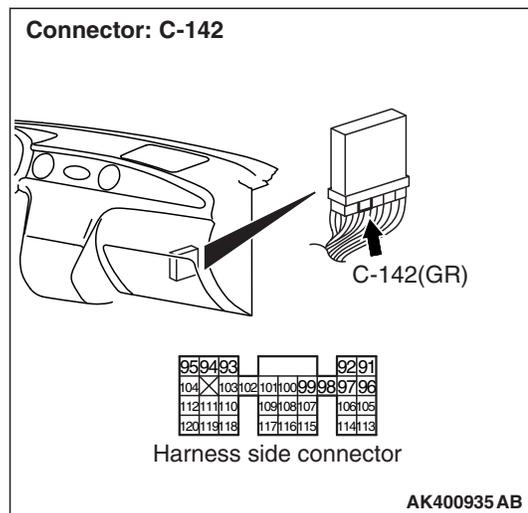
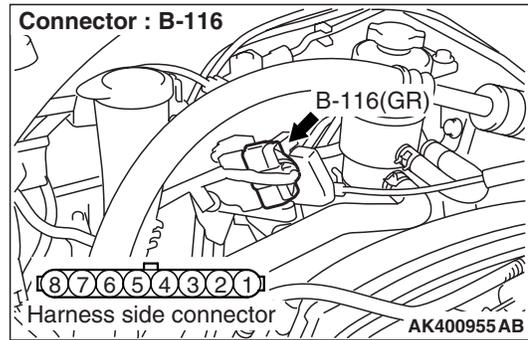
NO : Repair.

STEP 10. Connector check: C-142 engine-ECU connector



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

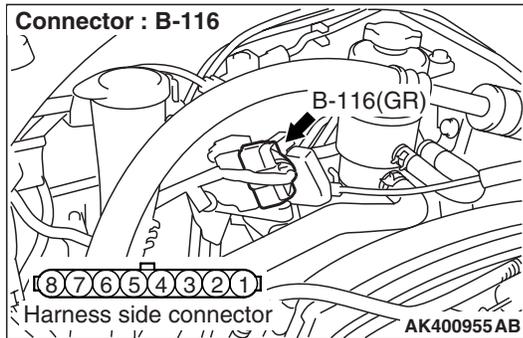
STEP 11. Check harness between B-116 (terminal No. 2) accelerator pedal position sensor connector and C-142 (terminal No. 92) engine-ECU connector.



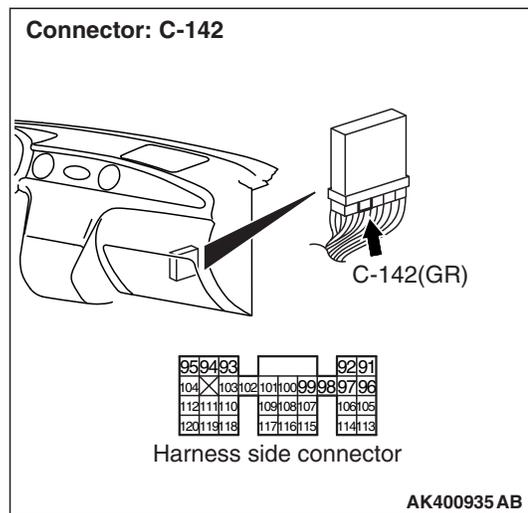
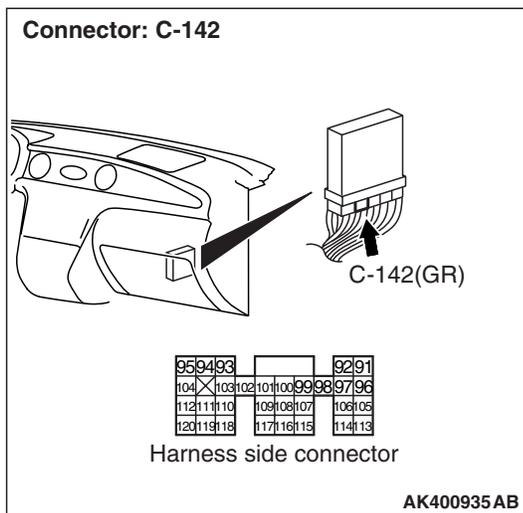
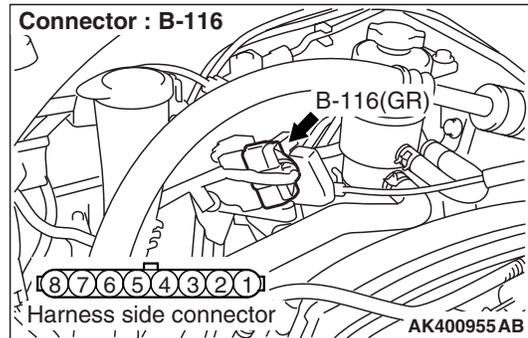
- Check power supply line for damage.

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 connector.



STEP 13. Check harness between B-116 (terminal No. 3) accelerator pedal position sensor connector and C-142 (terminal No. 114) engine-ECU connector.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

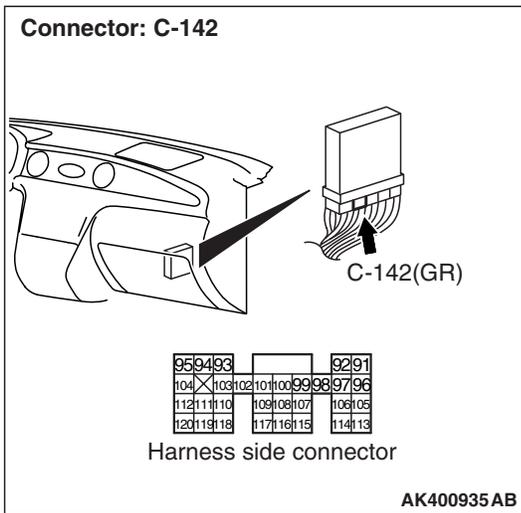
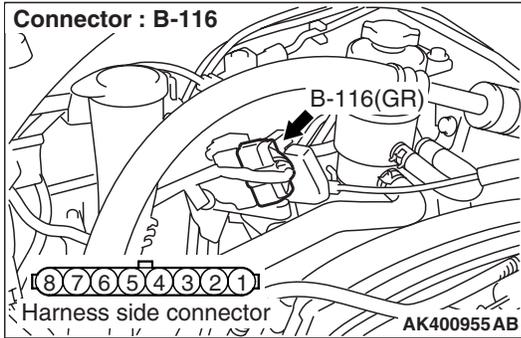
- Check output line for damage.

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 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 decides the allowable intake air amount in accordance with the engine speed and the target opening angle of throttle valve.
- Engine-ECU 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

DIAGNOSIS

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13B-20).

NO : Go to Step 2 .

STEP 2. Replace the air flow sensor.

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

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check end.

STEP 3. Replace the throttle body assembly.

- After replacing the throttle body assembly, re-check the trouble symptoms.

Q: Is the check result normal?

YES : Replacing engine-ECU.

NO : Check end.

INSPECTION CHART FOR TROUBLE SYMPTOMS

M1131151501224

Items	Trouble symptom		Inspection procedure No.
Communication with M.U.T.-II/III is impossible	Communication with all system is not possible		1
	Communication with engine-ECU only is not possible		2
Engine warning lamp	The engine warning lamp does not illuminate right after the ignition switch is turned to the "ON" position		3
	The engine warning lamp remains illuminating and never goes out		4
Starting	Starting impossible (starter inoperative)	The starter is impossible to operate.	5
	Starting impossible (Starter operative but no initial combustion)	The starter is operative and cranks the engine, but none of initial combustion is in the cylinders and the engine is not started.	6
	Starting impossible (Initial combustion but no complete combustion)	The initial combustion occurs, but the engine stalls soon due to the incomplete combustion.	7
	Improper starting (Long time to start)	It is long cranking to start the engine.	
Improper idling	Unstable idling (Rough idling, hunting)	The engine speed is not constant and changeable during the idling. Usually, the judgment can be based on the movement of the tachometer pointer, also on the vibration transmitted to the steering wheel, shift lever, vehicle body and so on.	8
	Improper idling speed	The proper idling speed is not satisfied.	
	Engine stalled during idling (Die out)	The engine stalls during the idling in no relation to the vehicle movement.	
Engine stalls	The engine stalls when starting the car (Pass out)	The engine stalls during the operation, or when the accelerator pedal is depressed from the idling.	9
	The engine stalls when decelerating	The engine stalls at the deceleration.	10

Items	Trouble symptom		Inspection procedure No.
Driving	Hesitation, sag	The response of vehicle speed (engine speed) is delayed when the accelerator pedal is depressed, or the vehicle speed (engine speed) is temporarily dropped during the acceleration. These phenomena are called "hesitation" and the serious hesitation is called "sag".	12
	Poor acceleration	The engine cannot obtain the acceleration corresponding to the degree of throttle opening although the engine is smooth at the constant speed.	
	Stumble	The engine speed increase is delayed when the accelerator pedal is initially depressed at the starting.	
	Surge	The vehicle body is repeated to vibrate jollity in the forward and backward directions at the constant speed or acceleration.	
	The feeling of impact or vibration when accelerating	The large impact feeling occurs at the acceleration.	13
	The feeling of impact or vibration when decelerating	The large impact feeling occurs at the deceleration.	14
	Knocking	Sharp sound like a hammer striking on the cylinder walls during the driving can be heard and wrongly affects the driving.	15
	Ignition timing offset	The basic ignition timing is deviated from the datum value.	16
Stopping	Run on (Dieseling)	The engine continues to run after the ignition switch is in "LOCK (OFF)" position.	17
Exhaust gas	Odor, white smoke, black smoke, high-concentration CO/HC during idling	The exhaust gas is extremely rank odor, white smoke or black smoke. The concentration of CO & HC is high during the idling.	18
Charging performance	Battery rundown	The battery is soon rundown or the charging ability of battery is small.	19

Items	Trouble symptom		Inspection procedure No.
Cooling performance	Overheating	The temperature of engine cooling water is extremely high.	20
	Abnormal rotation of fan Motor	The fan motor is abnormally rotated when the ignition switch is in "ON" position in no relation to the engine cooling water temperature.	21
A/C performance	Poor A/C Performance	The temperature of air cooling from A/C is not efficient or very far from the target temperature.	22

PROBLEM SYMPTOMS TABLE

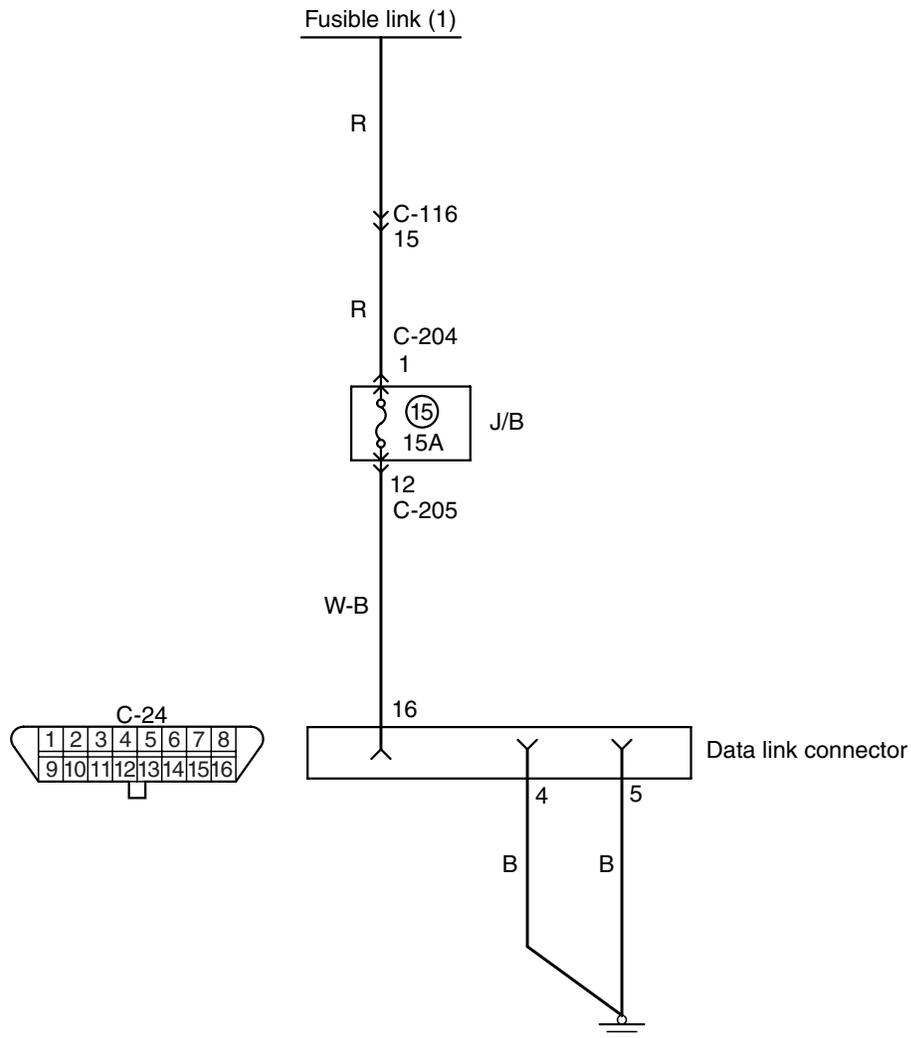
Inspection procedure No.	Trouble symptom	Reference page
1	Communication with all system is not possible	P.13B-252
2	Communication with engine-ECU only is not possible	P.13B-255
3	The engine warning lamp does not illuminate right after the ignition switch is turned "ON" position	P.13B-257
4	The engine warning lamp remains illuminating and never goes out	P.13B-263
5	Starting impossible (No initial combustion)	P.13B-266
6	Starting impossible (Starter operative but no initial combustion)	P.13B-271
7	Starting impossible (Initial combustion but no complete combustion)	P.13B-273
	Starting impossible (Long time to start)	
8	Unstable idling (Rough idling, hunting)	P.13B-276
	Improper idling speed (Too high or too low)	
	Engine stalls during idling (Die out)	
9	The engine stalls when starting the car (pass out)	P.13B-283
10	The engine stalls when decelerating	P.13B-285
11	Engine does not revolve up	P.13B-287
12	Hesitation, sag	P.13B-289
	Poor acceleration	
	Stumble	
	Surge	
13	The feeling of impact or vibration when accelerating	P.13B-291
14	The feeling of impact or vibration when decelerating	P.13B-293
15	Knocking	P.13B-293
16	Ignition timing offset	P.13B-294
17	Run on (Dieseling)	P.13B-296
18	Odor, white smoke, black smoke, high-concentration CO/HC during idling	P.13B-296
19	Battery rundown	P.13B-298
20	Overheating	P.13B-303

Inspection procedure No.	Trouble symptom	Reference page
21	Abnormal rotation of fan motor	P.13B-304
22	Poor A/C performance	P.13B-307
23	Engine-ECU power supply, engine control relay, ignition switch-IG1 system	P.13B-308
24	Fuel pump system	P.13B-316
25	Fan control relay system	P.13B-325
26	A/C switch system	P.13B-331
27	A/C compressor relay system	P.13B-335
28	A/C load signal system	P.13B-342
29	A/C pressure sensor system	P.13B-346
30	Ignition circuit system	P.13B-355
31	Accelerator pedal position switch circuit system	P.13B-362

INSPECTION CHART FOR TROUBLE SYMPTOMS

Inspection Procedure 1: Communication with All System is not Possible

Data link connector circuit



Wire colour code

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

AK300300 AD

OPERATION

- Battery voltage is applied to diagnosis connector (terminal No.16).
- Diagnosis connector (terminals No. 4 and 5) are earthed to the vehicle body.

COMMENTS ON TROUBLE SYMPTOM

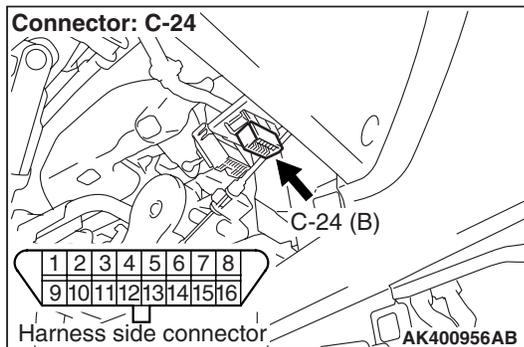
- Failure is possibly caused by failed power supply circuit or failed earthing circuit of diagnosis connector.

PROBABLE CAUSE

- Failed diagnosis connector
- Open/short circuit in diagnosis connector circuit.
- Failed M.U.T.-II/III

DIAGNOSIS PROCEDURE

STEP 1: Connector check: C-24 diagnosis connector

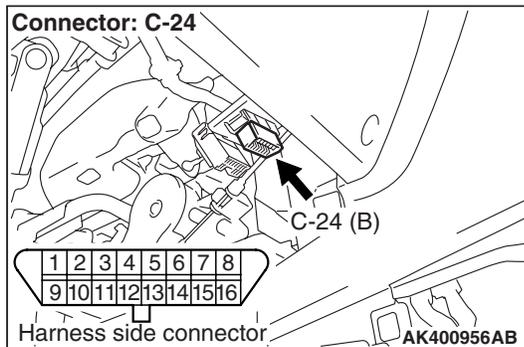


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

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)

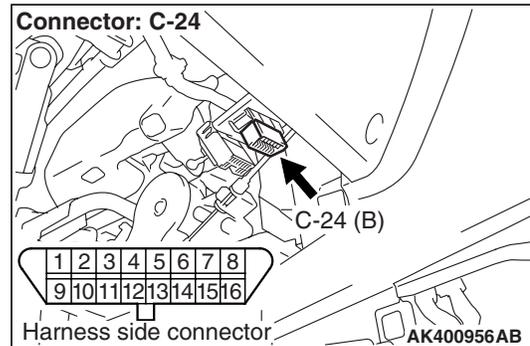
Q: Is the check result normal?

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, 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.

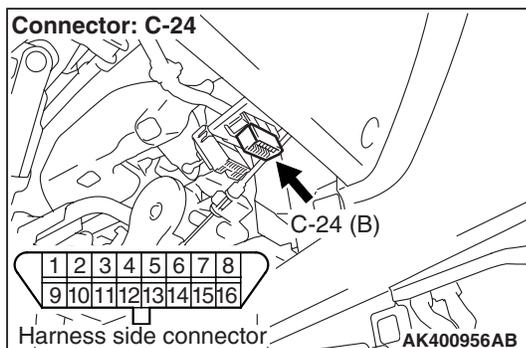
STEP 4: Replace M.U.T.-II/III.

- 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 C-116, C-204 and C-205, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

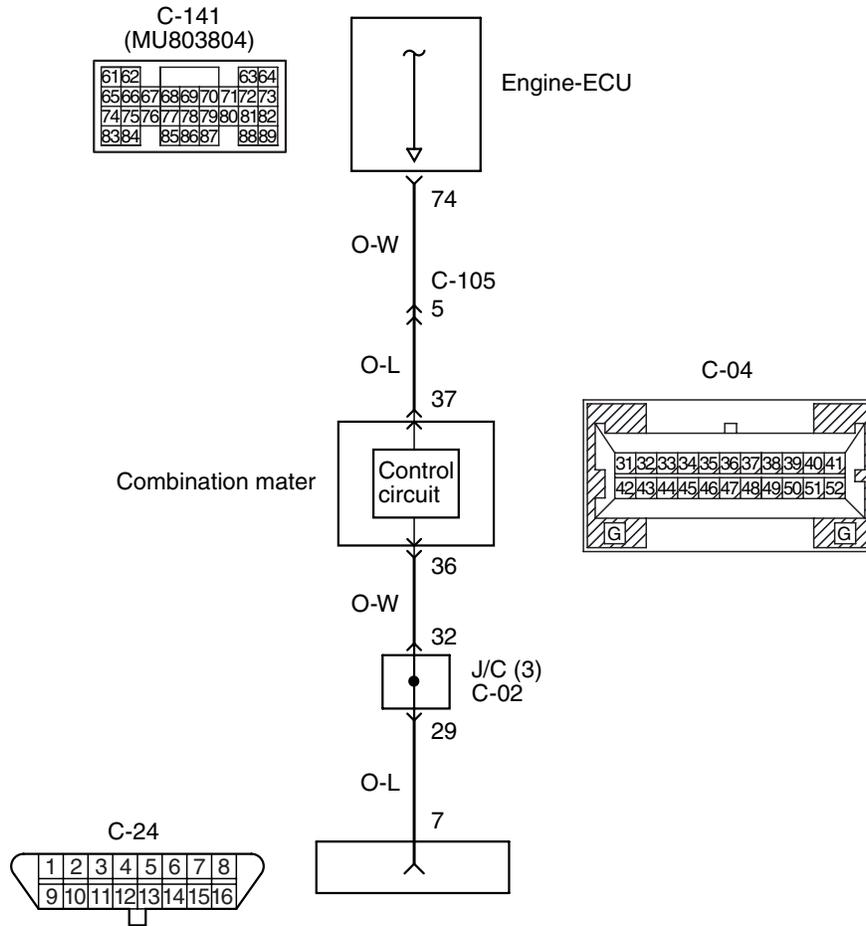
YES : Check and repair harness between C-24 (terminal No. 4 and No. 5) diagnosis connector and body earth.

- Check earthing line for damage.

NO : Repair.

Inspection Procedure 2: Communication with Engine-ECU Only is Not Possible.

Diagnosis connector circuit



Wire colour code

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

AK400822AB

OPERATION

- There is data communication between diagnosis connector output terminal (terminal No. 7) and engine-ECU (terminal No. 74).

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed power supply circuit or failed earthing circuit of engine-ECU.

PROBABLE CAUSE

- Open/short circuit in engine-ECU power circuit
- Between engine-ECU and diagnosis connector for short circuit
- Failed combination meter
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1: Check engine warning lamp.

- Ignition switch: OFF → ON

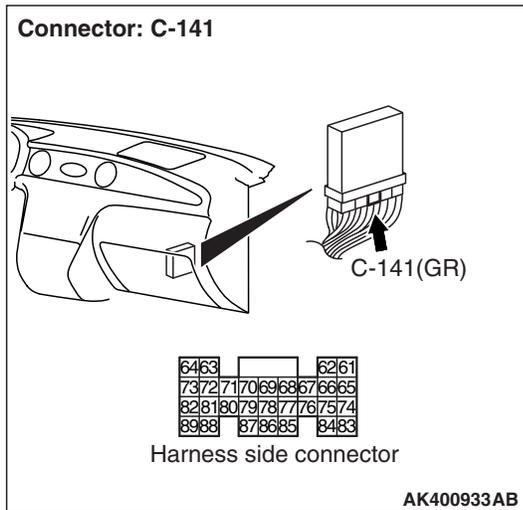
Q: Is lamp illuminating for few seconds?

YES : Go to Step 2 .

NO : Check engine-ECU power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 24

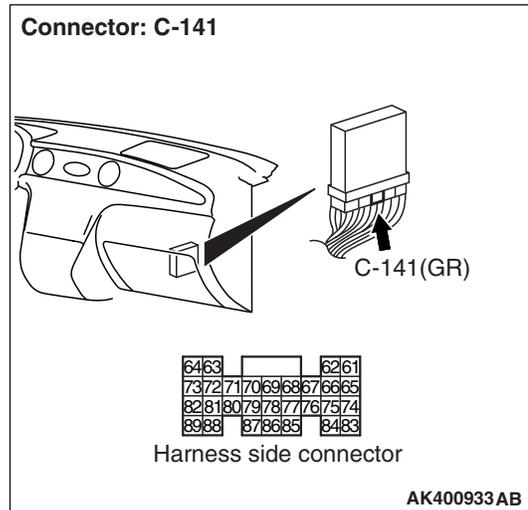
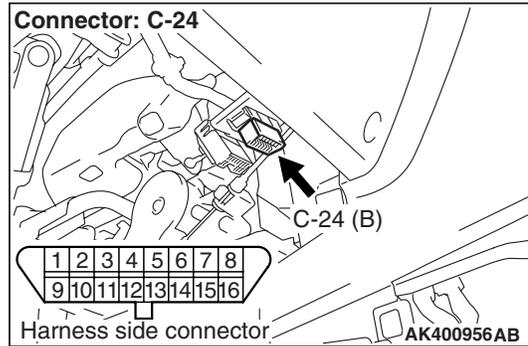
[P.13C-339](#)).

STEP 2: Connector check: C-141 engine-ECU connector



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

STEP 3: Check harness between C-24 (terminal No. 7) diagnosis connector and C-141 (terminal No. 74) engine-ECU connector.



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.

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.

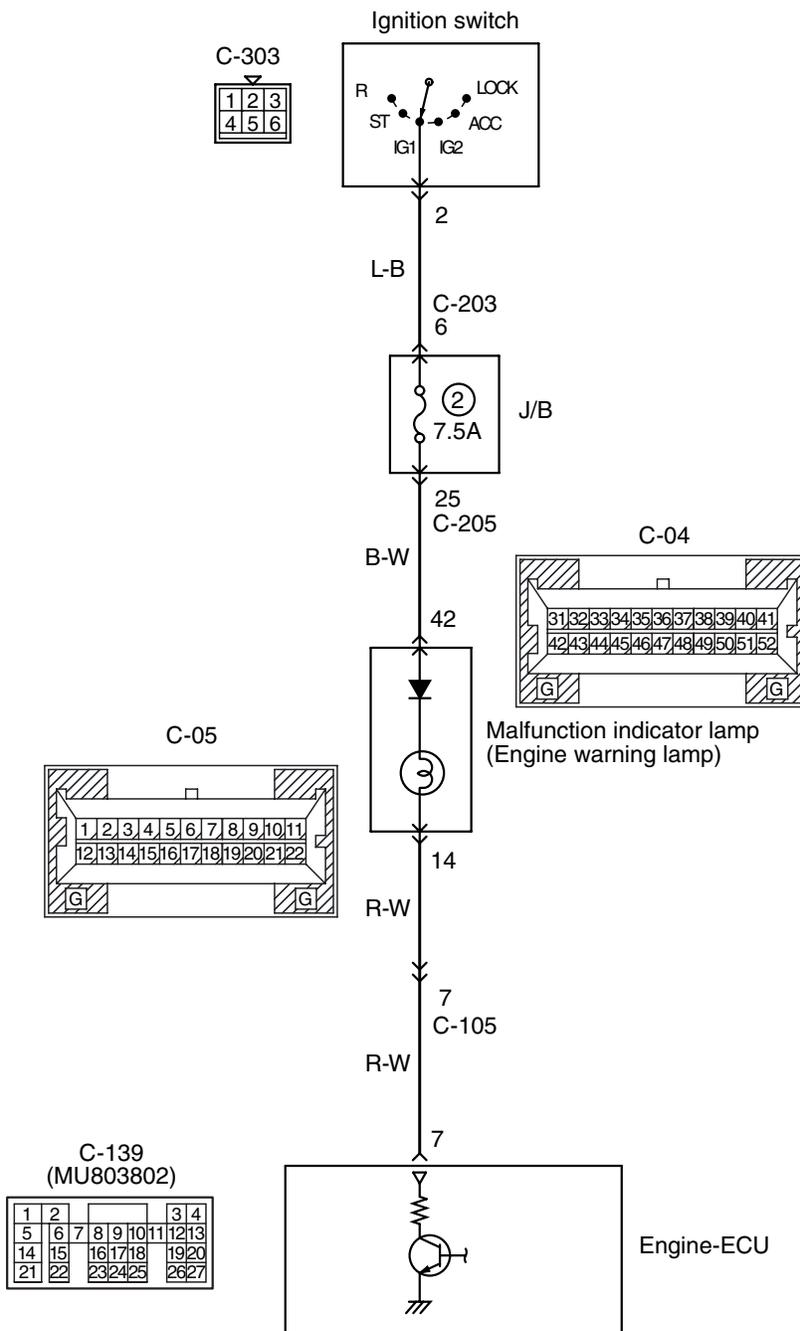
Q: Is the check result normal?
YES : Go to Step 5 .
NO : Check end.

STEP 5: Check the trouble symptom.

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

Inspection Procedure 3: The Engine Warning Lamp Does not Illuminate Right after the Ignition Switch is Turned The "ON" Position

Malfunction indicator lamp (Engine warning lamp) circuit



Wire colour code

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

OPERATION

- Battery voltage is applied to engine warning lamp of combination meter connector (terminal No. 42) from ignition switch.
- Engine-ECU (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

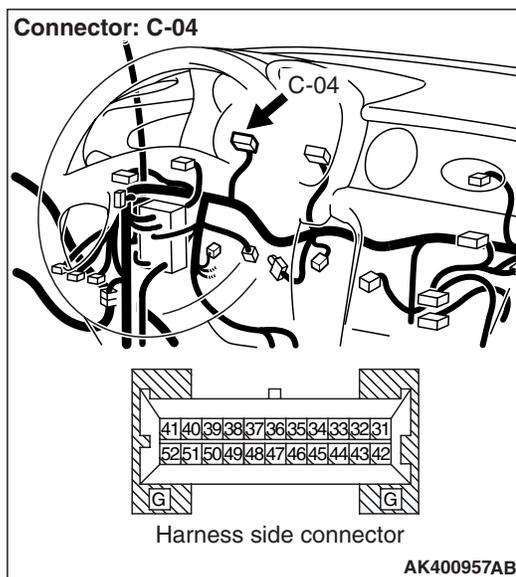
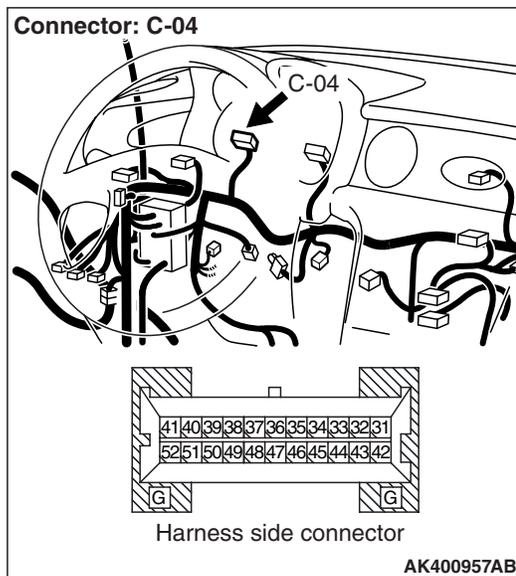
- Engine-ECU turns on engine warning lamp for 5 seconds to check for burnt-out bulb immediately after ignition switch is turned to ON.
- If engine warning lamp is not lit just after turning ignition switch to "ON" position, failure is possibly caused by burn-out bulb, open/short circuit or other faults.

PROBABLE CAUSE

- Engine warning lamp bulb burnt out
- Failed ignition switch
- Open/short circuit in engine warning lamp circuit for or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE**STEP 1: Check engine start-up.****Q: Is engine started?****YES** : Go to Step 2 .

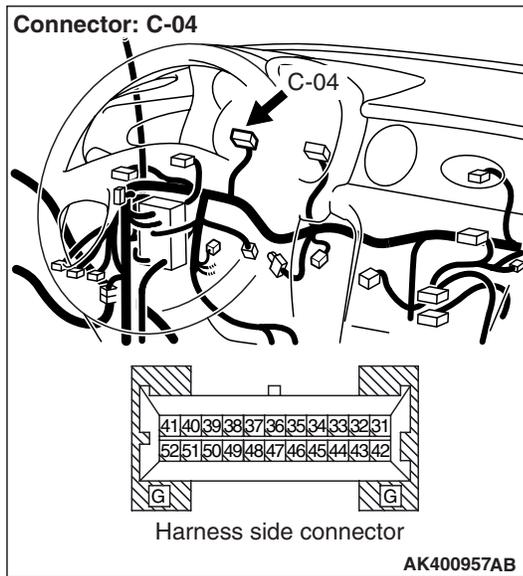
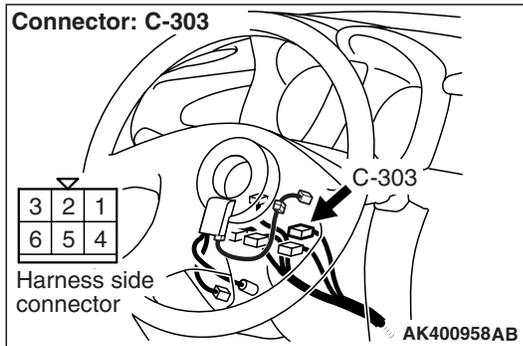
NO : Check engine-ECU power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 P.13B-308).

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 or replace.**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



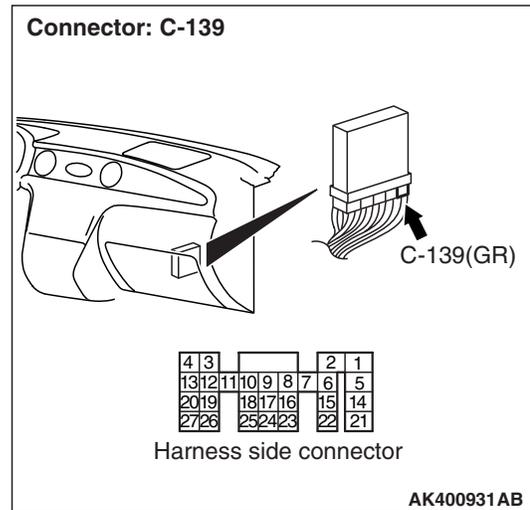
Q: Is the check result normal?

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 or replace.

STEP 6: Connector check: C-139 engine-ECU connector

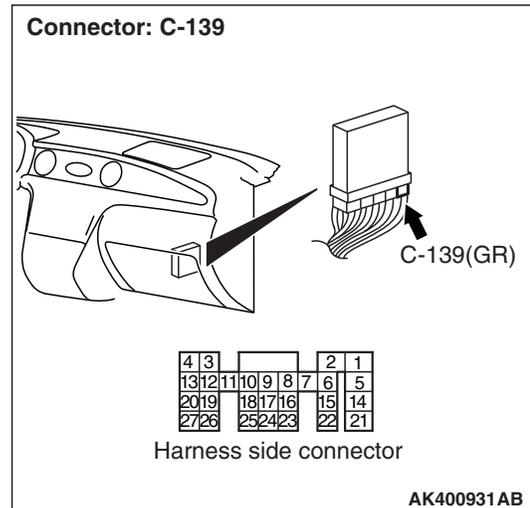


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7: Perform voltage measurement at C-139 engine-ECU connector.



- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 7 and earth.

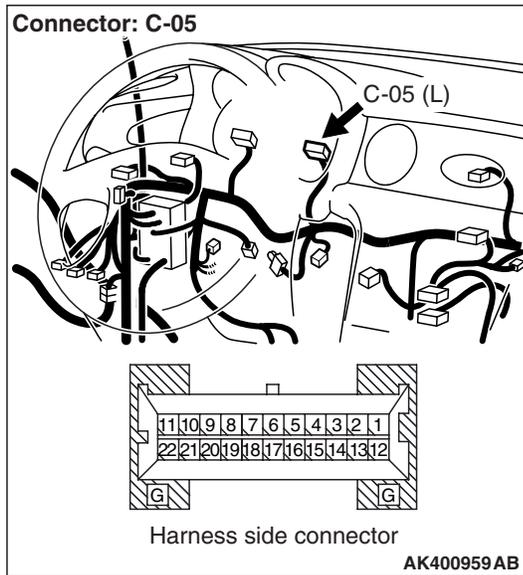
OK: System voltage

Q: Is the check result normal?

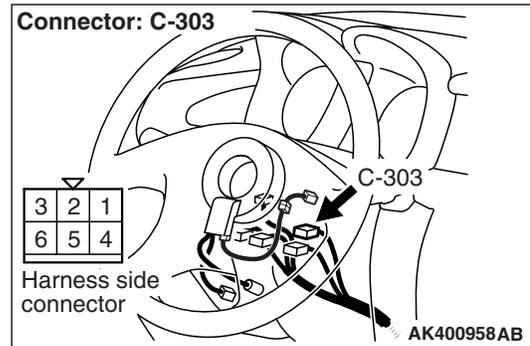
YES : Go to Step 9 .

NO : Go to Step 8 .

STEP 8: Check connector: C-05 combination meter connector



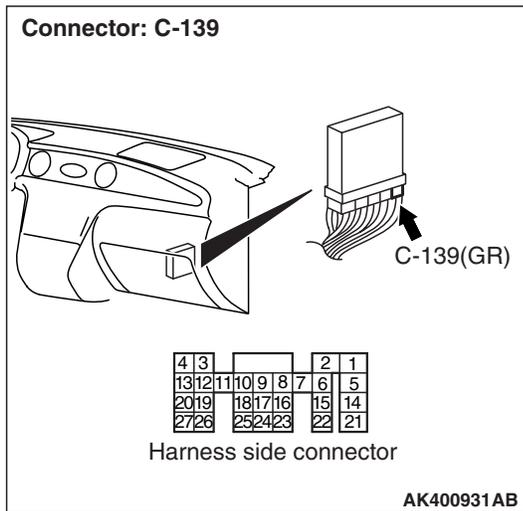
STEP 9: Connector check: C-303 ignition switch connector



Q: Is the check result normal?

YES : Go to Step 10 .

NO : Repair or replace.



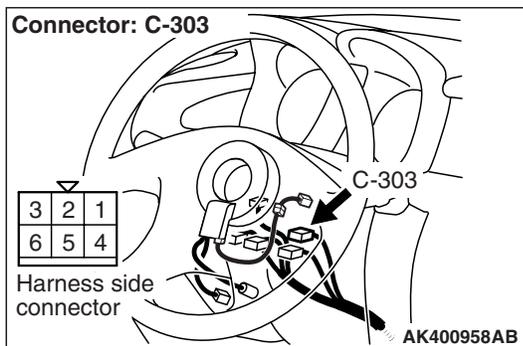
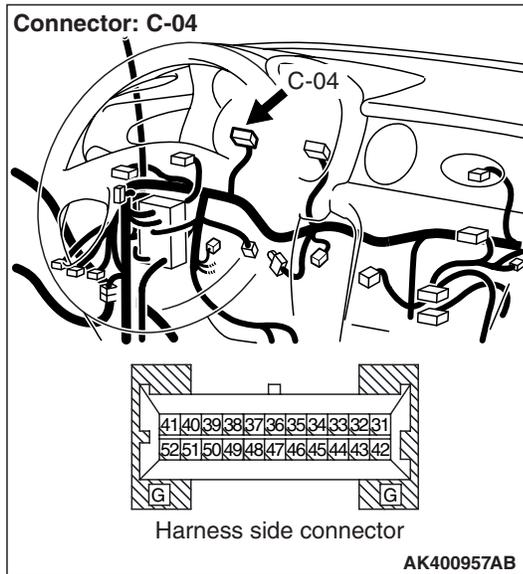
Q: Is the check result normal?

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 connector.

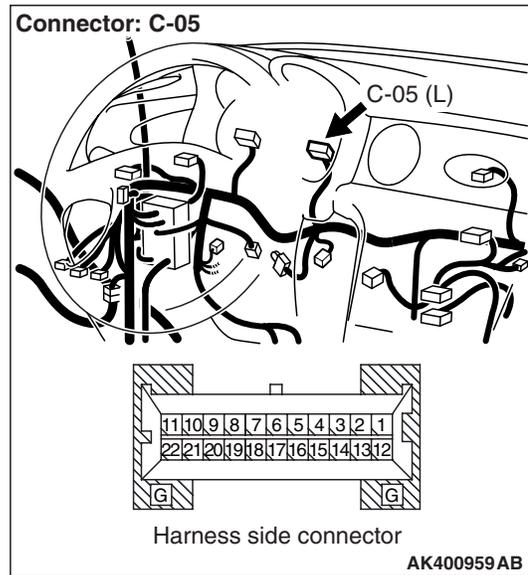
- Check output line for open/short circuit.

NO : Repair or replace.

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 combination meter connector



Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace.

NOTE: Before checking harness, check intermediate connectors C-203 and C-205, and repair if necessary.

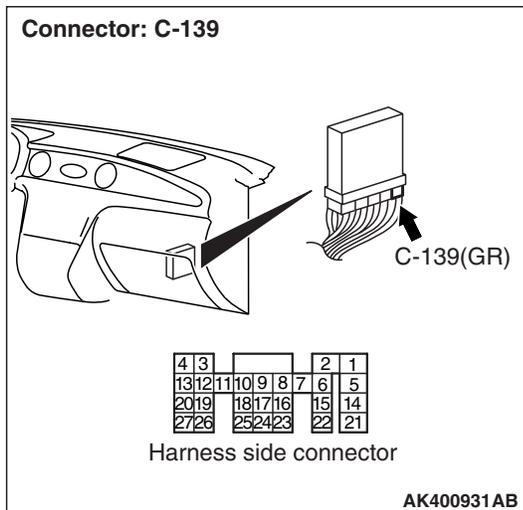
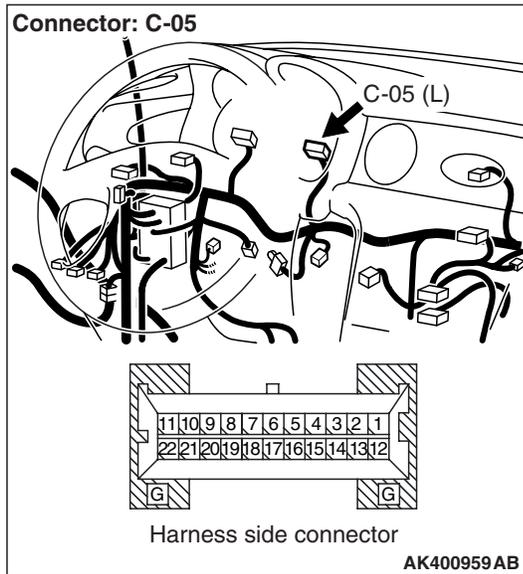
- Check power supply line for damage.

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 connector.



STEP 13: Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU.

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

NOTE: Before checking harness, check intermediate connector C-105, and repair if necessary.

- Check output line for damage.

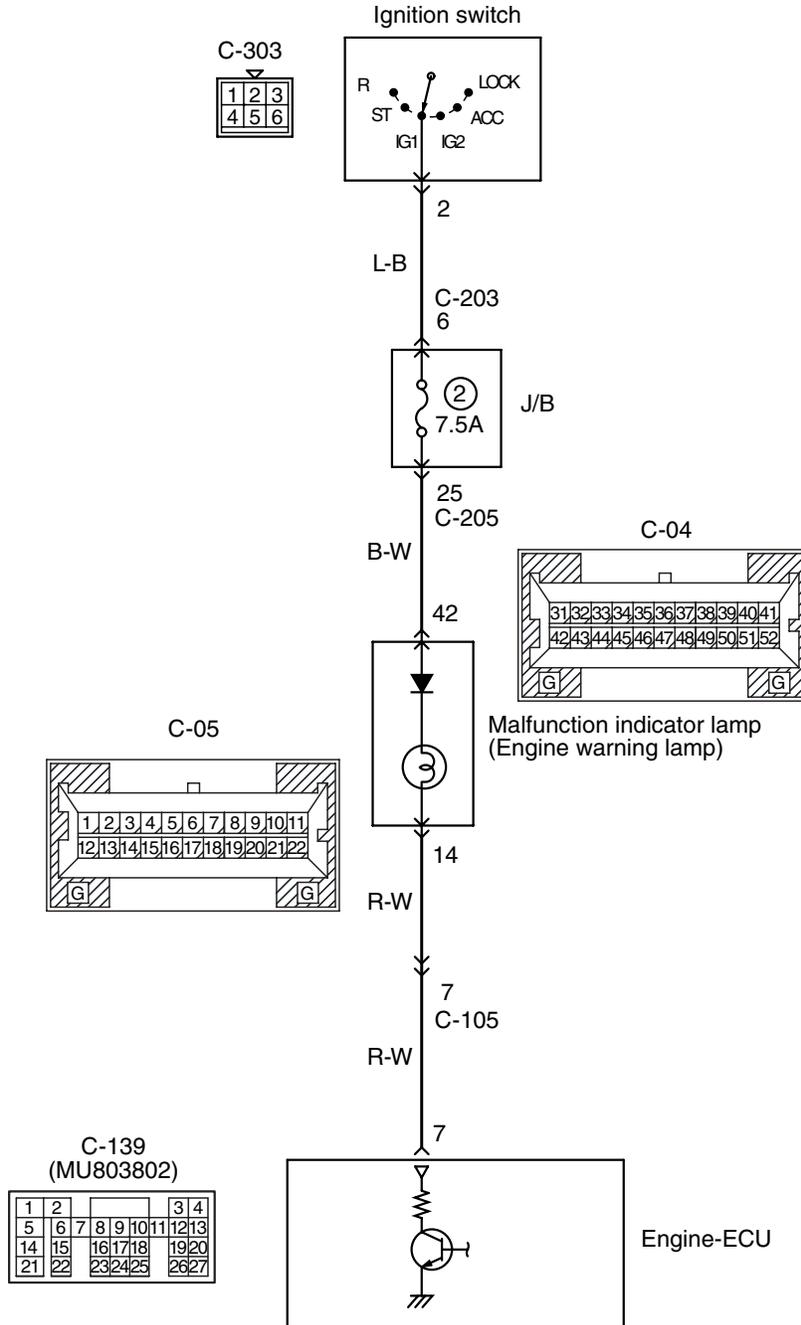
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair.

Inspection Procedure 4: The Engine Warning Lamp Remains Illuminating and never goes out

Malfunction indicator lamp (Engine warning lamp) circuit



Wire colour code

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

OPERATION

- Battery voltage is applied to engine warning lamp (terminal No. 42) from ignition switch.
- Engine-ECU (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 has detected failed sensor or failed actuator. Or failure is possibly caused by short circuit or other faults.

PROBABLE CAUSE

- Short circuit in between engine warning lamp and engine-ECU circuit.
- Failed engine-ECU

DIAGNOSIS PROCEDURE

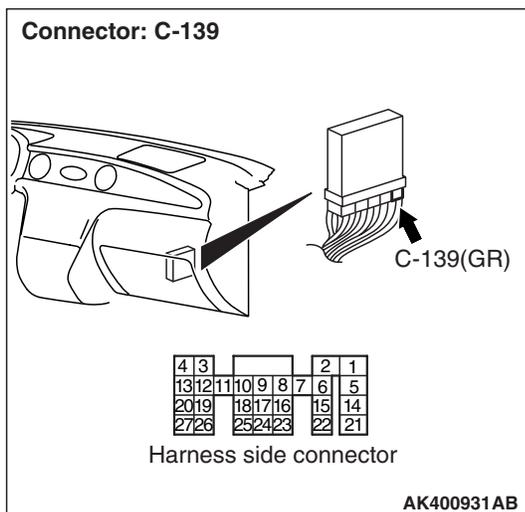
STEP 1: M.U.T.-II/III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13B-20.)

NO : Go to Step 2 .

STEP 2: Connector check: C-139 engine-ECU connector

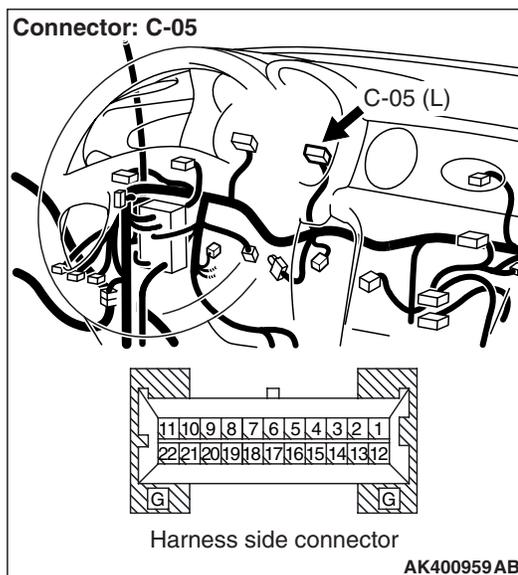
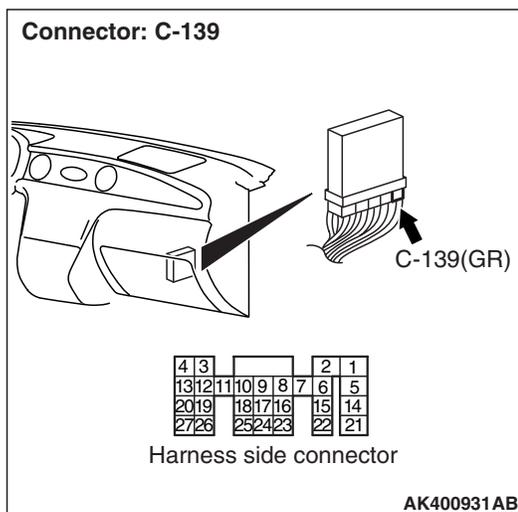


Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3: Perform voltage measurement at C-139 engine-ECU connector.



- Disconnect connector, and measure at the harness side.
- Ignition switch: ON
- Voltage between terminal No. 7 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check intermediate connector C-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 connector.

- Check output line for short circuit.

STEP 4: Check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU.

NO : Intermittent malfunction (Refer to GROUP

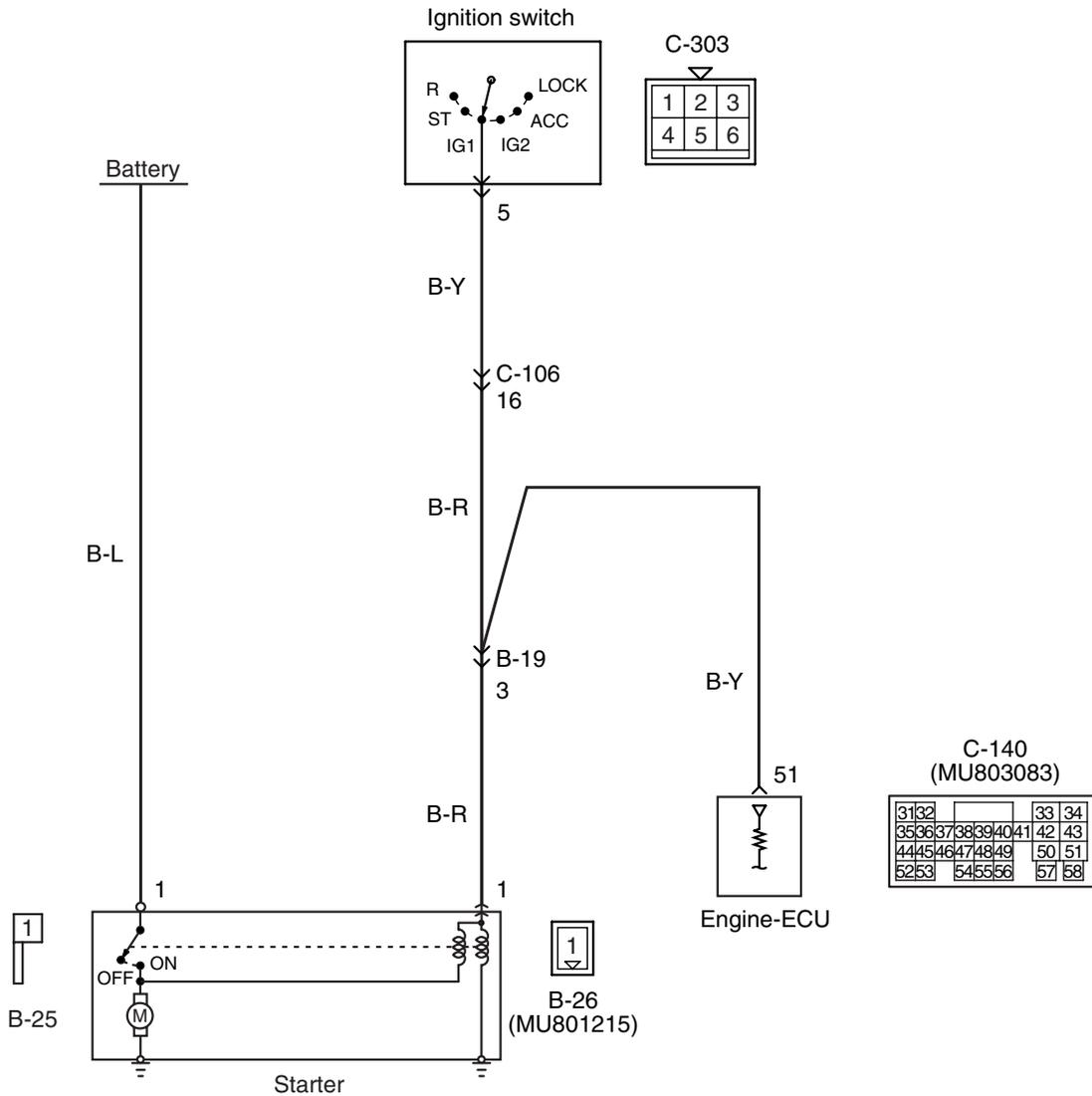
00 – How to Use

Troubleshooting/Inspection Service Points

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

Inspection Procedure 5: Starting Impossible (No Initial Combustion)

Starting impossible (no initial combustion)



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

AK304155AC

OPERATION

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

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed starter itself or failed related circuit.

PROBABLE CAUSE

- Failed battery
- Failed starter motor
- Open/short circuit in starter associated circuit or loose connector contact

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or 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)

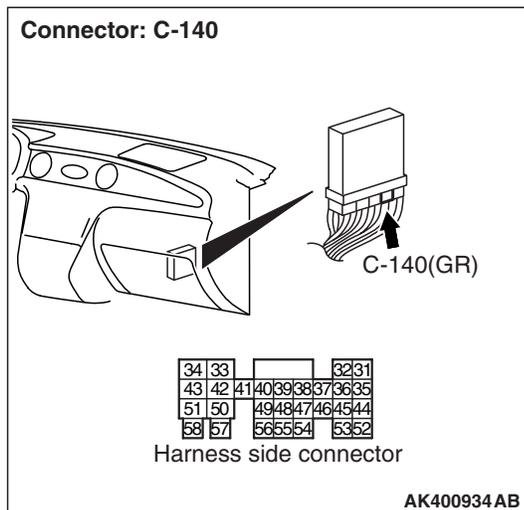
OFF (Ignition switch: ON)

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

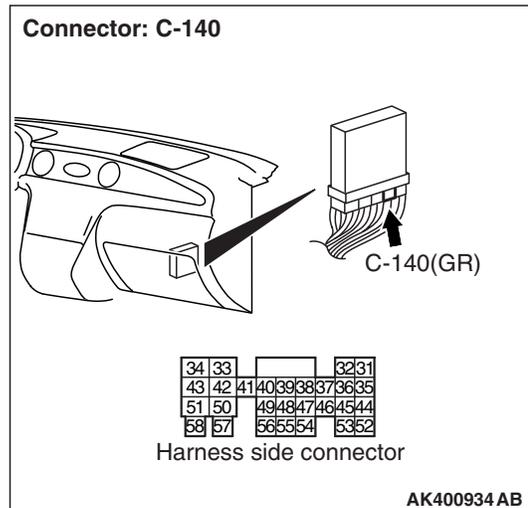


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

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.

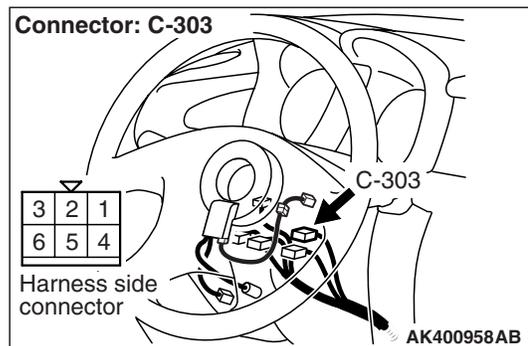
OK: System voltage

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

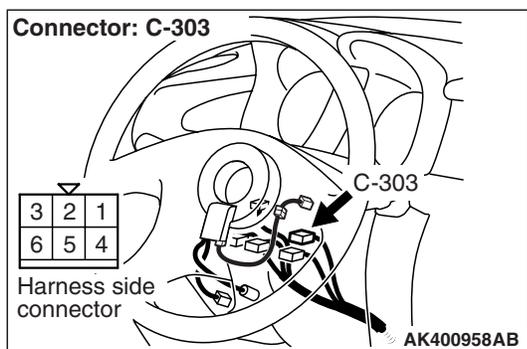
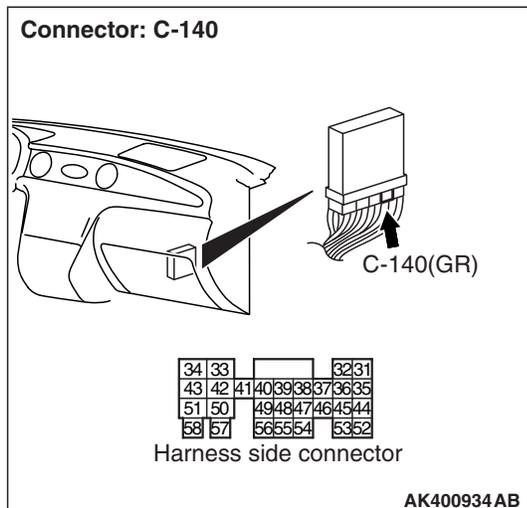


Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check ignition switch.



- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Ignition Switch – Inspection P.54A-30).

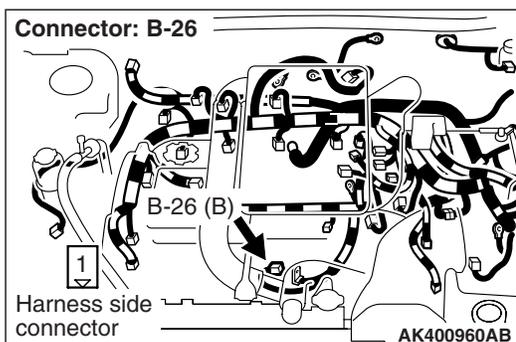
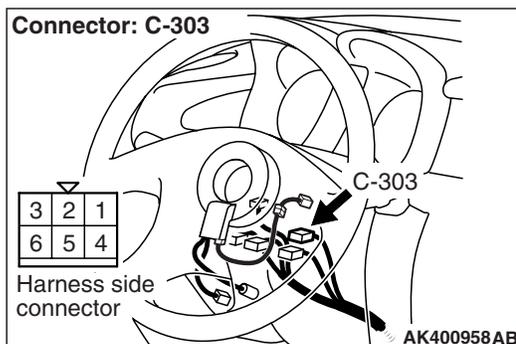
Q: Is the check result normal?

YES : Check intermediate connectors B-19 and C-106, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-140 (terminal No. 51) inhibitor switch connector and C-303 (terminal No. 5) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 7. Connector check: C-303 ignition switch connector and B-26 starter connector



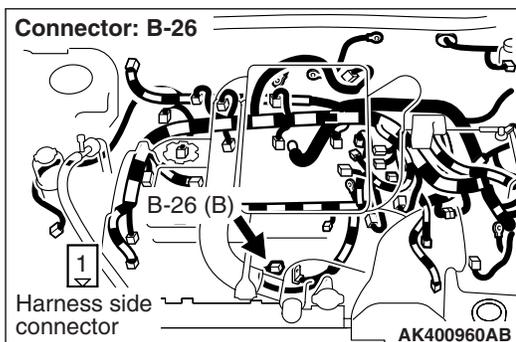
Q: Is the check result normal?

YES : Check intermediate connectors 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 short circuit.

NO : Repair or replace.

STEP 8. Check connector: B-26 starter connector

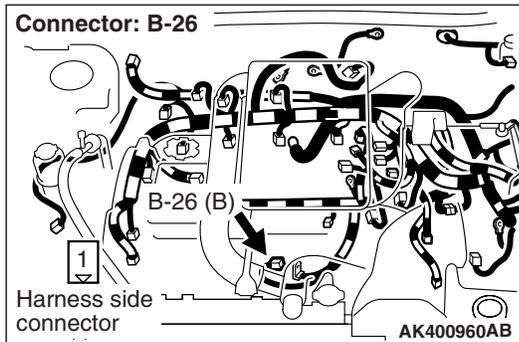


Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

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.

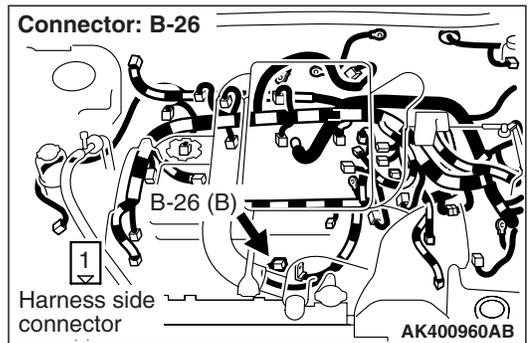
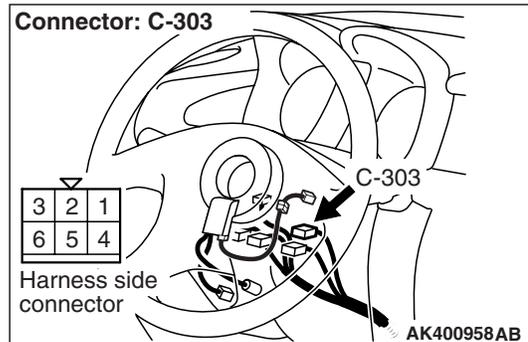
OK: System voltage

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



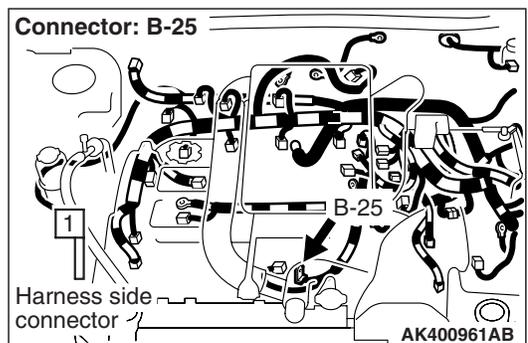
Q: Is the check result normal?

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 or replace.

STEP 11. Connector check: B-25 starter connector

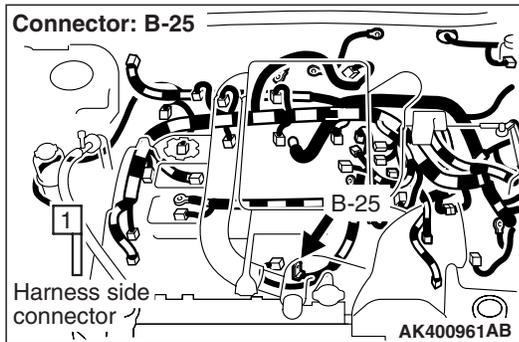


Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair or replace.

STEP 12. Perform voltage measurement at B-25 starter connector.



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

OK: System voltage

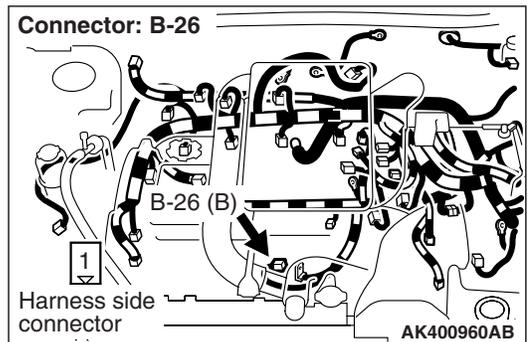
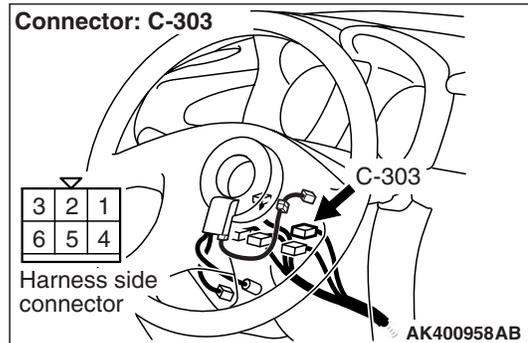
Q: Is the check result normal?

YES : Go to Step 13 .

NO : Check and repair harness between B-25 (terminal No. 1) starter connector and battery.

- Check power supply line for open/short circuit.

STEP 13. Check harness between C-303 (terminal No. 5) ignition switch connector and B-26 (terminal No. 1) starter connector.



NOTE: Before checking harness, check intermediate connectors B-19 and C-106, and repair if necessary.

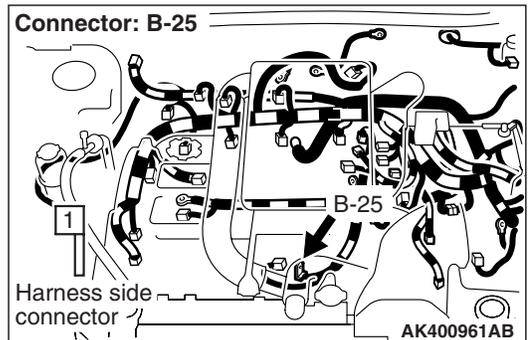
- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair.

STEP 14. Check harness between B-25 (terminal No. 1) starter connector and battery.



- Check power supply line for damage.

Q: Is the check result normal?

YES : Replace starter.

NO : Repair.

Inspection Procedure 6: Starting impossible (Starter Operative but No Initial Combustion)

OPERATION

- Refer to inspection procedure, ignition circuit system [P.13B-355](#).

COMMENTS ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition circuit, failed fuel feed or other faults.

PROBABLE CAUSE

- Failed battery
- Timing belt broken
- Throttle valve fouled around
- Failed ignition system
- Failed fuel system
- Failed immobilizer system
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1: Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery test [P.54A-7](#)).

STEP 2: Check engine warning lamp for burnt out bulb

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check engine-ECU power supply, engine control relay and ignition switch IG1 system (Refer to Inspection Procedure 23 [P.13B-308](#)).

STEP 3: M.U.T.-II/III diagnosis code

Q: Diagnosis code set?

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

NO : Go to Step 4 .

STEP 4: M.U.T.-II/III actuator test

- Item 07: Fuel pump

OK: Operating sound of fuel pump can be heard.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Check fuel pump system (Refer to Inspection Procedure 24 [P.13B-316](#)).

STEP 5. Check timing belt for breakage.

- Engine: Cranking

OK: Camshaft rotates.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace timing belt.

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

Q: Is the start ability good?

YES : Go to Step 7 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13B-390](#)).

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

- Item 18: Cranking signal

OK:

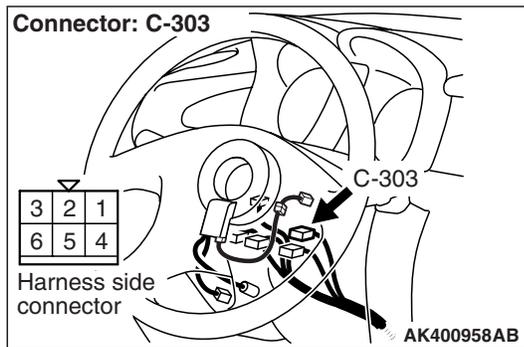
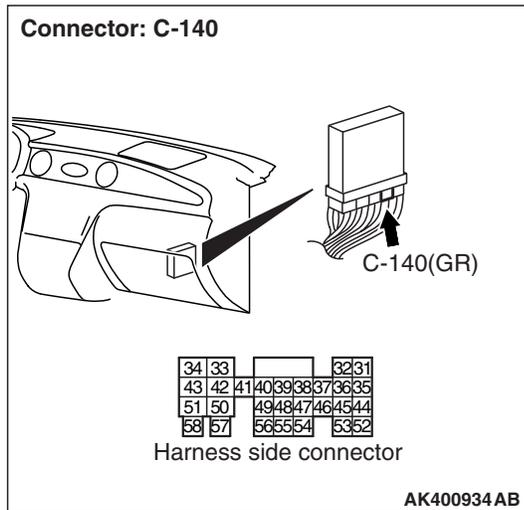
ON (Ignition switch: ST)

OFF (Ignition switch: ON)

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 8 .

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 connector is 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 or replace.

STEP 9: M.U.T.-II/III data list

- Refer to Data List Reference Table [P.13B-368](#).
 - 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.13B-145](#)).

STEP 10: Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13B-400](#)).

Q: Can operating sound be heard?

YES : Go to Step 11 .

NO : Check the injector system of the defective cylinder

(Refer to Code No. 0201: No. 1 injector system [P.13B-100](#)).

(Refer to Code No. 0202: No. 2 injector system [P.13B-104](#)).

(Refer to Code No. 0203: No. 3 injector system [P.13B-108](#)).

(Refer to Code No. 0204: No. 4 injector system [P.13B-112](#)).

STEP 11: Check ignition secondary voltage waveform using an oscilloscope.

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

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Check ignition circuit system (Refer to inspection procedure 30 [P.13B-355](#)).

STEP 12: Replace engine-ECU.

- After replacing the engine-ECU, re-check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Check for foreign matters (water, kerosene, etc.) in fuel and replace if necessary.

NO : Check end.

Inspection Procedure 7: Starting Impossible (Initial Combustion but no Complete Combustion), Starting (Long Time to Start)

COMMENTS 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
- Failed air-fuel ratio control system
- Failed intake system
- Failed exhaust gas cleaning system
- Throttle valve fouled around
- Timing belt not in place
- Improper compression pressure
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1: Check battery condition.

Q: Have the battery terminal been disconnected?

YES : After warm-up engine, idle for about 10 minutes.

NO : Go to Step 2 .

STEP 2: Check battery voltage.

- Measure battery voltage at cranking.

OK: 8 V or higher

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Check battery (Refer to GROUP 54A – 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.13B-20](#)).

NO : Go to Step 4 .

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

- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 13: Intake air temperature sensor
 - b. Item 21: Engine coolant temperature sensor
 - c. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 5 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes [P.13B-20](#)).

STEP 5: Check throttle body (throttle valve portion) contamination.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13B-390](#)).

STEP 6: 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 7 .

NO : Check fuel pump system (Refer to Inspection Procedure 24 [P.13B-316](#)).

STEP 7: Check air intake from intake hose and intake 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 at engine cranking (Refer to P.13B-400).

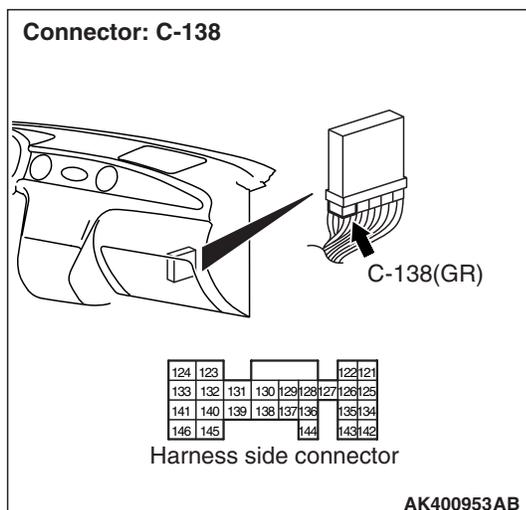
Q: Can operating sound be heard?**YES** : Go to Step 9 .**NO** : Check the injector system of the defective cylinder

(Refer to Code No. 0201: No. 1 injector system P.13B-100).

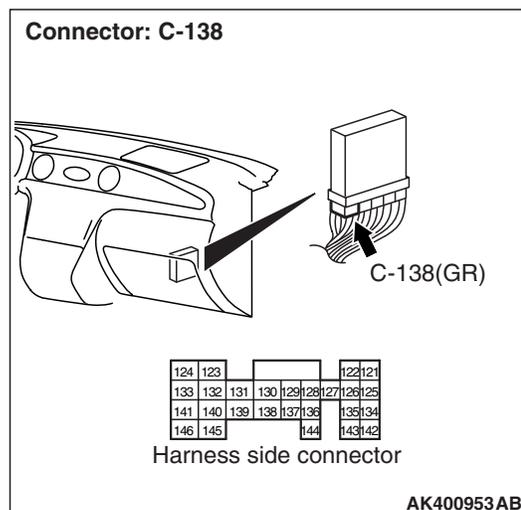
(Refer to Code No. 0202: No. 2 injector system P.13B-104).

(Refer to Code No. 0203: No. 3 injector system P.13B-108).

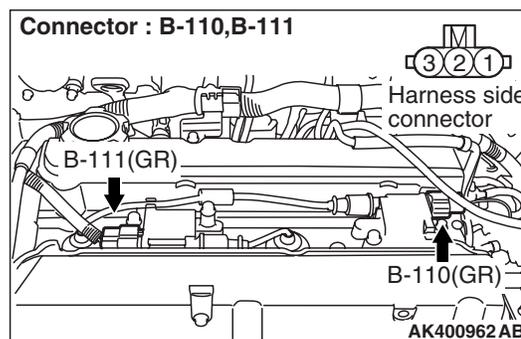
(Refer to Code No. 0204: No. 4 injector system P.13B-112).

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: Perform voltage measurement at C-138 engine-ECU connector.**

- Measure engine-ECU terminal voltage.
- Voltage between terminal No. 144 and earth also between terminal No. 145 and earth.

OK: System voltage**Q: Is the check result normal?****YES** : Go to Step 12 .**NO** : Go to Step 11 .**STEP 11: Connector check: C-138 engine-ECU connector****Q: Is the check result normal?****YES** : Check and repair harness between C-138 (terminal No. 144 and No. 145) engine-ECU connector and body earth.

- Check earth line for open circuit and damage.

NO : Repair or replace.**STEP 12: Connector check: B-110 and B-111 ignition coil connectors.****Q: Is the check result normal?****YES** : Go to Step 13 .**NO** : Repair or replace.**STEP 13: Check ignition secondary voltage waveform using an oscilloscope.**

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

Q: Is the check result normal?**YES** : Go to Step 18 .**NO** : Go to Step 14 .

STEP 14: Check spark plug.

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

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Replace spark plug.

STEP 15: Check spark plug cable itself.

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-39).

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Replace spark plug cable.

STEP 16: Check ignition coil itself.

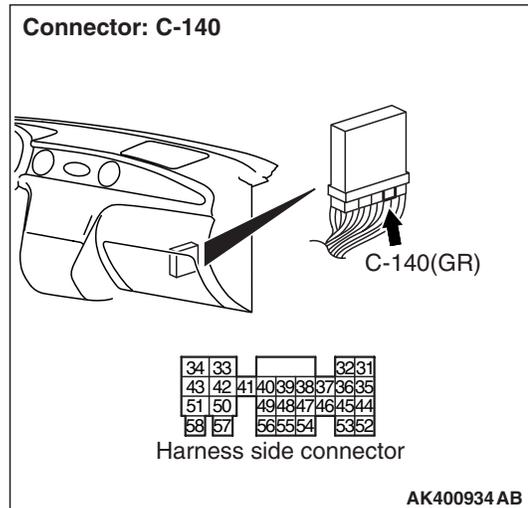
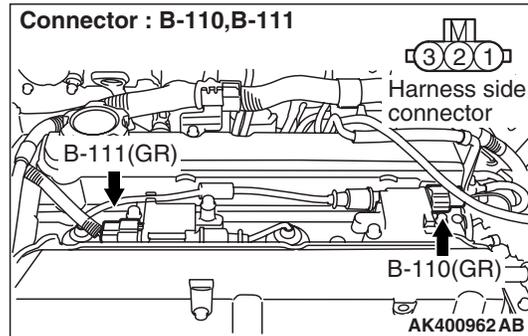
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-38).

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Replace ignition coil.

STEP 17: Check harness between ignition coil connector terminal No. 2 of each cylinder and body earth.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-140 engine-ECU connector.

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

NO : Repair.

STEP 18: Check spray condition of injector.

- Check each injector for spray condition (Refer to P.13B-400).

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 11C – On-vehicle Service P.11C-13).

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair.

STEP 20: Check EGR control solenoid valve itself.

- Check EGR control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-72](#)).

Q: Is the check result normal?**YES** : Go to Step 21 .**NO** : Replace EGR control solenoid valve.**STEP 21: Check EGR valve itself.**

- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-71](#)).

Q: Is the check result normal?**YES** : Go to Step 22 .**NO** : Replace EGR valve.**STEP 22: Replace engine-ECU.**

- After replacing the engine-ECU, re-check the trouble symptoms.

Q: Does trouble symptom persist?**YES** : Check for foreign matters (water, kerosene, etc.) in fuel and replace if necessary.**NO** : Check end.**Inspection Procedure 8: Unstable Idling (Rough Idling, hunting), Improper Idling Speed (Too High or too Low), Engine Stalls During Idling (Die Out)****COMMENTS 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 intake/exhaust system
- Failed emission gas cleaning system
- Throttle valve body fouled
- Timing belt out of place
- Improper compression pressure
- Failed engine-ECU

DIAGNOSIS PROCEDURE**STEP 1: Check battery condition.****Q: Has the battery terminal been disconnected?****YES** : After warm-up engine, idle for about 10 minutes.**NO** : Go to Step 2 .**STEP 2: M.U.T.-II/III diagnosis code****Q: Diagnosis code set?****YES** : Inspection chart for diagnosis code (Refer to [P.13B-20](#)).**NO** : Go to Step 3 .**STEP 3: M.U.T.-II/III data list**

- Refer to Data List Reference Table [P.13B-368](#).
 - Item 12: Air flow sensor
 - Item 13: Intake air temperature sensor
 - Item 14: Throttle position sensor (sub)
 - Item 21: Engine coolant temperature sensor
 - Item 25: Barometric pressure sensor
 - Item 77: Accelerator pedal position sensor (sub)
 - Item 78: Accelerator pedal position sensor (main)
 - Item 79: Throttle position sensor (main)

Q: Are the check results normal?**YES** : Go to Step 4 .**NO** : Perform the diagnosis code classified check Procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes [P.13B-20](#)).

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

- Refer to Data List Reference Table [P.13B-368](#).
 - Item 27: Power steering fluid pressure switch

Q: Are the check results normal?

YES : Go to Step 5 .

NO : Check power steering fluid pressure switch system (Refer to Code No. P0551 [P.13B-178](#)).

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

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13B-390](#)).

STEP 6: Check air intake from intake hose and intake manifold.

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair.

STEP 7: Check injector for operating sound.

- Check injector for operating sound (Refer to [P.13B-400](#)).

Q: Can operating sound be heard?

YES : Go to Step 8 .

NO : Check the injector system of the defective cylinder.

(Refer to Code No. P0201: No. 1 injector system [P.13B-100](#))

(Refer to Code No. P0202: No. 2 injector system [P.13B-104](#))

(Refer to Code No. P0203: No. 3 injector system [P.13B-108](#))

(Refer to Code No. P0204: No. 4 injector system [P.13B-112](#))

STEP 8: Check timing marks of timing belt.

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Align timing marks.

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

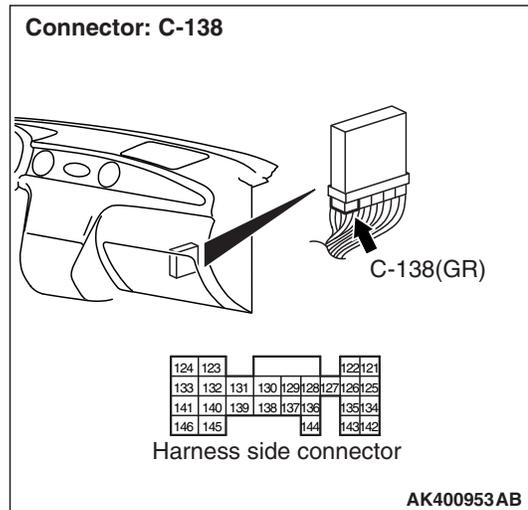
- Refer to Data List Reference Table [P.13B-368](#).
 - Item 11: Oxygen sensor (front)

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Check the oxygen sensor (front) system (Refer to Code No. P0130 [P.13B-72](#))

STEP 10: Perform voltage measurement at C-138 engine-ECU.



- Measure engine-ECU terminal voltage.
- Ignition switch: "ON"
- Voltage between terminal No. 144 and earth, also between terminal No. 145 and earth.

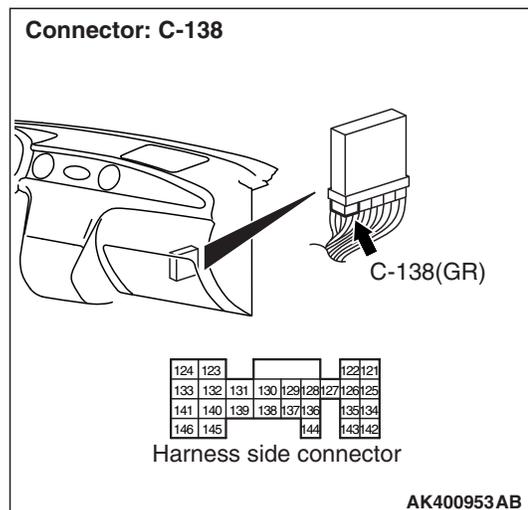
OK: 0.5 V or less

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 11 .

STEP 11: Connector check: C-138 engine-ECU connector



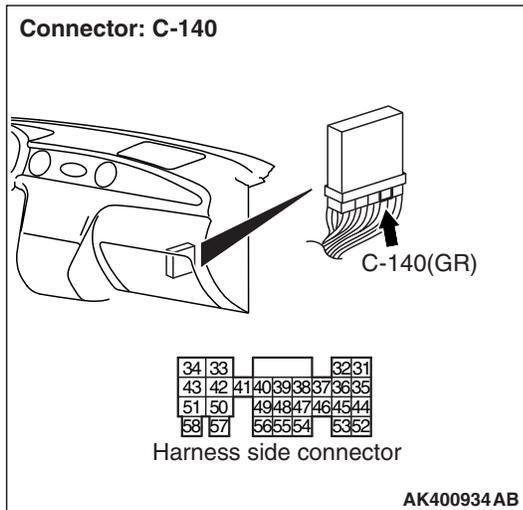
Q: Is the check result normal?

YES : Check and repair harness between C-138 (terminal No. 144 and No. 145) engine-ECU connector and body earth.

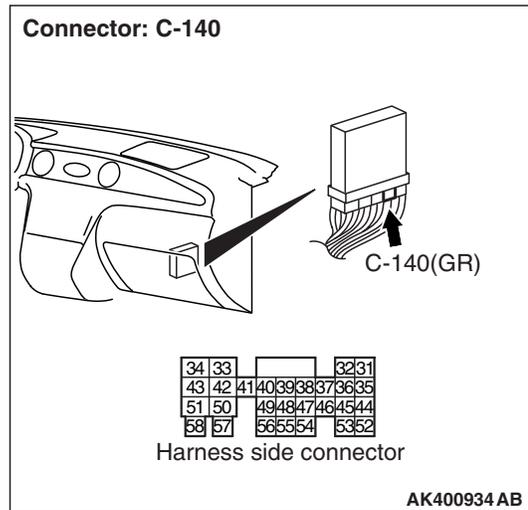
- Check earthing line for open circuit and damage.

NO : Repair or replace.

STEP 12. Perform voltage measurement at C-140 engine-ECU connector.



STEP 13. Connector check: C-140 engine-ECU connector and B-30 alternator connector.



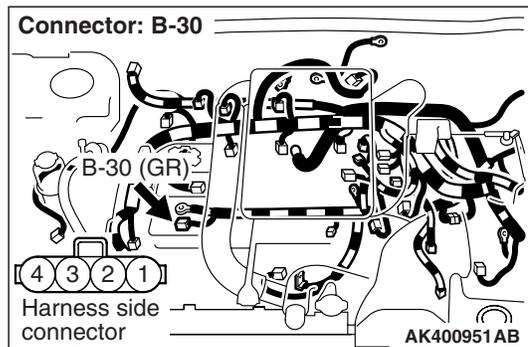
- Measure engine-ECU terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral
- Radiator fan: Not operating
- Voltage between terminal No. 45 and earth.

OK: Switching the head lamps to ON from OFF causes the voltage to increase by 0.2 – 3.5 V.

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Go to Step 13 .

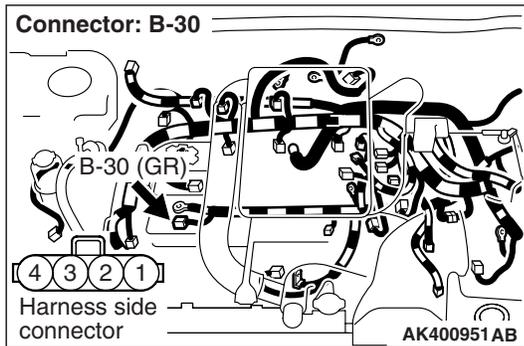
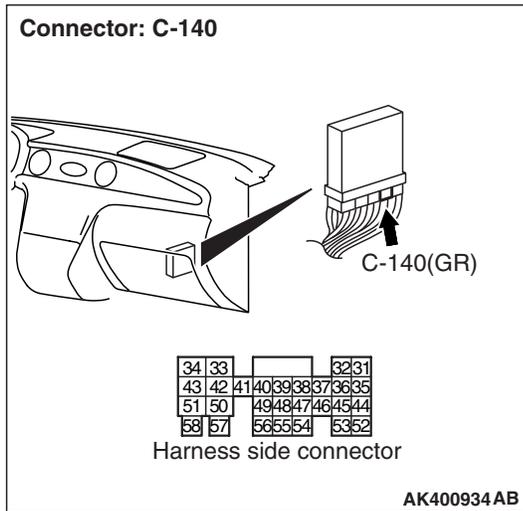


Q: Is the check result normal?

YES : Go to Step 14 .

NO : Repair or replace.

STEP 14. Check harness between C-140 (terminal No. 45) engine-ECU connector and B-30 (terminal No. 1) alternator connector.



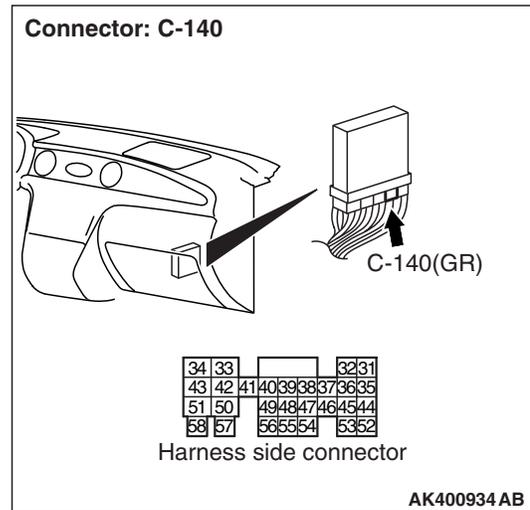
NOTE: Before checking harness, check intermediate connector B-19 and repair if necessary.

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

Q: Is the check result normal?

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

STEP 15. Perform voltage measurement at C-140 engine-ECU connector.



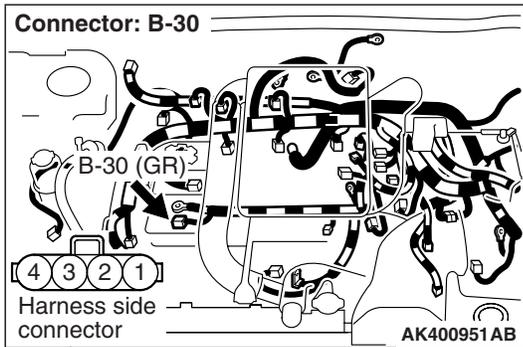
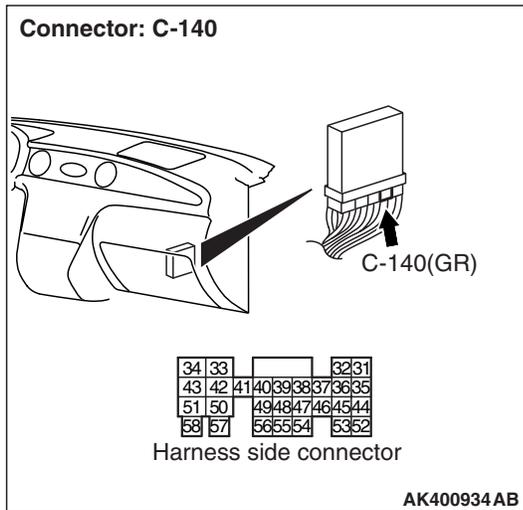
- Measure engine-ECU terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral
- Radiator fan: Not operating
- Voltage between terminal No. 45 and earth.

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

Q: Is the check result normal?

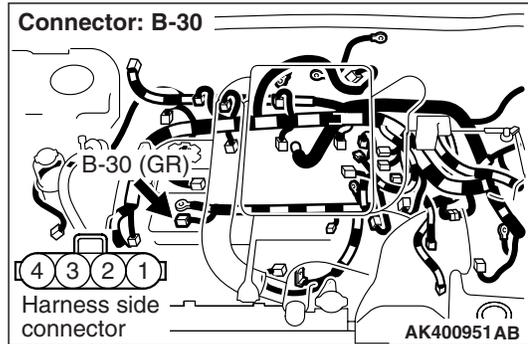
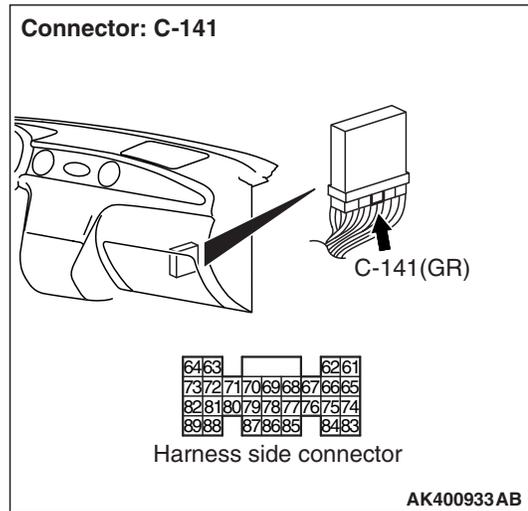
- YES :** Go to Step 19 .
NO : Go to Step 16 .

STEP 16. Connector check: C-140 engine-ECU connector and B-30 alternator connector.



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

STEP 17. Check harness between C-141 (terminal No. 86) engine-ECU connector and B-30 (terminal No. 4) alternator connector.



NOTE: Before checking harness, check intermediate connector B-19, and repair if necessary.

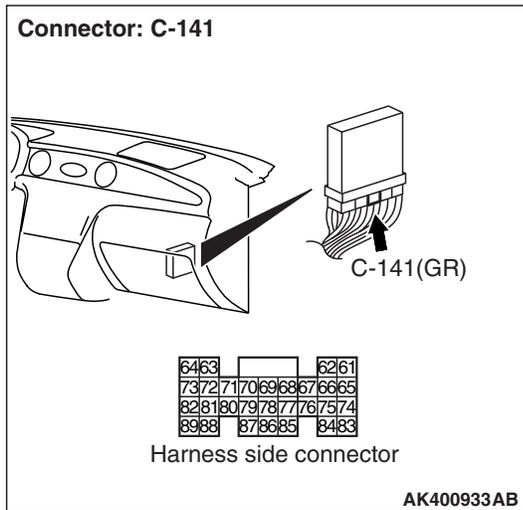
- Check output line for open/short circuit and damage.

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

STEP 18. Check the trouble symptoms.

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

STEP 19. Perform voltage measure at C-141 engine-ECU connector.



- Measure engine-ECU 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)

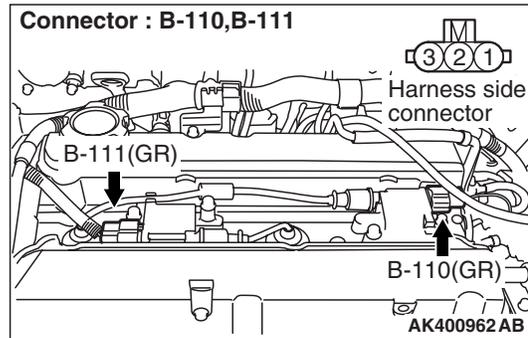
System voltage (with A/C set for minimum air flow at room temperature)

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Check A/C load signal system (Refer to Inspection Procedure 28 P.13B-342).

STEP 20. Connector check: B-110 and B-111 ignition coil connectors.



Q: Is the check result normal?

YES : Go to Step 21 .

NO : Repair or replace.

STEP 21. Check ignition secondary voltage waveform using an oscilloscope.

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

Q: Is the check result normal?

YES : Go to Step 26 .

NO : Go to Step 22 .

STEP 22. Check spark plug.

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

Q: Is the check result normal?

YES : Go to Step 23 .

NO : Replace spark plug.

STEP 23. Check spark plug cable.

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-39).

Q: Is the check result normal?

YES : Go to Step 24 .

NO : Replace spark plug cable.

STEP 24. Check ignition coil itself.

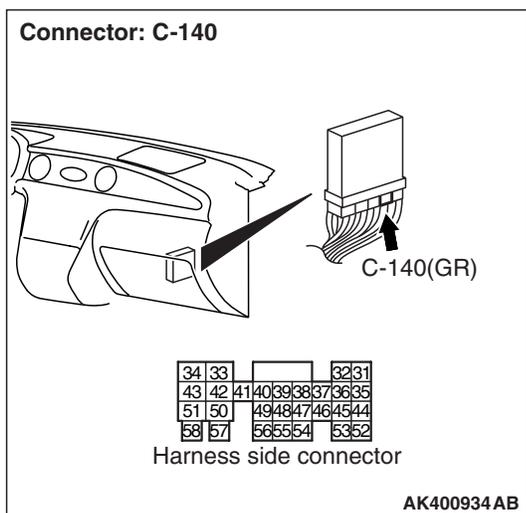
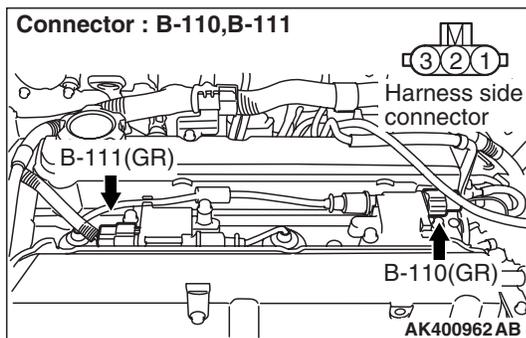
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-38).

Q: Is the check result normal?

YES : Go to Step 25 .

NO : Replace ignition coil.

STEP 25. Check harness between ignition coil connector terminal No. 2 of each cylinder and body earth.



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

Q: Is the check result normal?

YES : Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-140 engine-ECU.

- Check signal line for open/short and damage.

NO : Repair.

STEP 26. Check injector for spray condition.

- Check each injector for spray condition (Refer to [P.13B-400](#)).

Q: Is the check result normal?

YES : Go to Step 27 .

NO : Replace injector.

STEP 27. Check compression pressure.

- Check compression pressure (Refer to GROUP 11C – On-vehicle Service [P.11C-13](#)).

Q: Is the check result normal?

YES : Go to Step 28 .

NO : Repair.

STEP 28. Check purge control solenoid valve itself.

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

Q: Is the check result normal?

YES : Go to Step 29 .

NO : Replace purge control solenoid valve.

STEP 29. Check EGR control solenoid valve itself.

- Check EGR control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-72](#)).

Q: Is the check result normal?

YES : Go to Step 30 .

NO : Replace EGR control solenoid valve.

STEP 30. Check EGR valve itself.

- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-71](#)).

Q: Is the check result normal?

YES : Go to Step 31 .

NO : Replace EGR valve.

STEP 31. 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 32 .

NO : Check fuel pump system (Refer to inspection Procedure 24 [P.13B-316](#)).

STEP 32. Replace engine-ECU

- After engine-ECU is replaced, re-check for trouble symptoms.

Q: Does trouble system persist?

YES : Check for foreign matters (water, kerosene, etc.) in fuel and replace if necessary.

NO : Check end.

Inspection Procedure 9: The Engine Stalls when Starting the Car (Pass Out)

COMMENT ON TROUBLE SYMPTOM

- Engine stall on starting is possibly caused by mis-fire due to failed spark plug, improper air-fuel ratio at accelerator pedal depression or other faults.

PROBABLE CAUSE

- Failed ignition system
- Failed intake system
- Failed emission gas cleaning system
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

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

NO : Go to Step 2 .

STEP 2. Check EGR control solenoid valve itself.

- Check EGR control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-72](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace EGR control solenoid valve.

STEP 3. Check EGR valve itself.

- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-71](#)).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace EGR valve.

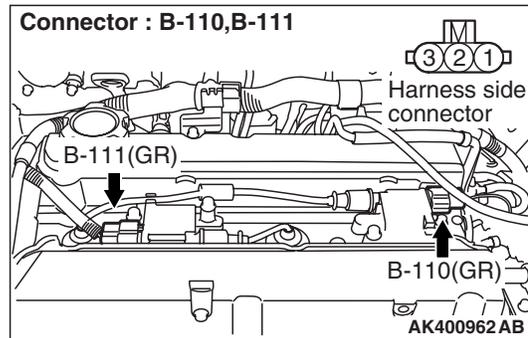
STEP 4. Check air intake from intake hose and intake manifold.

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair.

STEP 5. Connector check: B-110 and B-111 ignition connectors



Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

STEP 6. Check ignition secondary voltage waveform using an oscilloscope.

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

Q: Is the check result normal?

YES : Replace engine-ECU.

NO : Go to Step 7 .

STEP 7. Check spark plug.

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

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Replace spark plug.

STEP 8. Check spark plug cable itself.

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-39](#)).

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace spark plug cable.

STEP 9. Check ignition coil itself.

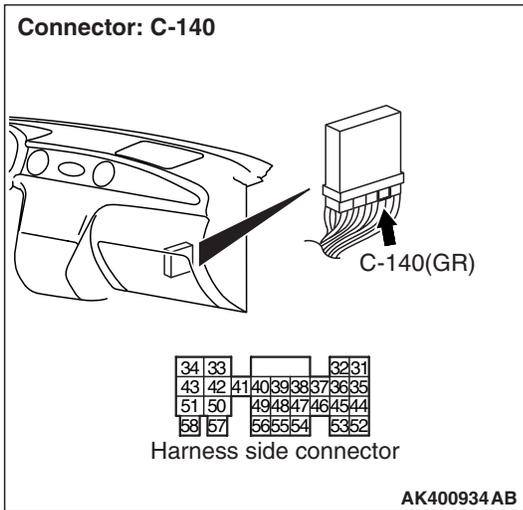
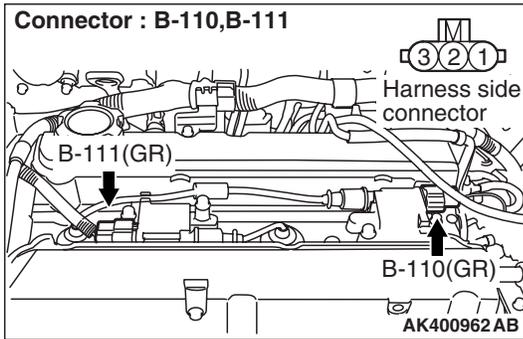
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Replace ignition coil.

STEP 10. Check harness between ignition coil connector terminal No. 2 of each cylinder and body earth.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-140 engine-ECU connector.

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

NO : Repair.

Inspection Procedure 10: The Engine Stalls when Decelerating

COMMENT ON TROUBLE SYMPTOM

- Engine stall on deceleration is possibly caused by insufficient air intake, improper air-fuel ratio due to failed exhaust gas recirculation system or other faults.

PROBABLE CAUSE

- Failed ignition system
- Failed emission control system
- Throttle valve fouled
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13B-20).

NO : Go to Step 2 .

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

- Refer to Data List Reference Table P.13B-368.
 - 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.13B-20)

STEP 3. Check EGR control solenoid valve itself.

- Check EGR control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System P.17-72).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Replace EGR control solenoid valve.

STEP 4. Check EGR valve itself.

- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System P.17-71).

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Replace EGR valve.

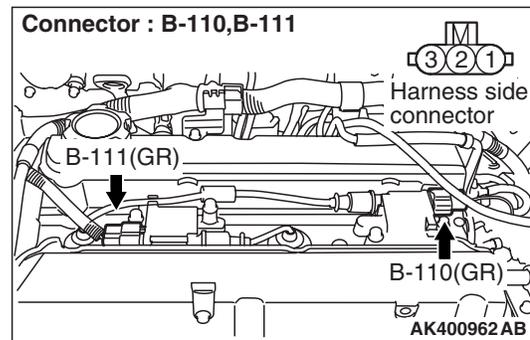
STEP 5. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Clean throttle body (throttle valve portion) (Refer to P.13B-390).

STEP 6. Connector check: B-110 and B-111 ignition coil connectors



Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check ignition secondary voltage waveform using an oscilloscope.

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

Q: Is the check result normal?

YES : Replace engine-ECU.

NO : Go to Step 8 .

STEP 8. Check spark plug.

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

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace spark plug.

STEP 9. Check spark plug cable itself.

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-39).

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Replace spark plug cable.

STEP 10. Check ignition coil itself.

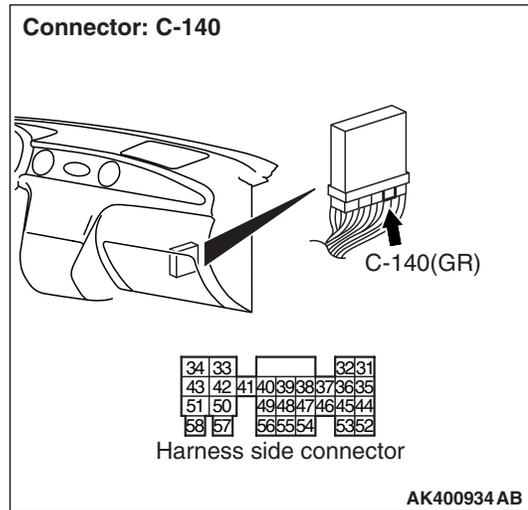
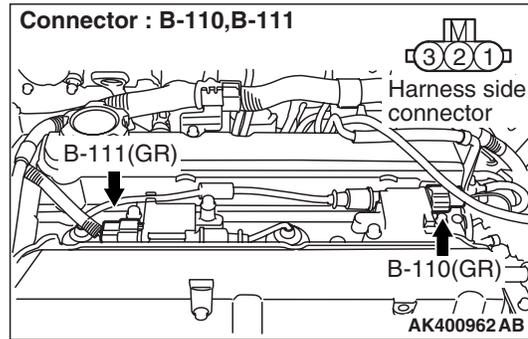
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-38).

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Replace ignition coil.

STEP 11. Check harness between ignition coil connector terminal No. 2 of each cylinder and body earth.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-140 engine-ECU connector.

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

NO : Repair.

Inspection Procedure 11: Engine does not Revolve Up

COMMENTS ON TROUBLE SYMPTOM

- Failure is possibly caused by failed fuel system, ignition system or other faults.

PROBABLE CAUSE

- Failed ignition system
- Failed fuel system
- Failed throttle valve opening control system
- Timing belt out of place
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13B-20).

NO : Go to Step 2 .

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

- Refer to Data list reference table P.13B-368
 - 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.13B-20).

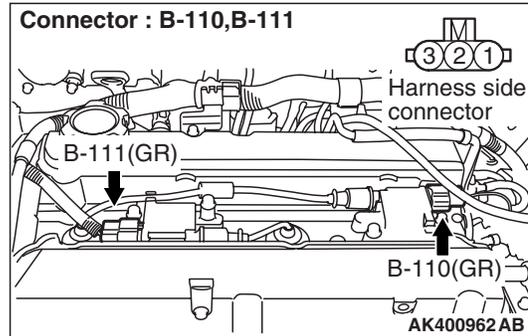
STEP 3. Check timing marks of timing belt.

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Align match marks.

STEP 4. Connector check: B-110 and B-111 ignition coil connectors



Q: Is the check result normal?

YES : Go to Step 5 .

NO : Repair or replace.

STEP 5. Check ignition secondary voltage waveform using an oscilloscope.

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

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 6 .

STEP 6. Check spark plug.

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

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Replace spark plug.

STEP 7. Check spark plug cable itself.

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-39).

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Replace spark plug cable.

STEP 8. Check ignition coil itself.

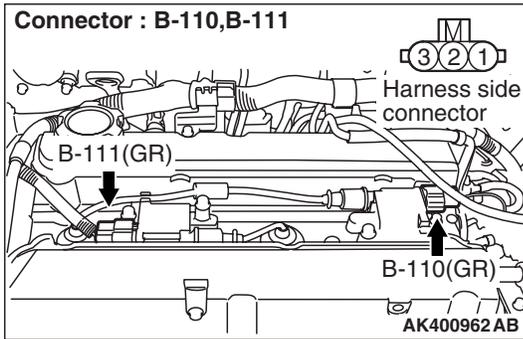
- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-38).

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Replace ignition coil.

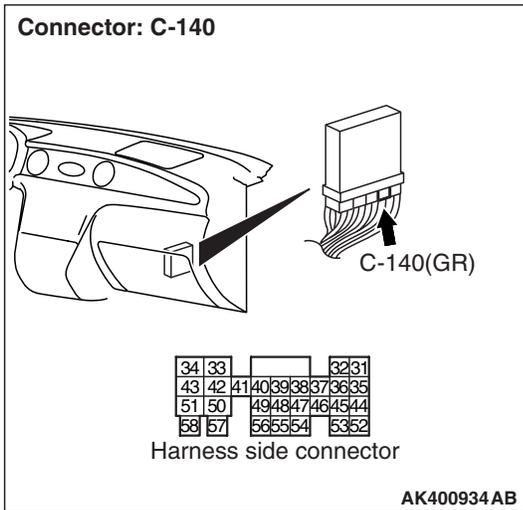
STEP 9. Check harness between ignition coil connector terminal No. 2 of each cylinder and body earth.



STEP 10. Fuel pressure measurement.

- Fuel pressure measurement (Refer to P.13B-391).

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



- Check earthing line for open circuit or damage.

Q: Is the check result normal?

YES : Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-140 engine-ECU connector.

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

NO : Repair.

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

COMMENTS ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition system, improper air-fuel ratio, improper compression pressure or other faults.

PROBABLE CAUSE

- Failed air-fuel ratio control system
- Failed ignition system
- Failed fuel system
- Failed intake and exhaust system
- Failed emission control system
- Failed throttle valve opening control system
- Failed turbocharger system
- Throttle valve fouled
- Improper compression pressure
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13B-20).

NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to P.13B-400).

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.13B-100)

(Refer to code No. P0202: No. 2 injector system P.13B-104)

(Refer to code No. P0203: No. 3 injector system P.13B-108)

(Refer to code No. P0204: No. 4 injector system P.13B-112)

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

- Refer to Data List Reference Table P.13B-368.
 - a. Item 13: Intake air temperature sensor
 - b. Item 14: Throttle position sensor (sub)
 - c. Item 21: Engine coolant temperature sensor
 - d. Item 25: Barometric pressure sensor
 - e. Item 77: Accelerator pedal position sensor (sub)
 - f. Item 78: Accelerator pedal position sensor (main)
 - g. Item 79: Throttle position sensor (main)

Q: Are the check results normal?

YES : Go to Step 4 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes P.13B-20).

STEP 4. Check Purge control solenoid valve itself.

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

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Replace purge control solenoid valve.

STEP 5. Check EGR control solenoid valve itself.

- Check EGR control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System P.17-72).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace EGR control solenoid valve.

STEP 6. Check EGR valve itself.

- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System P.17-71).

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Replace EGR valve.

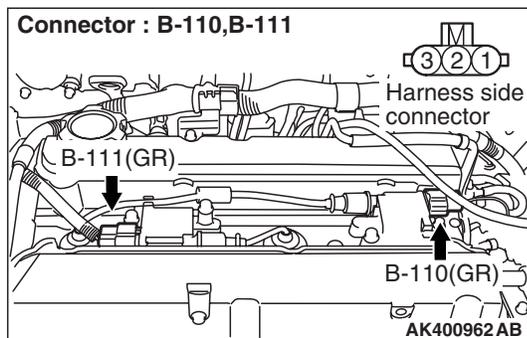
STEP 7. M.U.T.-II/III data list

- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 11: Oxygen sensor (front)

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Check oxygen sensor (front) system (Refer to Code No. P0130 [P.13B-72](#)).

STEP 8. Connector check: B-110 and B-111 ignition coil connectors

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Repair or replace.

STEP 9. Check ignition secondary voltage waveform using an oscilloscope.

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

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Go to Step 10 .

STEP 10. Check spark plug.

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

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Replace spark plug.

STEP 11. Check spark plug cable itself.

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-39](#)).

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Replace spark plug cable.

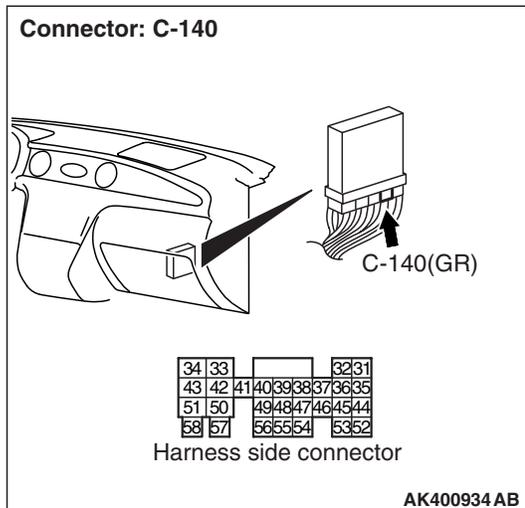
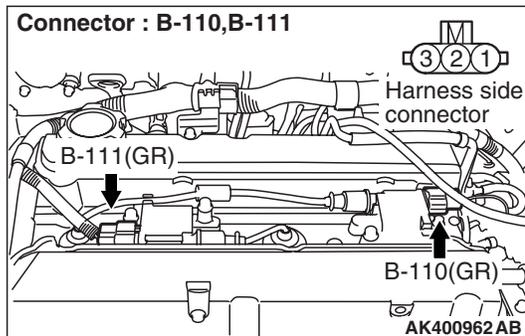
STEP 12. Check ignition coil itself.

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Replace ignition coil.

STEP 13. Check harness between ignition coil connector terminal No. 2 of each cylinder and body earth.

- Check earthing line for open circuit and damage.

Q: Is the check result normal?

YES : Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-140 engine-ECU connector.

- Check signal line for open or short circuit or damage.

NO : Repair.

STEP 14. Check throttle body (throttle valve portion) for contamination.

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13B-390](#)).

STEP 15. M.U.T.-II/III actuator test.

- Item 12: Waste gate solenoid valve
OK: Operating sound is audible on actuation.

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Check waste gate solenoid valve system (Refer to Code No. P0243 [P.13B-123](#)).

STEP 16. Check turbo charger supercharging pressure.

- Check turbo charger output pressure (Refer to GROUP 15 –Intake Exhaust –On-vehicle Service [P.15-3](#)).

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Check supercharging pressure control system.

- Check supercharging pressure control system (Refer to GROUP 15 –Intake Exhaust –On-vehicle Service [P.15-3](#)).

Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair.

STEP 18. M.U.T.-II/III actuator test.

- Item 09: Fuel pressure control solenoid valve
OK: Operating sound is audible on actuation.

Q: Is the check result normal?

YES : Go to Step 19 .

NO : Check fuel pressure control solenoid valve system (Refer to Code No. P0443 [P.13B-168](#)).

STEP 19. Fuel pressure measurement.

- Fuel pressure measurement (Refer to [P.13B-391](#)).

Q: Is the check result normal?

YES : Go to Step 20 .

NO : Repair.

STEP 20. Check compression pressure.

- Check compression pressure (Refer to GROUP 11C – On-vehicle Service [P.11C-13](#)).

Q: Is the check result normal?

YES : Replace engine-ECU.

NO : Repair.

Inspection Procedure 13: The Feeling of Impact or Vibration when Accelerating

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed ignition leak with rise in spark plug-required voltage at acceleration, throttle valve opening control system.

PROBABLE CAUSE

- Failed ignition system
- Failed throttle valve opening control system
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

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

NO : Go to Step 2 .

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

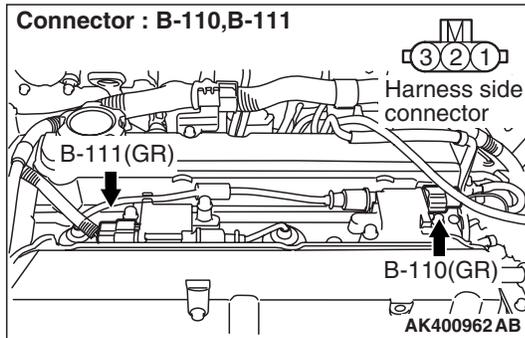
- Refer to Data List Reference Table [P.13B-368](#)
 - Item 14: Throttle position sensor (sub)
 - Item 77: Accelerator pedal position sensor (sub)
 - Item 78: Accelerator pedal position sensor (main)
 - Item 79: Throttle position sensor (main)

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.13B-20](#)).

STEP 3. Connector check: B-110 and B-111 ignition coil connectors



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

STEP 4. Check ignition secondary voltage waveform using an oscilloscope.

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

Q: Is the check result normal?
YES : Replace engine-ECU.
NO : Go to Step 5 .

STEP 5. Check spark plug.

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

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

STEP 6. Check spark plug cable itself.

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-39).

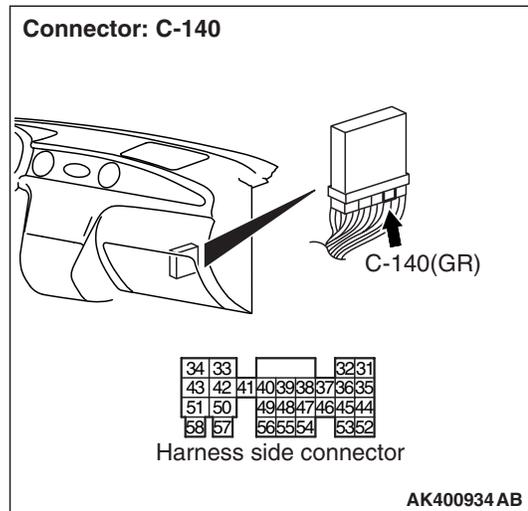
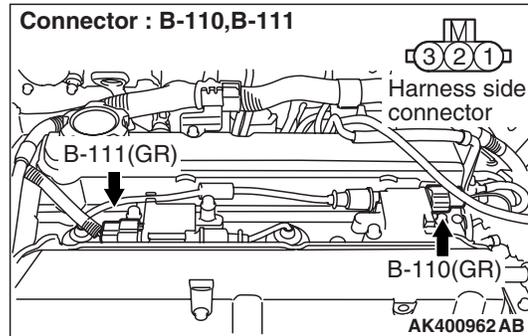
Q: Is the check result normal?
YES : Go to Step 7 .
NO : Replace spark plug cable.

STEP 7. Check ignition coil itself.

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-38).

Q: Is the check result normal?
YES : Go to Step 8 .
NO : Replace ignition coil.

STEP 8. Check harness between ignition coil connector terminal No. 2 of each cylinder and body earth.



- Check earthing line for open circuit and damage.

Q: Is the check result normal?
YES : Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-140 engine-ECU connector.
 • Check signal line for open/short circuit and damage.
NO : Repair.

Inspection Procedure 14: The Feeling of Impact or Vibration when Decelerating

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by insufficient air intake due to failed throttle valve opening control system.

PROBABLE CAUSE

- Failed throttle valve opening control system
- Throttle valve body fouled
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13B-20).

NO : Go to Step 2 .

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

- Refer to Data List Reference Table P.13B-368.
 - 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.13B-20).

STEP 3. Check throttle body (throttle valve portion) contamination.

Q: Is the check result normal?

YES : Replace engine-ECU.

NO : Clean throttle body (throttle valve portion) (Refer to P.13B-390).

Inspection Procedure 15: Knocking

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed detonation control, improper thermal value of spark plug or other faults.

PROBABLE CAUSE

- Defective detonation sensor
- Failed detonation control system
- Failed ignition system
- Defective spark plug
- Failed engine-ECU

DIAGNOSIS PROCEDURE

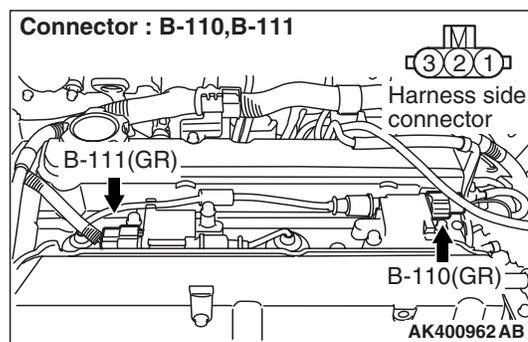
STEP 1. M.U.T.-II/III diagnosis code

Q: Diagnosis code set?

YES : Inspection chart for diagnosis code (Refer to P.13B-20).

NO : Go to Step 2 .

STEP 2. Connector check: B-110 and B-111 ignition coil connectors



Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

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

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

Q: Is the check result normal?

YES : Check detonation sensor (Refer to Code No. P0325 P.13B-141).

NO : Go to Step 4 .

STEP 4. Check spark plug.

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

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Replace spark plug.

STEP 5. Check spark plug cable itself.

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-39).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace spark plug cable.

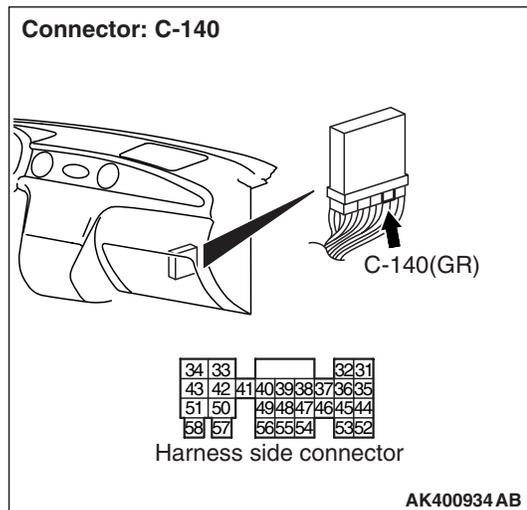
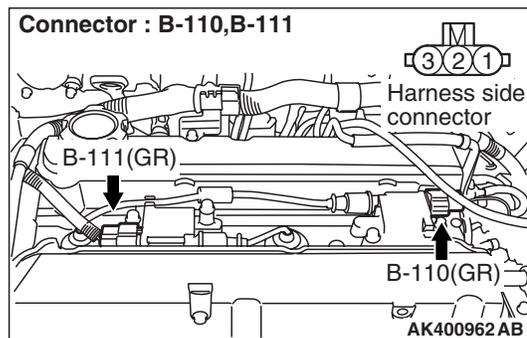
STEP 6. Check ignition coil itself.

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service P.16-38).

Q: Is the check result normal?

YES : Go to Step 7 .

NO : Replace ignition coil.

STEP 7. Check harness between ignition coil connector terminal No. 2 of each cylinder and body earth.

- Check earthing line for open circuit or damage.

Q: Is the check result normal?

YES : Check and repair harness between ignition coil connector terminal No. 3 of each cylinder and C-140 engine-ECU connector.

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

NO : Repair.

Inspection Procedure 16: Ignition Timing Offset**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed crank angle sensor, failed camshaft position sensor, improper installed timing belt or other faults.

PROBABLE CAUSE

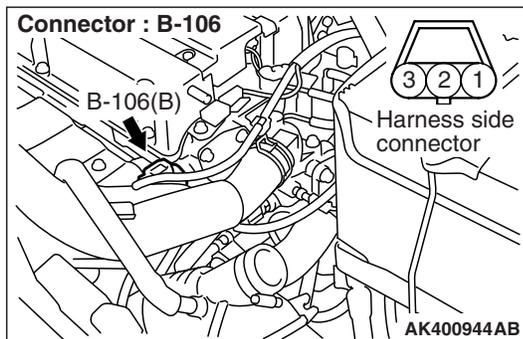
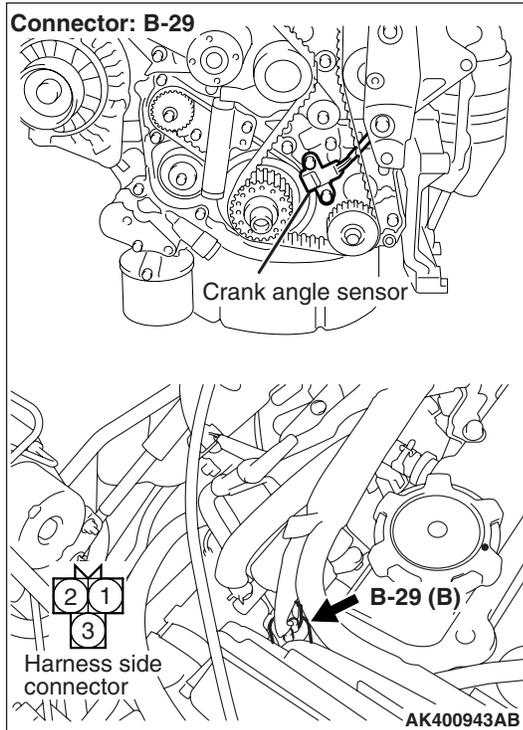
- Failed crank angle sensor
- Failed camshaft position sensor
- Improperly installed timing belt
- Failed engine-ECU

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

YES : Inspection chart for diagnosis code (Refer to P.13B-20).

NO : Go to Step 2 .

STEP 2. Perform output wave pattern measurement of crank angle sensor and camshaft position sensor (Using oscilloscope).



Crank Angle Sensor

- Use special tool test harness (MD998478) to connect B-29 crank angle sensor connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 2 and earth.

Camshaft Position Sensor

- Use special tool test harness (MB991709) to connect B-106 camshaft position sensor connector, and measure at pick-up harness.
- Engine: Idling
- Transmission: Neutral
- Voltage between terminal No. 2 and earth.

OK: Output waveform timings of both sensors are the same as the check procedure (Refer to P.13B-383) using an oscilloscope.

Q: Is the check result normal?

- YES :** Go to Step 3 .
- NO :** Go to Step 4 .

STEP 3. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

STEP 4. Check crank angle sensor and camshaft position sensor mounted conditions.

Q: Is the check result normal?

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

STEP 5. Check timing marks of timing belt.

Q: Is the check result normal?

- YES :** Go to Step 6 .
- NO :** Align timing marks.

STEP 6. Check crank angle sensor vane.

Q: Is the check result normal?

- YES :** Go to Step 7 .
- NO :** Replace crank angle sensor vane.

STEP 7. Check camshaft position sensing cylinder.

Q: Is the check result normal?

- YES :** Go to Step 8 .
- NO :** Replace camshaft position sensing cylinder.

STEP 8. Replace crank angle sensor.

- After replacing the crank angle sensor, re-check the trouble symptoms.

Q: Does trouble symptom persist?

- YES :** Go to Step 9 .
- NO :** check end.

STEP 9. Replace camshaft position sensor.

- After replacing the camshaft position sensor, re-check the trouble symptoms.

Q: Does trouble symptom persist?

YES : Replace engine-ECU.

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

Inspection Procedure 17: Run on (Dieseling)**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by leakage from injector.

PROBABLE CAUSE

- Failed injector
- Failed engine-ECU

DIAGNOSIS PROCEDURE**STEP 1. Check injector for spray condition.**

- Check each injector for spray condition (Refer to P.13B-400).

Q: Does trouble symptom persist?

YES : Replace engine-ECU.

NO : Replace injector.

Inspection Procedure 18: Odor, White Smoke, Black Smoke, and High-Concentration CO/HC During Idling**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by improper air-fuel ratio, deteriorated catalyst, failed ignition system, failed fuel system, failed compression pressure or other faults.

PROBABLE CAUSE

- Failed air-fuel control system
- Failed ignition system
- Failed fuel system
- Failed intake and exhaust system
- Failed emission control system
- Failed compression pressure
- Failed catalytic converter
- Failed engine-ECU

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

YES : Inspection chart for diagnosis code (Refer to P.13B-20).

NO : Go to Step 2 .

STEP 2. Check injector for operating sound.

- Check injector for operating sound (Refer to P.13B-400).

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.13B-100).

(Refer to Code No. P0202: No. 2 injector system P.13B-104).

(Refer to Code No. P0203: No. 3 injector system P.13B-108).

(Refer to Code No. P0204: No. 4 injector system P.13B-112).

STEP 3. Check ignition timing.

- Check ignition timing (Refer to GROUP 11C – On-vehicle Service P.11C-11).

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check for offset ignition timing (Refer to Inspection Procedure 16 P.13B-294).

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

- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 12: Air flow sensor
 - b. Item 13: Intake air temperature sensor
 - c. Item 21: Engine coolant temperature sensor
 - d. Item 25: Barometric pressure sensor

Q: Are the check results normal?

YES : Go to Step 5 .

NO : Perform the diagnosis code classified check procedure for the sensor that has shown an abnormal data value (Refer to Inspection Chart for Diagnosis Codes [P.13B-20](#)).

STEP 5. Check air intake from intake hose and intake manifold.**Q: Is the check result normal?**

YES : Go to Step 6 .

NO : Repair.

STEP 6. Check for emission leakage from exhaust manifold.**Q: Is the check result normal?**

YES : Go to Step 7 .

NO : Repair.

STEP 7. Check throttle body (throttle valve portion) for contamination.**Q: Is the check result normal?**

YES : Go to Step 8 .

NO : Clean throttle body (throttle valve portion) (Refer to [P.13B-390](#)).

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

- Refer to Data List Reference Table [P.13B-368](#).
 - a. Item 11: Oxygen sensor (front)

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Check oxygen sensor (front) system (Refer to Code No. P0130 [P.13B-72](#)).

STEP 9. Check Purge control solenoid valve itself.

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

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Replace purge control solenoid valve.

STEP 10. Check EGR control solenoid valve itself.

- Check EGR control solenoid valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-72](#)).

Q: Is the check result normal?

YES : Go to Step 11 .

NO : Replace EGR control solenoid valve.

STEP 11. Check EGR valve itself.

- Check EGR valve itself (Refer to GROUP 17 – Emission Control System – Exhaust Gas Recirculation (EGR) System [P.17-71](#)).

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Replace EGR valve.

STEP 12. Fuel pressure measurement.

- Fuel pressure measurement (Refer to [P.13B-391](#)).

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 – Evaporative Emission Control System [P.17-60](#)).

Q: Is the check result normal?

YES : Go to Step 14 .

NO : Replace positive crankcase ventilation valve.

STEP 14. Check spark plug.

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

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Replace spark plug.

STEP 15. Check spark plug cable itself.

- Check spark plug cable itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-39](#)).

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Replace spark plug cable.

STEP 16. Check ignition coil itself.

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Replace ignition coil.

STEP 17. Check compression pressure.

- Check compression pressure (Refer to GROUP 11C – On-vehicle Service [P.11C-13](#)).

Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair.

STEP 18. Check injector for spraying condition.

- Check each injector for spray condition (Refer to [P.13B-400](#)).

Q: Does trouble symptom persist?

YES : Go to Step 19 .

NO : Replace injector.

STEP 19. Replace catalytic converter.

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

Q: Does trouble symptom persist?

YES : Replace engine-ECU.

NO : Check end.

Inspection Procedure 19: Battery Rundown**COMMENT ON TROUBLE SYMPTOM**

- Failure is possibly caused by failed alternator, failed generation control circuit or other faults.

PROBABLE CAUSE

- Failed battery
- Alternator G terminal short-circuit
- Failed alternator
- Failed engine-ECU

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

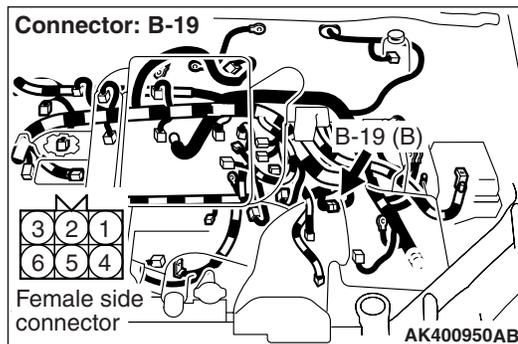
- Measure battery voltage during cranking.

OK: 8 V or more

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 54A – Battery – On-vehicle Service – Battery test [P.54A-7](#)).

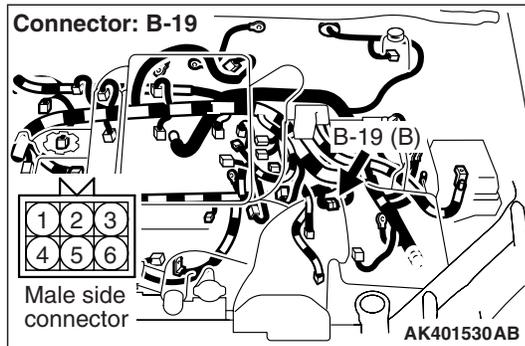
STEP 2. Connector check: B-19 intermediate connector

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Repair or replace.

STEP 3. Perform voltage measurement at B-19 intermediate connector.



- Disconnect connector, and measure at male connector side.
- Ignition switch: "ON"
- Voltage between terminal No. 7 and earth.

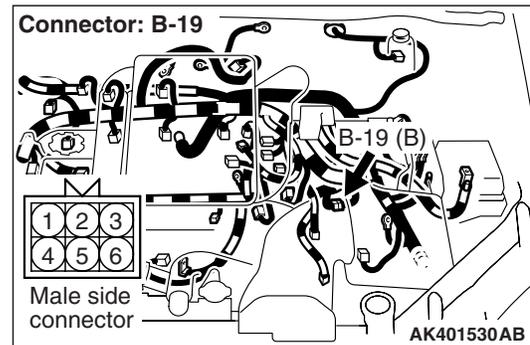
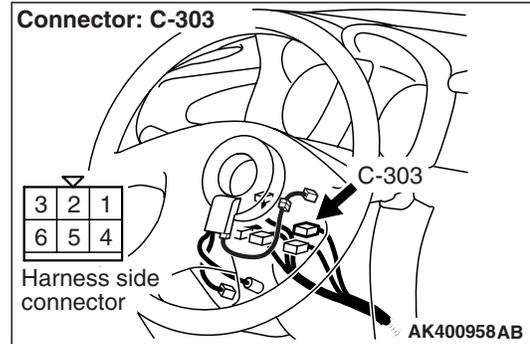
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: C-303 ignition switch connector



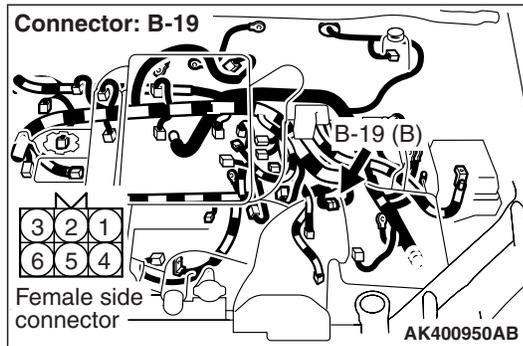
Q: Is the check result normal?

YES : Check intermediate connectors C-04, C-05, C-105, C-203 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-19 (terminal No. 7) intermediate connector and C-303 (terminal No. 2) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 5. Perform voltage measurement at B-19 intermediate connector.



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

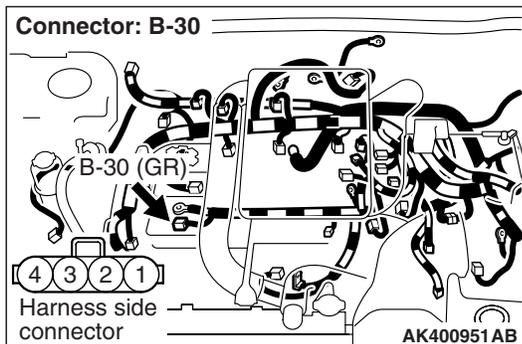
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10 .

NO : Go to Step 6 .

STEP 6. Connector check: B-30 alternator connector

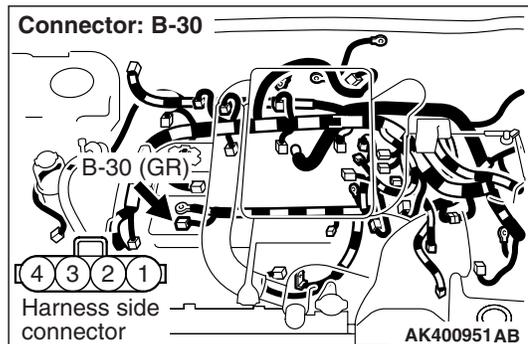
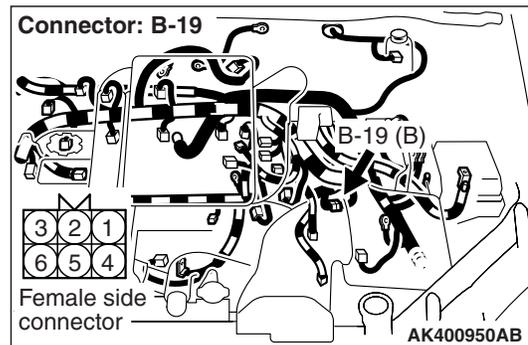


Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

STEP 7. Check harness between B-19 (terminal No. 6) intermediate connector and B-30 (terminal No. 1) alternator connector.



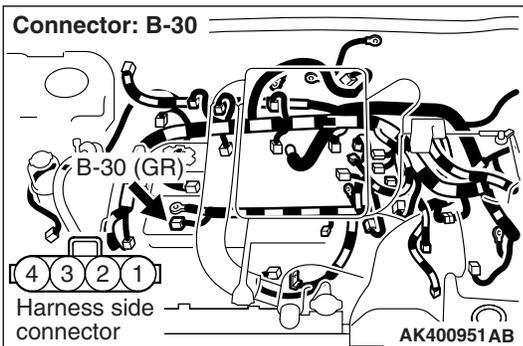
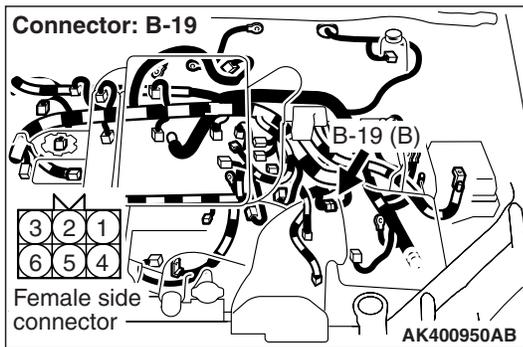
- Check output line for short circuit.

Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair.

STEP 8. Check harness between B-19 (terminal No. 7) intermediate connector and B-30 (terminal No. 3) alternator connector.

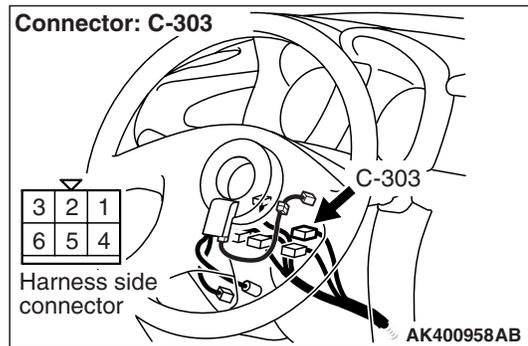
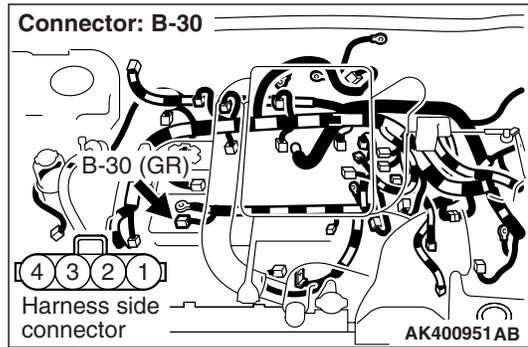


- Check power supply line for open/short circuit.

Q: Is the check result normal?

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

STEP 9. Check harness between B-30 (terminal No. 3) alternator connector and C-303 (terminal No. 2) ignition switch connector.



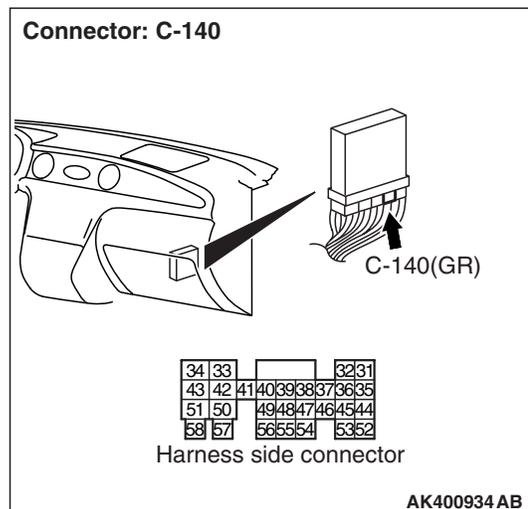
NOTE: Before checking harness, check intermediate connectors C-04, C-05, C-105, C-203 and C-205, and repair if necessary.

- Check power supply line for damage.

Q: Is the check result normal?

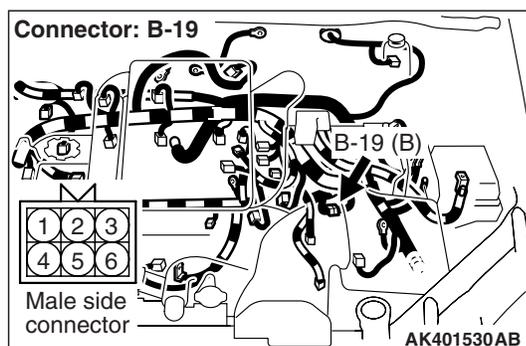
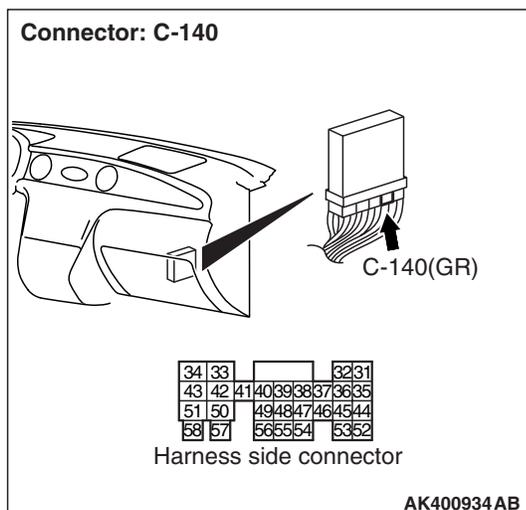
- YES :** Replace alternator.
NO : Repair.

STEP 10. Connector check: C-140 engine-ECU connector



Q: Is the check result normal?

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

STEP 11. Perform voltage measurement at C-140 engine-ECU connector.

- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 45 and earth.

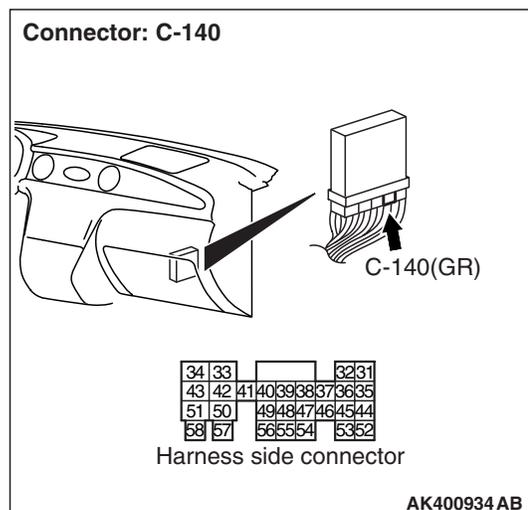
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Check and repair harness between B-19 (terminal No. 6) intermediate connector and C-140 (terminal No. 45) engine-ECU connector.

- Check output line for short circuit.

STEP 12. Perform voltage measurement at C-140 engine-ECU connector.

- Measure engine-ECU terminal voltage.
- Engine: Idling after warm-up
- Transmission: Neutral
- Radiator fan: Inactive
- Voltage between terminal No. 45 and earth.

OK: Switching the head lamps to ON from OFF causes the voltage to increase by 0.2 – 3.5 V.

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Check alternator.

STEP 13. Check the trouble symptoms.**Q: Does trouble symptom persist?**

YES : Replace engine-ECU.

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

Inspection Procedure 20: Overheating

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by failed engine cooling system, failed fan controller, failed engine coolant temperature sensor or other faults.

PROBABLE CAUSE

- Insufficient or deteriorated engine coolant
- Failed fan controller
- Failed engine coolant temperature sensor
- Failed thermostat
- Failed water pump
- Failed radiator core
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

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

NO : Go to Step 2 .

STEP 2. Check engine coolant.

NOTE: If engine coolant level falls too early, check for leaky spots, and repair if necessary.

- Check engine coolant (Refer to GROUP 14 – On-vehicle Service [P.14-17](#)).

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace or add engine coolant.

STEP 3. M.U.T.-II/III actuator test

- Item 21: Fan controller

OK: Fan motor rotating

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check fan control relay system (Refer to Inspection Procedure 25 [P.13B-325](#)).

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.13B-54](#)).

STEP 5. Check thermostat.

- Check thermostat (Refer to GROUP 14 – Thermostat [P.14-24](#)).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Replace thermostat.

STEP 6. Check water pump.

- Check water pump.

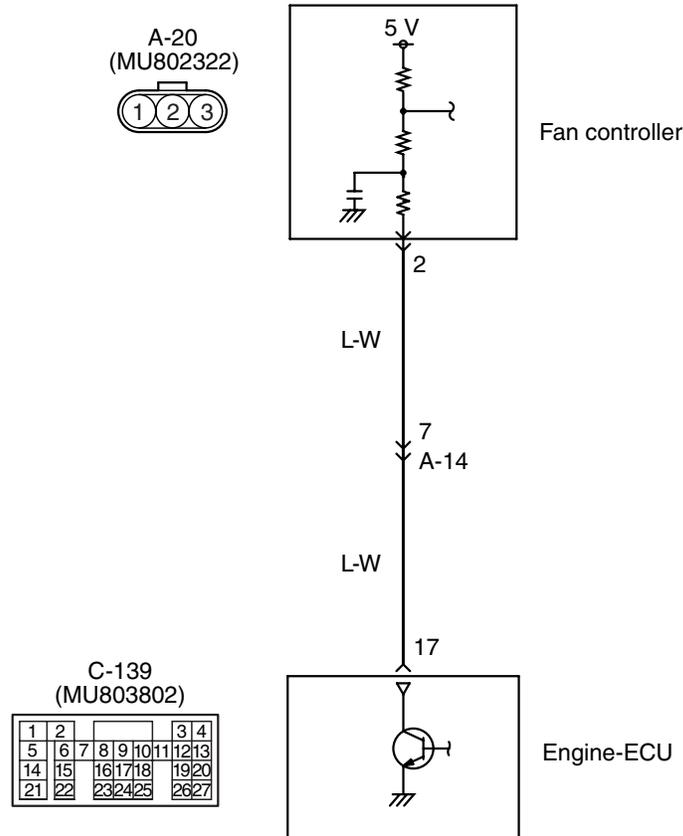
Q: Is the check result normal?

YES : Replace radiator.

NO : Replace water pump.

Inspection Procedure 21: Abnormal Rotation of Fan Motor

Fan controller (Radiator fan, A/C 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

AK400824AB

OPERATION

- The control (duty) signal is inputted to the fan controller (terminal No. 2) from the engine-ECU (terminal No. 17).

FUNCTION

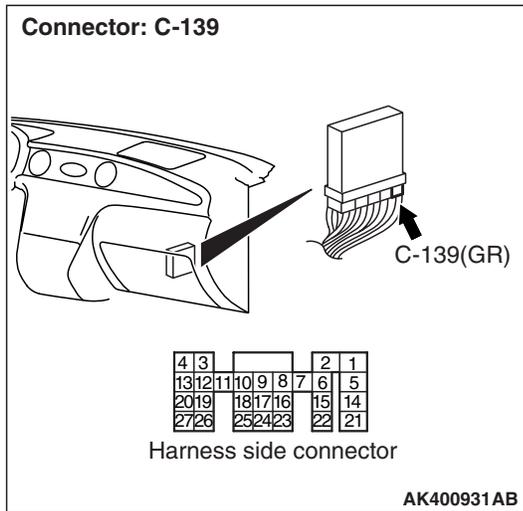
- The engine-ECU inputs a duty signal suitable for the engine coolant temperature, vehicle speed and A/C switch position to the fan controller. In response to the signal, the fan controller controls the rotating speeds of the radiator fan and A/C condenser fan. (The fan speed becomes higher as the average voltage of the terminal comes nearer to 5 V.)

PROBABLE CAUSE

- Failed fan controller
- Open/short circuit in fan controller circuit or loose connector contact
- Failed engine-ECU

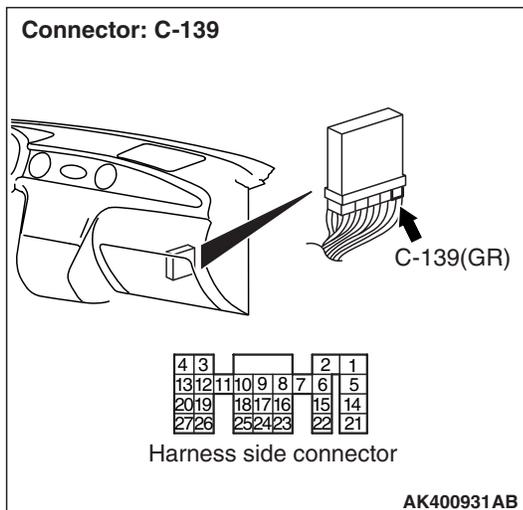
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-139 engine-ECU connector



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

STEP 2. Check at C-139 engine-ECU connector.



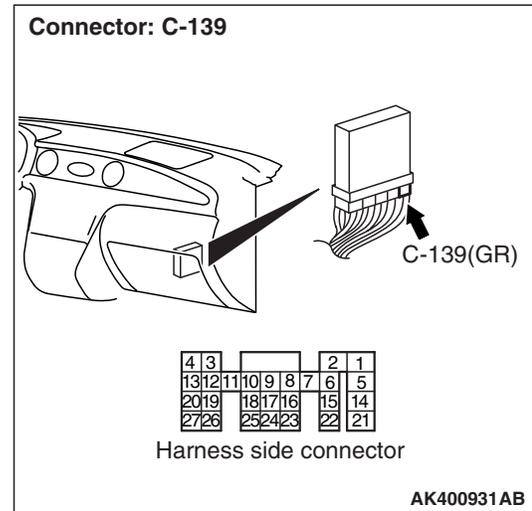
- Disconnect connector, and measure at harness side.
 - Ignition switch: "ON"
 - Short-circuit terminal No.17 to earth.
- OK: Fan motor stops rotating.**

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

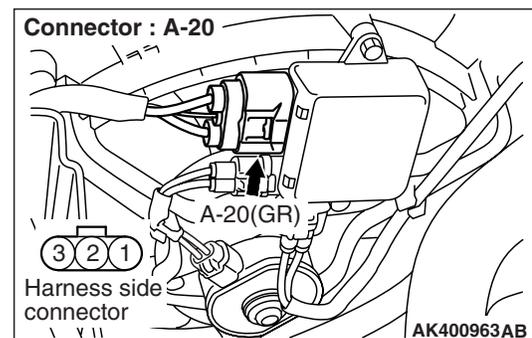
STEP 4. Perform voltage measurement at C-139 engine-ECU connector.



- Disconnect connector, and measure at harness side.
 - Ignition switch: "ON"
 - Voltage between terminal No.17 and earth.
- OK: 4.9 – 5.1 V**

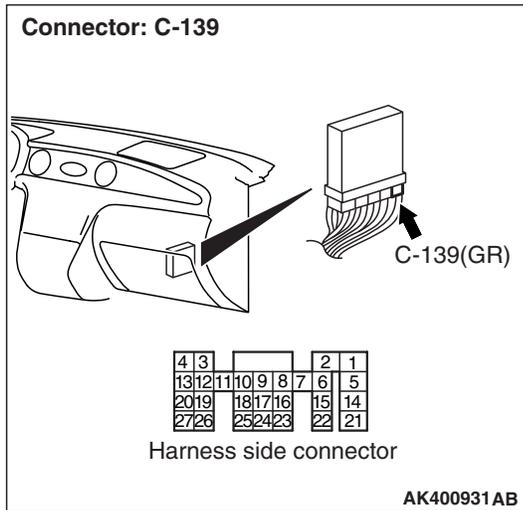
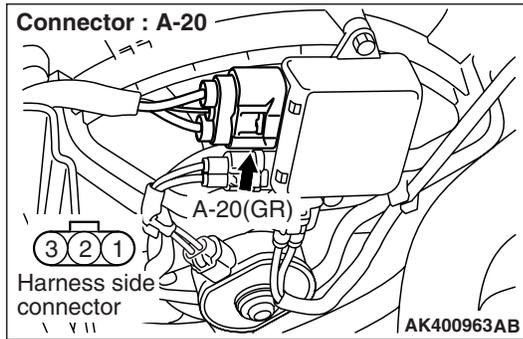
Q: Is the check result normal?
YES : Replace fan controller.
NO : Go to Step 5 .

STEP 5. Connector check: A-20 fan controller connector



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

STEP 6. Check harness between A-20 (terminal No. 2) fan controller connector and C-139 (terminal No. 17) engine-ECU connector.



NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check output line for open circuit.

Q: Is the check result normal?

YES : Replace fan controller.

NO : Repair.

Inspection Procedure 22: Poor A/C Performance

COMMENT ON TROUBLE SYMPTOM

- Failure is possibly caused by short /overcharged A/C refrigerant, failed A/C control system, failed fan control system or other faults.

PROBABLE CAUSE

- Short or overcharged A/C refrigerant
- Failed A/C compressor
- Failed fan controller
- Failed A/C-ECU
- Failed engine-ECU

DIAGNOSIS PROCEDURE

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

Q: Diagnosis code set?

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

NO : Go to Step 2 .

STEP 2. A/C compressor magnet clutch operation check.

- Engine: Idling
- A/C set temperature:
Maximum Cool when temperature in cabin is 25°C or more
Maximum Hot when temperature in cabin is 25°C or less

OK:

Magnet clutch active (when A/C is ON)

Magnet clutch inactive (when A/C is OFF)

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 3 .

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

- Item 28: A/C switch
 - a. Engine: Idling
 - b. A/C set temperature:
Maximum Cool when temperature in cabin is 25°C or more
Maximum Hot when temperature in cabin is 25°C or less

OK:

ON (when A/C is ON)

OFF (when A/C is OFF)

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Check A/C switch (Refer to Inspection Procedure 26 [P.13B-331](#)).

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

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

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 55 – Troubleshooting [P.55A-5](#)).

NO : Check A/C compressor relay (Refer to Inspection procedure 27 [P.13B-335](#)).

STEP 5. Check charged amount of A/C refrigerant.

- Check charged amount of A/C refrigerant (Refer to GROUP 55 – On-vehicle Service [P.55A-49](#)).

Q: Is the check result normal?

YES : Go to Step 6 .

NO : Adjust charged amount of A/C refrigerant.

STEP 6. M.U.T.-II/III actuator test

- Item 21: Fan controller

OK: Fan motor rotates.

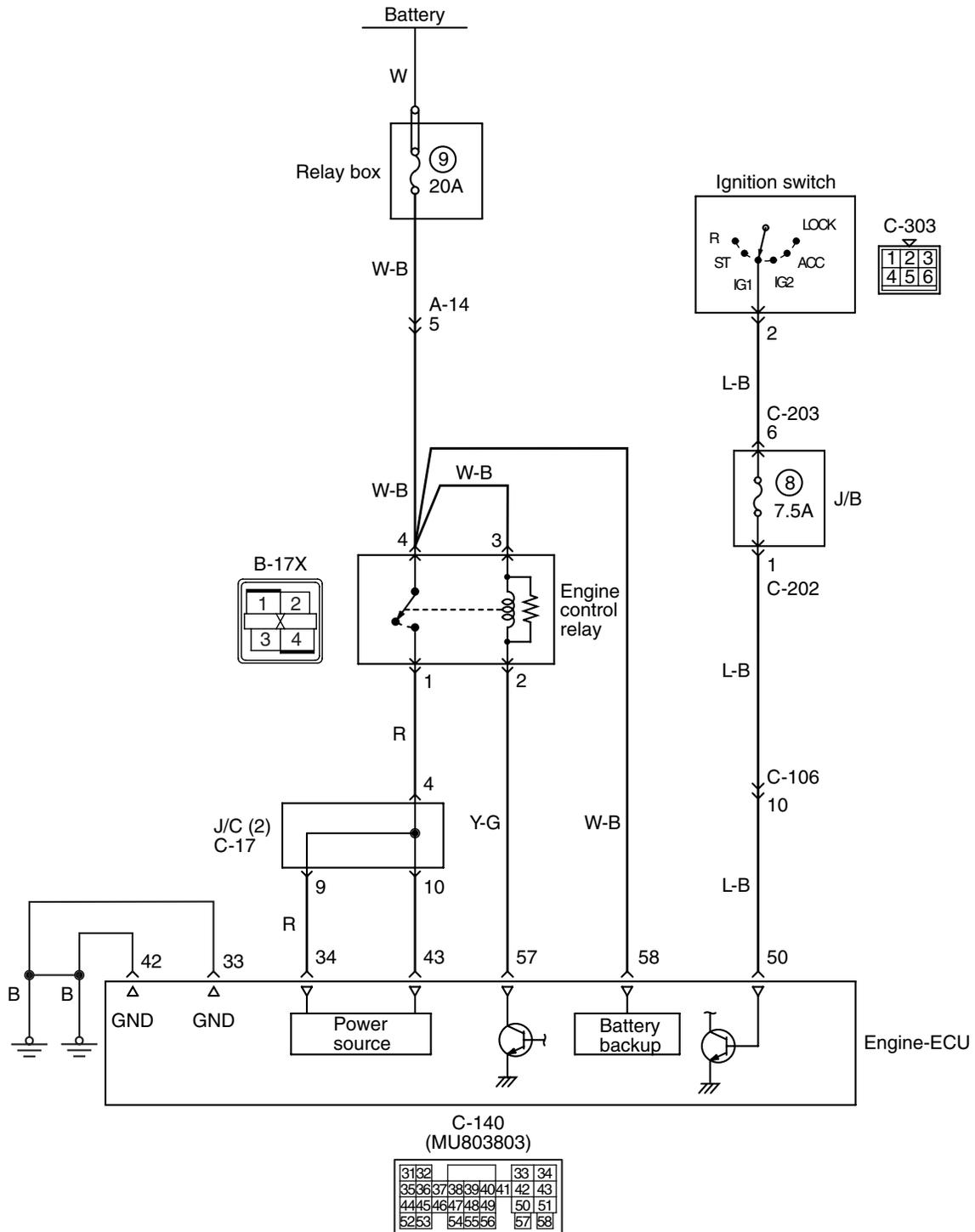
Q: Is the check result normal?

YES : Check A/C load signal system (Refer to Inspection Procedure 28 [P.13B-342](#)).

NO : Check fan control relay system (Refer to Inspection Procedure 25 [P.13B-325](#)).

Inspection Procedure 23: Engine-ECU Power Supply, Engine Control Relay, Ignition Switch-IG1 System

Power supply and ignition switch-IG circuit



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

OPERATION

- The battery voltage is applied to the engine control relay (terminal No. 3 and No. 4).
- The engine-ECU (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, the sensor and the actuator from the engine control relay (terminal No. 1).

FUNCTION

- When the ignition switch ON signal is input to the engine-ECU, the engine-ECU places the engine control relay in the ON position. Accordingly, the battery voltage is supplied to the engine-ECU, sensor and actuator.

PROBABLE CAUSE

- Failed engine control relay
- Open/short circuit in engine control relay circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1. Check battery voltage.

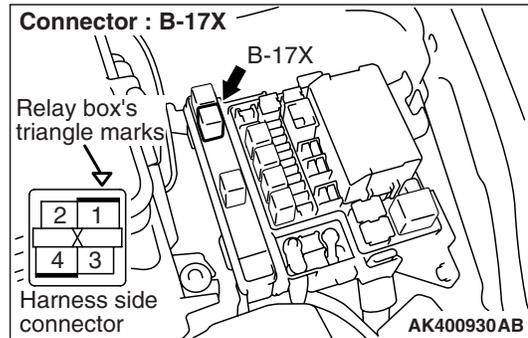
- Measure battery voltage during cranking.
OK: 8 V or more

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Check battery (Refer to GROUP 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 or replace.

STEP 3. Check engine control relay.

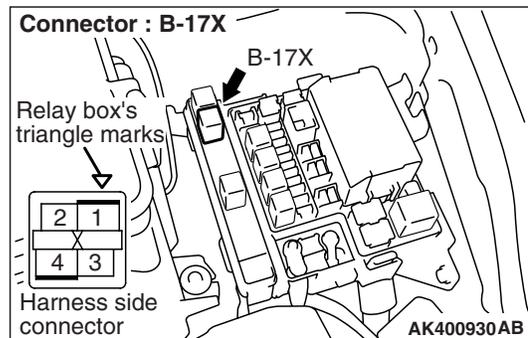
- Check engine control relay (Refer to P.13B-395).

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

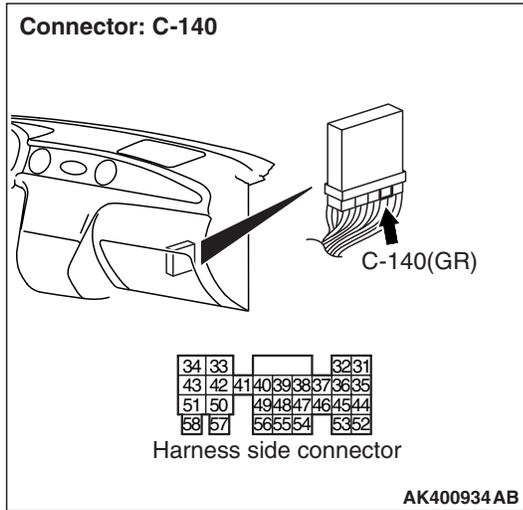
Q: Is the check result normal?

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, No. 4) engine control relay connector and battery.

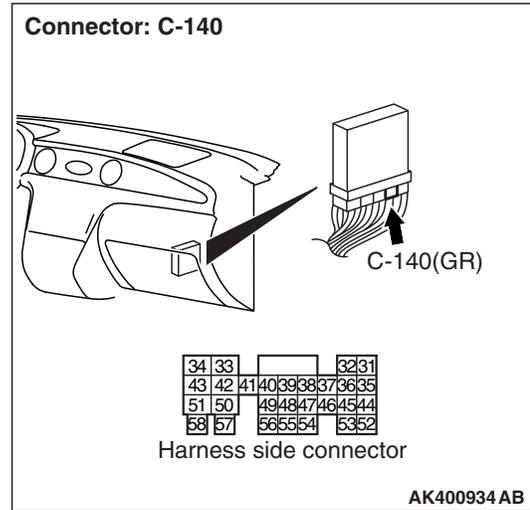
- Check power supply line for open/short circuit.

STEP 5. Connector check: C-140 engine-ECU connector



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

STEP 6. Perform voltage measurement at C-140 engine-ECU connector.

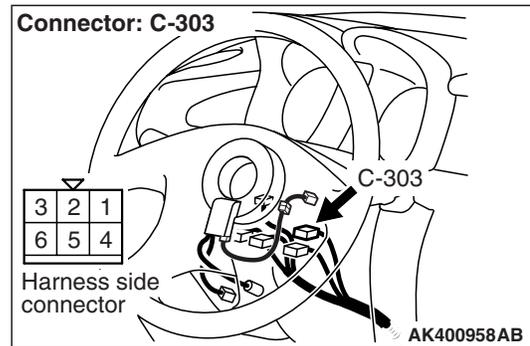


- Disconnect connector, and measure at harness side.
- Ignition switch: "ON"
- Voltage between terminal No. 50 and earth.

OK: System voltage

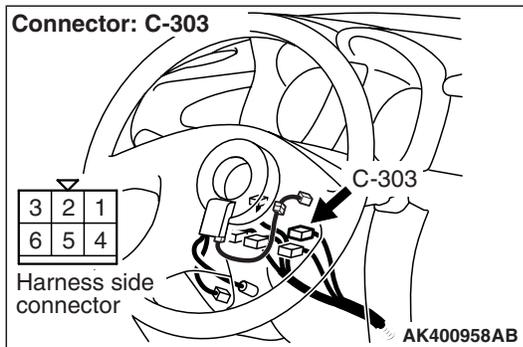
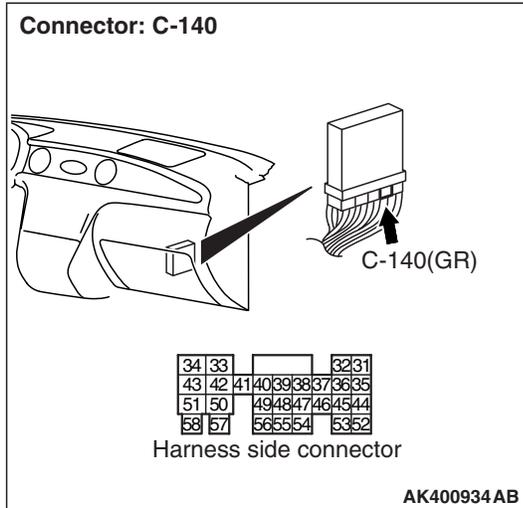
Q: Is the check result normal?
YES : Go to Step 9 .
NO : Go to Step 7 .

STEP 7. Connector check: C-303 ignition switch connector



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

STEP 8. Check ignition switch.



- Check ignition switch (Refer to GROUP 54A – Ignition Switch – Ignition Switch – Inspection P.54A-30).

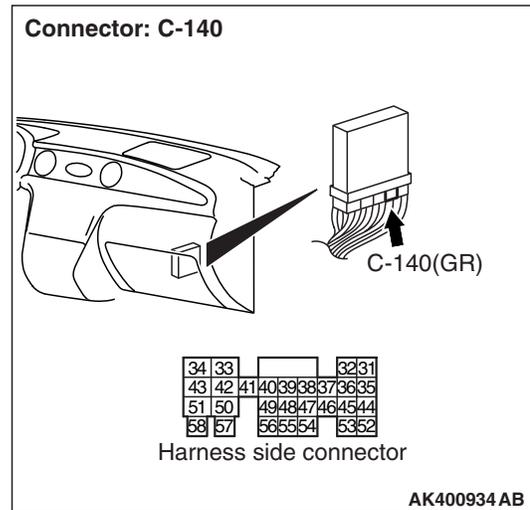
Q: Is the check result normal?

YES : • Check intermediate connectors C-106, C-202 and C-203, then repair if necessary. If intermediate connectors are normal, check and repair harness between C-140 (terminal No. 50) engine-ECU connector and C-303 (terminal No. 2) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Replace ignition switch.

STEP 9. Perform voltage measurement at C-140 engine-ECU connector.



- Disconnect connector, and measure at harness side.
- Voltage between terminal No. 58 and earth.

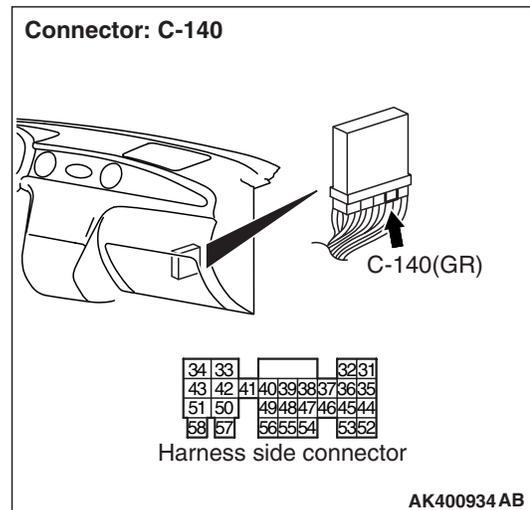
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 10 .

- NO :**
- Check intermediate connector A-14 and repair if necessary. If intermediate connector is normal, check and repair harness between C-140 (terminal No. 58) engine-ECU connector and battery.
 - Check power supply line for short circuit.

STEP 10. Connector check: C-140 engine-ECU connector

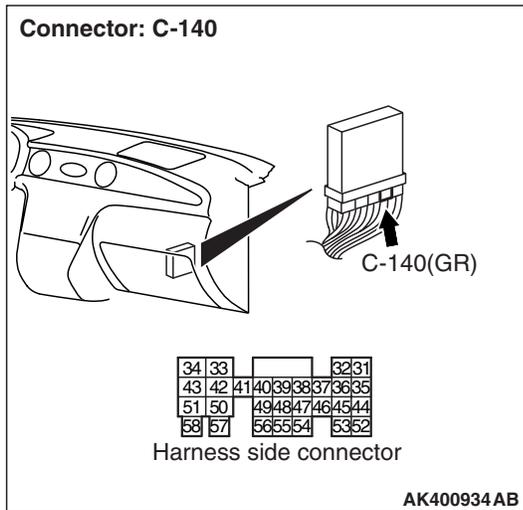


Q: Is the check result normal?

YES : Go to Step 11 .

NO : Repair or replace.

STEP 11. Perform resistance measurement at C-140 engine-ECU connector.



- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 33 and earth, and No. 42 and earth.

OK: Continuity (2 Ω or less)

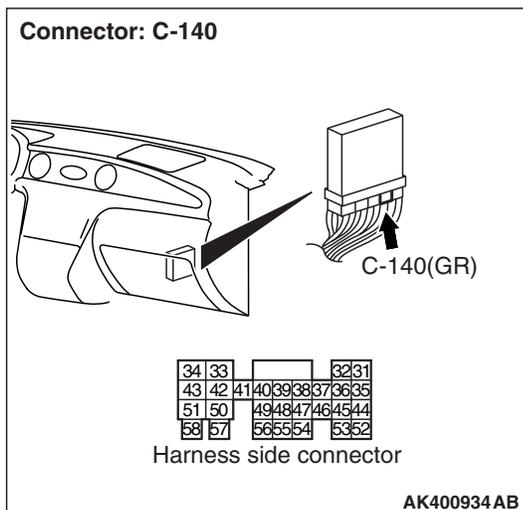
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Check and repair harness between C-140 (terminal No. 33, No. 42) engine-ECU connector and body earth.

- Check earthing line for open circuit and damage.

STEP 12. Connector check: C-140 engine-ECU connector

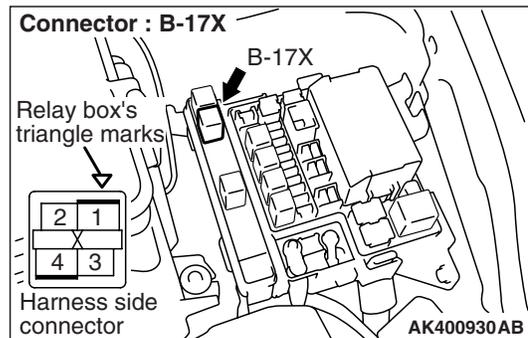
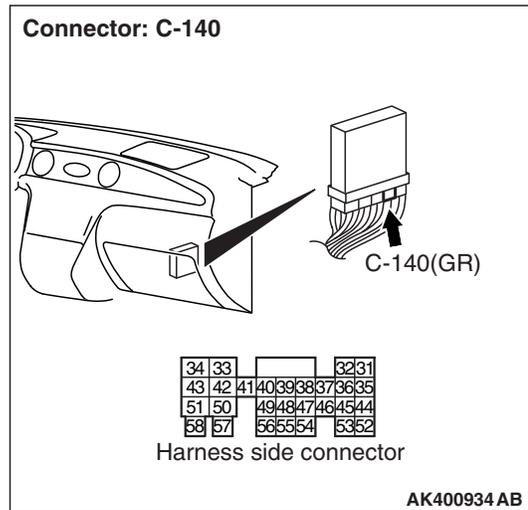


Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair or replace.

STEP 13. Perform voltage measurement at C-140 engine-ECU connector.



- Disconnect connector, and measure at harness side.
- Voltage between terminal No. 57 and earth.

OK: System voltage

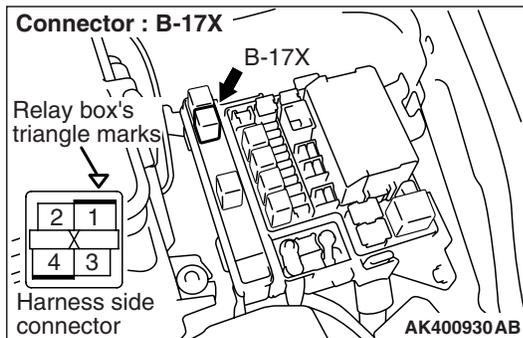
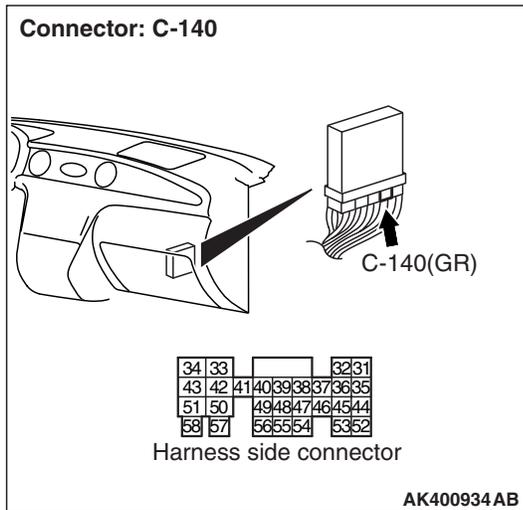
Q: Is the check result normal?

YES : Go to Step 14 .

NO : Check and repair harness between B-17X (terminal No. 2) engine control relay connector and C-140 (terminal No. 57) engine-ECU connector.

- Check earthing line for open/short circuit.

STEP 14. Perform voltage measurement at C-140 engine-ECU connector.



- Disconnect connector, and measure at harness side.
- Using jumper wire, connect C-140 (terminal No. 57) engine-ECU connector and earth.
- Voltage between terminal No. 34 and earth, and No. 43 and earth.

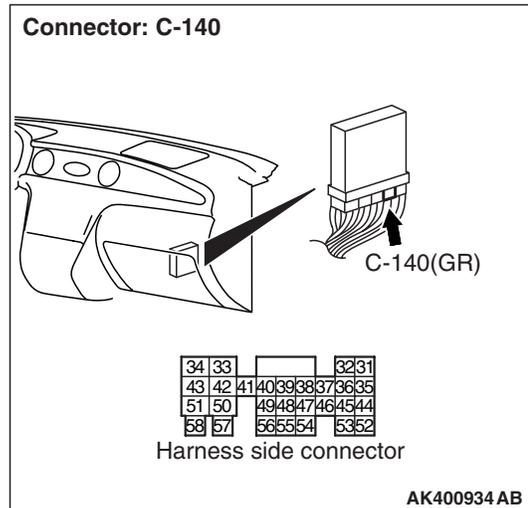
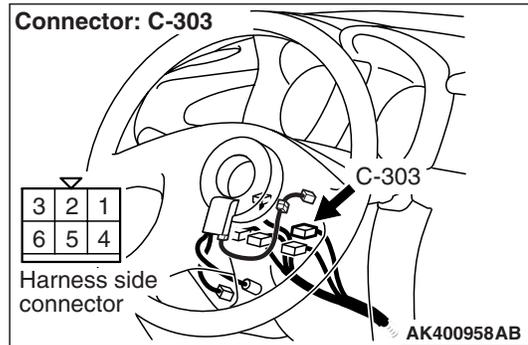
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Check intermediate connector C-17 and repair if necessary. If intermediate connector is normal, check and repair harness between C-140 (terminal No. 34, No. 43) engine-ECU connector and B-17X (terminal No. 1) engine control relay.

STEP 15. Check harness between C-303 (terminal No. 2) ignition switch connector and C-140 (terminal No. 50) engine-ECU connector.



NOTE: Before checking harness, check intermediate connectors C-106, C-202 and C-203, and repair if necessary.

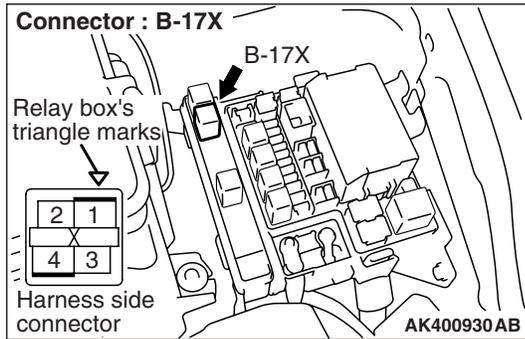
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 16 .

NO : Repair.

STEP 16. Check harness between B-17X (terminal No. 3, No. 4) engine control relay connector and battery.



NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

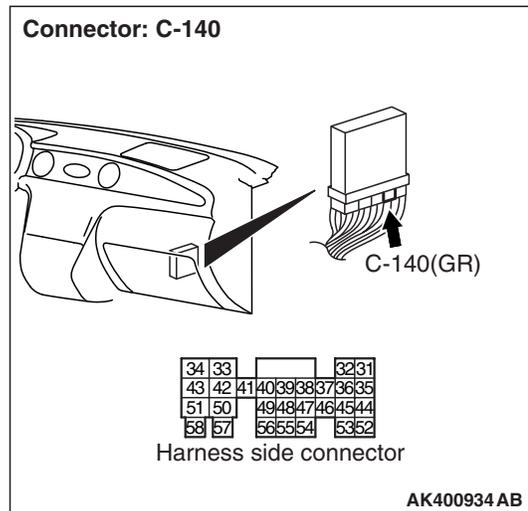
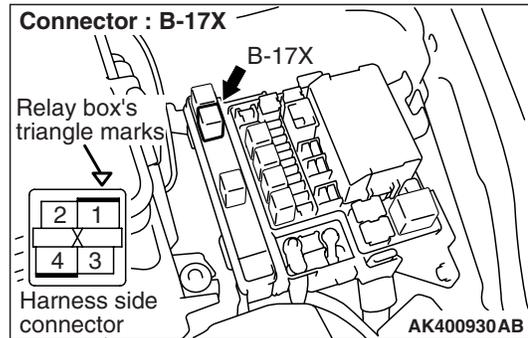
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 17 .

NO : Repair.

STEP 17. Check harness between B-17X (terminal No. 2) engine control relay connector and C-140 (terminal No. 57) engine-ECU connector.



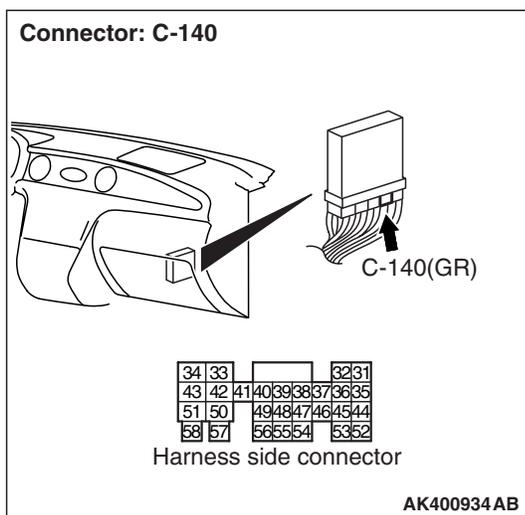
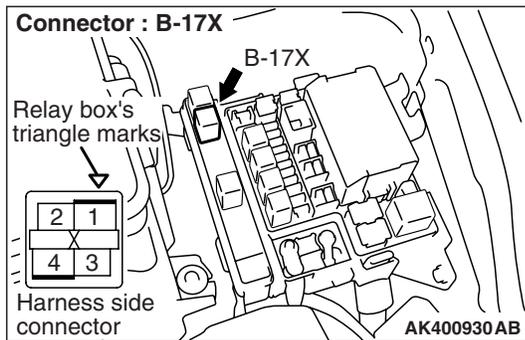
- Check earthing line for damage.

Q: Is the check result normal?

YES : Go to Step 18 .

NO : Repair.

STEP 18. Check harness between B-17X (terminal No. 1) engine control relay connector and C-140 (terminal No. 34, No. 43) engine-ECU 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 : Go to Step 19 .

NO : Repair.

STEP 19. Check the trouble symptoms.

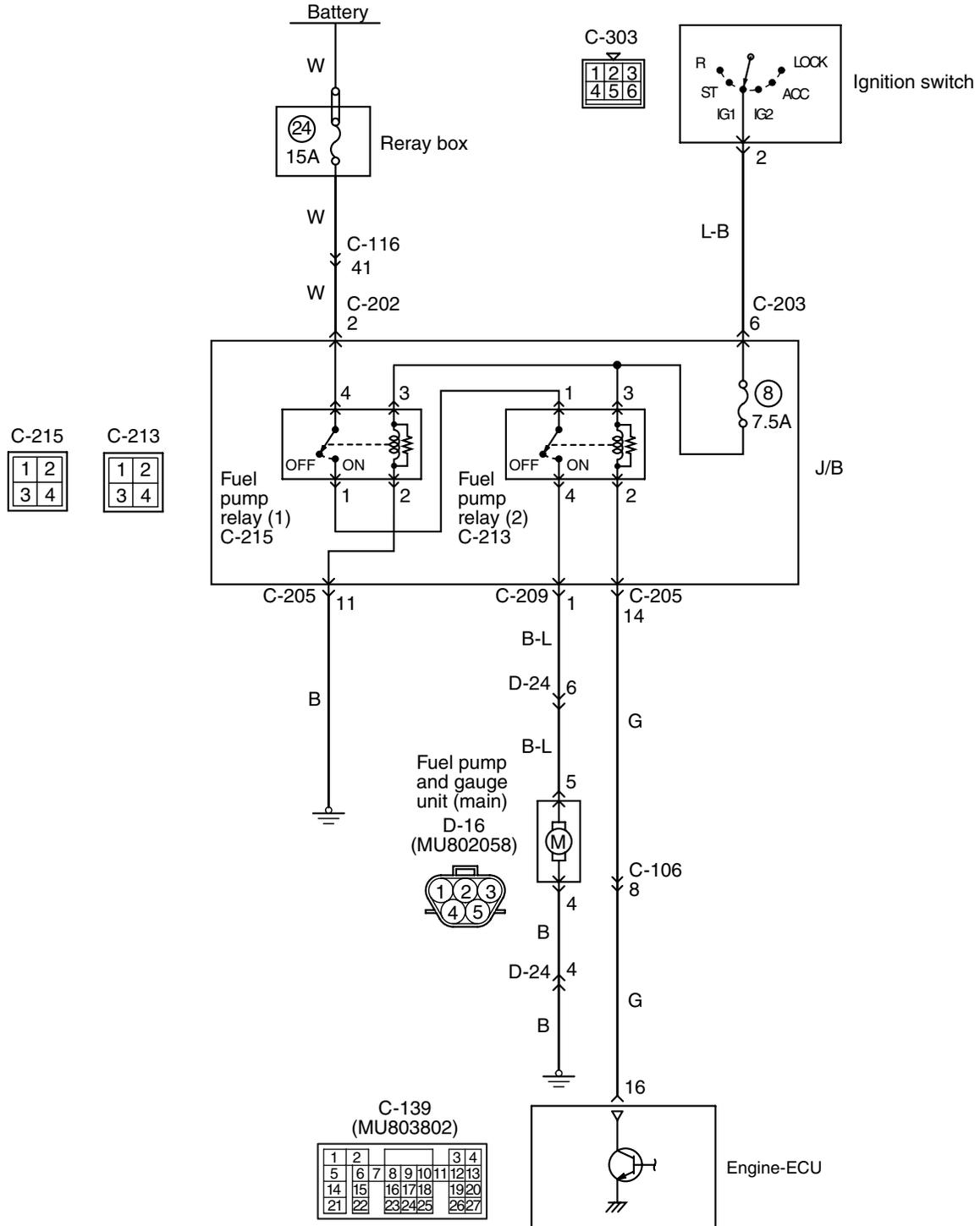
Q: Does trouble symptom persist?

YES : Replace engine-ECU.

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

Inspection Procedure 24: Fuel Pump System

Fuel pump 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 fuel pump relay (1) (terminal No. 3) from the ignition switch and is earthed to the vehicle body from the fuel pump relay (1) (terminal No. 2).
- The battery voltage is applied to the fuel pump relay (1) (terminal No. 4) and to the fuel pump relay (2) (terminal No. 1) from the fuel pump relay (1) (terminal No. 1).
- The battery voltage is applied to the fuel pump relay (2) (terminal No. 3) from the ignition switch. The engine-ECU (terminal No. 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

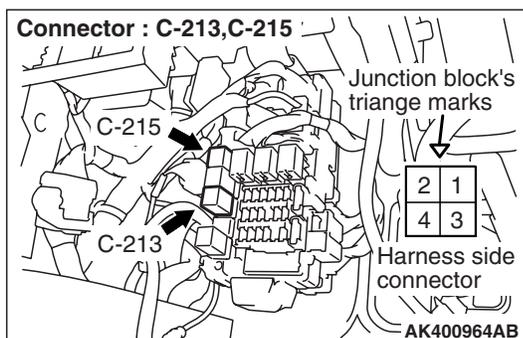
- When the ignition switch ON signal is input to the engine-ECU, the engine-ECU places the fuel pump relay in the "ON" position. Accordingly, the battery voltage is supplied to the fuel pump.

PROBABLE CAUSE

- Failed fuel pump relay
- Failed fuel pump
- Open/short circuit in fuel pump drive circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-215 fuel pump relay (1) connector and C-213 fuel pump relay (2) connector



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

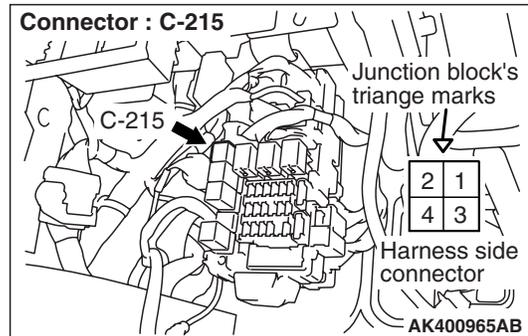
STEP 2. Check fuel pump relay.

- Fuel pump relay, continuity check (Refer to P.13B-395).

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.

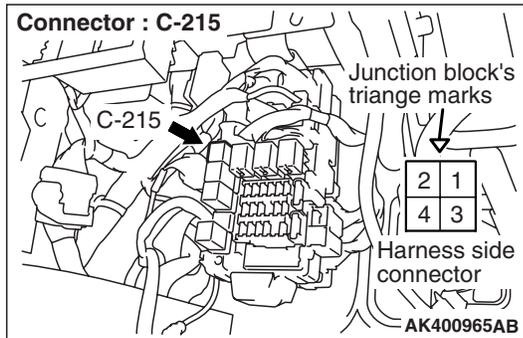


- Remove relay, and measure at junction block side.
- Resistance between terminal No. 2 and earth.

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.

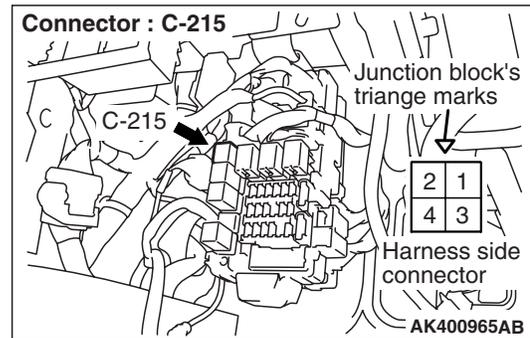
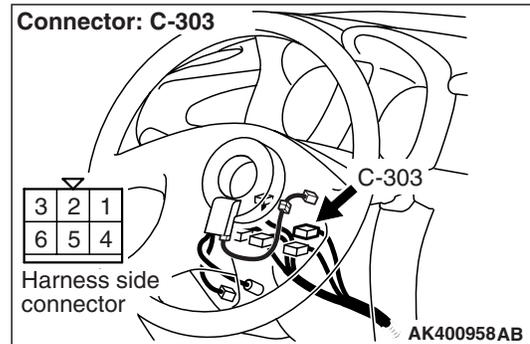
- Remove relay, and measure at junction block side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

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

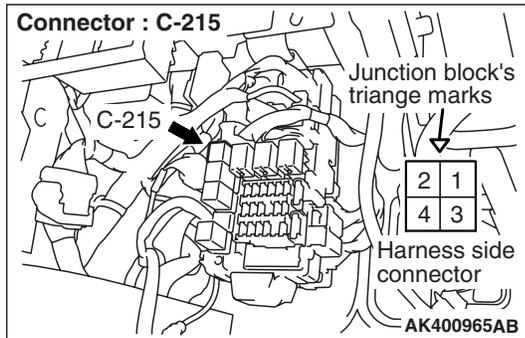
Q: Is the check result normal?

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 or replace.

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

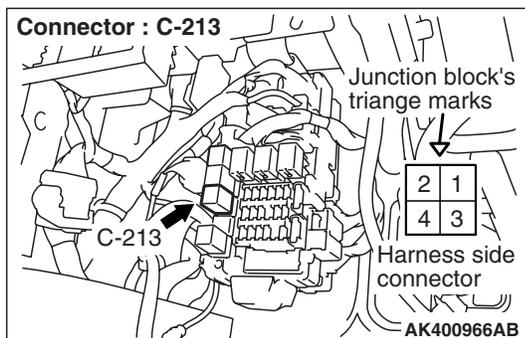
Q: Is the check result normal?

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.

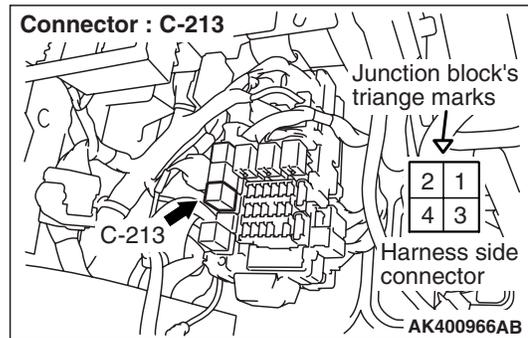
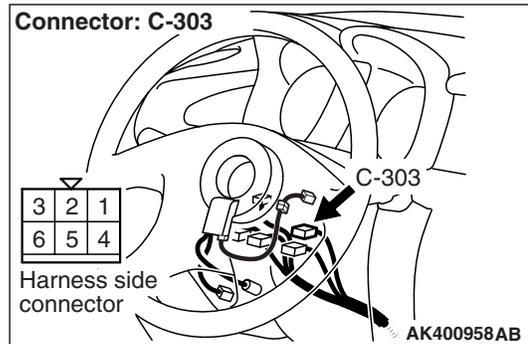
OK: System voltage

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

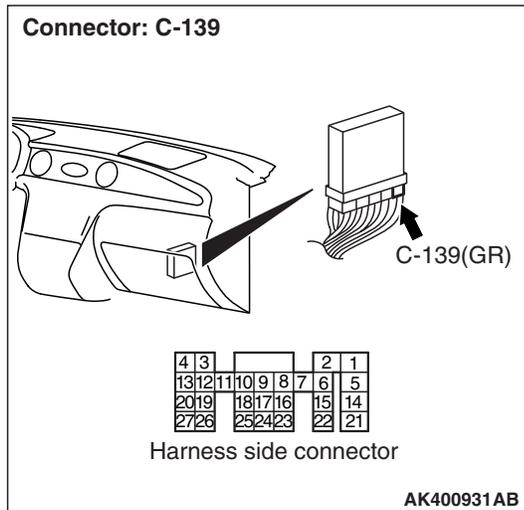
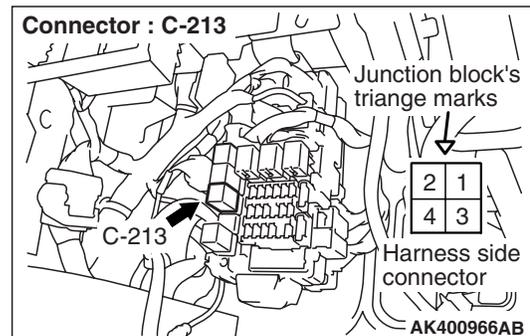
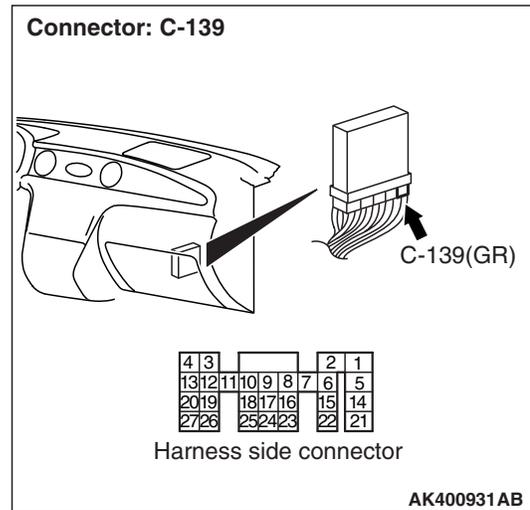


Q: Is the check result normal?

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 or replace.

STEP 9. Connector check: C-139 engine-ECU connector**Q: Is the check result normal?****YES :** Go to Step 10 .**NO :** Repair or replace.**STEP 10. Perform voltage measurement at C-139 engine-ECU connector.**

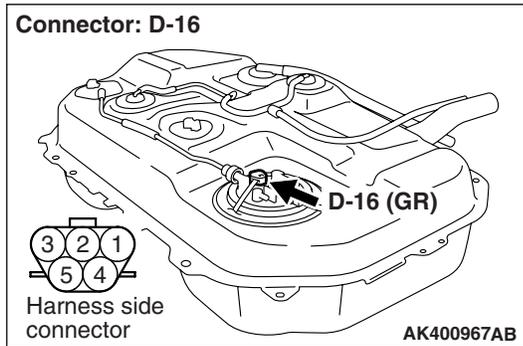
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 16 and earth.

OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 11 .

NO : Check intermediate connectors C-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 connector.

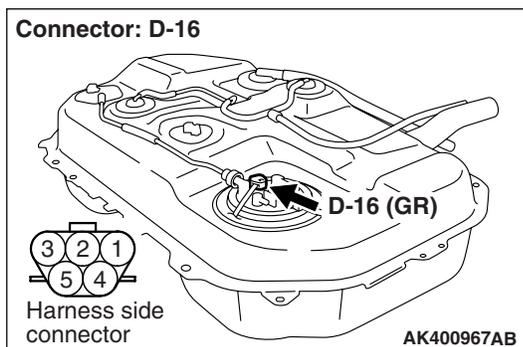
- Check earthing line for open/short circuit.

STEP 11. Connector check: D-16 fuel pump connector



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

STEP 12. Perform voltage measurement at D-16 fuel pump connector.

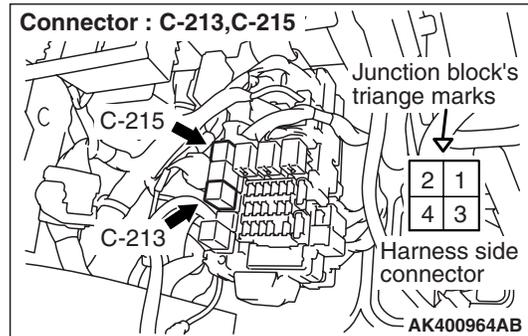


- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Using a jumper wire, connect C-139 (terminal No. 16) engine-ECU connector and earth.
- Voltage between terminal No. 5 and earth.

OK: System voltage

Q: Is the check result normal?
YES : Go to Step 15 .
NO : Go to Step 13 .

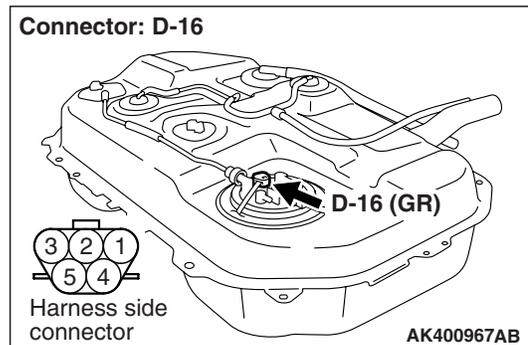
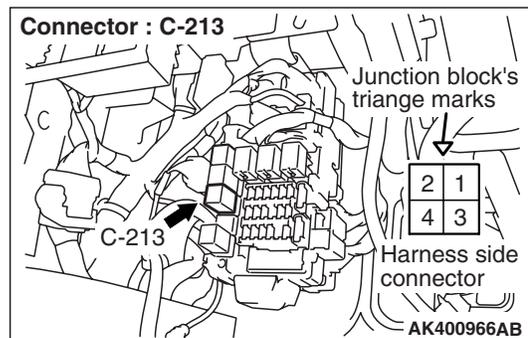
STEP 13. Check harness between C-215 (terminal No. 1) fuel pump relay (1) connector and C-213 (terminal No. 4) fuel pump relay (2) connector.



- Check power supply line for open/short circuit.

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

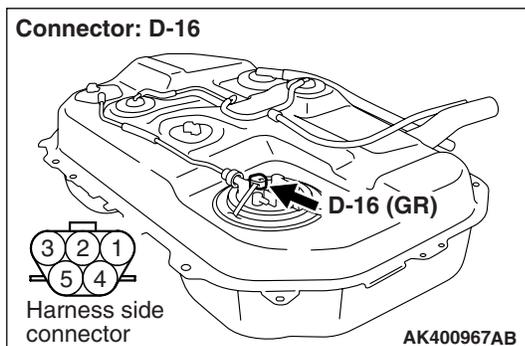
STEP 14. Check harness between C-213 (terminal No. 4) fuel pump relay (2) connector and D-16 (terminal No. 5) fuel pump connector.



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.
NO : Repair.

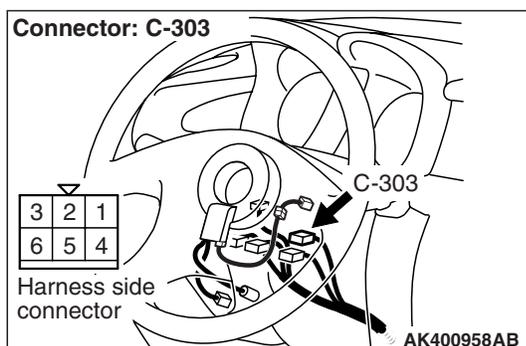
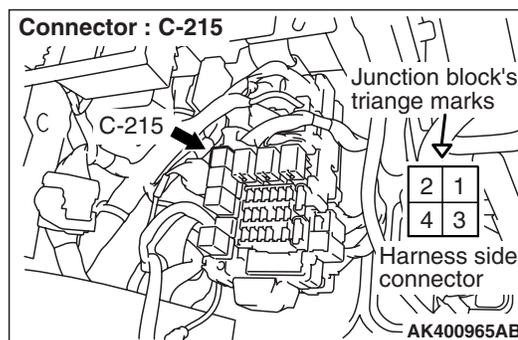
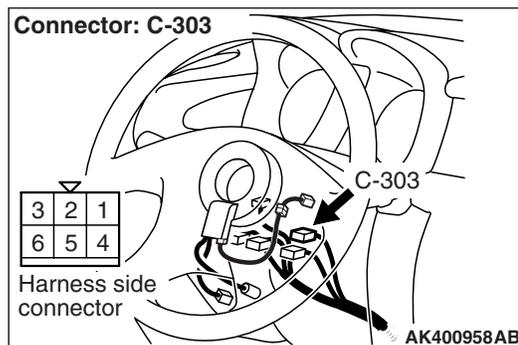
STEP 15. Perform resistance measurement at D-16 fuel pump connector.

- 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 .

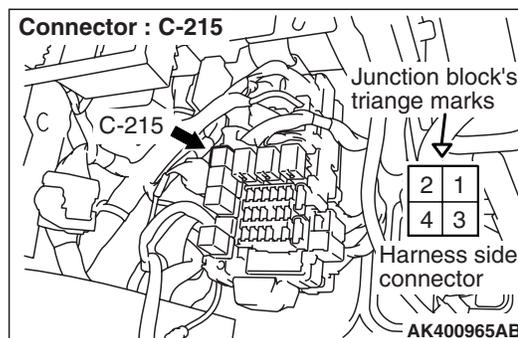
NO : Check intermediate connector D-24, and repair if necessary. If intermediate connector is normal, check and repair harness between D-16 (terminal No. 4) fuel pump connector and body earth.

- 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 or replace.**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.

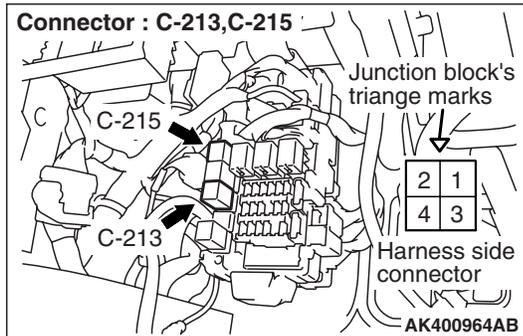
Q: Is the check result normal?**YES :** Go to Step 18 .**NO :** Repair.**STEP 18. Check harness between battery and C-215 (terminal No. 4) fuel pump relay (1) connector.**

NOTE: Before checking harness, check intermediate connector 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.



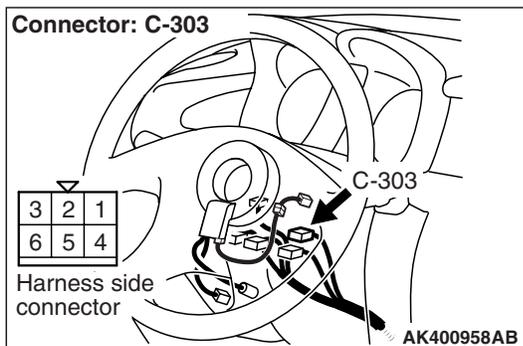
- Check power supply line for damage.

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.



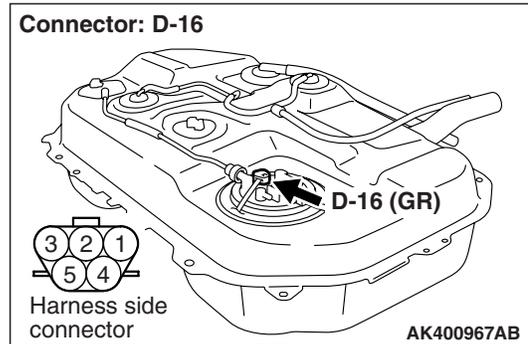
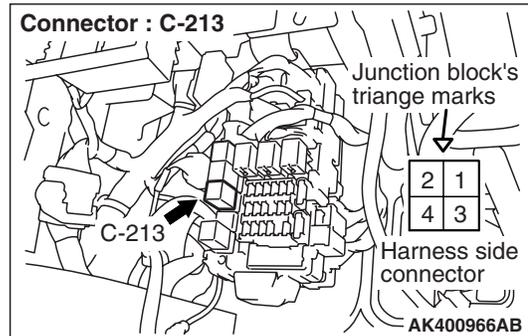
- Check power supply line for damage.

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.



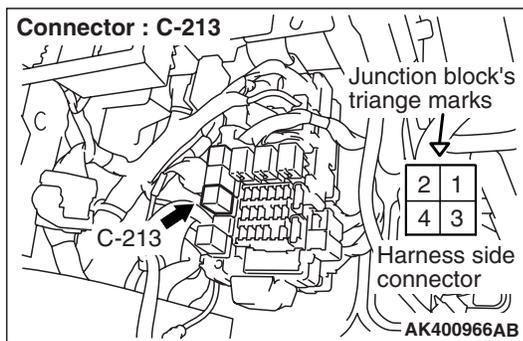
NOTE: Before checking harness, check intermediate connectors D-24 and C-209, and repair if necessary.

- Check earthing line for damage.

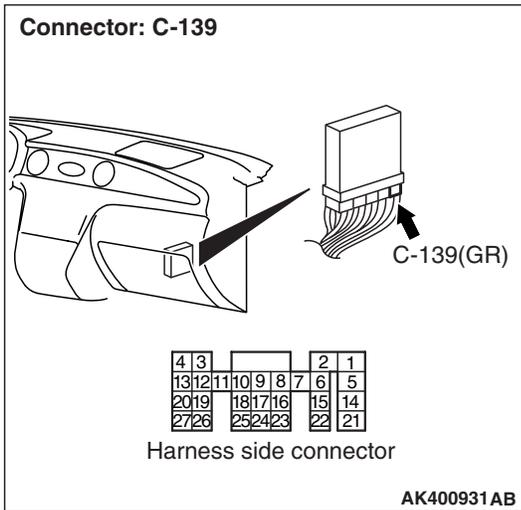
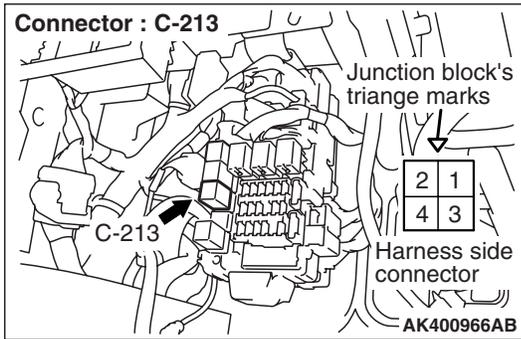
Q: Is the check result normal?

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 connector.



NOTE: Before checking harness, check intermediate connectors C-106 and C-205, and repair if necessary.

- Check output line for damage.

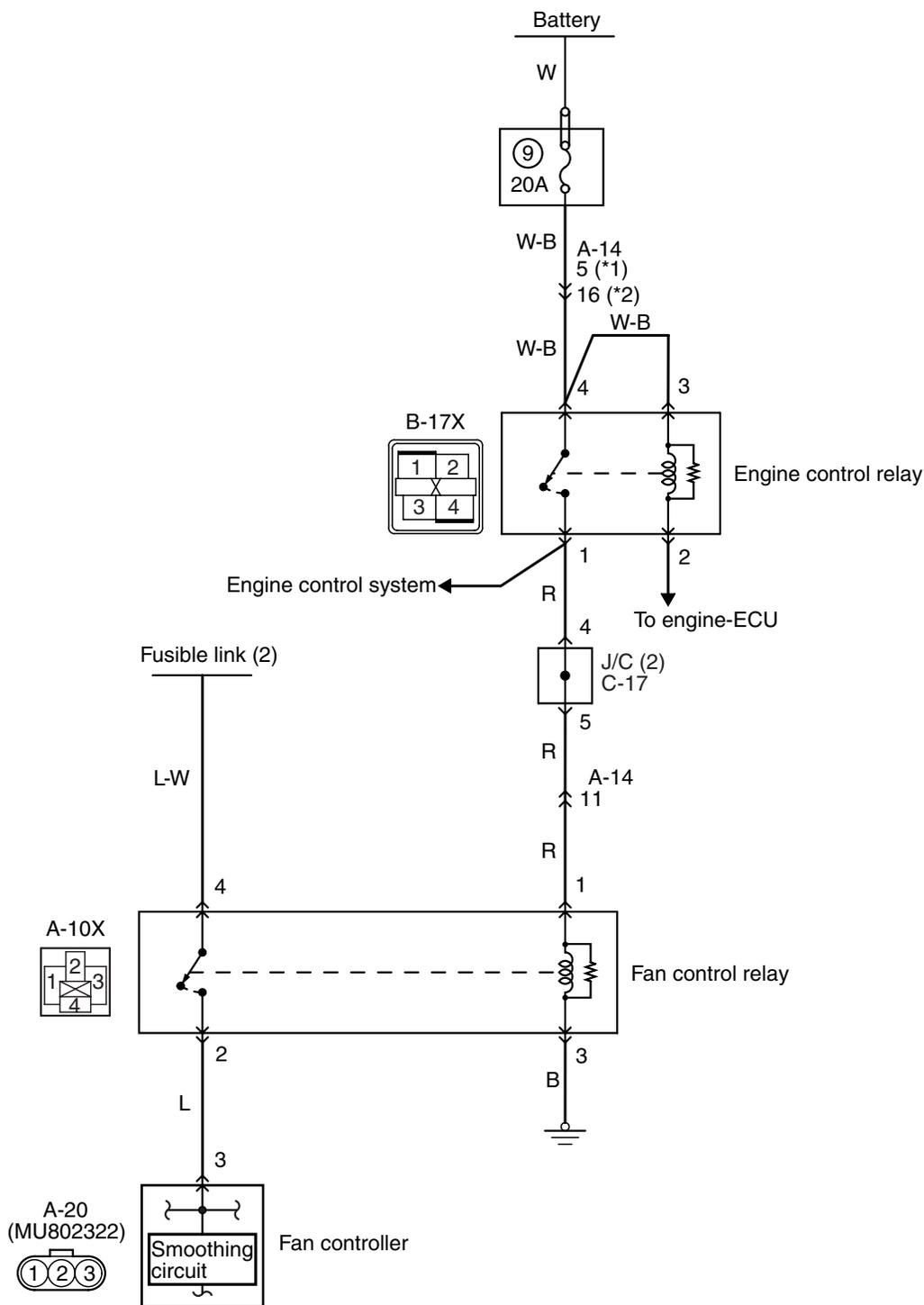
Q: Is the check result normal?

YES : Replace fuel pump

NO : Repair.

Inspection Procedure 25: Fan Control Relay System

Fan control relay Circuit



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

OPERATION

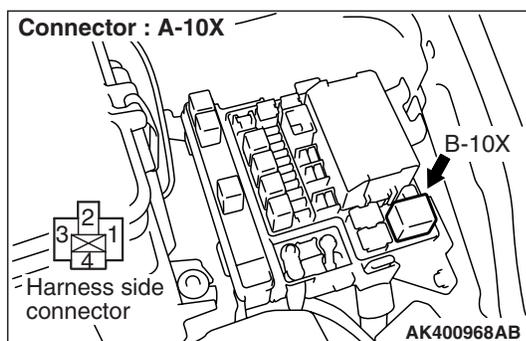
- The battery voltage is applied to the fan control relay (terminal No. 3) from the engine control relay (terminal No. 1) and is earthed to the vehicle body from the fan control relay (terminal No. 1).
- The battery voltage is applied to the fan control relay (terminal No. 4).
- When the fan control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

FUNCTION

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

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE**STEP 1. Connector check: A-10X fan control relay connector**

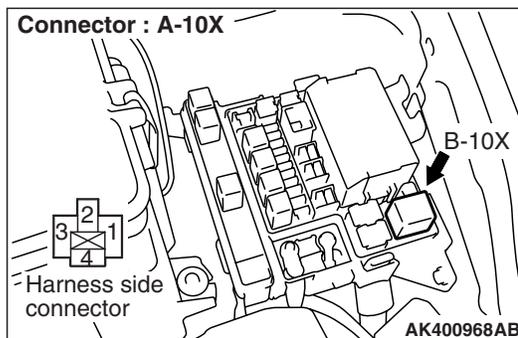
- Q: Is the check result normal?**
YES : Go to Step 2 .
NO : Repair or replace.

STEP 2. Check fan control relay.

- Check fan control relay (Refer to GROUP 14 – On-vehicle Service – Fan Control Relay Continuity Check P.14-19).

Q: Is the check result normal?

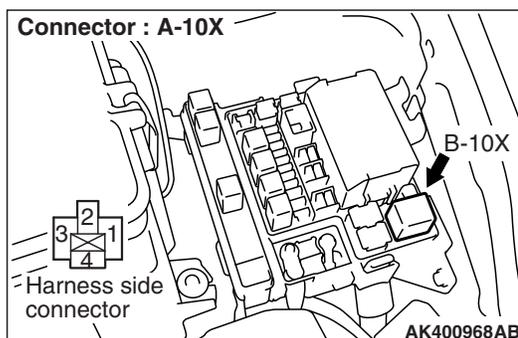
- YES :** Go to Step 3 .
NO : Replace fan control relay.

STEP 3. Perform resistance measurement at A-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.

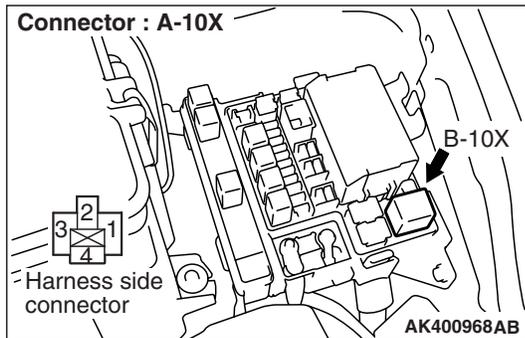
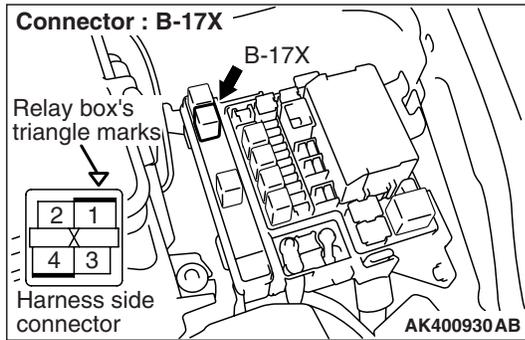
STEP 4. Perform voltage measurement at A-10X fan control relay connector.

- 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



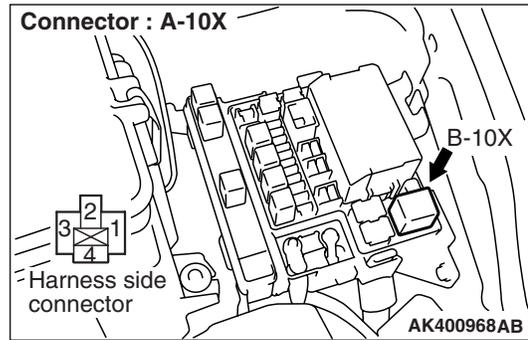
Q: Is the check result normal?

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 or replace.

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

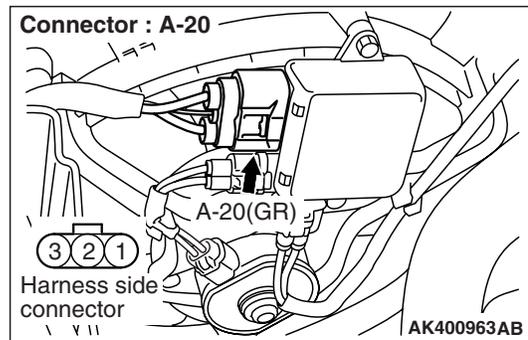
Q: Is the check result normal?

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.

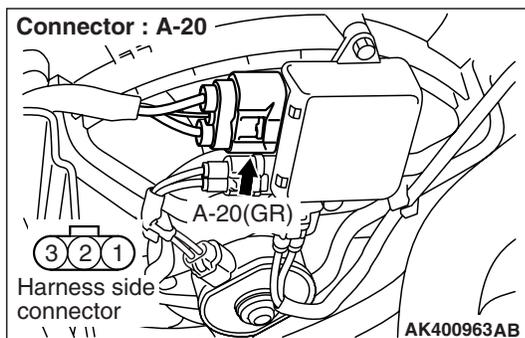
STEP 7. Connector check: A-20 fan controller connector



Q: Is the check result normal?

YES : Go to Step 8 .

NO : Repair or replace.

STEP 8. Perform voltage measurement at A-20 fan controller connector.

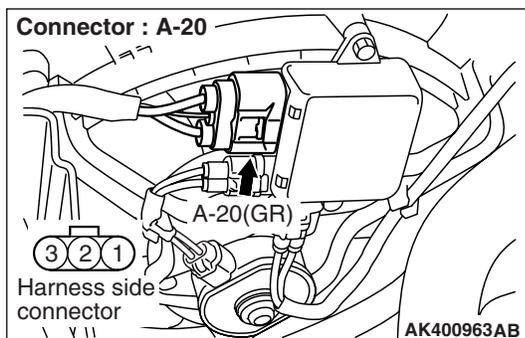
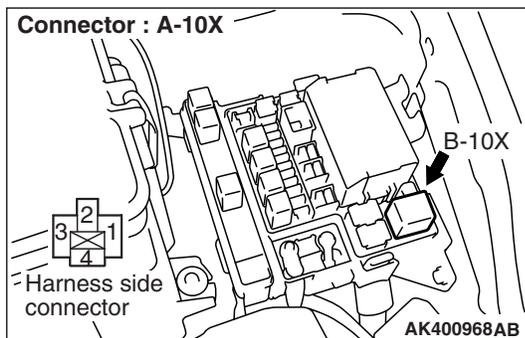
- Disconnect connector, and measure at harness side.
- Ignition switch: ON
- Voltage between terminal No. 3 and earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 12 .

NO : Go to Step 9 .

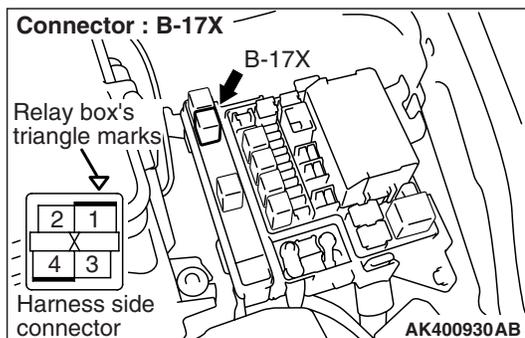
STEP 9. Check harness between A-10X (terminal No. 2) fan control relay connector and A-20 (terminal No. 3) fan controller connector.

- Check output line for open/short circuit.

Q: Is the check result normal?

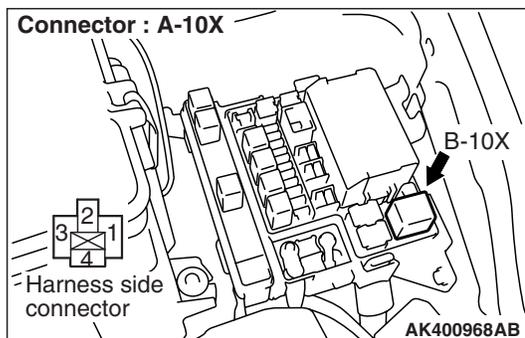
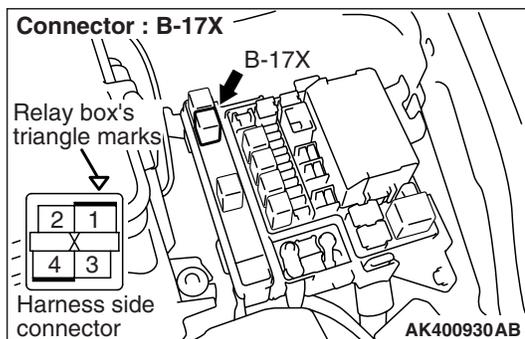
YES : Go to Step 10 .

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 or replace.

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.

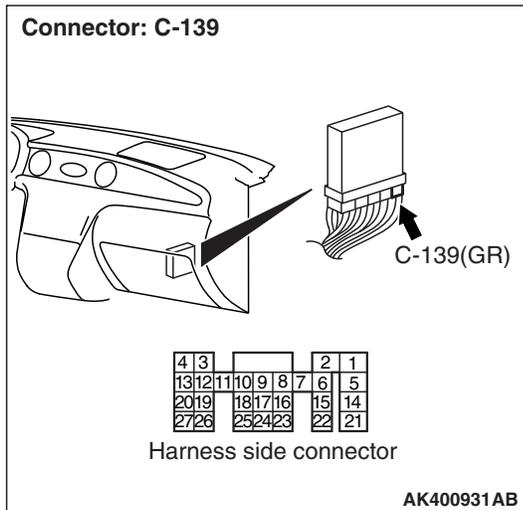
Q: Is the check result normal?

YES : Check and repair harness between A-10X (terminal No. 1) fan control relay connector and body earth.

- Check earthing line for damage.

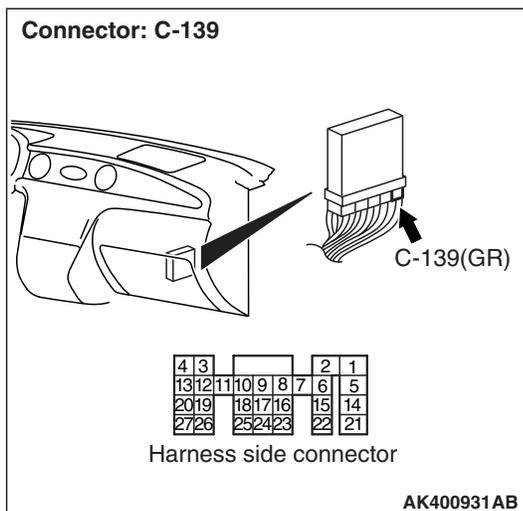
NO : Repair.

STEP 12. Connector check: C-139 engine-ECU connector



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

STEP 13. Fan motor drive test.



- Disconnect C-139 engine-ECU connector.
 - Ignition switch: ON
- OK: Fan motor rotates.**

- Q: Is the check result normal?**
YES : Go to Step 14 .
NO : Go to Step 15 .

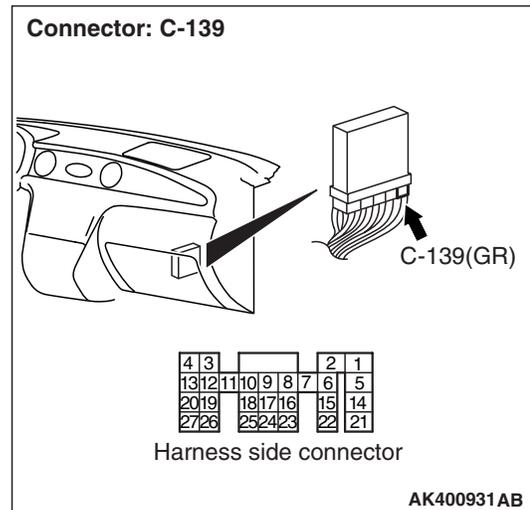
STEP 14. M.U.T.-II/III actuator test

- Item 21: Fan controller
- OK: Fan motor rotates.**

Q: Is the check result normal?

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

STEP 15. Perform voltage measurement at C-139 engine-ECU connector.

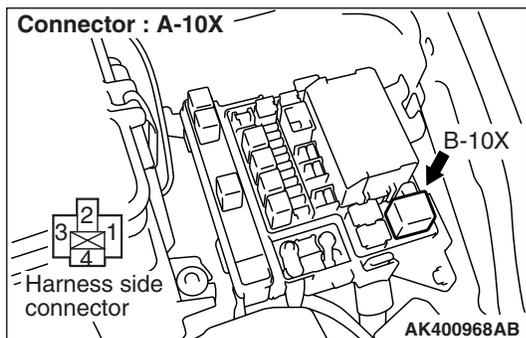


- Disconnect connector, and measure at harness side.
 - Ignition switch: ON
 - Voltage between terminal No. 17 and earth.
- OK: 4.9 – 5.1 V**

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.



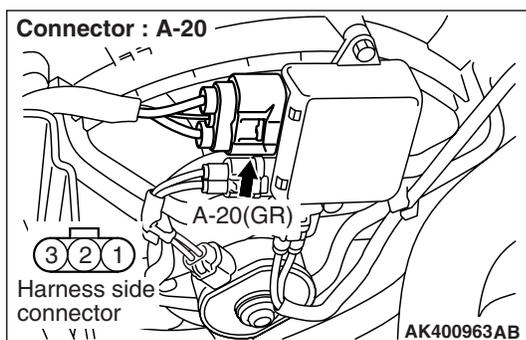
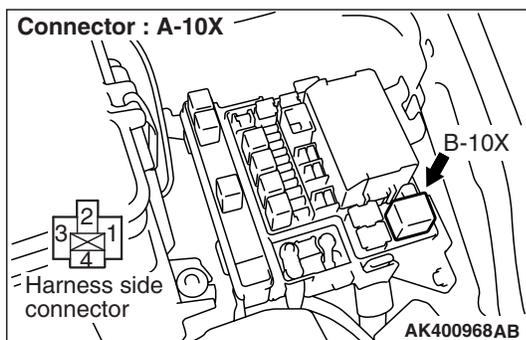
- Check power supply line for damage.

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.



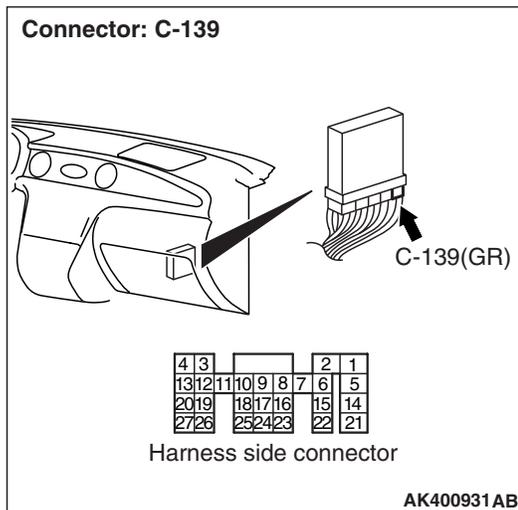
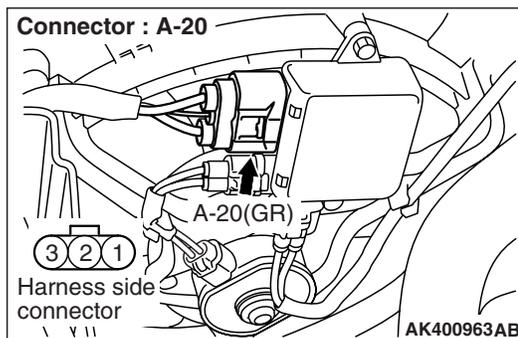
- Check output line for damage.

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 connector.



NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

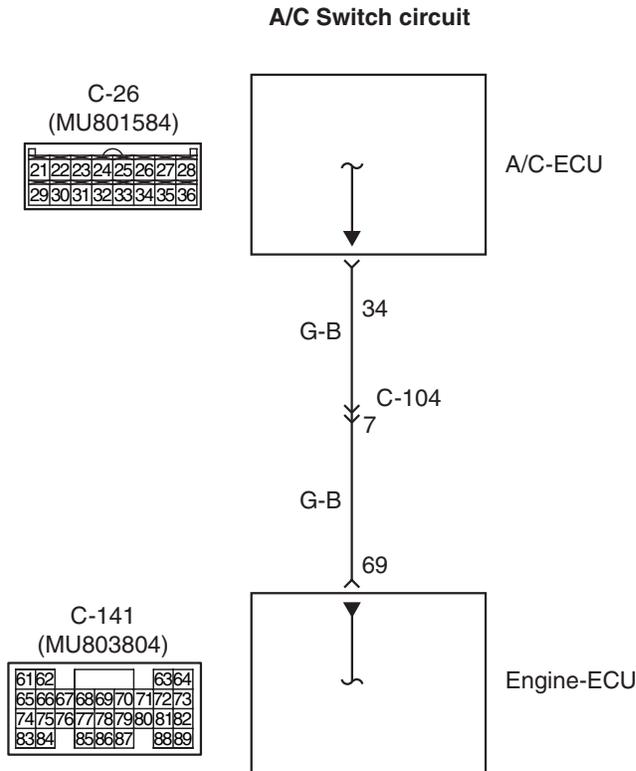
- Check output line for short circuit.

Q: Is the check result normal?

YES : Replace fan motor and fan controller.

NO : Repair.

Inspection Procedure 26: A/C Switch System



Wire colour code

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

AK400827AB

OPERATION

- The battery voltage is applied to the engine-ECU (terminal No. 69) from the A/C-ECU (terminal No. 34).

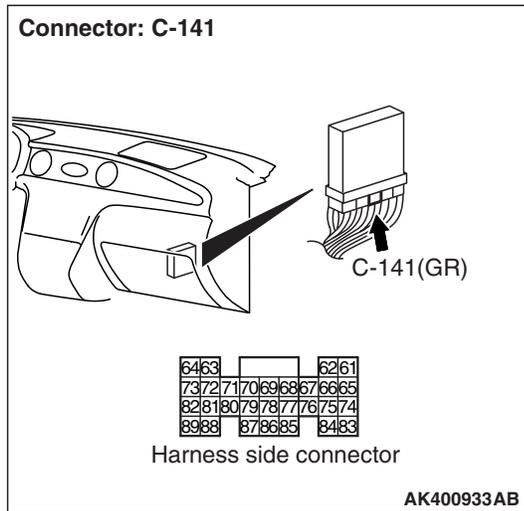
FUNCTION

- When the A/C switch is in "ON" position, A/C switch ON signal is inputted to the engine-ECU from the A/C-ECU. In response to the signal, the engine-ECU controls the A/C compressor relay.

PROBABLE CAUSE

- Failed A/C
- Failed A/C system
- Open/short circuit in A/C circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1. Perform voltage measurement at C-141 engine-ECU connector.

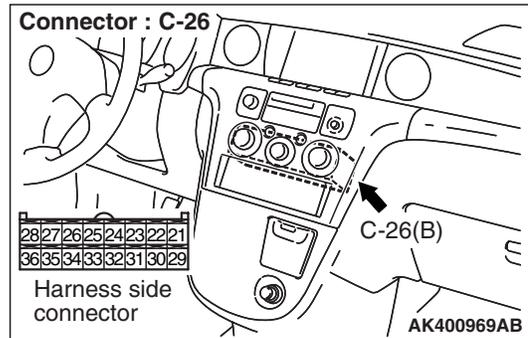
- Measure engine-ECU terminal voltage.
- Engine: Running at idle
- A/C set temperature:
Maximum Cool when temperature in cabin is 25°C or more
Maximum Hot when temperature in cabin is 25°C or less
- Voltage between terminal No. 69 and earth.

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 .

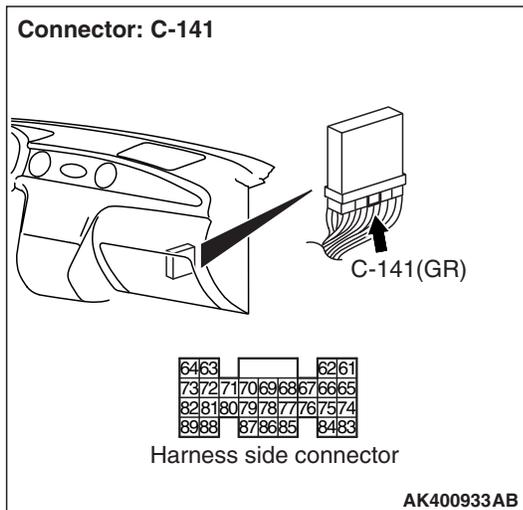
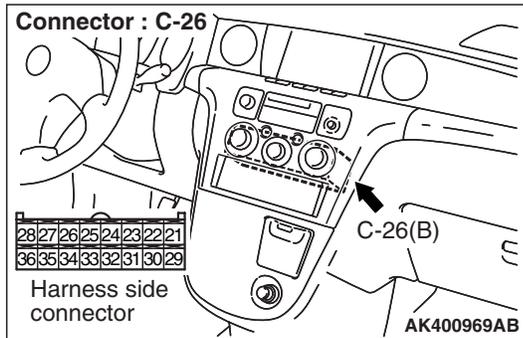
STEP 2. Perform voltage measurement at C-26 A/C-ECU connector.

- 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. 34 and earth

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

YES : Go to Step 5 .
NO : Go to Step 3 .

STEP 3. Connector check: C-26 A/C-ECU connector and C-141 engine-ECU connector

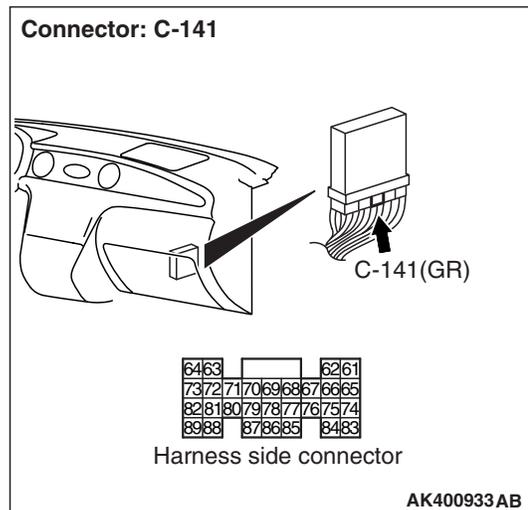
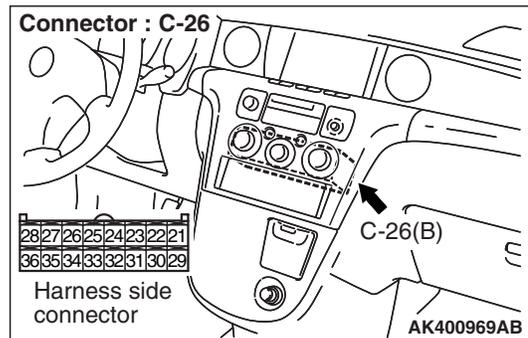


Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

STEP 4. Check harness between C-26 (terminal No. 34) A/C-ECU connector and C-141 (terminal No. 69) engine-ECU connector.



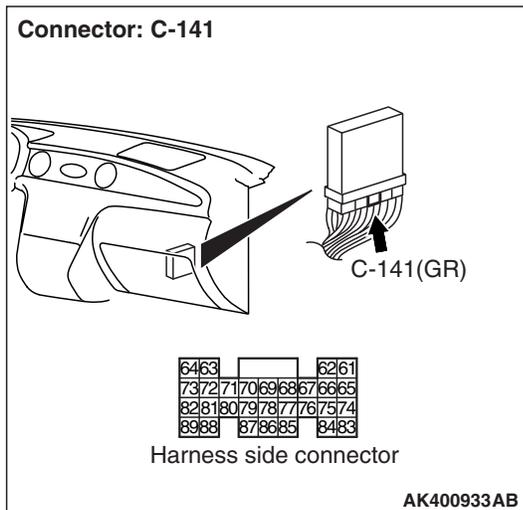
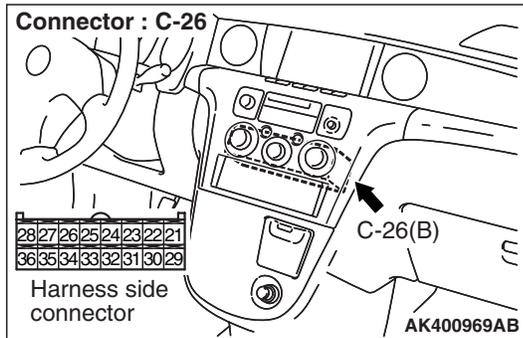
NOTE: Before checking harness, check intermediate connector C-104, and repair if necessary.

- Check output line for short circuit.

Q: Is the check result normal?

YES : Check A/C system (Refer to GROUP 55A – Troubleshooting – Check Chart for Trouble Symptoms P.55A-5).

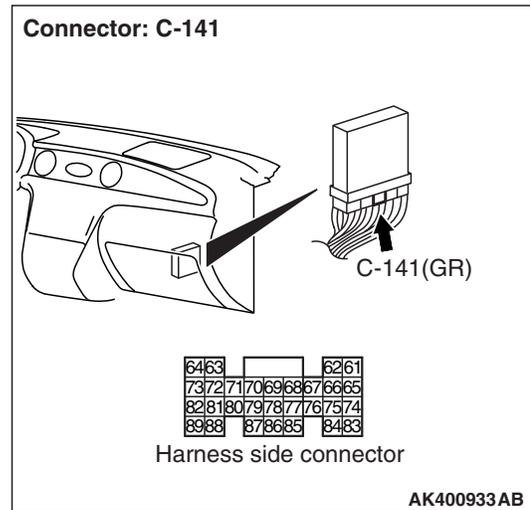
NO : Repair.

STEP 5. Connector check: C-26 A/C-ECU connector and C-141 engine-ECU connector**Q: Is the check result normal?**

YES : Check intermediate connector C-104, and repair if necessary. If intermediate connector is normal, check and repair harness between C-26 (terminal No. 34) A/C-ECU connector and C-141 (terminal No. 69) engine-ECU connector.

- Check output line for open circuit.

NO : Repair or replace.

STEP 6. Connector check: C-141 engine-ECU connector**Q: Is the check result normal?**

YES : Go to Step 7 .

NO : Repair or replace.

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

- Item 28: A/C switch
 - Engine: Idling
 - A/C set temperature:
 - Maximum Cool when temperature in cabin is 25°C or more.
 - Maximum Hot when temperature in cabin is 25°C or less.

OK:

ON (when A/C is ON)

OFF (when A/C is OFF)

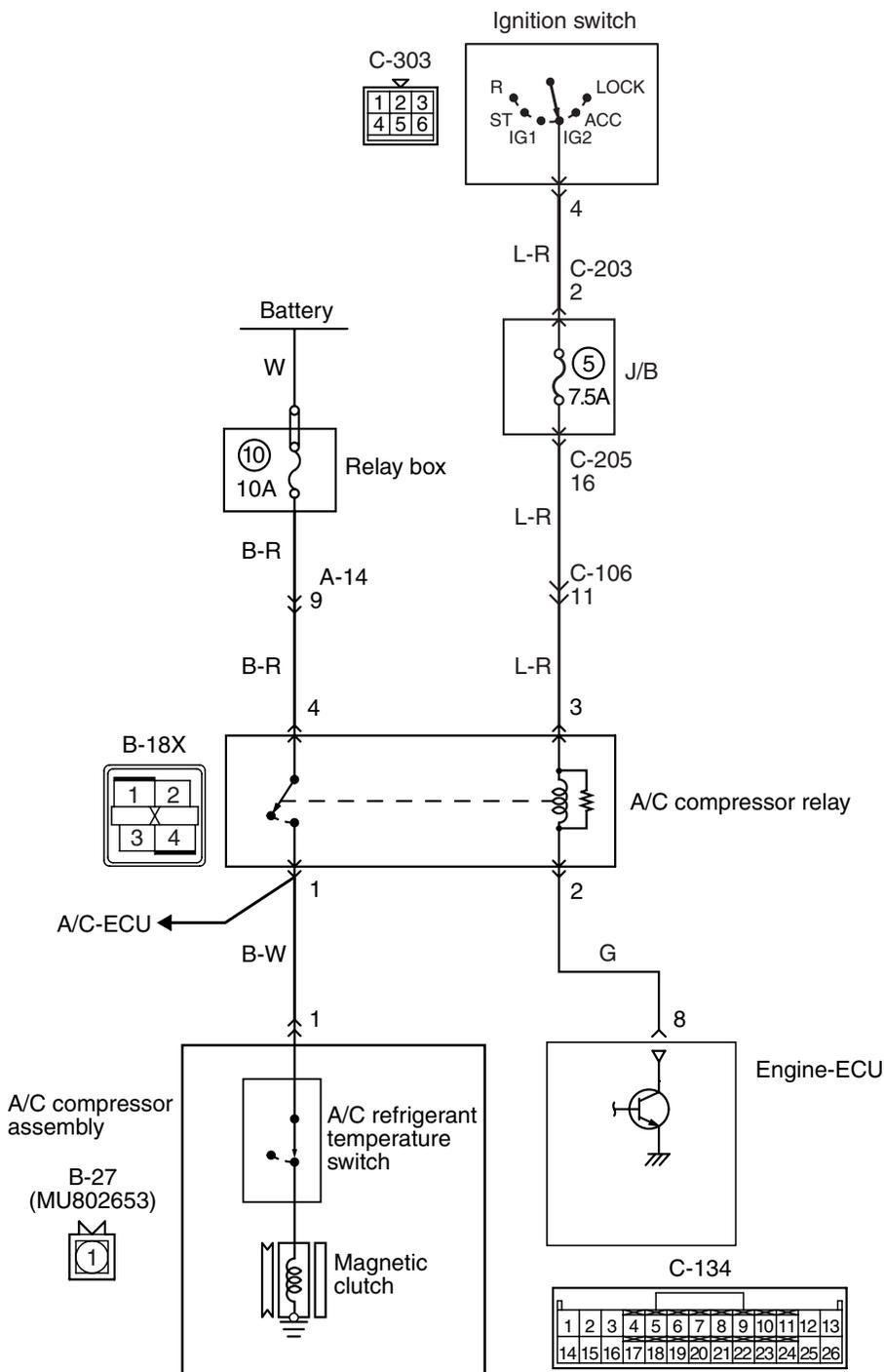
Q: Is the check result normal?

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

NO : Replace engine-ECU.

Inspection Procedure 27: A/C Compressor Relay System

A/C compressor relay Circuit



Wire colour code

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

OPERATION

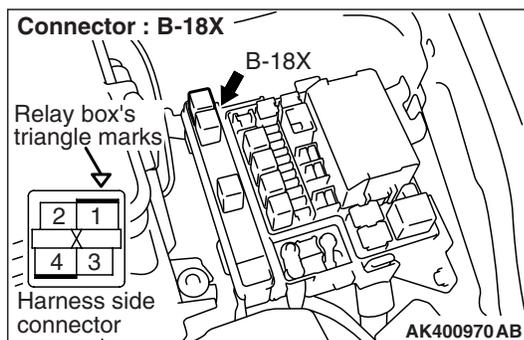
- The battery voltage is applied to the A/C compressor relay (terminal No. 4).
- The battery voltage is applied to the A/C compressor relay (terminal No. 3) from the ignition switch. The engine-ECU (terminal No. 8) makes the power transistor in the unit be in "ON" position and makes currents go on the A/C compressor relay coil, and that makes the relay be in "ON" position.
- When the A/C compressor is in "ON" position, the battery voltage is supplied to the A/C compressor (terminal No. 1) from the A/C compressor relay assembly (terminal No. 1).

FUNCTION

- When the A/C switch "ON" signal is input to the engine-ECU, the engine-ECU places the A/C compressor relay in the "ON" position. Accordingly, the battery voltage supplied to the A/C compressor operates the magnet clutch.

PROBABLE CAUSE

- Failed A/C compressor relay
- Failed A/C compressor magnet clutch
- Open/short circuit in A/C compressor relay circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE**STEP 1. Connector check: B-18X A/C compressor relay connector**

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

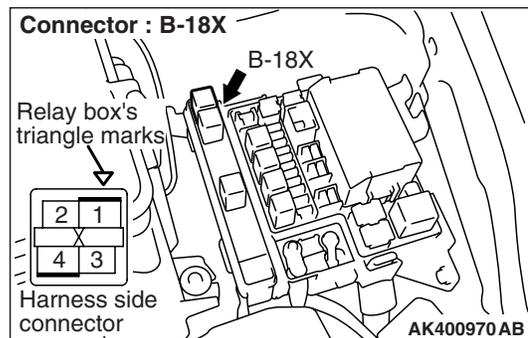
STEP 2. A/C compressor relay check.

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

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace A/C compressor relay.

STEP 3. Perform voltage measurement at B-18X A/C compressor relay connector.

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

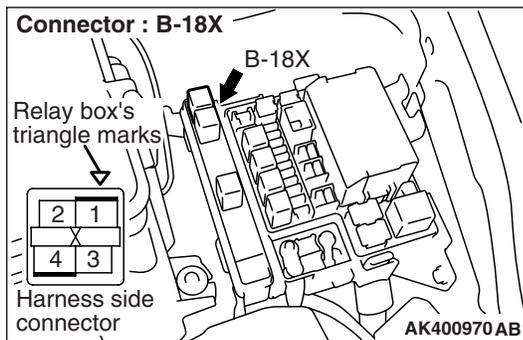
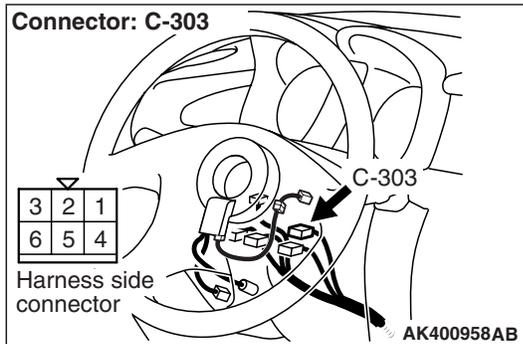
OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Go to Step 4 .

STEP 4. Connector check: C-303 ignition switch connector



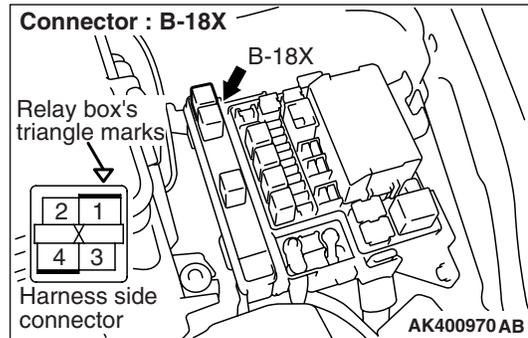
Q: Is the check result normal?

YES : Check intermediate connectors C-106, C-203 and C-205, and repair if necessary. If intermediate connectors are normal, check and repair harness between B-18X (terminal No. 3) A/C compressor relay connector and C-303 (terminal No. 4) ignition switch connector.

- Check power supply line for open/short circuit.

NO : Repair or replace.

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

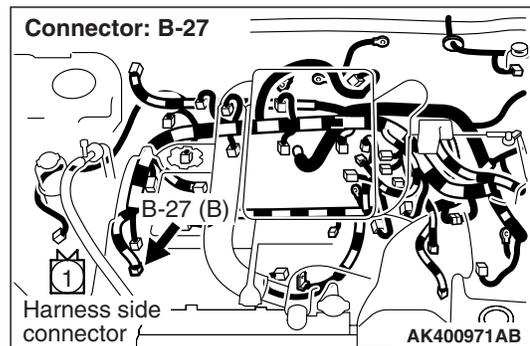
Q: Is the check result normal?

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.

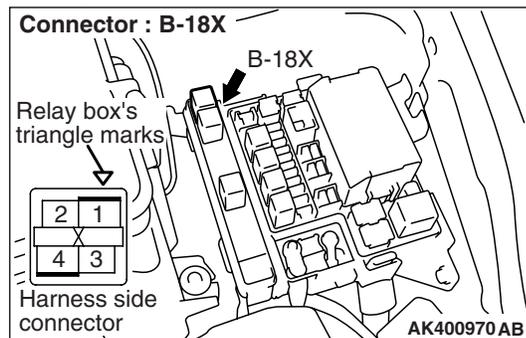
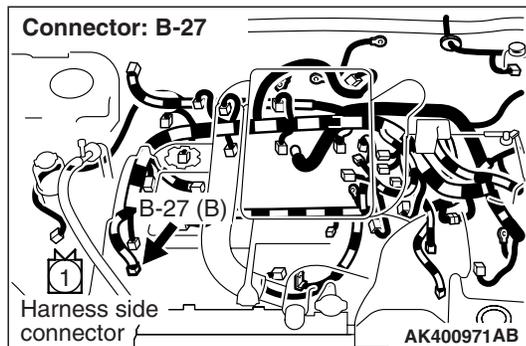
STEP 6. Connector check: B-27 A/C compressor assembly connector



Q: Is the check result normal?

YES : Go to Step 7 .

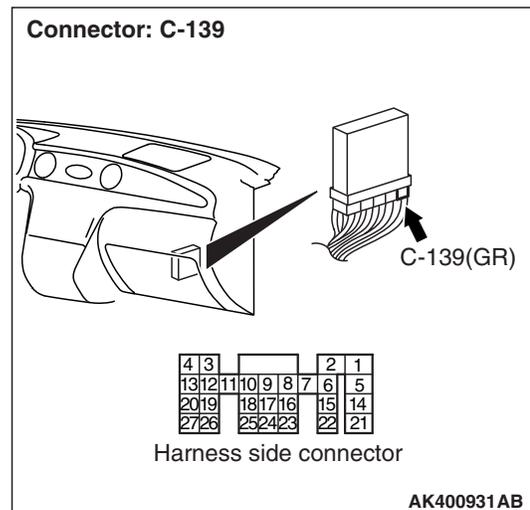
NO : Repair or replace.

**STEP 7. Perform voltage measurement at B-27
A/C compressor assembly connector.**

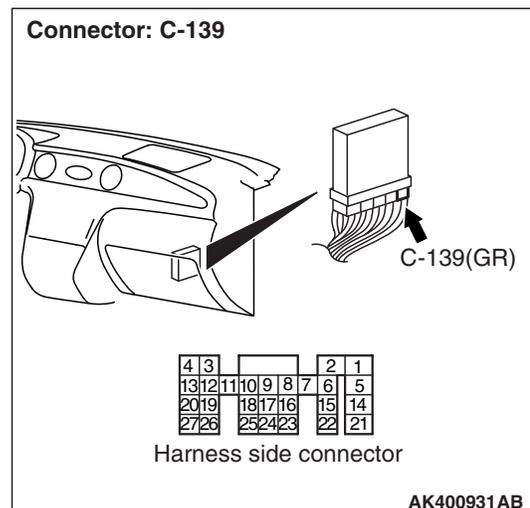
- Disconnect connector, and measure at harness side.
- Remove B-18X (terminal No. 1 and No. 4) A/C compressor relay and short-circuit of harness side connector.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

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.

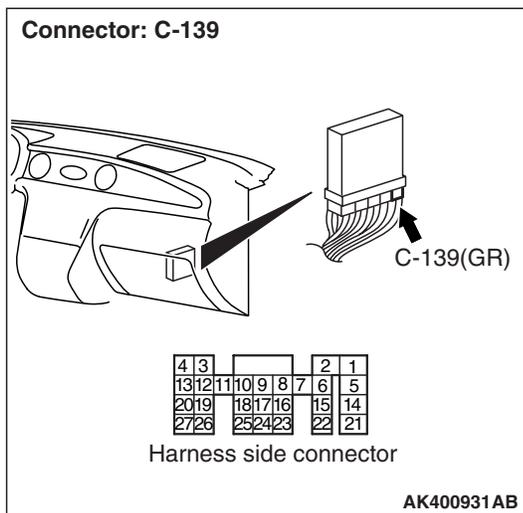
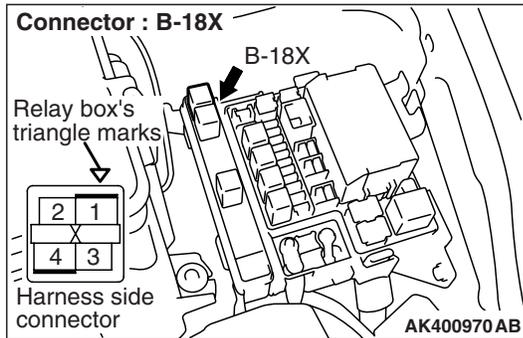
- Check output line for open/short circuit.

**STEP 8. Perform voltage measurement at C-139
engine-ECU 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
connector****Q: Is the check result normal?****YES :** Go to Step 10 .**NO :** Repair or replace.

STEP 10. Check harness between B-18X (terminal No. 2) A/C compressor relay connector and C-139 (terminal No. 8) engine-ECU 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
 - Engine: Idling
 - A/C set temperature:
 - Maximum Cool when temperature in cabin is 25°C or more
 - Maximum Hot when temperature in cabin is 25°C or less

OK:

ON (when A/C is ON)

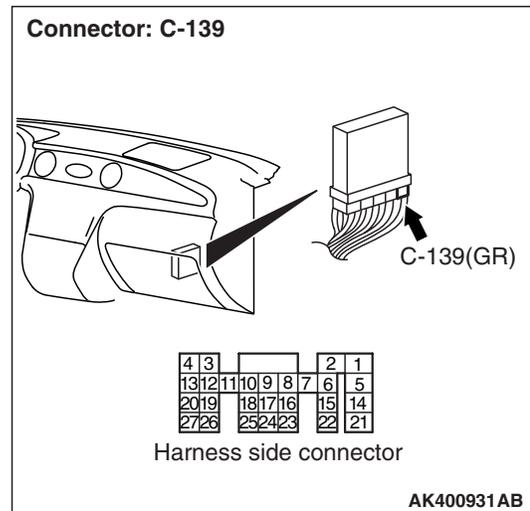
OFF (when A/C is OFF)

Q: Is the check result normal?

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

NO : Replace engine-ECU.

STEP 12. Connector check: C-139 engine-ECU connector

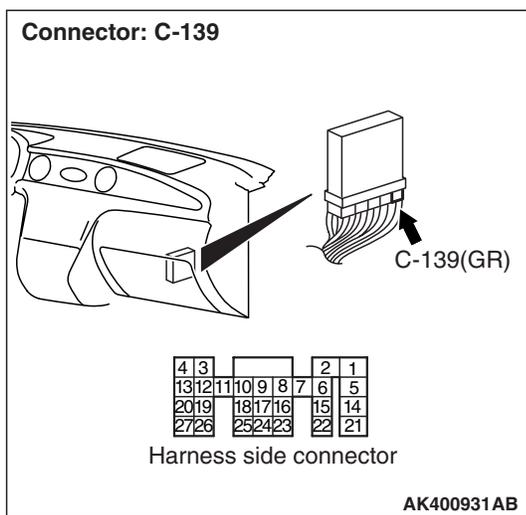
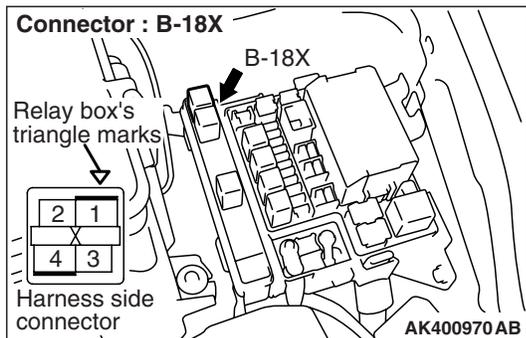


Q: Is the check result normal?

YES : Go to Step 13 .

NO : Repair or replace.

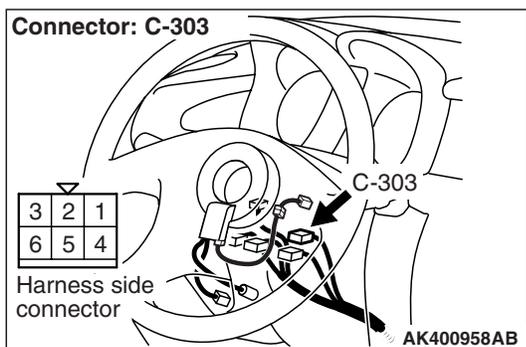
STEP 13. Check harness between B-18X (terminal No. 2) A/C compressor relay connector and C-139 (terminal No. 8) engine-ECU connector.



- Check earthing line for damage.

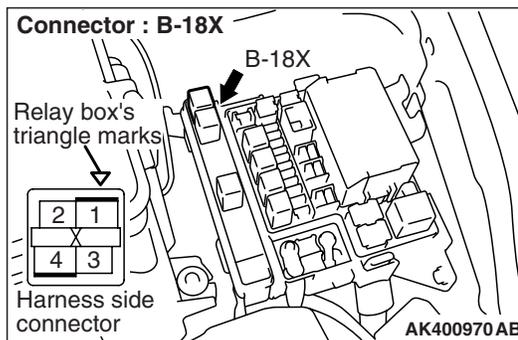
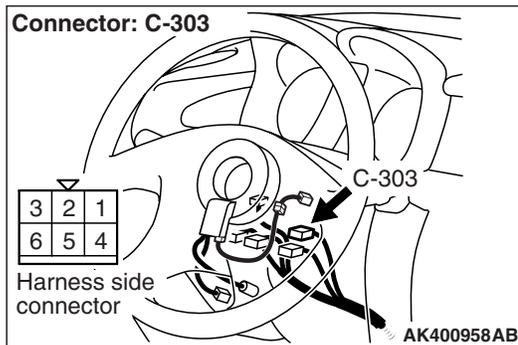
Q: Is the check result normal?
YES : Go to Step 14 .
NO : Repair.

STEP 14. Connector check: C-303 ignition switch connector



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

STEP 15. Check harness between C-303 (terminal No. 4) ignition switch connector and B-18X (terminal No. 3) A/C compressor relay connector.

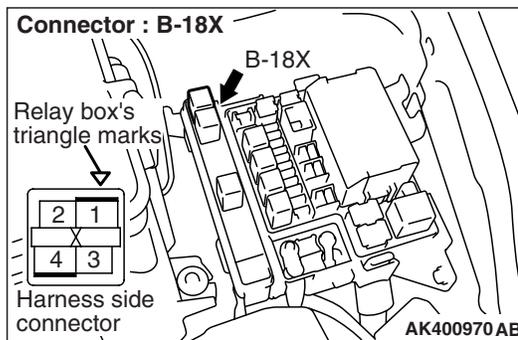


NOTE: Before checking harness, check intermediate connectors C-106, C-203 and C-205, and repair if necessary.

- Check power supply line for damage.

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

STEP 16. Check harness between battery and B-18X (terminal No. 4) A/C compressor relay connector.

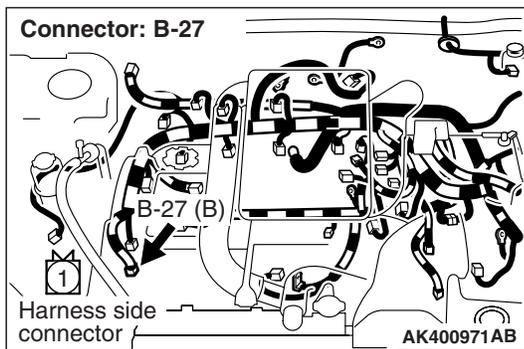
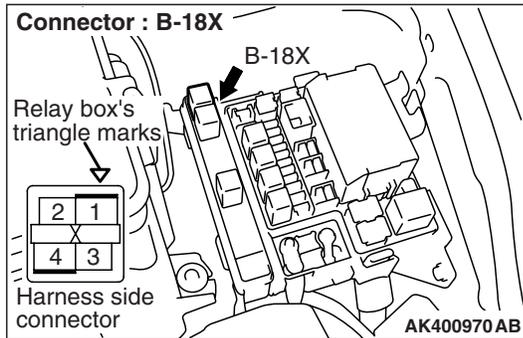


NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check power supply line for damage.

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

STEP 17. Check harness between B-18X (terminal No. 1) A/C compressor relay connector and B-27 (terminal No. 1) A/C compressor assembly connector.



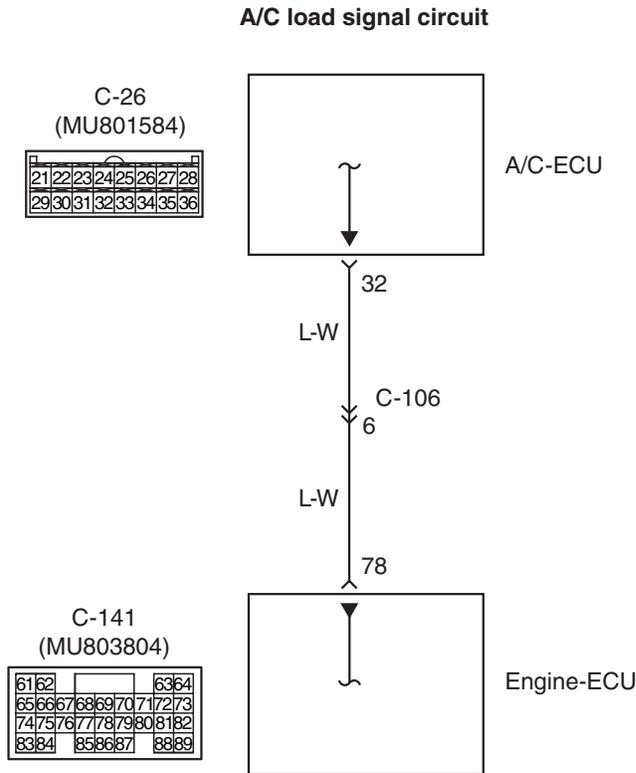
- Check output line for damage.

Q: Is the check result normal?

YES : Replace A/C compressor magnet clutch.

NO : Repair.

Inspection Procedure 28: A/C Load Signal System



Wire colour code

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

AK400829AB

OPERATION

- The A/C load signal is inputted to the engine-ECU (terminal No. 78) from the A/C-ECU (terminal No. 32).

FUNCTION

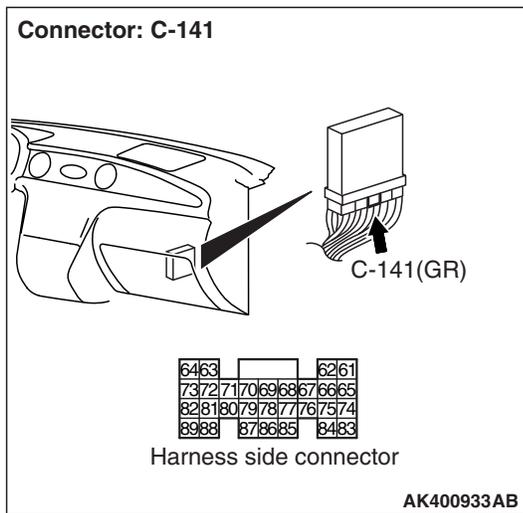
- The magnitude of the A/C compressor load is detected and input to the engine-ECU. The engine-ECU provides A/C idle up control according to the A/C compressor load condition.

PROBABLE CAUSE

- Failed A/C-ECU
- Open/short circuit in A/C load signal circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE

STEP 1. Perform voltage measurement at C-141 engine-ECU connector.



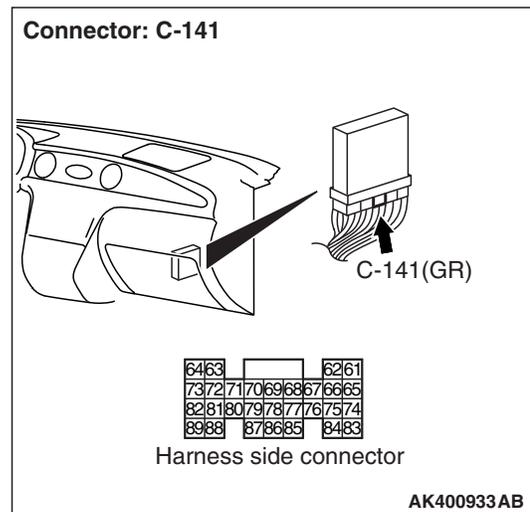
- Measure engine-ECU terminal voltage.
- Engine: Idling
- A/C switch: ON (A/C compressor in driven state)
- Voltage between terminal No. 78 and earth

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 connector

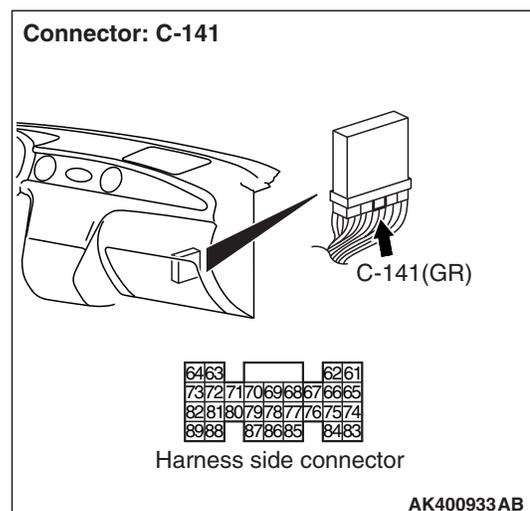


- Q: Is the check result normal?**
YES : Go to Step 3 .
NO : Repair.

STEP 3. Check the trouble symptoms.

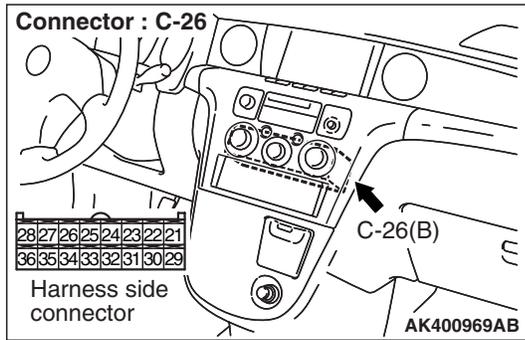
- Q: Does trouble symptom persist?**
YES : Replace engine-ECU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points P.00-6).

STEP 4. Connector check: C-141 engine-ECU connector



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

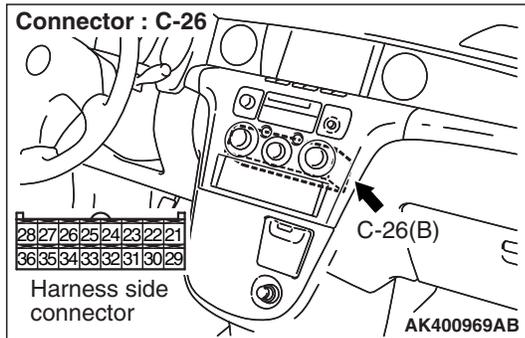
STEP 5. Perform voltage measurement at C-26 A/C-ECU connector.



- 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. 32 and earth
OK: System voltage

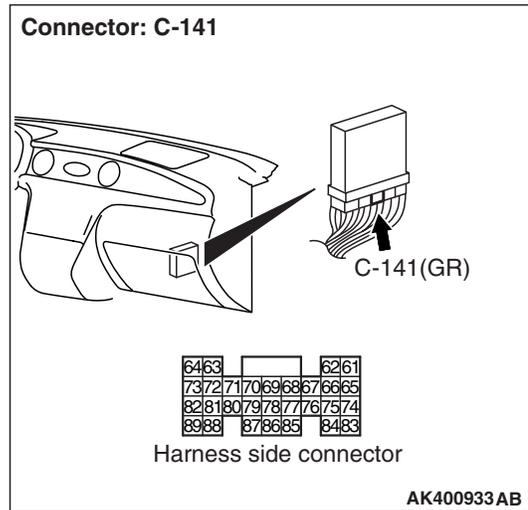
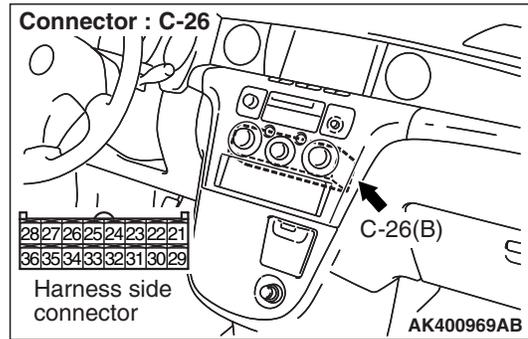
Q: Is the check result normal?
YES : Go to Step 8 .
NO : Go to Step 6 .

STEP 6. Connector Check: C-26 A/C-ECU connector



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

STEP 7. Check harness between C-26 (terminal No. 32) A/C-ECU connector and C-141 (terminal No. 78) engine-ECU connector.

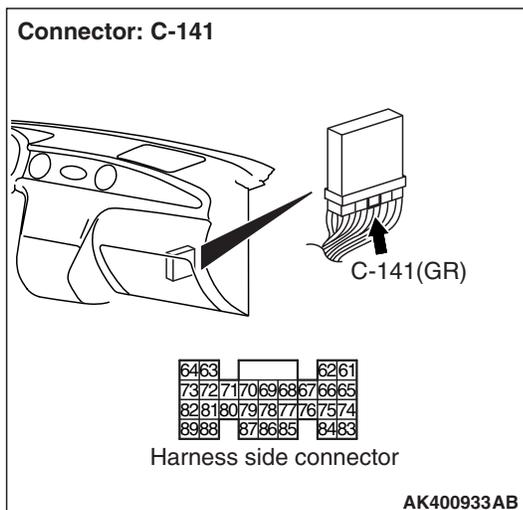
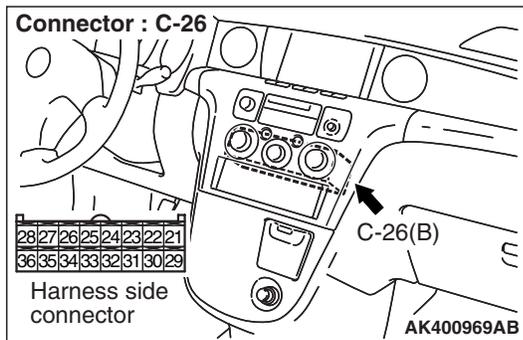


NOTE: Before checking harness, check intermediate connector C-106 and repair if necessary.

- 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-26 A/C-ECU connector



Q: Is the check result normal?

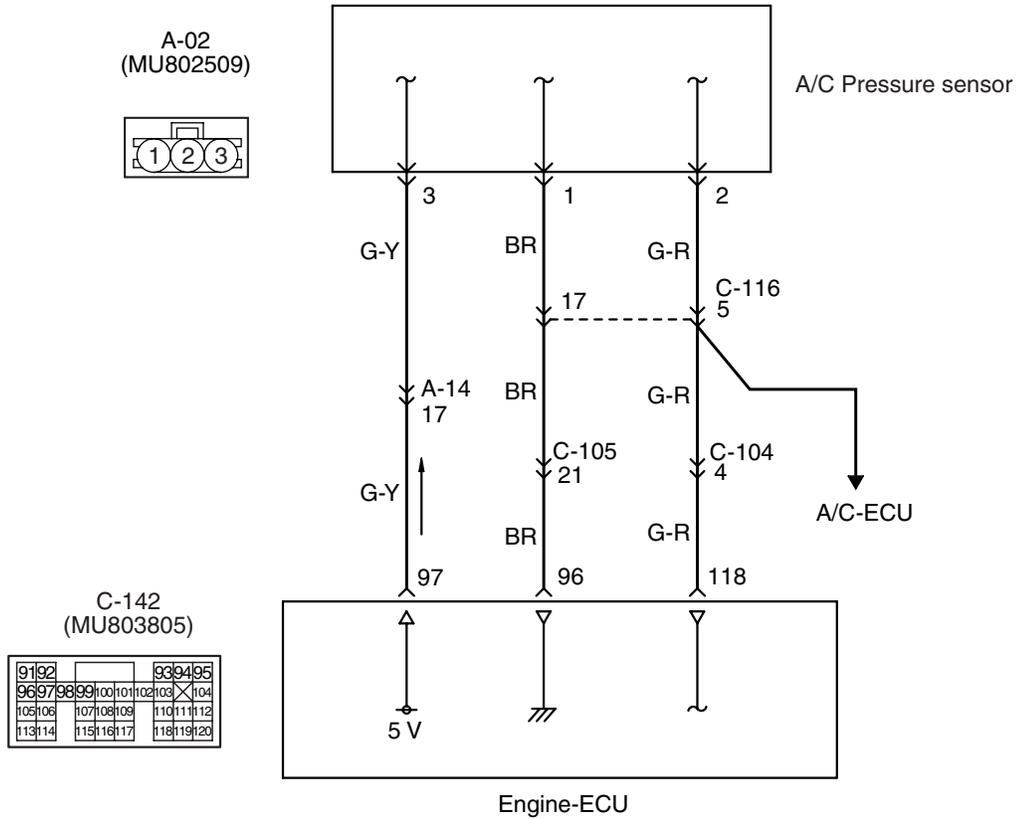
YES : Check intermediate connector C-106, and repair if necessary. If intermediate connector is normal, check and repair harness between C-26 (terminal No. 32) A/C-ECU connector and C-141 (terminal No. 78) engine-ECU connector.

- Check output line for open circuit.

NO : Repair or replace.

Inspection Procedure 29: 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

AK304330AC

OPERATION

- A power voltage of 5 V is applied to the A/C pressure sensor power terminal (terminal No. 3) from the engine-ECU (terminal No. 97) and is earthed to the engine-ECU (terminal No. 96) from the A/C pressure sensor (terminal No. 1).
- The sensor signal is inputted to the engine-ECU (terminal No. 118) from the A/C pressure sensor output terminal (terminal No. 2).

FUNCTION

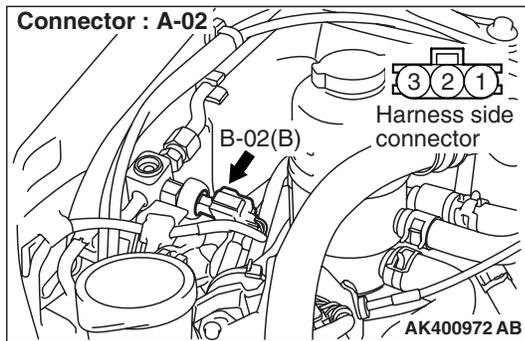
- The A/C pressure sensor detects the A/C refrigerant pressure and inputs the pressure signal to the engine-ECU. The engine-ECU uses the signal for ON/OFF control of the magnet clutch of the A/C compressor.

PROBABLE CAUSE

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

DIAGNOSIS PROCEDURE

STEP 1. Connector check: A-02 A/C pressure sensor connector

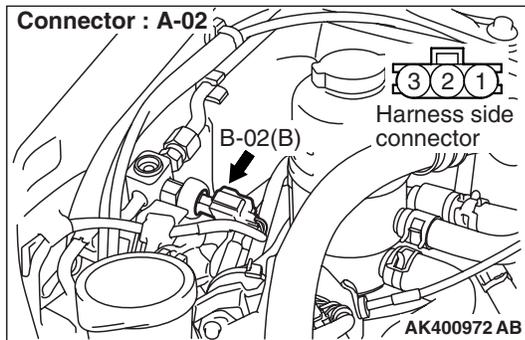


Q: Is the check result normal?

YES : Go to Step 2 .

NO : Repair or replace.

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.

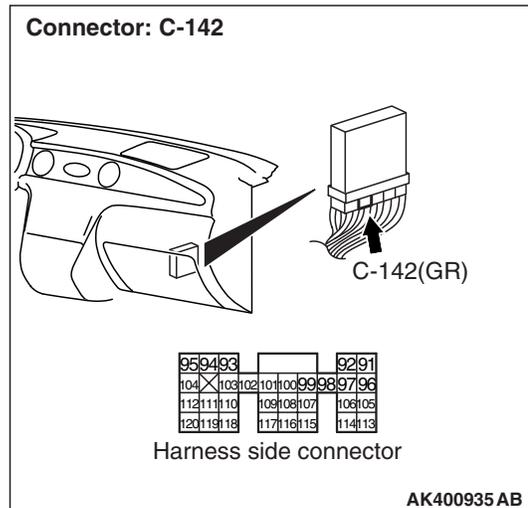
OK: 4.9 – 5.1 V

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 connector.



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 97 and earth.

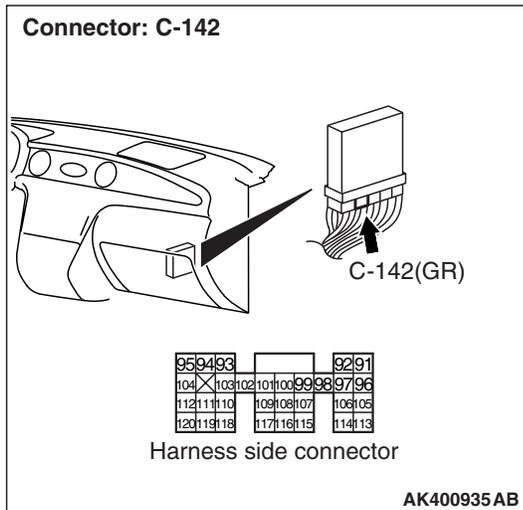
OK: 4.9 – 5.1 V

Q: Is the check result normal?

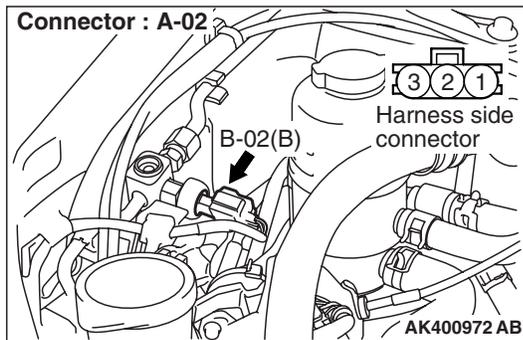
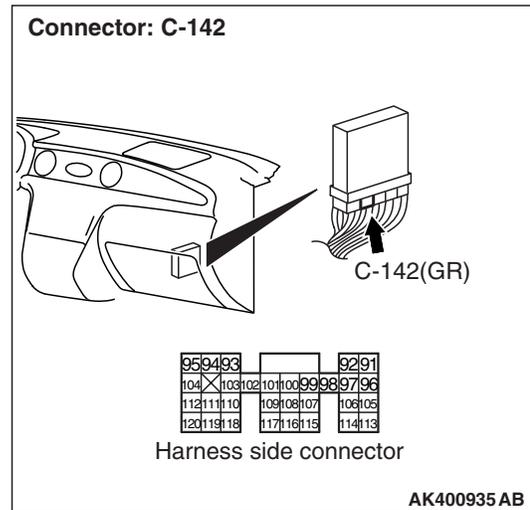
YES : Go to Step 4 .

NO : Go to Step 5 .

STEP 4. Connector check: C-142 engine-ECU connector



STEP 5. Connector check: C-142 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 6 .

NO : Repair or replace.

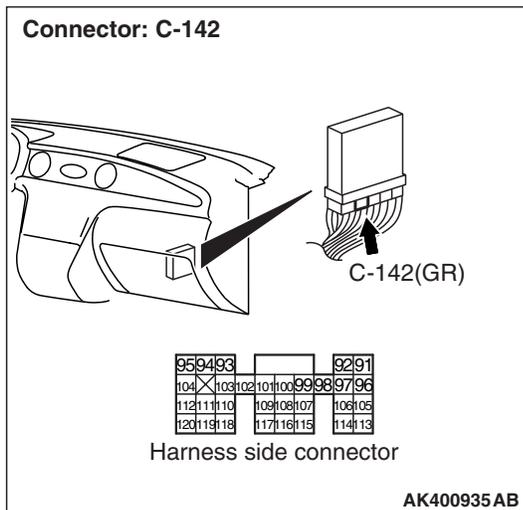
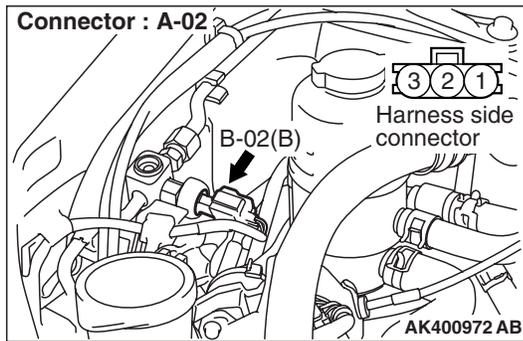
Q: Is the check result normal?

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 connector.

- Check power supply line for open circuit.

NO : Repair or replace.

STEP 6. Check harness between A-02 (terminal No. 3) A/C pressure sensor connector and C-142 (terminal No. 97) engine-ECU connector.



NOTE: Before checking harness, check intermediate connector A-14, and repair if necessary.

- Check power supply line for short circuit.

Q: Is the check result normal?

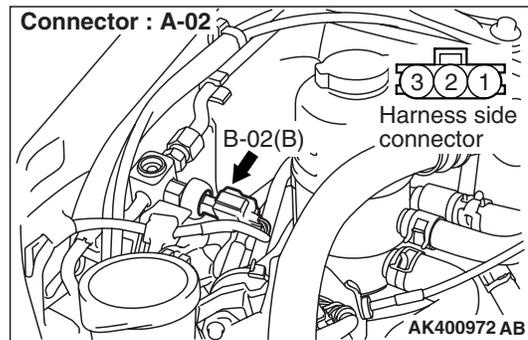
- YES :** Go to Step 7 .
NO : Repair.

STEP 7. Check the trouble symptoms.

Q: Does trouble symptom persist?

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

STEP 8. Perform resistance measurement at A-02 A/C pressure sensor connector.

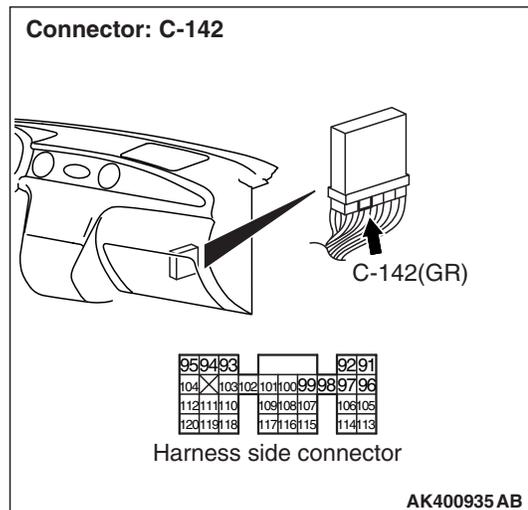


- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 1 and earth.
OK: Continuity (2 Ω or less)

Q: Is the check result normal?

- YES :** Go to Step 11 .
NO : Go to Step 9 .

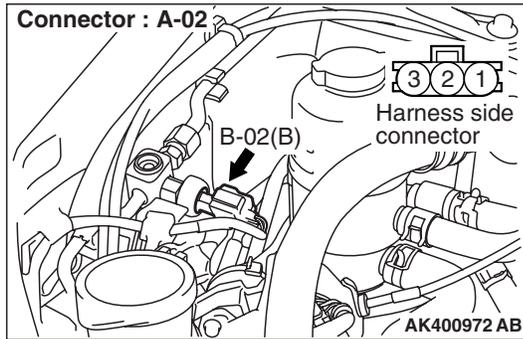
STEP 9. Connector check: C-142 engine-ECU connector



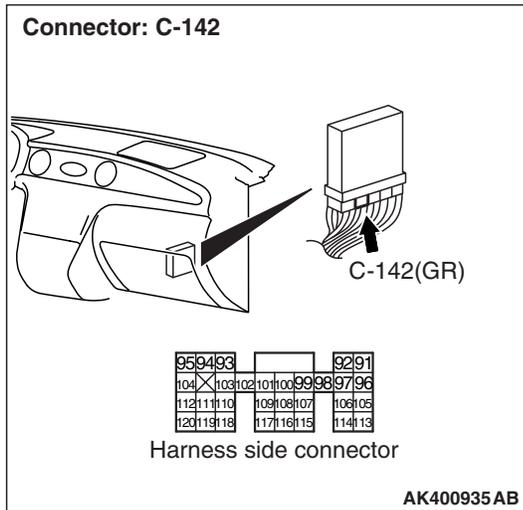
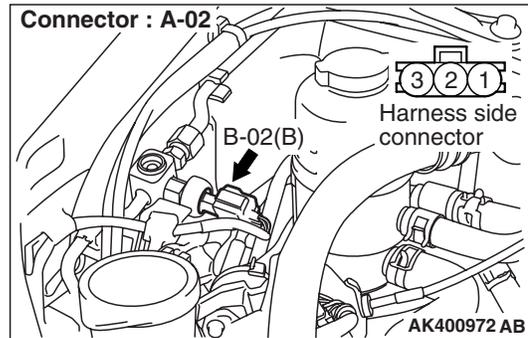
Q: Is the check result normal?

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

STEP 10. Check harness between A-02 (terminal No. 1) A/C pressure sensor connector and C-142 (terminal No. 96) engine-ECU 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.

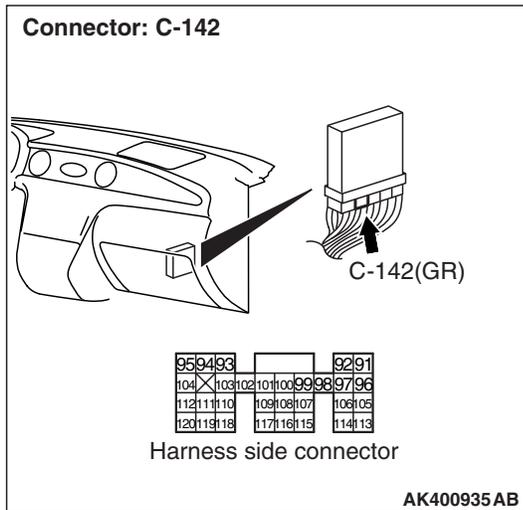
- Check earthing line for open circuit or damage.

Q: Is the check result normal?

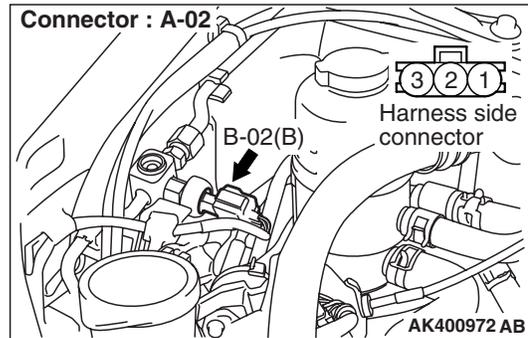
YES : Go to Step 7 .

NO : Repair.

STEP 12. Connector check: C-142 engine-ECU connector



STEP 13. Perform voltage measurement at A-02 A/C pressure sensor connector.



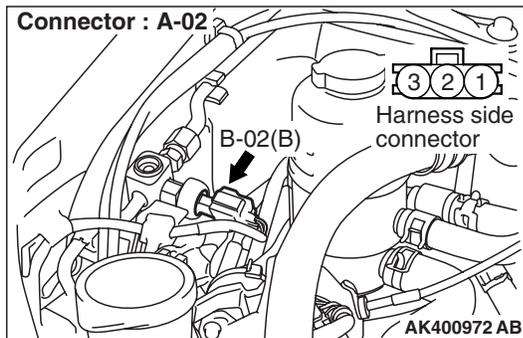
- Use special tool test harness (MB991348) to connect connector, and measure at pick-up harness.
- Ignition switch: ON
- Voltage between terminal No. 1 and earth.

OK: 0.5 or less

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Go to Step 14 .

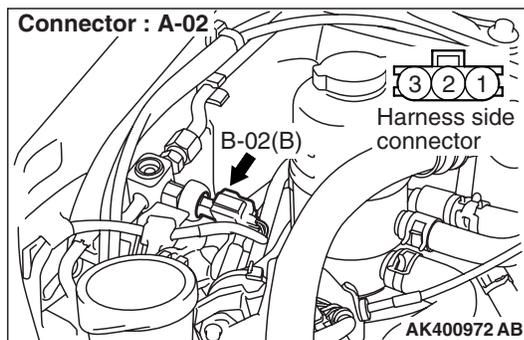
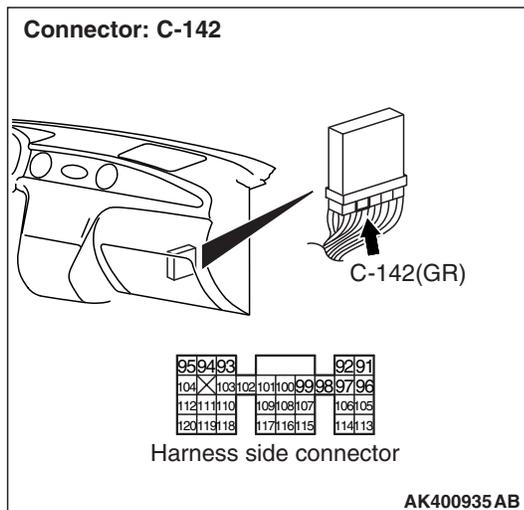


Q: Is the check result normal?

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 connector.

- Check power supply line for damage.

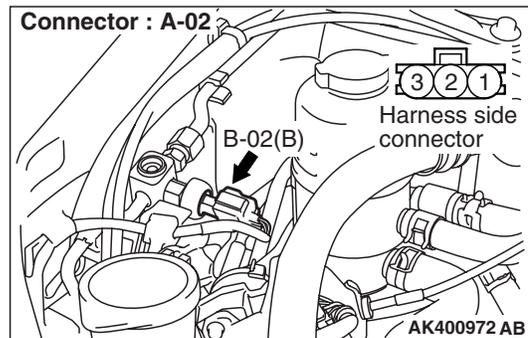
NO : Repair or replace.

STEP 14. Connector check: C-142 engine-ECU connector**Q: Is the check result normal?**

YES : Check intermediate connectors C-105 and C-116, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-02 (terminal No. 1) A/C pressure sensor connector and C-142 (terminal No. 96) engine-ECU connector.

- Check earthing line for damage.

NO : Repair or replace.

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:

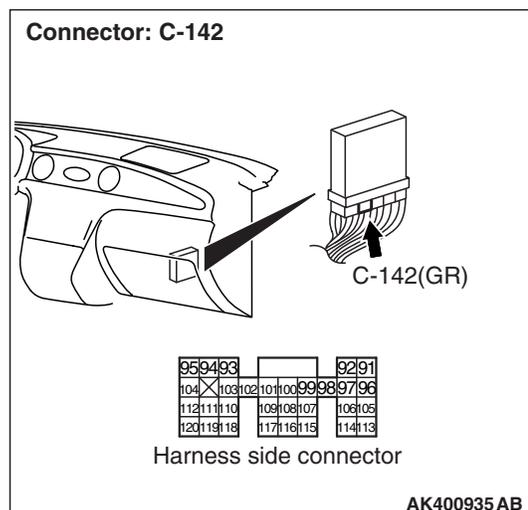
2.2 V or more (When A/C is "MAX, COOL" condition)

1.8 V or less (When A/C is "MAX, HOT" condition)

Q: Is the check result normal?

YES : Go to Step 18 .

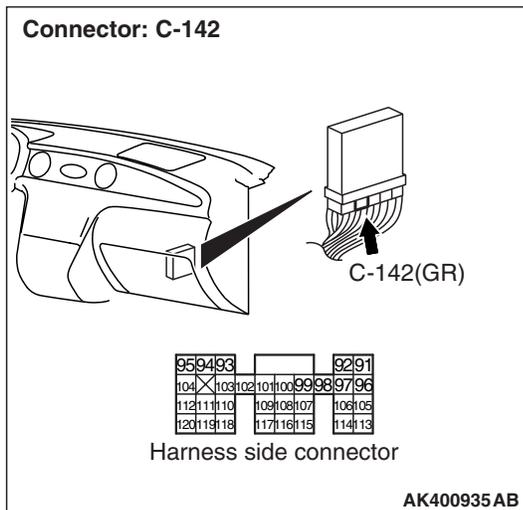
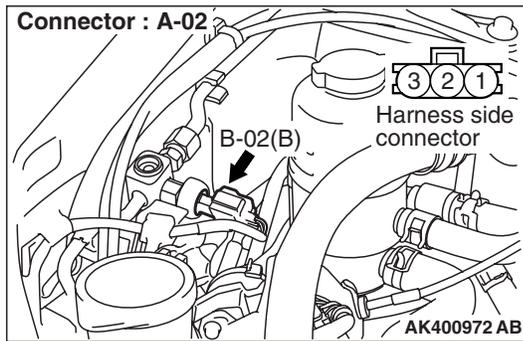
NO : Go to Step 16 .

STEP 16. Connector check: C-142 engine-ECU connector**Q: Is the check result normal?**

YES : Go to Step 17 .

NO : Repair or replace.

STEP 17. Check harness between A-02 (terminal No. 2) A/C pressure sensor connector and C-142 (terminal No. 118) engine-ECU connector.



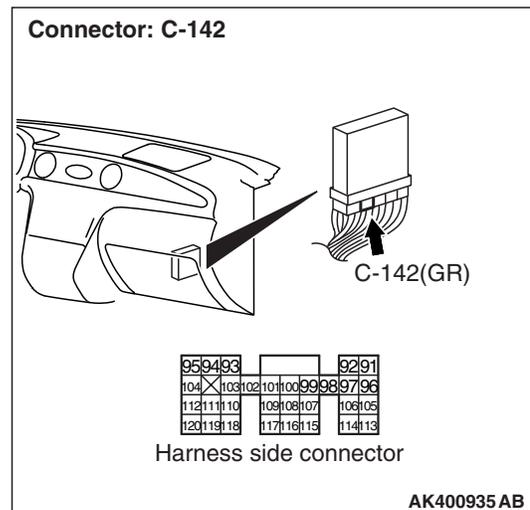
NOTE: Before checking harness, check intermediate connectors C-104 and C-116, and repair if necessary.

- 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 connector.



- Measure engine-ECU terminal voltage.
- Engine: Running at idle
- A/C switch: ON
- Voltage between terminal No. 118 and earth.

OK:

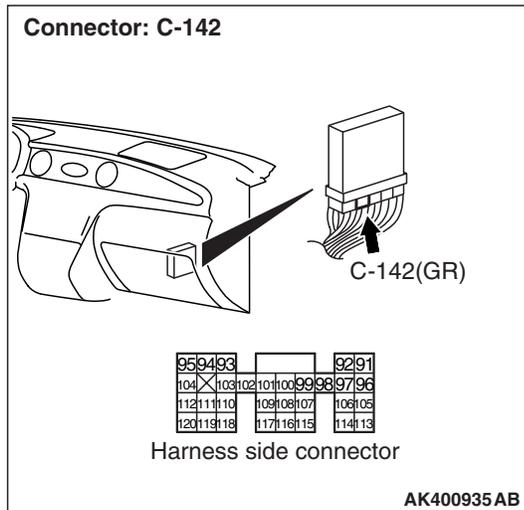
2.2 V or more (When A/C is "MAX, COOL" condition)

1.8 V or more (When A/C is "MAX, HOT" condition)

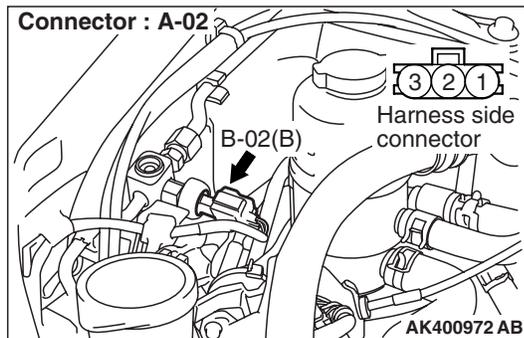
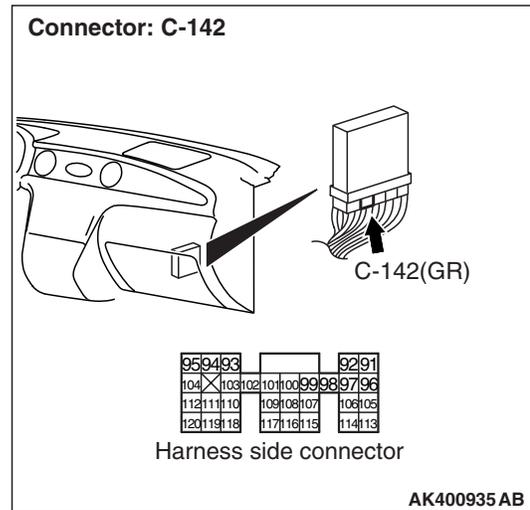
Q: Is the check result normal?

- YES :** Go to Step 20 .
NO : Go to Step 19 .

STEP 19. Connector check: C-142 engine-ECU connector



STEP 20. Connector check: C-142 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

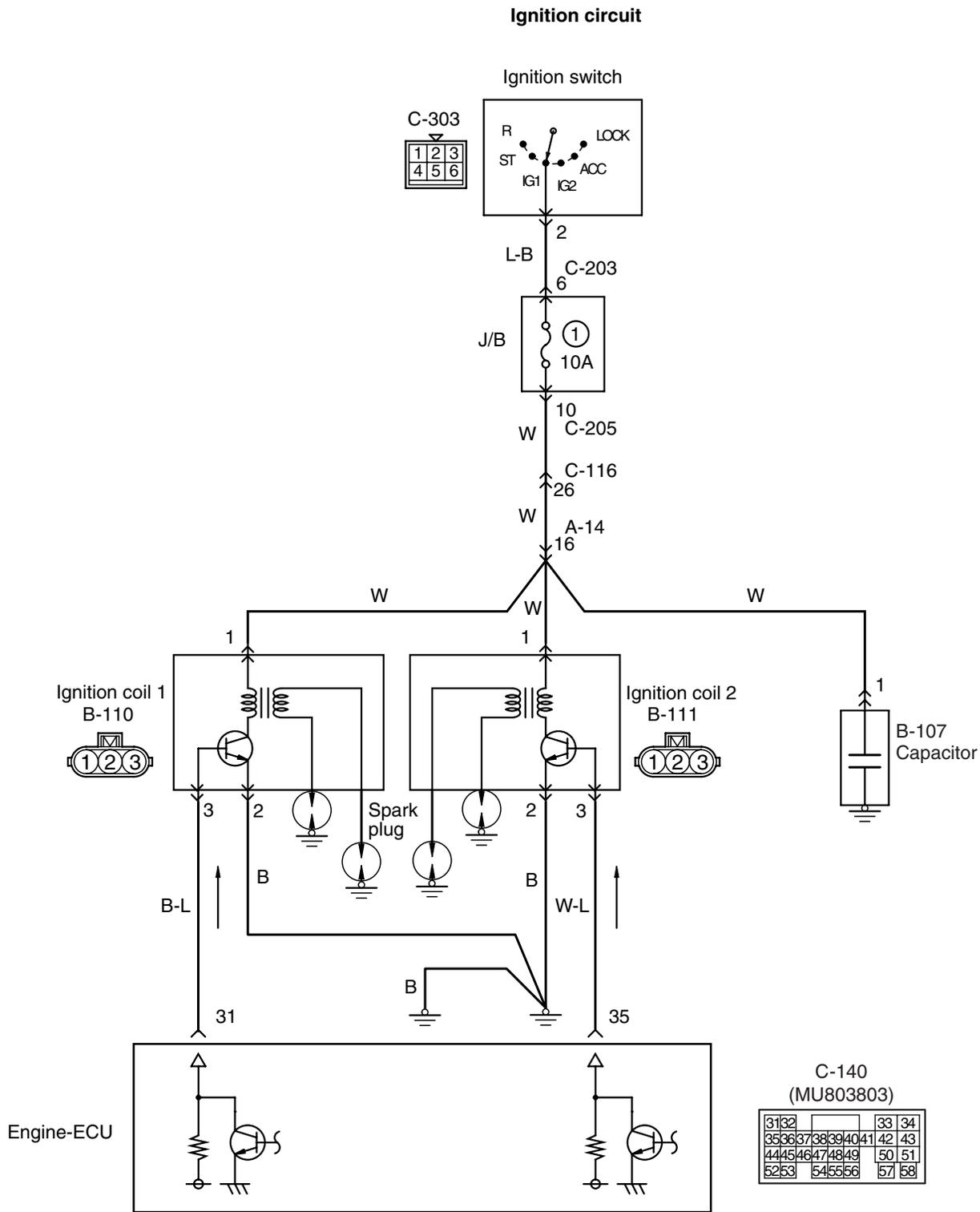
Q: Is the check result normal?

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 connector.

- Check power supply line for short circuit and damage.

NO : Repair or replace.

Inspection Procedure 30: Ignition Circuit System



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

OPERATION

- The battery voltage is applied to the ignition coil (terminal No. 1) from the ignition switch and is earthed to the vehicle body from the ignition coil (terminal No. 2).
- A power voltage of 12 V is applied to the ignition coil output terminal (terminal No. 3) from the engine-ECU (terminal No. 31 and No. 35).

FUNCTION

- When the engine-ECU makes the power transistor in the unit be in "OFF" position, the battery voltage in the unit is applied to the power transistor unit, and that makes the power transistor unit be in "ON" position. The engine-ECU makes the power transistor in the unit be in "ON", and that makes the power transistor unit be in "OFF" position.
- In response to the signal from the engine-ECU, the power transistor unit is in "ON" position. The primary current is going to the ignition coil. When the power transistor unit is in "OFF" position, the primary current is interrupted and high voltage is generated in the secondary coil.

PROBABLE CAUSE

- Failed ignition coil
- Failed spark plug
- Failed spark plug cable
- Open/short circuit in ignition primary circuit or loose connector contact
- Failed engine-ECU

DIAGNOSIS PROCEDURE**STEP 1. Check spark plug cable itself.**

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

Q: Is the check result normal?

YES : Go to Step 2 .

NO : Replace spark plug cable.

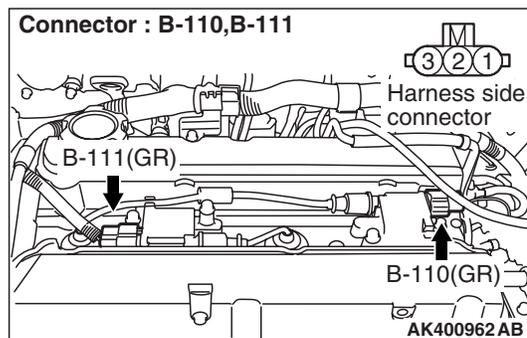
STEP 2. Check spark plug.

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

Q: Is the check result normal?

YES : Go to Step 3 .

NO : Replace spark plug.

STEP 3. Connector check: B-111 and B-110 ignition coil connectors

Q: Is the check result normal?

YES : Go to Step 4 .

NO : Repair or replace.

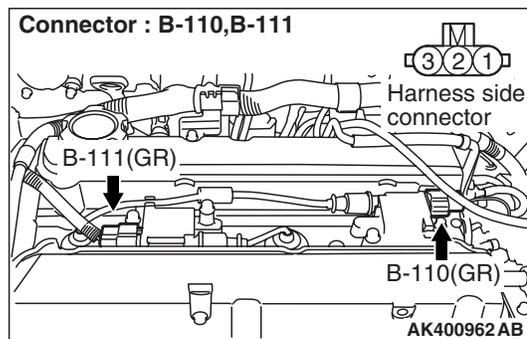
STEP 4. Check ignition coil itself.

- Check ignition coil itself (Refer to GROUP 16 – Ignition System – On-vehicle Service [P.16-38](#)).

Q: Is the check result normal?

YES : Go to Step 5 .

NO : Replace ignition coil.

STEP 5. Perform voltage measurement at B-111 and B-110 ignition coil connectors.

- Disconnect connector, and measure at harness side.

- Ignition switch: ON

- Voltage between terminal No. 1 and earth.

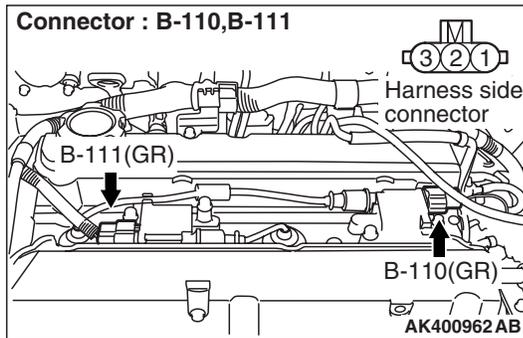
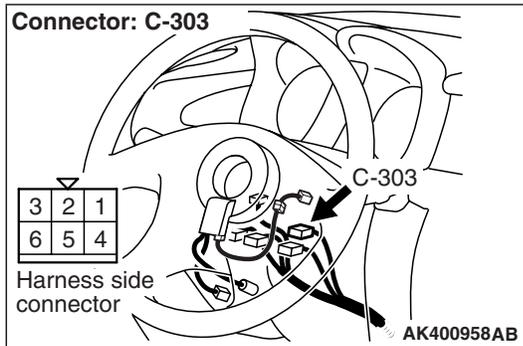
OK: System voltage

Q: Is the check result normal?

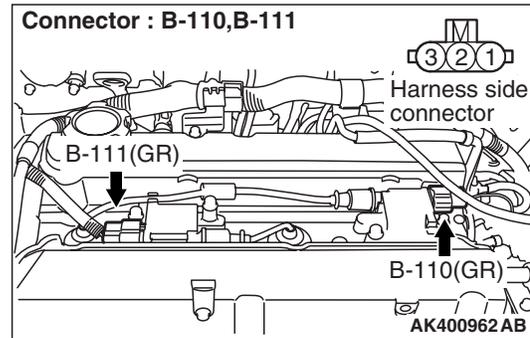
YES : Go to Step 7 .

NO : Go to Step 6 .

STEP 6. Connector check: C-303 ignition switch connector



STEP 7. Perform voltage measurement at B-111 and B-110 ignition coil connectors.



- Disconnect connector, and measure at harness side.
- Engine: Cranking
- Voltage between terminal No. 3 and earth.

OK: 0.5 – 4.0 V

Q: Is the check result normal?

YES : Go to Step 13 .

NO : Go to Step 8 .

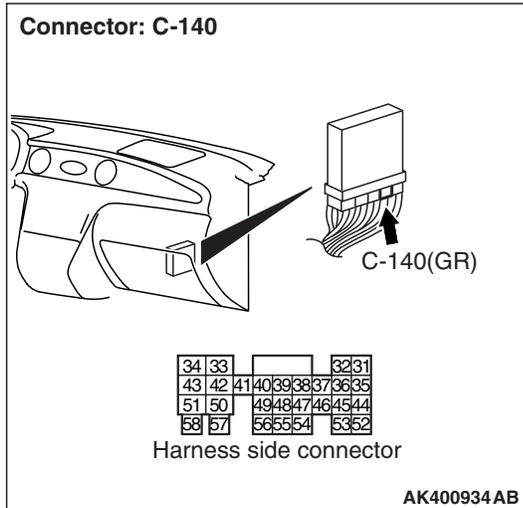
Q: Is the check result normal?

YES : Check intermediate connectors A-14, C-203, C-205 and C-116, and repair if necessary. If intermediate connectors are normal, check and repair harness between C-303 (terminal No. 2) ignition switch connector and B-111 (terminal No. 1) ignition coil connector, also between C-303 (terminal No. 2) ignition switch connector and B-110 (terminal No. 1) ignition coil connector.

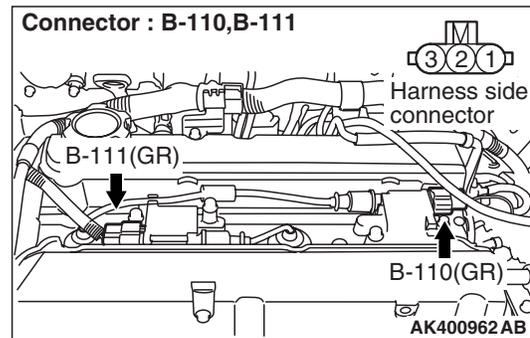
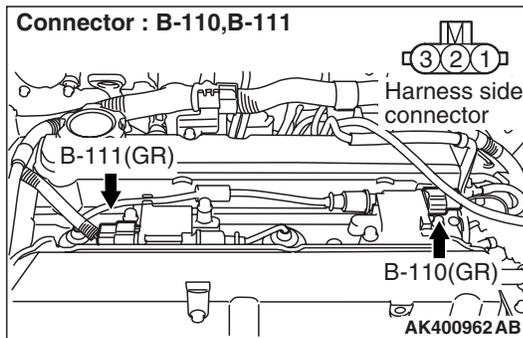
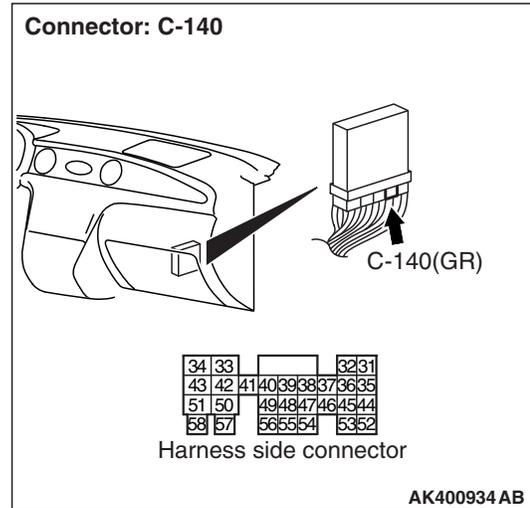
- Check power supply line for open/short circuit.

NO : Repair or replace.

STEP 8. Perform voltage measurement at C-140 engine-ECU connector.



STEP 9. Connector check: C-140 engine-ECU connector



- Measure engine-ECU terminal voltage.
- Disconnect B-111 and B-110 ignition coil connectors.
- Engine: Cranking
- Voltage between terminal No. 31 and earth, also between terminal No. 35 and earth.

OK: 0.5 – 4.0 V

Q: Is the check result normal?

YES : Go to Step 9 .

NO : Go to Step 10 .

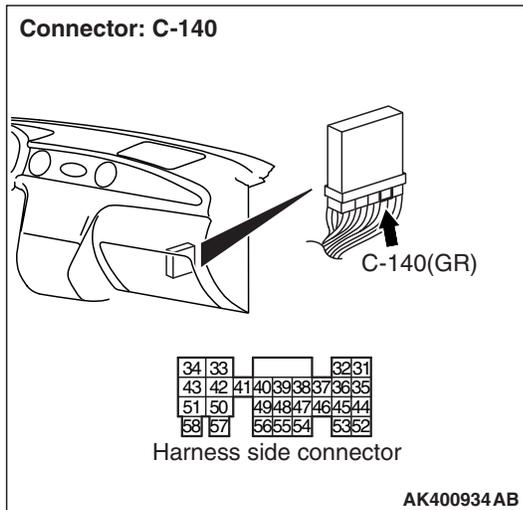
Q: Is the check result normal?

YES : Check and repair harness between B-111 (terminal No. 3) ignition coil connector and C-140 (terminal No. 35) engine-ECU connector, also between B-110 (terminal No. 3) ignition coil connector and C-140 (terminal No. 31) engine-ECU connector.

- Check output line for open circuit.

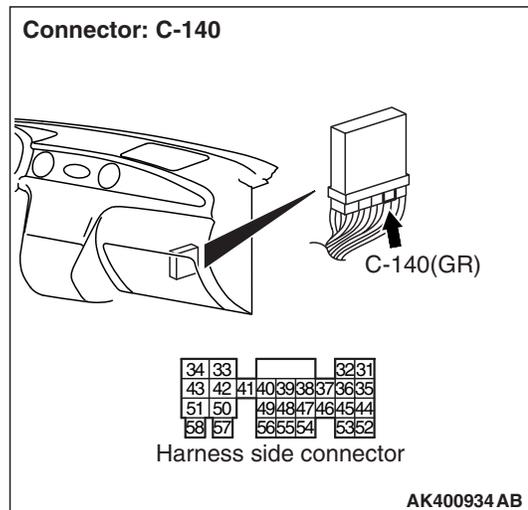
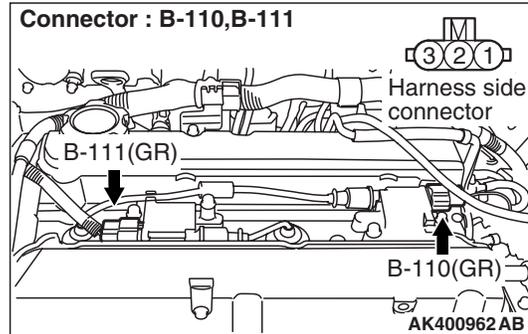
NO : Repair or replace.

STEP 10. Connector check: C-140 engine-ECU connector



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

STEP 11. Check harness between B-111 (terminal No. 3) ignition coil connector and C-140 (terminal No. 35) engine-ECU connector, also between B-110 (terminal No. 3) ignition coil connector and C-140 (terminal No. 31) engine-ECU connector.



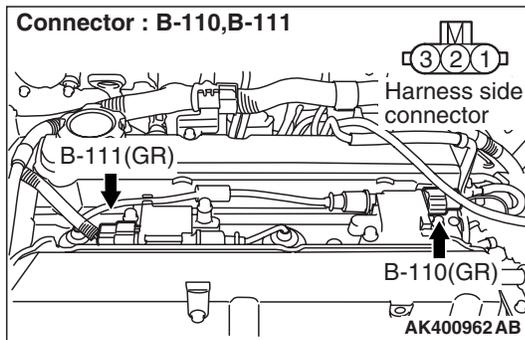
- Check output line for short circuit.

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

STEP 12. Check the trouble symptoms.

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

STEP 13. Perform resistance measurement at B-111 and B-110 ignition coil connectors.



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

OK: Continuity (2Ω or less)

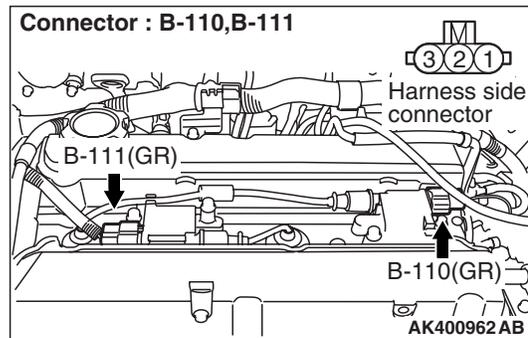
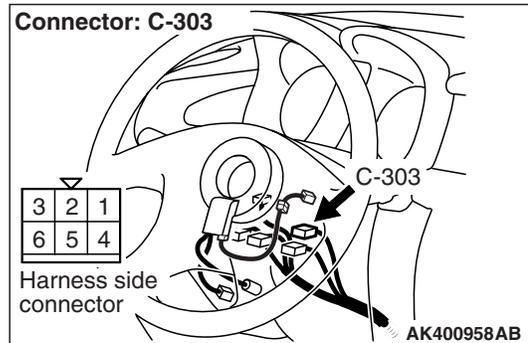
Q: Is the check result normal?

YES : Go to Step 14 .

NO : Check and repair harness between B-111 (terminal No. 2) ignition coil connector and body earth, also between B-110 (terminal No. 2) ignition coil connector and body earth.

- Check earthing line for open circuit and damage.

STEP 14. Check harness between C-303 (terminal No. 2) ignition switch connector and B-111 (terminal No. 1) ignition coil connector, also between C-303 (terminal No. 2) ignition switch connector and B-110 (terminal No. 1) ignition coil connector.



NOTE: Before checking harness, check intermediate connectors A-14, C-116, C-203 and C-205, and repair if necessary.

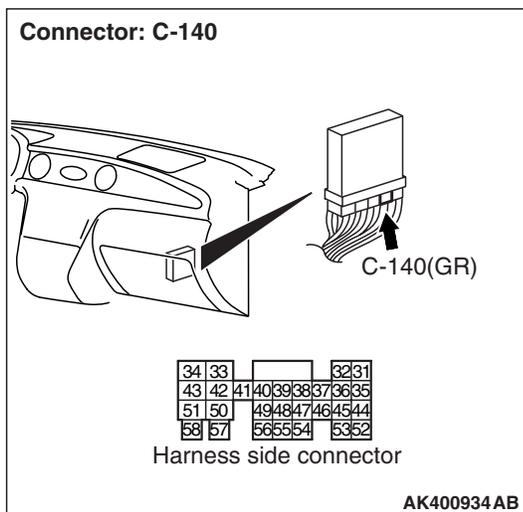
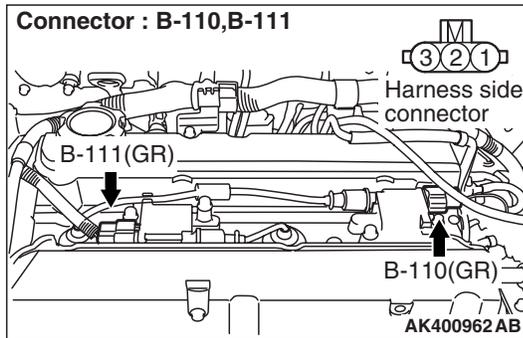
- Check power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 15 .

NO : Repair.

STEP 15. Check harness between B-111 (terminal No. 3) ignition coil connector and C-140 (terminal No. 35) engine-ECU connector, also between B-110 (terminal No. 3) ignition coil connector and C-140 (terminal No. 31) engine-ECU connector.



- Check output line for damage.

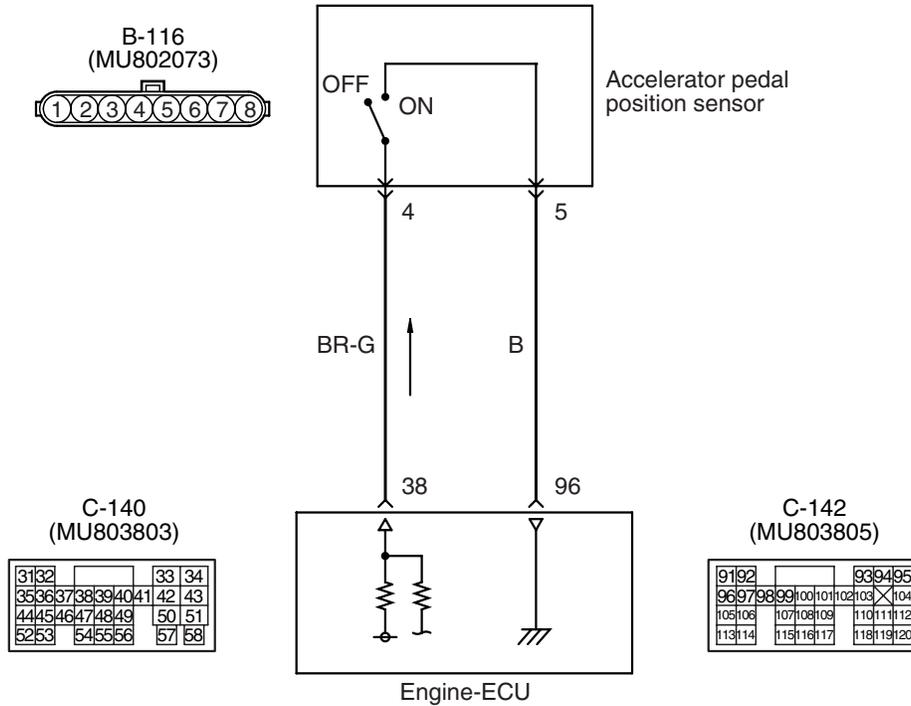
Q: Is the check result normal?

YES : Go to Step 12 .

NO : Repair.

Inspection Procedure 31: Accelerator Pedal Position Switch Circuit System

Accelerator pedal position switch circuit



Wire colour code

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

AK304332AC

OPERATION

- A power voltage of 5 V is applied to the accelerator pedal position switch output terminal (terminal No. 4) from the engine-ECU (terminal No. 38).
- The power voltage is earthed to the engine-ECU (terminal No. 92) from the Accelerator pedal position switch (terminal No. 5).

COMMENT ON TROUBLE SYMPTOM

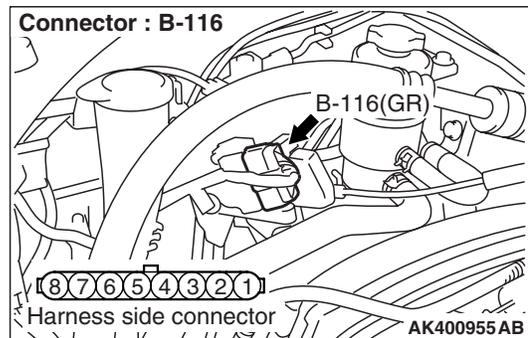
- Accelerator pedal position switch turns OFF when amount of travel of the accelerator pedal exceeds the prescribed value.
- Engine-ECU uses the signal that is input by the accelerator pedal position switch for determining the abnormal characteristics of the accelerator pedal position sensor (sub).

PROBABLE CAUSE

- Failed accelerator pedal position switch.
- Open/short circuit in accelerator pedal position switch circuit or loose connector contact.
- Failed engine-ECU

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 or replace.

STEP 2. Check accelerator pedal position switch itself

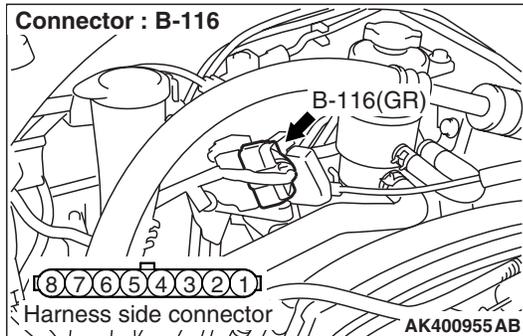
- Check accelerator pedal position switch itself (Refer to P.13B-397).

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.

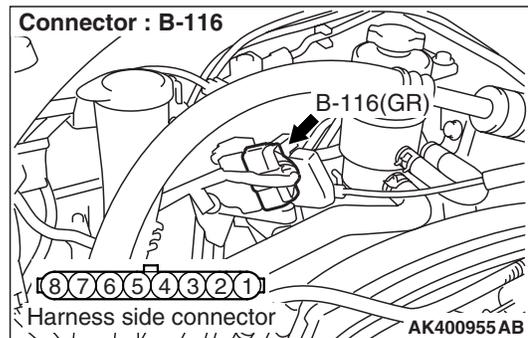
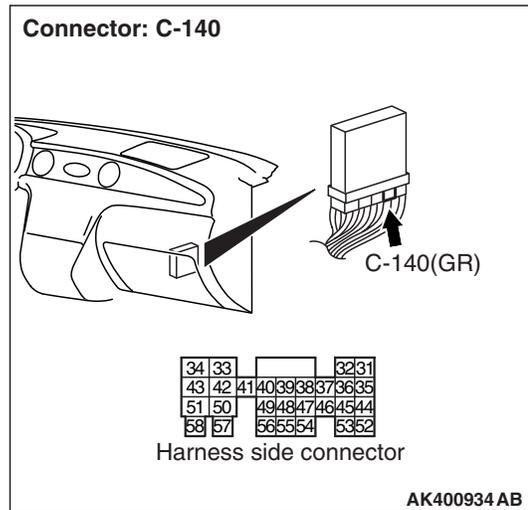
OK: 4.9 – 5.1 V

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 connector.



- Measure engine-ECU terminal voltage.
- Disconnect B-116 accelerator pedal position sensor
- Ignition switch: ON
- Voltage between terminal No. 38 and earth.

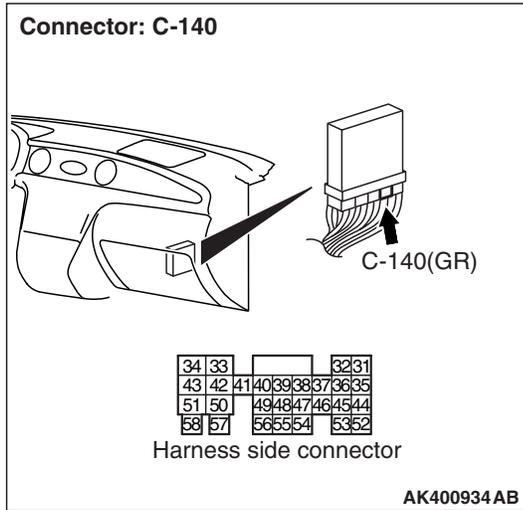
OK: 4.9 – 5.1 V

Q: Is the check result normal?

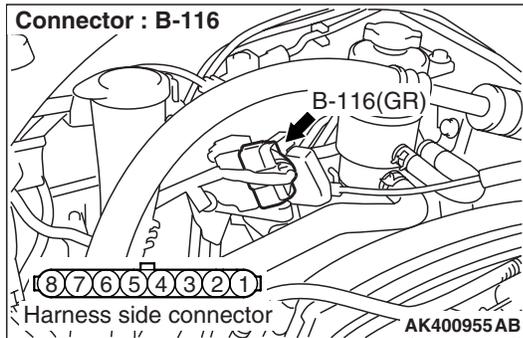
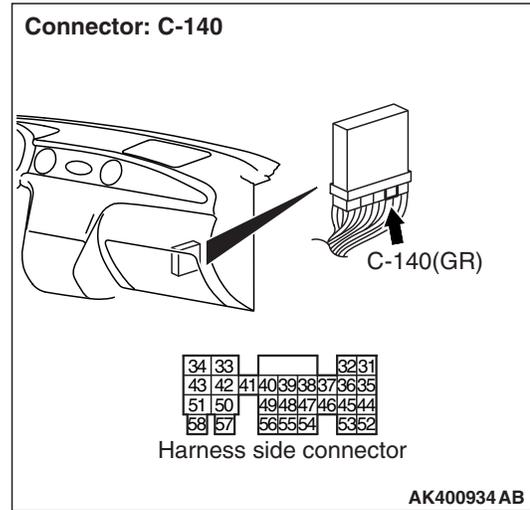
YES : Go to Step 5 .

NO : Go to Step 6 .

STEP 5. Connector check: C-140 engine-ECU connector



STEP 6. Connector check: C-140 engine-ECU connector



Q: Is the check result normal?

YES : Go to Step 7 .

NO : Repair or replace.

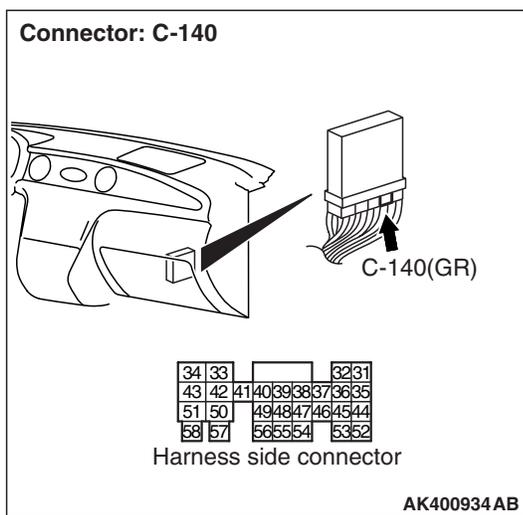
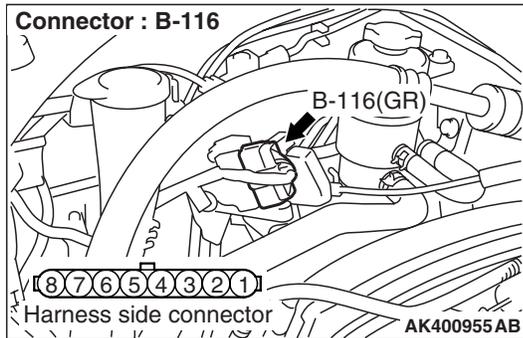
Q: Is the check result normal?

YES : Check and repair harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU connector.

- Check output line for open circuit.

NO : Repair or replace.

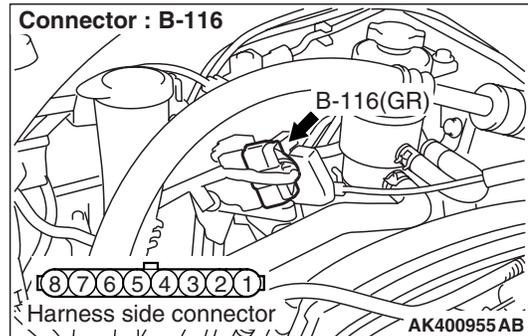
STEP 7. Check harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU connector.



- Check output line for short circuit.

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

STEP 8. Perform resistance measurement at B-116 accelerator pedal position sensor connector.

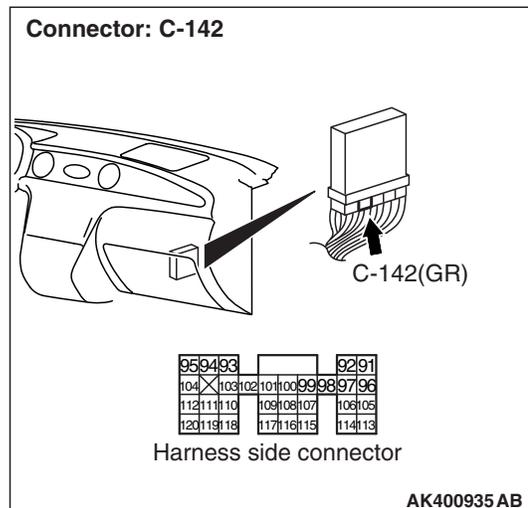


- Disconnect connector and measure at harness side.
- Resistance between terminal No. 5 and earth.
OK: Continuity (2 Ω or less)

Q: Is the check result normal?
YES : Go to Step 11 .
NO : Go to Step 9 .

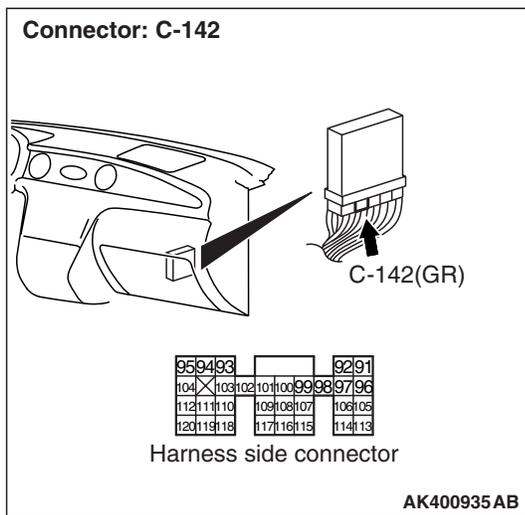
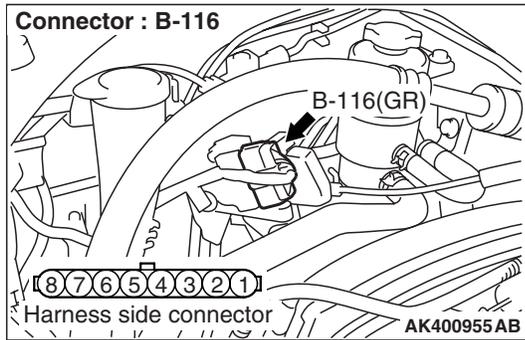
STEP 9. Connector check: C-142 engine-ECU connector

Q: Is the check result normal?



YES : Go to Step 10 .
NO : Repair or replace.

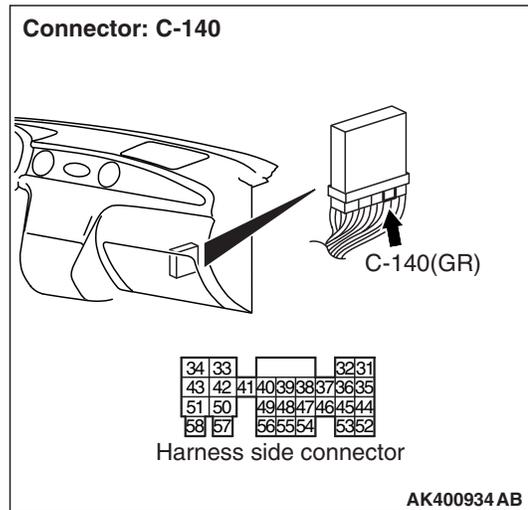
STEP 10. Check harness between B-116 (terminal No. 5) accelerator pedal position sensor connector and C-142 (terminal No. 96) engine-ECU connector.



- Check earthing line for open circuit and damage.

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

STEP 11. Perform voltage measurement at C-140 engine-ECU connector



- Measure engine-ECU terminal voltage.
- Ignition switch: ON
- Voltage between terminal No. 38 and earth.

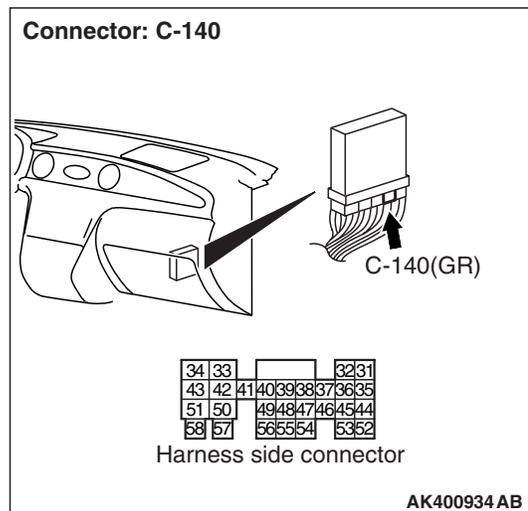
OK:

0 – 1 V (Release the accelerator pedal)

4 V or more (Depress the accelerator pedal)

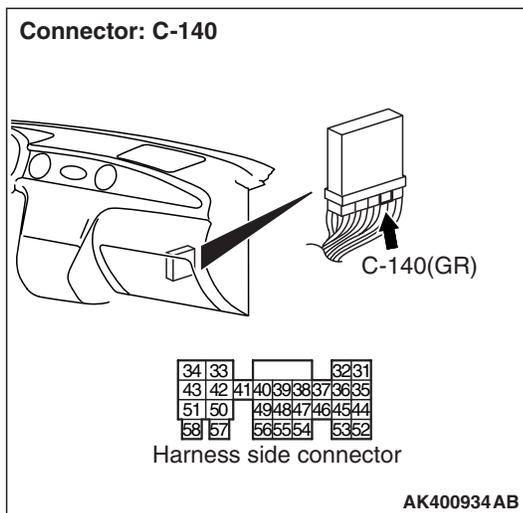
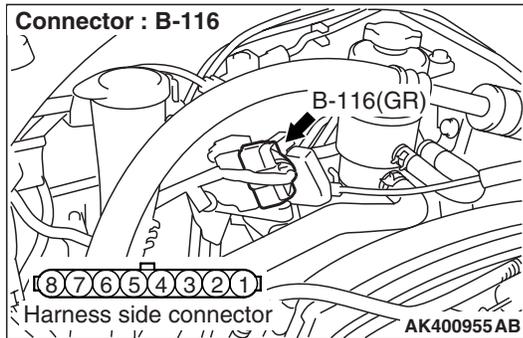
Q: Is the check result normal?
YES : Replace engine-ECU.
NO : Go to Step 12 .

STEP 12. Connector check: C-140 engine-ECU connector



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

STEP 13. Check harness between B-116 (terminal No. 4) accelerator pedal position sensor connector and C-140 (terminal No. 38) engine-ECU connector.

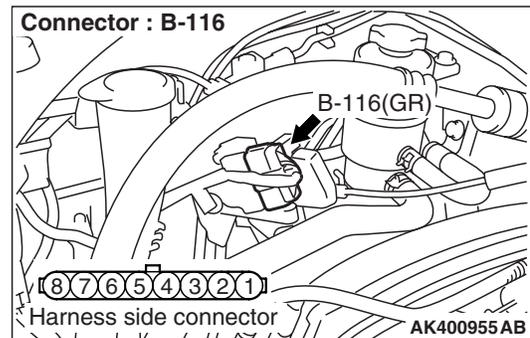
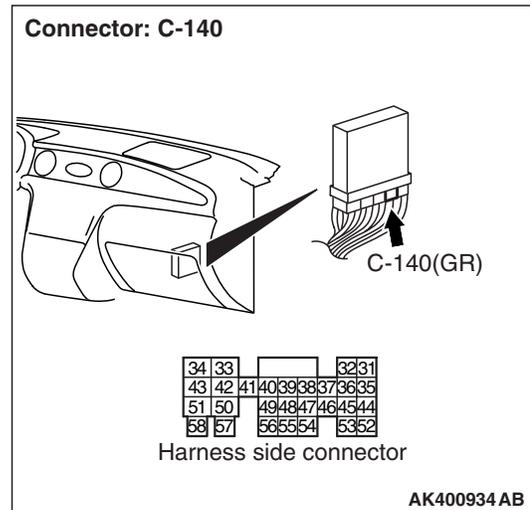


- Check output line for damage.

Q: Is the check result normal?

YES : Go to Step 14 .
NO : Repair.

STEP 14. Connector check: C-142 engine-ECU 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 connector.

- Check earthing line for damage.

NO : Repair or replace.

Data List Reference Table

M1131152001471

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page	
11	Oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	200 mV or less	Code No. P0130	P.13B-72
			At excessive acceleration	600 – 1,000 mV		
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU.	Idle operation	400 mV or less		
			2,500 r/min	⇔ 600 – 1,000 mV (altered)		
12	Air flow sensor *1	<ul style="list-style-type: none"> • Engine coolant temperature: 85 – 95°C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral 	Idle operation	18 – 44 Hz	–	–
			2,500 r/min	40 – 100 Hz		
			Acceleration	According to acceleration, frequency is amplified.		
13	Intake air temperature sensor	Ignition switch: "ON" or engine running	Intake air temperature: –20°C	–20°C	Code No. P0110	P.13B-47
			Intake air temperature: 0°C	0°C		
			Intake air temperature: 20°C	20°C		
			Intake air temperature: 40°C	40°C		
			Intake air temperature: 80°C	80°C		
14	Throttle position sensor (sub) *4	<ul style="list-style-type: none"> • Remove the intake air hose at the throttle body • Disconnect the throttle position sensor, and the connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. • Ignition switch: ON 	Fully close the throttle valve with your finger	2,200 – 2,800 mV	Code No. P0222, P0223	P.13B-116 P.13B-120
			Fully open the throttle valve with your finger	4,600 mV or more		

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page	
16	Power supply voltage	Ignition switch: "ON"	System voltage	Procedure No. 23	P.13B-308	
18	Cranking signal (ignition switch-ST)	Ignition switch: "ON"	Engine: Stopped	OFF	Procedure No. 23	P.13B-308
			Engine: Cranking	ON		
21	Engine coolant temperature sensor	Ignition switch: "ON" or engine running	Coolant temperature: -20°C	-20°C	Code No. P0115	P.13B-54
			Coolant temperature: 0°C	0°C		
			Coolant temperature: 20°C	20°C		
			Coolant temperature: 40°C	40°C		
			Coolant temperature: 80°C	80°C		
22	Crank angle sensor	<ul style="list-style-type: none"> • Engine: Cranking • Tachometer: Connected 	Compare engine speed on tachometer with the value displayed on M.U.T.-II/III	Matched	Code No. P0335	P.13B-145
			Engine: Idle operation	Coolant temperature: -20°C		
		Coolant temperature: 0°C		1,300 – 1,500 r/min		
		Coolant temperature: 20°C		1,300 – 1,500 r/min		
		Coolant temperature: 40°C		1,150 – 1,350 r/min		
		Coolant temperature: 80°C	750 – 950 r/min			
25	Barometric pressure sensor	Ignition switch: "ON"	Altitude: 0m	101 kPa	Code No. P0105	P.13B-38
			Altitude: 600m	95 kPa		
			Altitude: 1,200m	88 kPa		
			Altitude: 1,800m	81 kPa		
26	Accelerator pedal position switch	Ignition switch: "ON"	Release the accelerator pedal	ON	Procedure No. 31	P.13B-362
			Depress the accelerator pedal	OFF		
27	Power steering fluid pressure switch	Engine: Idle operation	Steering wheel: Not operated	OFF	Code No. P0551	P.13B-178
			Steering wheel: Operated	ON		

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page		
28	A/C switch	Engine: Idle	AC switch: OFF	OFF	Procedure No. 26	P.13B-331	
			AC switch: ON	A/C compressor is not driven			OFF
				A/C compressor is driven			ON
34	Air flow sensor reset signal	Engine: After engine warm-up	Idle operation	ON	Code No. P0100	P.13B-28	
			3,000 r/min	OFF			
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 	Idle operation	15 – 35%	–	–	
			2,500 r/min	15 – 35%			
			Excessive acceleration	According to acceleration, volumetric efficiency is increased.			
41	Injectors *2	Engine: Cranking	Coolant temperature: 0°C (all cylinders in simultaneous injecting operation)	22 – 34 ms	–	–	
			Coolant temperature: 20°C	5 – 11 ms			
			Coolant temperature: 80°C	2.0 – 4.0 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 	Idle operation	1.5 – 2.7 ms			
			2,500 r/min	1.2 – 2.4 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	0 – 13°BTDC	Procedure No. 30	P.13B-355	
			2,500 r/min	20 – 40°BTDC			

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page		
49	A/C relay	Engine: After warm-up, idle operation after warm-up	A/C switch: OFF	OFF	Procedure No. 27	P.13B-335	
			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.13B-84	
77	Accelerator pedal position sensor (sub)	Ignition switch: ON	Release the accelerator pedal	335 – 935 mV	Code No. P2126, P2127, P2128	P.13B-229 P.13B-232 P.13B-236	
			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.13B-219 P.13B-222 P.13B-226	
			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.13B-61 P.13B-65	
			Fully open the throttle valve with your finger	4,000 mV or more			
		No load	520 – 620 mV				

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page	
9A	Throttle position sensor (main) mid opening learning value	Ignition switch: ON	600 – 1,200 mV	Code No. P0122, P0123	P.13B-61 P.13B-65	
13 *5	Intake air temperature sensor	Ignition switch: "ON" or engine running	Intake air temperature: –20°C	–20°C	Code No. P0110	P.13B-47
			Intake air temperature: 0°C	0°C		
			Intake air temperature: 20°C	20°C		
			Intake air temperature: 40°C	40°C		
			Intake air temperature: 80°C	80° C		
21 *5	Engine coolant temperature sensor	Ignition switch: "ON" or engine running	Coolant temperature: –20°C	–20°C	Code No. P0115	P.13B-54
			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		
		Coolant temperature: 0°C		1,300 – 1,500 r/min		
		Coolant temperature: 20°C		1,300 – 1,500 r/min		
		Coolant temperature: 40°C		1,150 – 1,350 r/min		
		Coolant temperature: 80°C		750 – 950 r/min		
24 *5	Vehicle speed sensor	Drive 40 km/h	Approximately 40 km/h	–	–	

Item No.	Inspection item	Inspection condition	Normal condition	Inspection procedure No.	Reference page	
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	0 – 13 deg	–	–
			2,500 r/min	20 – 40 deg		
81 *5	Long-term fuel compensation on 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.13B-96	
82 *5	Shot-term fuel compensation on cylinder 1, 4	Engine: After warm-up, 2,500 r/min without any load (during closed loop)	–20 to 20%	Code No. P0170	P.13B-96	
87 *5	Calculation load value	Engine: After warm-up	Idle operation	13 – 33%	–	–
			2,500 r/min	10 – 30%		
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.13B-61 P.13B-65
			Fully open the throttle valve with your finger	88% or more		

Item No.	Inspection item	Inspection condition		Normal condition	Inspection procedure No.	Reference page
A1 *5	Oxygen sensor (front)	Engine: After warm-up (leaner by deceleration, richer by acceleration)	Excessive deceleration from 4,000 r/min	0.2 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0130	P.13B-72
		Engine: After warm-up (using oxygen sensor, check air-fuel ratio as well as control status by engine-ECU)	Idle operation 2,500 r/min	0.4 V or less ⇔ 0.6 – 1 V (altered)		
A2 *5	Oxygen sensor (rear)	Engine: After warm-up	At excessive acceleration	0 V or less ⇔ 0.6 – 1 V (altered)	Code No. P0136	P.13B-84
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 approximately 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 approximately 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

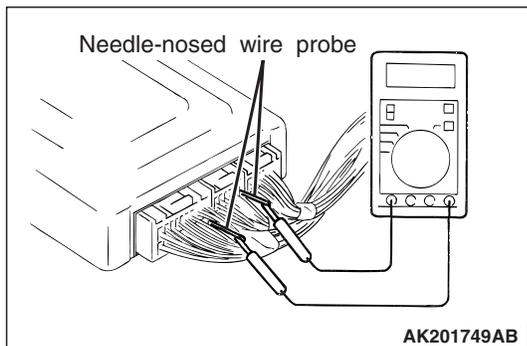
M1131152500912

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.13B-100
02		Cut off No. 2 injector				Code No. P0202	P.13B-104
03		Cut off No. 3 injector				Code No. P0203	P.13B-108
04		Cut off No. 4 injector				Code No. P0204	P.13B-112
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.13B-316
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.13B-168
09	Fuel pressure control solenoid valve	Switch solenoid valve from OFF to ON	Ignition switch: "ON"		When the valve is actuated, operating noise is audible	Code No. P0090	P.13B-22
10	EGR control solenoid valve	Switch solenoid valve from OFF to ON	Ignition switch: "ON"		When the valve is actuated, operating noise is audible.	Code No. P0403	P.13B-162
12	Waste gate solenoid valve	Switch solenoid valve from OFF to ON	Ignition switch: "ON"		When the valve is actuated, operating noise is audible	Code No. P0243	P.13B-123
17	Basic ignition timing	Switch engine-ECU 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.13B-304
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.13B-207 P.13B-210 P.13B-213 P.13B-216

CHECK AT THE ECU TERMINALS

M1131153500421

TERMINAL VOLTAGE CHECK CHART



NOTE:

1. Make the voltage measurement with the engine-ECU connector connected.
2. You may find it convenient to pull out the engine-ECU to make it easier to reach the connector terminals.
3. The checks can be carried out off the order given in the chart.

CAUTION

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU or all of them. Be careful to prevent this!

1. Connect a needle-nosed wire probe to a voltmeter probe.
2. Insert the needle-nosed wire probe into each of the engine-ECU connector terminals from the wire side, and measure the voltage while referring to the check chart.
3. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

Engine-ECU Connector Terminal Arrangement

Engine-ECU Connector

C-139	C-140	C-141	C-142	C-138
1	32	33	92	122
2	31	34	91	121
3	4	35	90	120
4	13	36	89	119
5	12	37	88	118
6	11	38	87	117
7	10	39	86	116
8	9	40	85	115
9	8	41	84	114
10	7	67	83	113
11	6	68	82	112
12	5	69	81	111
13	4	70	80	110
14	3	71	79	109
15	2	72	78	108
16	1	73	77	107
17		74	76	106
18		62	75	105
19		61	74	104
20		60	73	103
21		59	72	102
22		58	71	101
23		57	70	100
24		56	69	99
25		55	68	98
26		54	67	97
27		53	66	96
28		52	65	95
29		51	64	94
30		50	63	93
31		49	62	92
32		48	61	91
33		47	60	90
34		46	59	89
35		45	58	88
36		44	57	87
37		43	56	86
38		42	55	85
39		41	54	84
40		40	53	83
41		39	52	82
42		38	51	81
43		37	50	80
44		36	49	79
45		35	48	78
46		34	47	77
47		33	46	76
48		32	45	75
49		31	44	74
50		30	43	73
51		29	42	72
52		28	41	71
53		27	40	70
54		26	39	69
55		25	38	68
56		24	37	67
57		23	36	66
58		22	35	65
59		21	34	64
60		20	33	63
61		19	32	62
62		18	31	61
63		17	30	60
64		16	29	59
65		15	28	58
66		14	27	57
67		13	26	56
68		12	25	55
69		11	24	54
70		10	23	53
71		9	22	52
72		8	21	51
73		7	20	50
74		6	19	49
75		5	18	48
76		4	17	47
77		3	16	46
78		2	15	45
79		1	14	44
80			13	43
81			12	42
82			11	41
83			10	40
84			9	39
85			8	38
86			7	37
87			6	36
88			5	35
89			4	34
90			3	33
91			2	32
92			1	31
93				30
94				29
95				28
96				27
97				26
98				25
99				24
100				23
101				22
102				21
103				20
104				19
105				18
106				17
107				16
108				15
109				14
110				13
111				12
112				11
113				10
114				9
115				8
116				7
117				6
118				5
119				4
120				3
121				2
122				1
123				
124				

AK303309AE

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	Fuel pressure control solenoid valve	Ignition switch: ON	System voltage
		Engine: Cranking → Idle operation (within approximately 2 minutes or less)	1V or less → System voltage
7	Engine warning lamp	Ignition switch: "LOCK" (OFF) → "ON"	1 V or less → System voltage (After several seconds have elapsed)
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	Oxygen sensor heater (front)	Engine: Idling after warming up	9 – 11 V
		Engine: 5,000 r/min	System voltage

Terminal No.	Check item	Check condition (Engine condition)	Normal condition	
15	Throttle valve control servo relay	Ignition switch: "ON"	System voltage	
		Running at 3,500 r/min while engine is warming up after having been started.	1 V or less	
16	Fuel pump relay	Ignition switch: ON	System voltage	
		Engine: Idle speed	1 V or less	
17	Fan controller	Radiator and condenser fan is not operating	0 – 0.3 V*	
		Radiator and condenser fan is operating	0.7 V* or more	
18	Oxygen sensor heater (rear)	Engine: Idling after warming up	1 V or less	
		Engine: Racing	System voltage	
20	EGR control solenoid valve	Ignition switch: "ON"	System voltage	
		While engine is idling, suddenly depress the accelerator pedal	From system voltage, momentarily drops.	
23	Purge control solenoid valve	Ignition switch: "ON"	Decreases Voltage	
		Running at 3,500 r/min while engine is warming up after having been started.	1 V or less	
31	Ignition coil – No. 1, No. 4	Engine r/min: 3,000 r/min	0.3 – 3.0 V*	
35	Ignition coil – No. 2, No. 3			
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	
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: Idle speed.	2.2 – 3.2V	
		Engine r/min: 2,500 r/min speed		

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
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	Vehicle speed sensor	<ul style="list-style-type: none"> Ignition switch: "ON" Move the vehicle forward slowly 	0 ↔ 5 V Changes repeatedly
84	Clutch oil pressure sensor	Ignition switch: "ON"	Release the clutch pedal 1.3V or less
			Depress the clutch pedal 1.9 V or more
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
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
100	Barometric pressure sensor	Ignition switch: "ON"	Altitude: 0m	3.8 – 4.2V
			Altitude: 600m	3.5 – 3.9V
			Altitude: 1,200m	3.3 – 3.7V
			Altitude: 1,800m	3.0 – 3.4V
106	Power supply voltage applied to throttle position sensor	Ignition switch: "ON"	4.5 – 5.5 V	
107	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	0.335 – 0.935 V
			Depress the accelerator pedal fully	4.0 V or more
108	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)	0 ⇔ 0.8 V (Changes repeatedly)	
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	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
126	Waste gate solenoid valve	Ignition switch: "ON"	System voltage	
		Engine: After warm-up, idle operation (When using premium gasoline)	1 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 connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU harness-side connector while referring to the check chart.

NOTE:

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

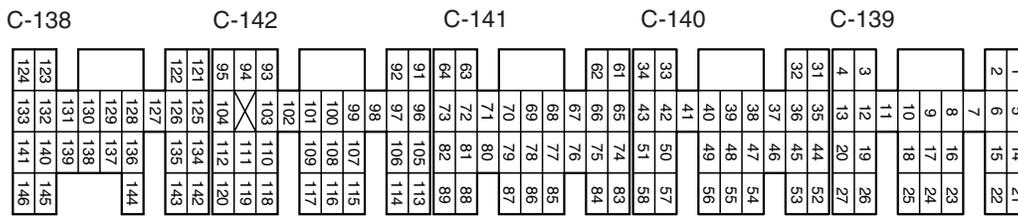
CAUTION

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

4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and the repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-ECU Harness Side Connector Terminal Arrangement

Engine-ECU Harness Side Connector



AK303310AE

Terminal No.	Inspection item	Normal condition (Check condition)
1 – 34	No. 1 injector	13 – 16 Ω (At 20°C)
5 – 34	No. 2 injector	
14 – 34	No. 3 injector	
21 – 34	No. 4 injector	
3 – 34	Fuel pressure control solenoid valve	28 – 36 Ω (at 20°C)
10 – 34	Oxygen sensor heater (front)	4.5 – 8.0 Ω (at 20°C)
18 – 34	Oxygen sensor heater (rear)	11 – 18 Ω (at 20°C)
20 – 34	EGR control solenoid valve	29 – 35Ω (at 20°C)
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		

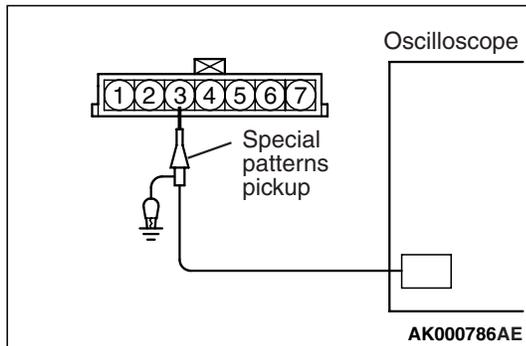
Terminal No.	Inspection item	Normal condition (Check condition)
34 – 126	Waste gate solenoid valve	29 – 35 Ω (at 20°C)
96 – 98	Engine coolant temperature sensor	14 – 17 k Ω (When coolant temperature is –20°C)
		5.1 – 6.5 k Ω (When coolant temperature is 0°C)
		2.1 – 2.7 k Ω (When coolant temperature 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)
133 – 141	Throttle actuator control motor	0.56 – 0.76 k Ω (When intake air temperature is 60°C)
		0.30 – 0.42 k Ω (When intake air temperature is 80°C)
133 – 141	Throttle actuator control motor	0.3 – 80 Ω (at 20°C)

INSPECTION PROCEDURE USING OSCILLOSCOPE

M1131154501030

The output signals of the sensors and the conditions of the actuation signals of the actuators can be inspected visually by observing the waveforms on the oscilloscope.

AIR FLOW SENSOR (AFS) Measurement Method



1. Disconnect the air flow sensor connector, and connect the special tool test harness (MB991709) in between (All terminals should be connected).
2. Connect the oscilloscope special patterns pickup to air flow sensor connector terminal No. 3.

Alternate Method (Test harness not available)

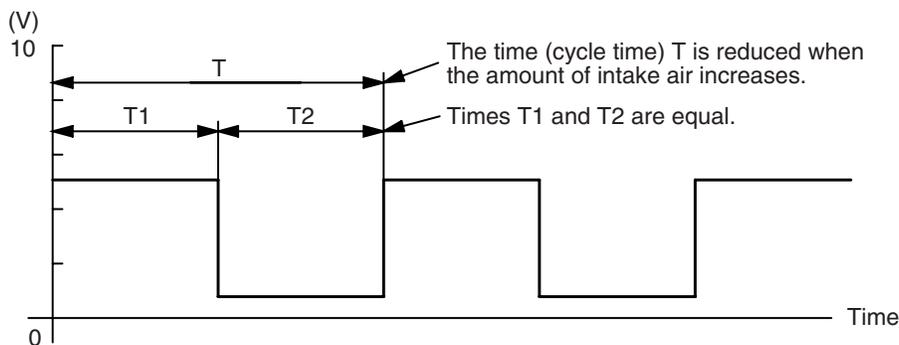
1. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 63.

Standard Wave Pattern

Observation conditions

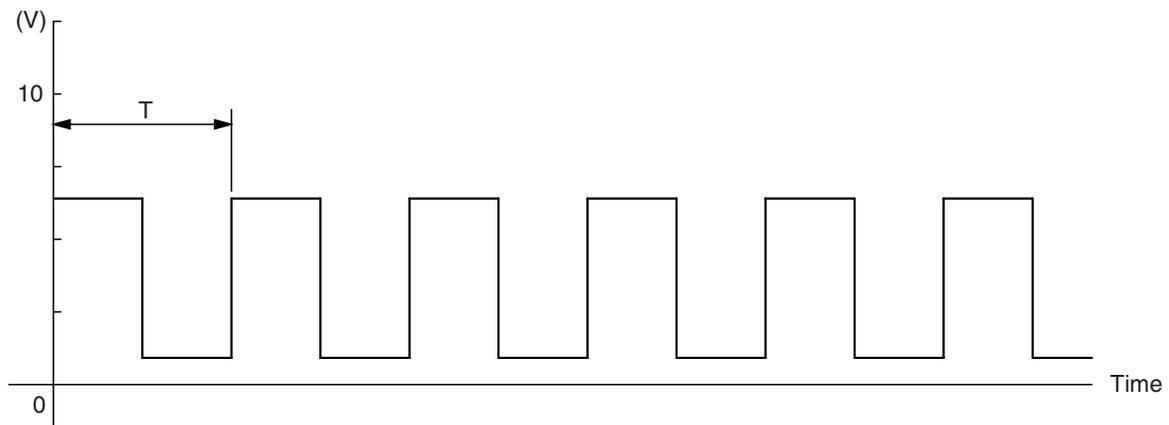
Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine speed	Idle

Standard wave pattern



AK202334AC

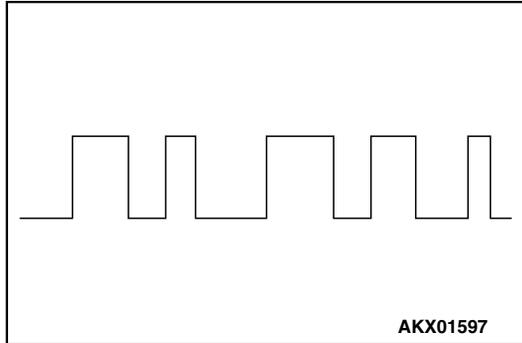
Observation conditions (from conditions above engine is increased by racing.)



AK202335AB

Wave Pattern Observation Points

Check that cycle time T becomes shorter and the frequency increases when the engine speed is increased.

Examples of Abnormal Wave Patterns

- Example 1

Cause of problem

Sensor interface malfunction

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.

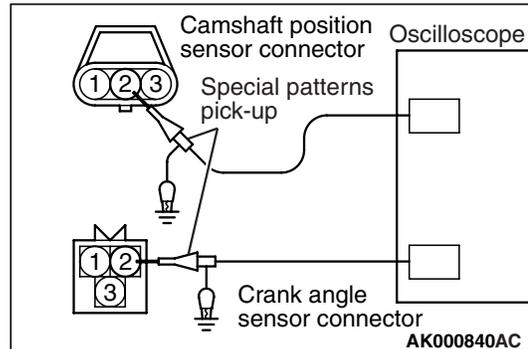
- Example 2

Cause of problem

Damaged rectifier or vortex generation column

Wave pattern characteristics

Unstable wave pattern with non-uniform frequency. However, when an ignition leak occurs during acceleration, the wave pattern will be distorted temporarily, even if the air flow sensor is normal.

CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR**Measurement Method**

1. Disconnect the camshaft position sensor connector and connect the special tool test harness (MB991709) in between (All terminals should be connected).
2. Connect the oscilloscope special pattern pickup to camshaft position sensor terminal No. 2.
3. Disconnect the crank angle sensor connector and connect the special tool test harness (MD998478) in between.
4. Connect the oscilloscope special patterns pickup to crank angle sensor terminal No. 2.

Alternate Method (Test harness not available)

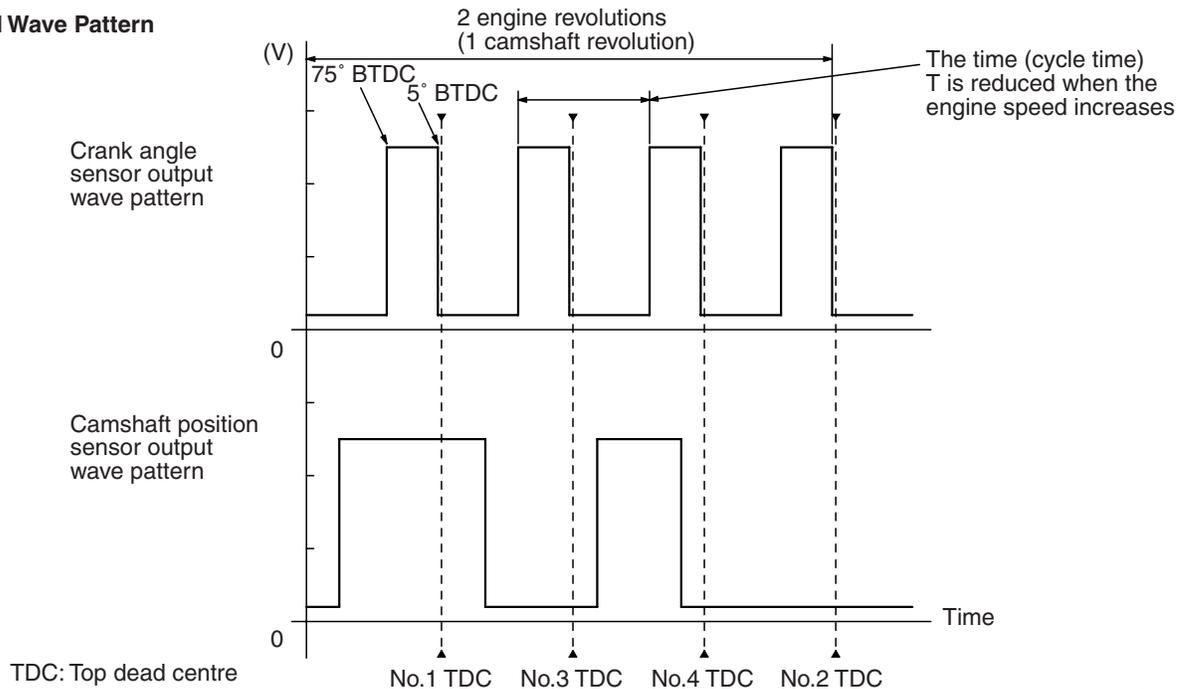
1. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 71 (When checking the camshaft position sensor signal wave pattern).
2. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 70 (When checking the crank angle sensor signal wave pattern).

Standard Wave Pattern

Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine speed	Idle

Standard Wave Pattern



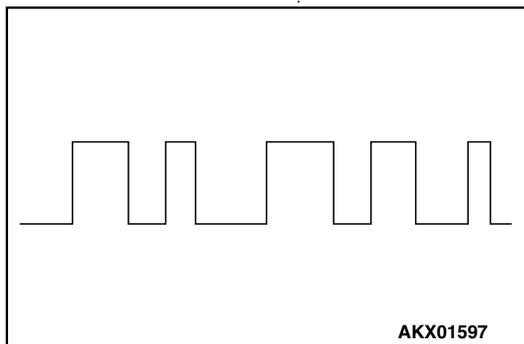
Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.

Wave pattern characteristics

Rectangular wave pattern is output even when the engine is not started.

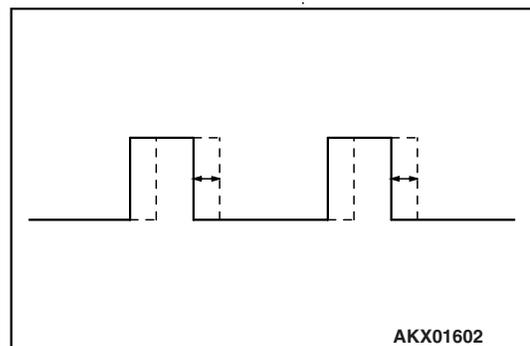
Examples of Abnormal Wave Patterns



Example 1

Cause of problem

Sensor interface malfunction



Example 2

Cause of problem

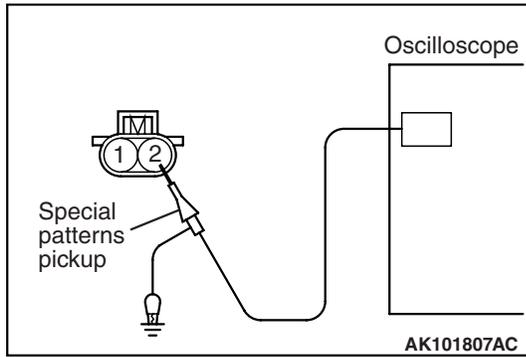
Loose timing belt
Abnormality in sensor disk

Wave pattern characteristics

Wave pattern is displaced to the left or right.

INJECTOR

Measurement Method



1. Disconnect the injector connector, and then connect the special tool test harness (MB991348) in between (All terminals should be connected).
2. Connect the oscilloscope special patterns pickup to terminal No. 2 of the injector connector.

Alternate Method (Test harness not available)

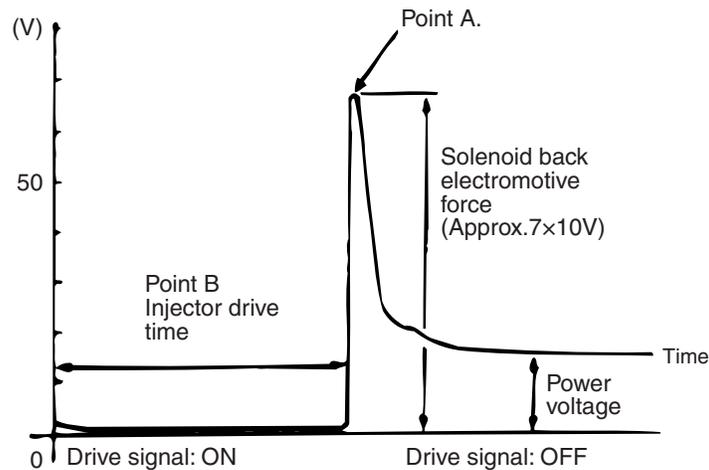
1. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 1 (When checking the No. 1 cylinder).
2. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 5 (When checking the No. 2 cylinder).
3. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 14 (When checking the No. 3 cylinder).
4. Connect the oscilloscope special patterns pickup to engine-ECU 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 speed	Idle

Standard wave pattern

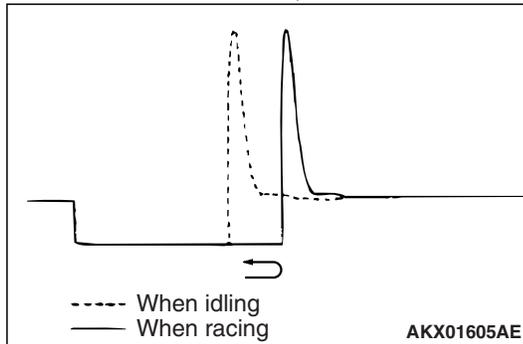


Wave Pattern Observation Points

Point A: Height of solenoid back electromotive force

Contrast with standard wave pattern	Probable cause
Solenoid coil back electromotive force is low or does not appear at all.	Short in the injector solenoid

Point B: Injector drive time

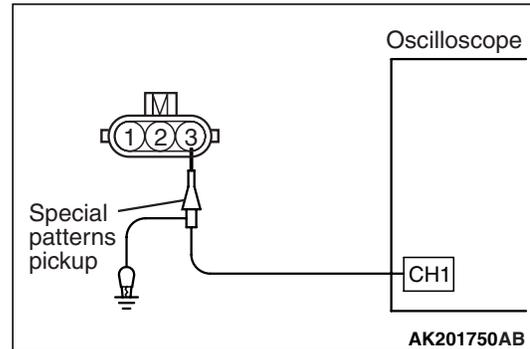


The injector drive time will be synchronized with the M.U.T.-II/III tester display.

- When the engine is suddenly raced, the drive time will be greatly extended at first, but the drive time will soon match the engine speed.

IGNITION COIL AND POWER TRANSISTOR

Measurement Method



1. Disconnect the ignition coil connector, and connect the special tool test harness (MB991348) in between (All terminals should be connected).
2. Connect the oscilloscope special patterns pickup to terminal No. 3 of each ignition coil connector in turn.

Alternate Method (Test harness not available)

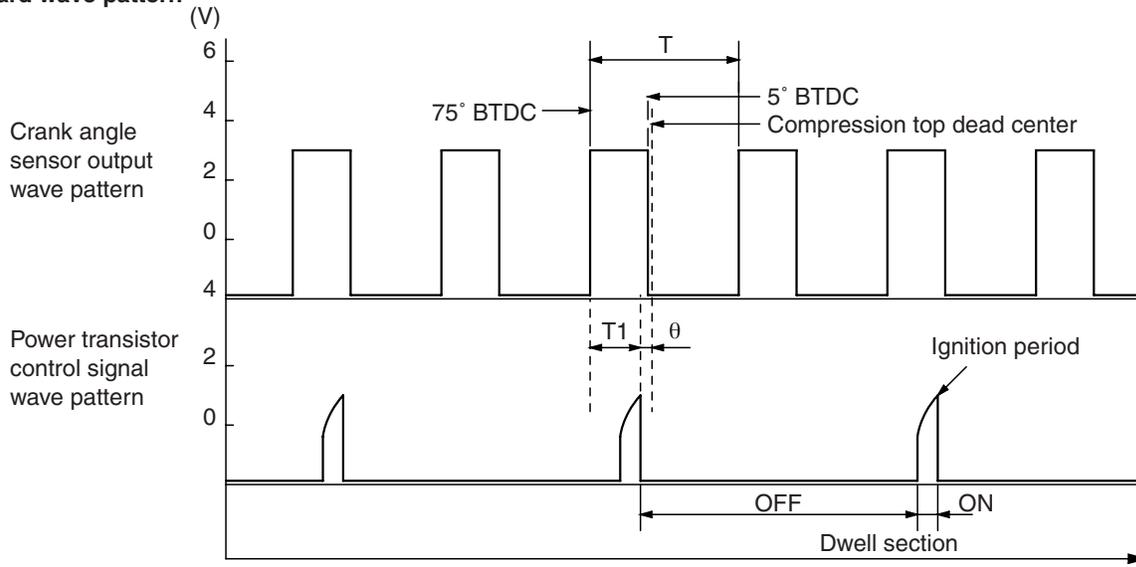
1. Connect the oscilloscope special patterns pickup to engine-ECU terminal No. 31 (No. 1 – No. 4), connection terminal No. 35 (No. 2 – No.3) respectively.

Standard Wave Pattern

Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min	Approximately 1,200 r/min

Standard wave pattern



T : Revolution time corresponding to a crank angle of 180°
 T1 : Time computed by the engine-ECU
 θ : Spark advance angle

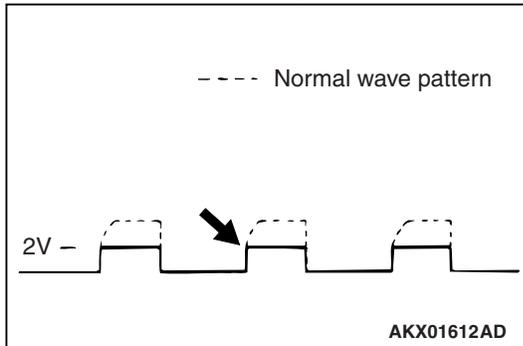
AK204435AC

Wave Pattern Observation Points

Point: Condition of wave pattern build-up section and maximum voltage (Refer to abnormal wave pattern examples 1 and 2).

Condition of wave pattern build-up section and maximum voltage	Probable cause
Rises from approximately 2 V to approximately 4.5 V at the top-right	Normal
2 V rectangular wave	Open-circuit in ignition primary circuit
Rectangular wave at power voltage	Power transistor malfunction

Examples of Abnormal Wave Patterns



Example 1

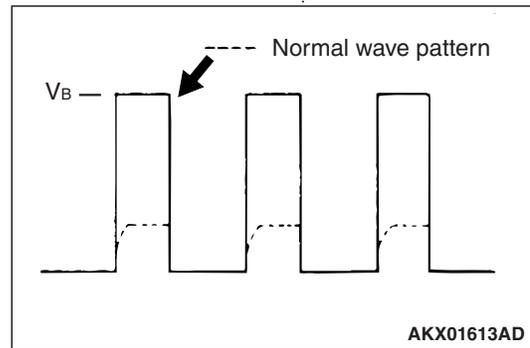
Wave pattern during engine cranking

Cause of problem

Open-circuit in ignition primary circuit

Wave pattern characteristics

Top-right part of the build-up section cannot be seen, and voltage value is approximately 2 V too low.



Example 2

Wave pattern during engine cranking

Cause of problem

Malfunction in power transistor

Wave pattern characteristics

Power voltage results when the power transistor is ON.

ON-VEHICLE SERVICE

THROTTLE BODY (THROTTLE VALVE
AREA) CLEANING

M1131001000804

1. Remove the air intake hose from the throttle body.
2. Remove the throttle body assembly.

CAUTION

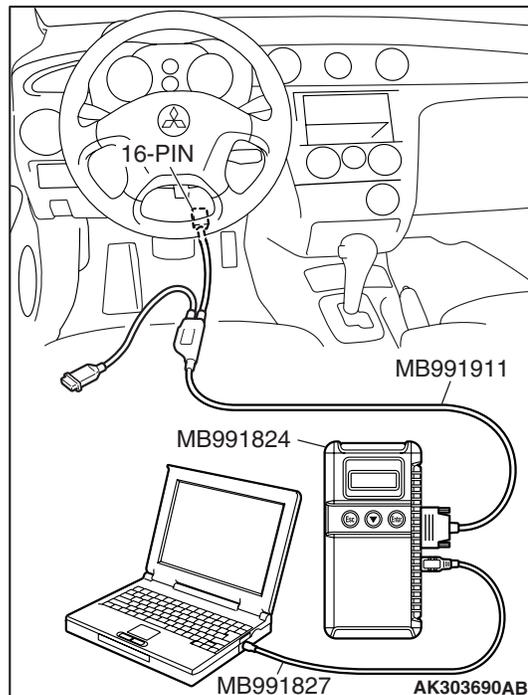
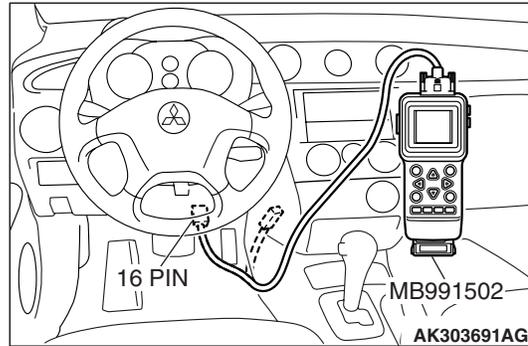
- Do not spray the cleaning fluid directly to the throttle valve.
 - Make sure the cleaning fluid does not enter the motor from the bypass line. Also make sure it does not enter the sensor through the shaft.
3. Spray cleaning fluid on a clean cloth.
 4. Wipe off the dirt around the throttle valve with the cloth sprayed with cleaning fluid.
 5. Install the throttle body assembly.
 6. Attach the air intake hose.

ACCELERATOR PEDAL POSITION
SWITCH AND ACCELERATOR PEDAL
POSITION SENSOR (APS) ADJUSTMENT

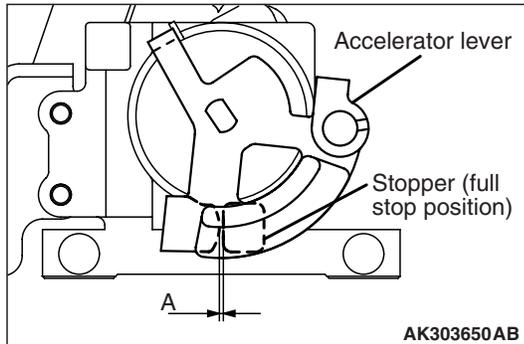
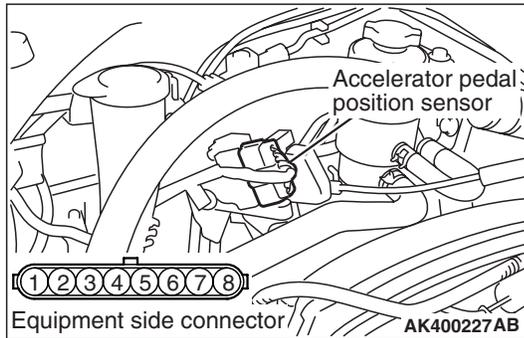
M1131053400052

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.

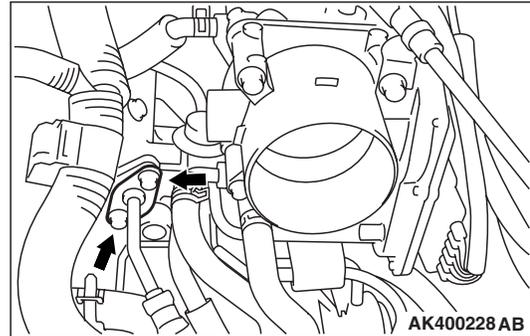
FUEL PRESSURE TEST

M1131001900959

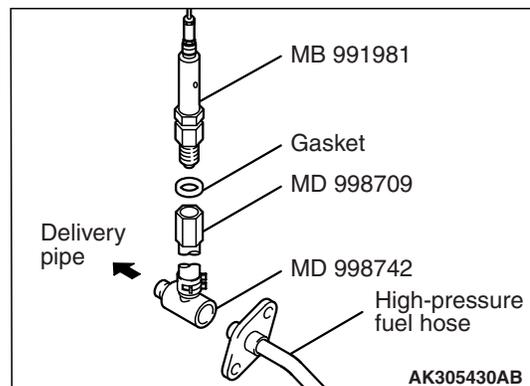
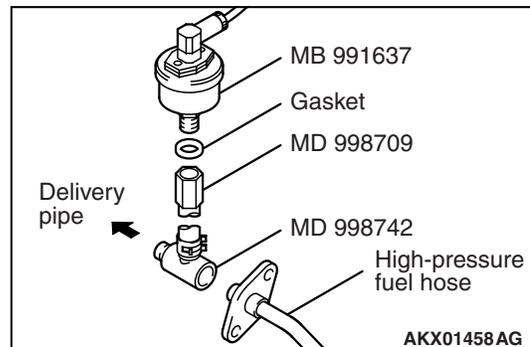
1. Release residual pressure from the fuel pipe line to prevent fuel gush out (Refer to P.13B-393).

⚠ 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.

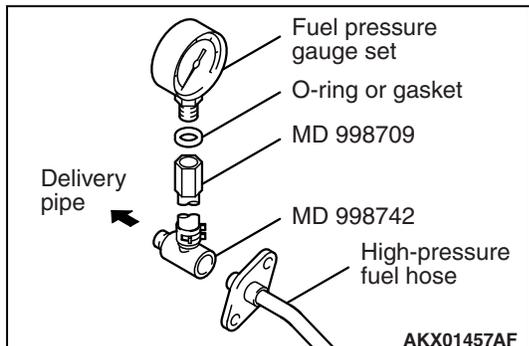


3. Assemble the fuel pressure measurement tools as follows.

<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.

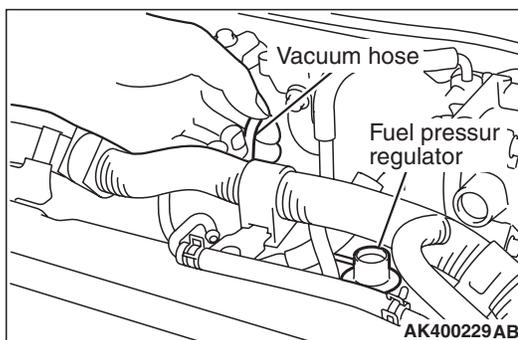
CAUTION

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 230 kPa



- 11. Disconnect the vacuum hose from the fuel pressure regulator and measure fuel pressure with the hose end closed by a finger.

Standard value: 289 – 309 kPa

- 12. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
- 13. Racing the engine repeatedly, hold the fuel return hose lightly with fingers to feel that fuel pressure is present in the return hose.
NOTE: If the fuel flow rate is low, there will be no fuel pressure in the return hose.
- 14. If any of fuel pressure measured in steps 10 to 13 is out of specification, troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
<ul style="list-style-type: none"> • Fuel pressure too low • Fuel pressure drops after racing • No fuel pressure in fuel return hose 	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel regulator valve seating or settled spring	Replace fuel pressure regulator
	Low fuel pump delivery pressure	Replace fuel pump
Fuel pressure too high	Binding valve in fuel pressure regulator	Replace fuel pressure regulator
	Clogged fuel return hose or pipe	Clean or replace hose or pipe
Same fuel pressure when vacuum hose is connected and when disconnected	Damaged vacuum hose or Clogged nipple	Replace vacuum hose or clean nipple

15. Stop the engine and check change of fuel pressure gauge reading. Normal if the reading does not drop within 2 minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
Fuel pressure drops gradually after engine is stopped	Leaky injector	Replace injector
	Leaky fuel regulator valve seat	Replace fuel pressure regulator
Fuel pressure drops sharply immediately after engine is stopped	Check valve in fuel pump is held open	Replace fuel pump

16. Release residual pressure from the fuel pipe line (Refer to P.13B-393).

⚠ CAUTION

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

17. Remove the fuel pressure gauge and special tool from the delivery pipe.

18. Replace the O-ring at the end of the fuel high pressure hose with a new one. Furthermore, apply engine oil to the new O-ring before replacement.

19. Fit the fuel high pressure hose over the delivery pipe and tighten the bolt to specified torque.

Tightening torque: 5.0 ± 1.0 N·m

20. Check for any fuel leaks by following the procedure in step 7.

21. Disconnect the M.U.T.-II/III.

FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE PRESSURIZED FUEL LINES)

M1131000900804

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

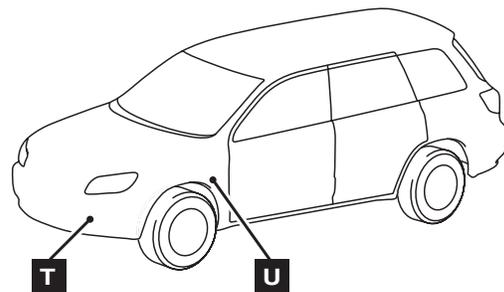
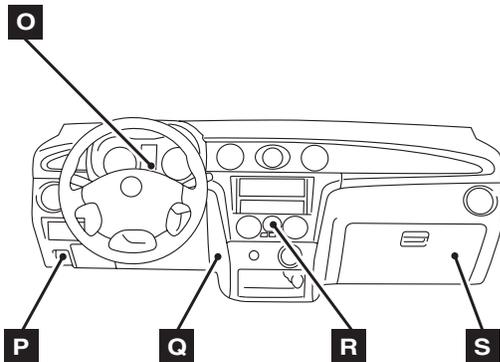
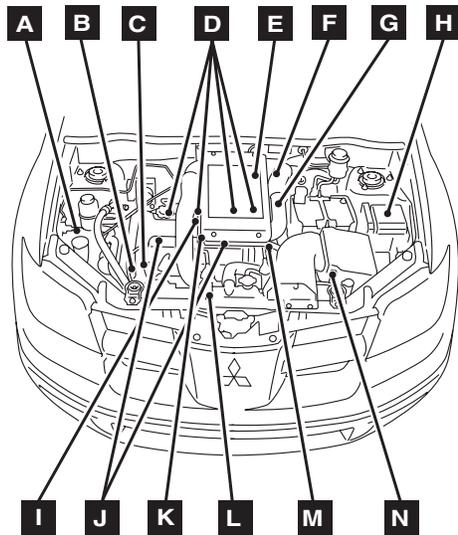
M1131002000915

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

M1131002101205

Name	Symbol	Name	Symbol
A/C relay	H	Engine-ECU	S
A/C switch	Q	Engine warming lamp (check engine lamp)	O
Accelerator pedal position sensor (with accelerator pedal position switch)	A	Fan control relay	H
Air flow sensor (with intake air temperature sensor and barometric pressure sensor)	N	Fuel pressure control solenoid valve	G
		Fuel pump relay (1) and (2)	P
Camshaft position sensor	M	Ignition coil (integrated power transistor)	J
Clutch oil pressure sensor	T		
Crank angle sensor	C	Injector	D
Detonation sensor	K	Oxygen sensor (front)	L
Diagnosis connector	Q	Oxygen sensor (rear)	U
EGR control solenoid valve	I	Power steering fluid pressure switch	B
Electronic-controlled throttled valve (Throttle position sensor and throttle valve control servo)	E	Purge control solenoid valve	I
Engine control relay	H	Vehicle speed sensor	F
Engine coolant temperature sensor	M	Waste gate solenoid valve	G

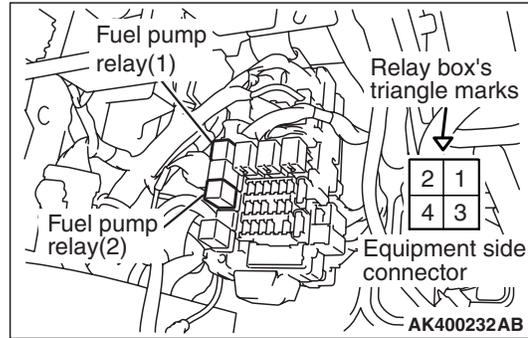
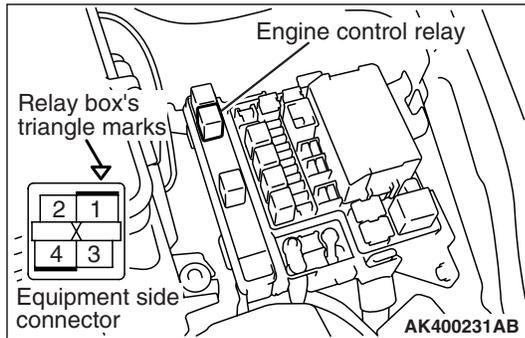


ENGINE CONTROL RELAY CONTINUITY CHECK

FUEL PUMP RELAY CONTINUITY CHECK

M1131033000999

M1131050000992



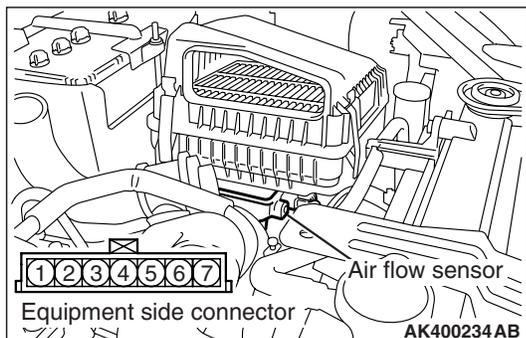
Fuel pump relay (1) and (2)

Tester Connection Terminal	Battery Voltage	Normal State
2 – 3	No Voltage	Continuity
1 – 4	No Voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 2 and negative (-) terminal of battery to terminal No. 3.)	Continuity (2 Ω or less)

Tester Connection Terminal	Battery Voltage	Normal State
1 – 4	No Voltage	Continuity
2 – 3	No Voltage	No continuity
	Voltage (Connect positive (+) terminal of battery to terminal No. 1 and negative (-) terminal of battery to terminal No. 4.)	Continuity (2 Ω or less)

INTAKE AIR TEMPERATURE SENSOR CHECK

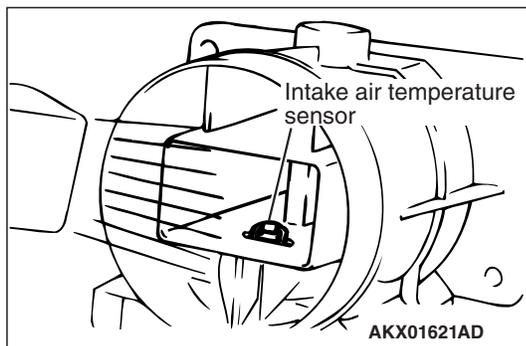
M1131002800858



1. Disconnect the air flow sensor connector.
2. Measure resistance between terminals No. 5 and No. 6.

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 – 0.42 kΩ (at 80°C)



3. Measure resistance while heating the sensor using a hair drier.

Normal condition:

Temperature (°C)	Resistance (kΩ)
Higher	Smaller

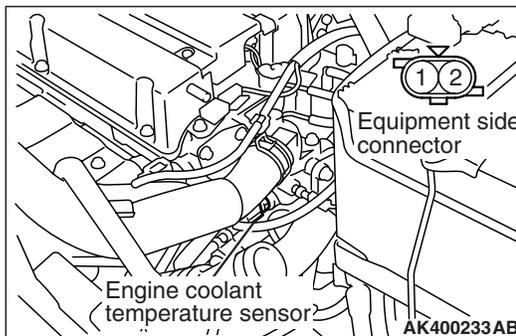
4. If the value deviates from the standard value or the resistance remains unchanged, replace the air flow sensor assembly.

ENGINE COOLANT TEMPERATURE SENSOR CHECK

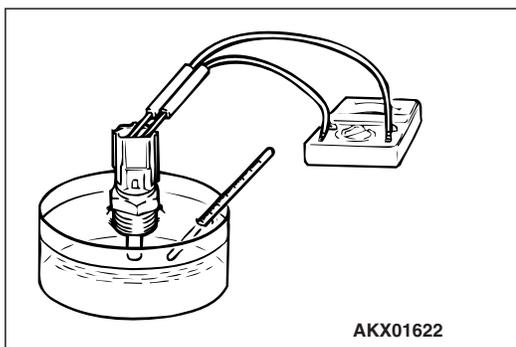
M1131003100818

CAUTION

Be careful not to touch the connector (resin section) with the tool when removing and installing.



1. Remove the engine coolant temperature sensor.

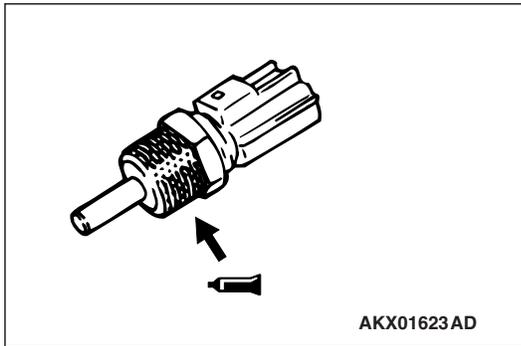


2. With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

Standard value:

- 14 – 17 kΩ (at -20°C)
- 5.1 – 6.5 kΩ (at 0°C)
- 2.1 – 2.7 kΩ (at 20°C)
- 0.9 – 1.3 kΩ (at 40°C)
- 0.48 – 0.68 kΩ (at 60°C)
- 0.26 – 0.36 kΩ (at 80°C)

3. If the resistance deviates from the standard value greatly, replace the sensor.



4. Apply sealant to threaded portion.

Specified sealant:

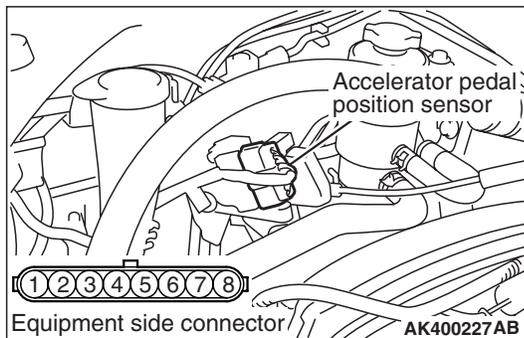
3M NUT Locking Part No. 4171 or equivalent

5. Install the engine coolant temperature sensor and tighten it to the specified torque.

Tightening torque: 29 ± 10 N·m

ACCELERATOR PEDAL POSITION SENSOR CHECK

M1131003400110



1. Disconnect the accelerator pedal position sensor connector.
2. Measure resistance between terminal No. 2 (main power supply) and No. 1 (main earth) as well as between terminal No. 8 (sub power supply) and terminal No. 7 (sub earth) of the sensor connector.

Standard value: 3.5 – 6.5 kΩ

3. Measure resistance between terminal No. 2 (main power supply) and No. 3 (main output) as well as between terminal No. 8 (sub power supply) and No. 6 (sub output) of the sensor connector.

Normal condition:

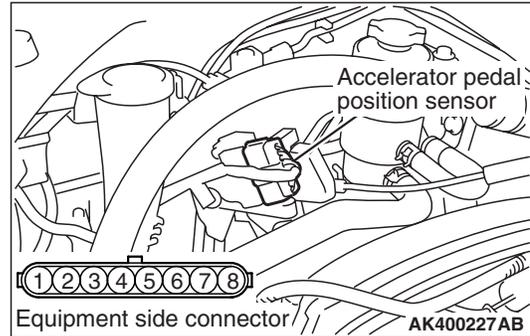
Depress the accelerator pedal slowly.	Resistance value changes in accordance with the accelerator pedal depression smoothly.
---------------------------------------	--

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.13B-390.)

ACCELERATOR PEDAL POSITION SWITCH CHECK

M1131052500131



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)

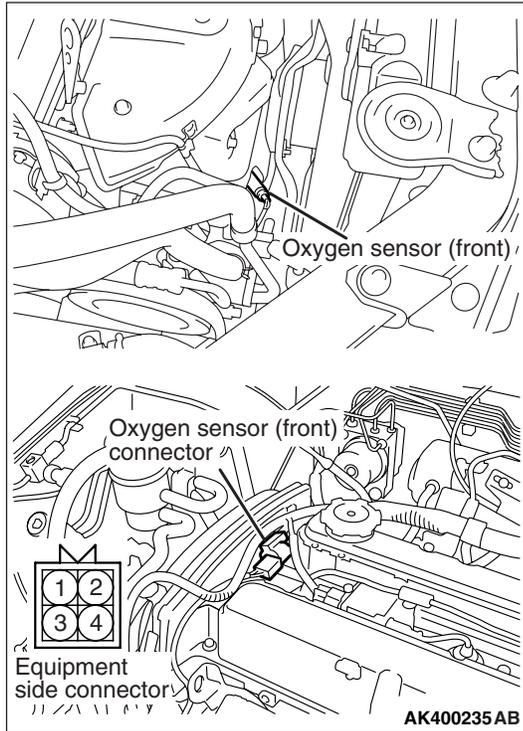
3. If defective, replace the accelerator pedal position sensor.

NOTE: After replacement, adjust the accelerator pedal position sensor. (Refer to P.13B-390.)

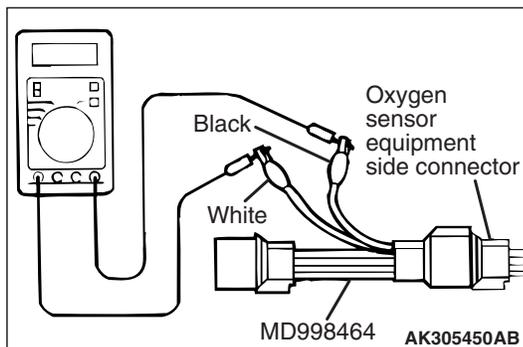
OXYGEN SENSOR CHECK

M1131005001069

Oxygen sensor (front)



1. Disconnect the oxygen sensor connector and connect the special tool test harness (MD998464) to the connector on the oxygen sensor side.
2. Make sure that there is continuity ($4.5 - 8.0 \Omega$ at 20°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

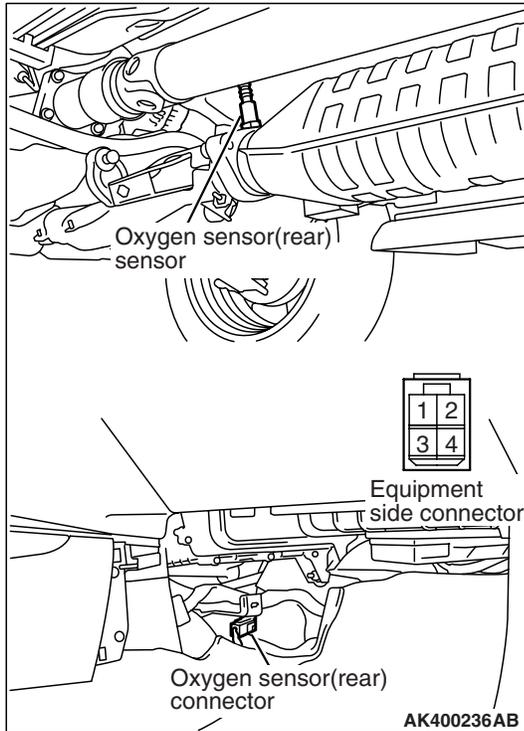
- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
- Be careful the heater is broken when voltage of beyond 8 V is applied to the oxygen sensor heater.

NOTE: If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 1 (red clip of special tool) and the terminal No. 3 (blue clip of special tool) of the oxygen sensor with a (+) terminal and (-) terminal of 8 V power supply respectively, then check again.

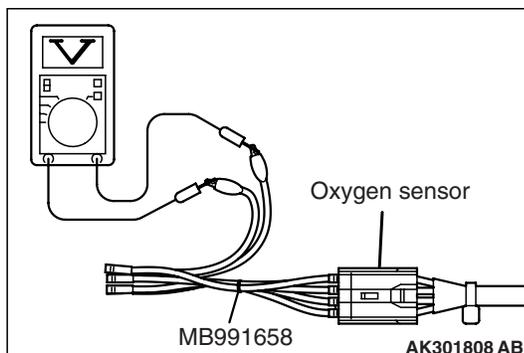
8. If the sensor is defective, replace the oxygen sensor.

NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Manifold and turbocharger. P.15-22.

Oxygen sensor (rear)



1. Disconnect the oxygen sensor connector and connect the special tool test harness (MB991658) to the connector on the oxygen sensor side.
2. Make sure that there is continuity (11 – 18 Ω at 20°C) between terminal No. 3 and No. 4 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. 1 and No. 2.
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air-fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V.

CAUTION

- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
- Be careful the heater is broken when voltage of beyond 12 V is applied to the oxygen sensor heater.

NOTE: If the sufficiently high temperature (of approximately 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. 3 and the terminal No. 4 of the oxygen sensor with a (+) terminal and (-) terminal of 12 V power supply respectively, then check again.

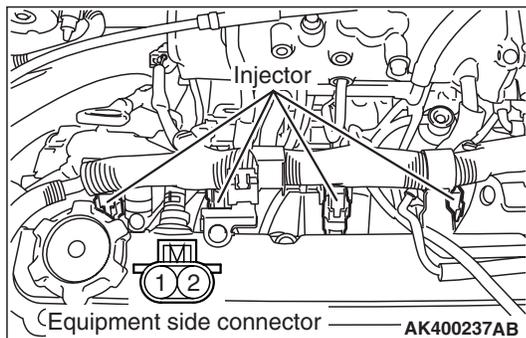
8. If the sensor is defective, replace the oxygen sensor.

NOTE: For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler P.15-27.

INJECTOR CHECK

M1131005200929

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

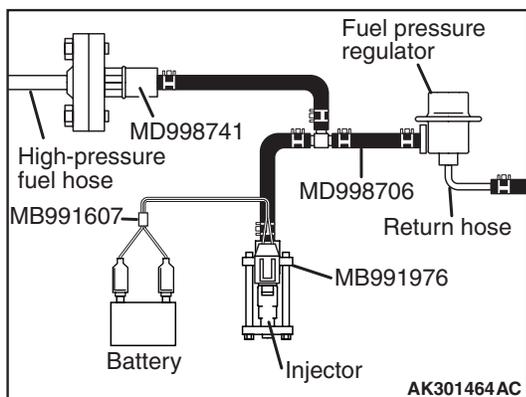
1. Disconnect the injector connector.
2. Measure the resistance between terminals.

Standard value: 13 – 16 Ω (at 20°C)

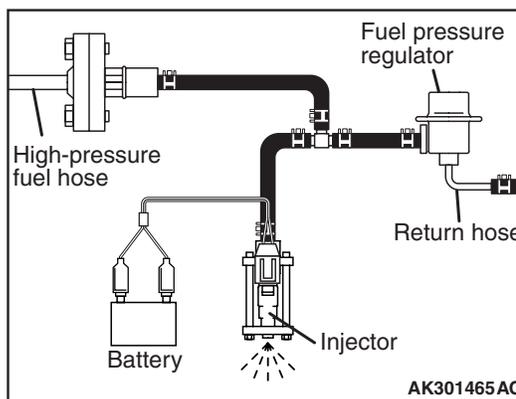
3. Connect the injector connector.

Check the Injection Condition

1. Following the steps below, bleed out the residual pressure within the fuel pipe line to prevent flow of the fuel (Refer to P.13B-393).
2. Remove the injector.



3. Assemble the following special tools as shown in Fig.
 - Injector test set (MD998706)
 - Injector test harness (MB991607)
 - Injector test adaptor (MD998741)
 - Injector test holder assembly (MB991976)
4. Connect the M.U.T.-II/III to the diagnosis connector.
5. Turn the ignition switch to "ON" position (But do not start the engine).
6. Select "Item No. 07" from the M.U.T.-II/III actuator test to drive the fuel pump.



7. Activate the injector and check the atomized spray condition of the fuel.

The condition can be considered satisfactory unless it is extremely poor.
8. Stop the actuation of the injector, and check for leakage from the injector's nozzle.

Standard value: 1 drop or less per minute
9. Without the fuel pump operation, operate the injector to draw the fuel out.
10. If the spraying is extremely poor or the fuel leakage from the injector nozzle deviates from the standard value, replace the injector.
11. Disconnect the M.U.T.-II/III.

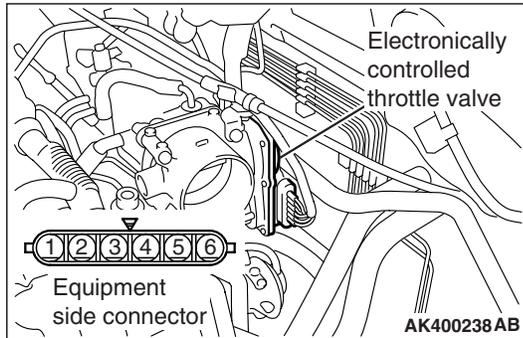
THROTTLE VALVE CONTROL SERVO CHECK

M1131051000230

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

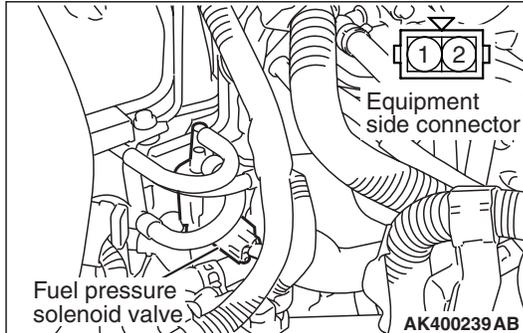


1. Disconnect the electronically controlled throttle valve connector.
2. Measure the resistance between terminals No. 1 and No. 2 at the throttle valve control servo connector.
Standard value: 0.3 – 80 Ω (at 20°C)
3. If resistance is outside the standard value, replace the throttle body assembly.

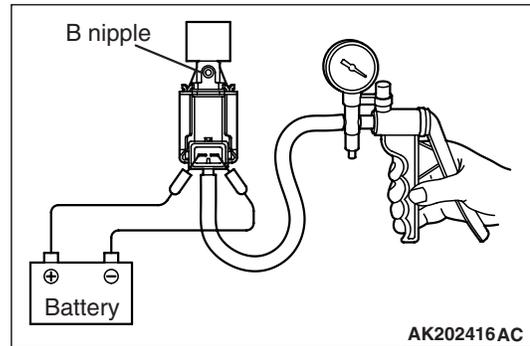
FUEL PRESSURE SOLENOID VALVE CHECK

M1131005800084

OPERATION CHECK



1. Remove the vacuum hose from the solenoid valve.
2. Disconnect the harness connector.

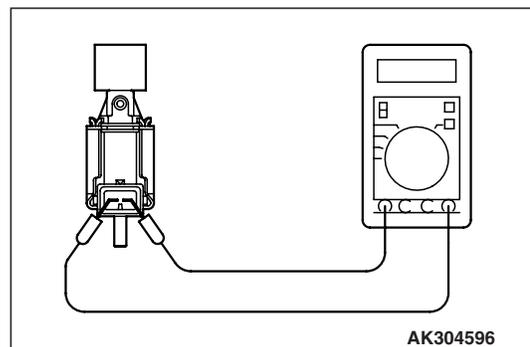


3. Connect a hand vacuum pump to the solenoid valve's A nipple.
4. Connect the solenoid valve terminal and battery terminal with a jumper wire.
5. Disconnect the jumper wire between the battery's (-) terminals, apply a negative pressure, and inspect the tightness.

Standard value:

Battery voltage	B nipple	Normal condition
No applied	Open	Vacuum leak
	Close	Vacuum maintained
Applied	Open	Vacuum maintained

COIL RESISTANCE CHECK



1. Measure the resistance between the terminals of the solenoid valve.

Standard value: 28 – 36 Ω (at 20°C)

INJECTOR

REMOVAL AND INSTALLATION

M1131007101482

CAUTION

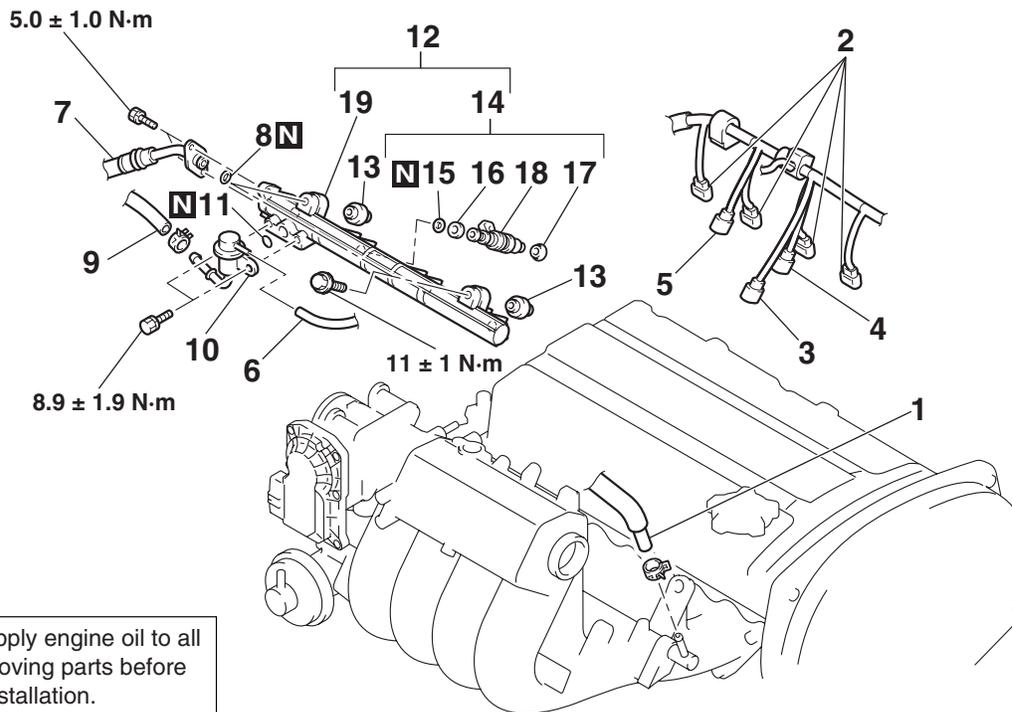
When the fuel injector replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-21).

Pre-removal Operation

- Fuel Discharge Prevention (Refer to P.13B-393).
- Intercooler Assembly and Intercooler Outlet Air Hose A Removal (Refer to GROUP 15, Intercooler P.15-9).

Post-installation Operation

- Intercooler Assembly and Intercooler Outlet Air Hose Installation (Refer to GROUP 15, Intercooler P.15-9).
- Fuel Leakage Inspection.



AC400839AB

Removal steps

1. PCV hose connection
2. Injector connector
3. Detonation sensor connector
4. Purge control solenoid valve connector
5. EGR solenoid valve connector
6. Emission control equipment hose connector
- >>A<< 7. Fuel high-pressure hose connection
8. O-ring
9. Fuel return hose connection
- >>A<< 10. Delivery pipe pressure regulator

<<A>>

>>A<<

Removal steps (Continued)

11. O-ring
12. Fuel delivery pipe and fuel injector assembly
13. Insulators
- >>A<< 14. Fuel injector assembly
15. O-ring
16. Fuel injector sheets
17. Insulators
18. Fuel injectors
19. Fuel delivery pipe

REMOVAL SERVICE POINT

<<A>> FUEL DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY REMOVAL

⚠ CAUTION

Do not drop the injector.

Remove the fuel delivery pipe with the fuel injector assembly attached to it.

INSTALLATION SERVICE POINT

>>A<< FUEL INJECTOR ASSEMBLY/DELIVERY PIPE PRESSURE REGULATOR/FUEL HIGH-PRESSURE HOSE INSTALLATION

⚠ CAUTION

Do not let the engine oil get into the delivery pipe will be damaged.

1. Apply a drop of new engine oil to the O-ring.
2. Turn the fuel injector assembly. To the right and left to install to the fuel delivery pipe. Repeat for delivery pipe pressure regulator and fuel high-pressure hose. Be careful not to damage the O-ring. After installing, check that the item turns smoothly.
3. If it dose not turn smoothly, the O-ring may be trapped, remove the item, re-install it into the fuel delivery pipe and check again.
4. Tighten the delivery pipe pressure regulator and fuel high-pressure hose to the specified torque.

Tightening torque:

8.9 ± 1.9 N·m <Delivery pipe pressure regulator>

5.0 ± 1.0 N·m <Fuel high-pressure hose>

THROTTLE BODY ASSEMBLY

REMOVAL AND INSTALLATION

M1131007701365

CAUTION

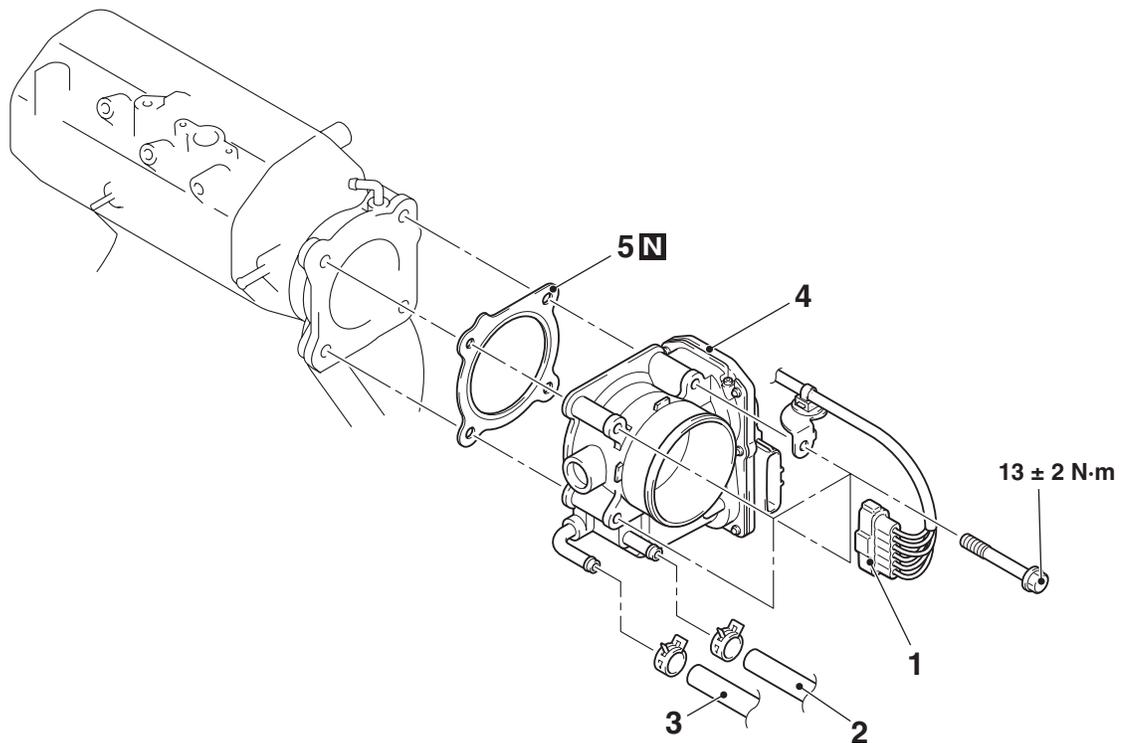
- When the throttle body assembly replacement is performed, use the M.U.T.-II/III to initialise the learning value (Refer to GROUP 00, Precautions Before Service – Initialisation Procedure for Learning Value in MPI Engine P.00-21).
- Do not loosen the fixing screws for the resin cover of throttle body 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).
- Intercooler Assembly and Intercooler Outlet Air Hose Removal (Refer to GROUP 15, Intercooler P.15-9).

Post-installation Operation

- Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-17).
- Intercooler Assembly and Intercooler Outlet Air Hose Installation (Refer to GROUP 15, Intercooler P.15-9).



AC400809AB

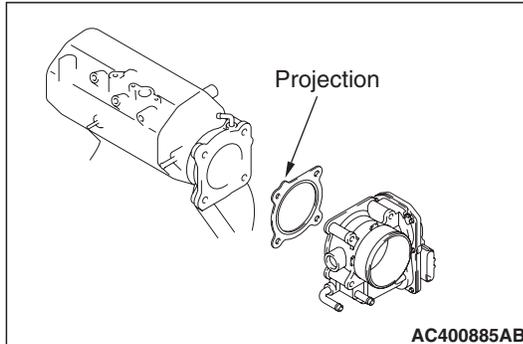
- >>B<<
- Removal steps**
- Initialisation procedure (installation only)
 - 1. Throttle position sensor connector
 - 2. Water return hose connection

- >>A<<
- Removal steps (Continued)**
- 3. Water feed hose connection
 - 4. Throttle body assembly
 - 5. Throttle body gasket

INSTALLATION SERVICE POINT
>>A<< THROTTLE BODY GASKET
INSTALLATION

⚠ CAUTION

Poor idling etc. may result if the throttle body gasket is installed incorrectly.



Install the throttle body gasket as its protrusion is in the direction shown.

>>B<< INITIALISATION PROCEDURE

Turn the ignition switch on then off, and keep it off for at least 10 seconds.

ENGINE-ECU

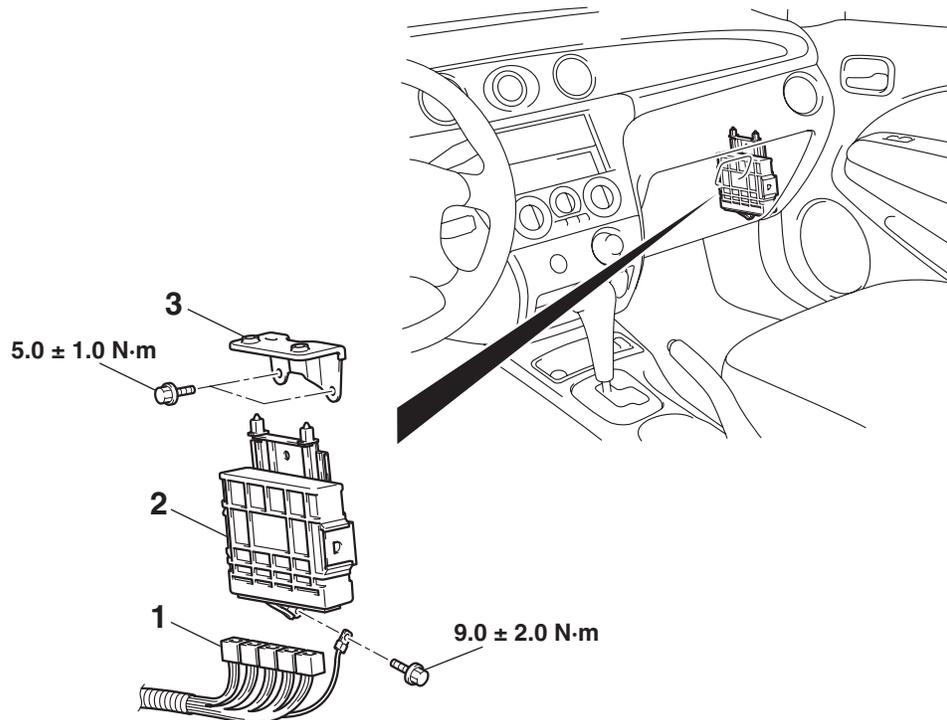
REMOVAL AND INSTALLATION

M1131033800456

CAUTION

- When the engine-ECU replacement is performed, always refer to GROUP 54A, On-vehicle Service - How to Register Encrypted Code [P.54A-22](#).
- After the engine-ECU is replaced, idling speed may be unstable because the MPI engine learning is not completed. To make it stable, make the system learn the idling (Refer to GROUP 00 – Pre-cautions before Service, Learning Procedure for Idling in MPI Engine [P.00-21](#)).

Pre-removal and Post-installation Operation
Cowl Side Trim (RH) Removal and Installation (Refer to GROUP 52A, Trim [P.52A-10](#)).



AC309335AB

- >>A<<
- Removal steps**
- Initialisation procedure (installation only)
1. Engine-ECU connector
 2. Engine-ECU
 3. Engine-ECU bracket

INSTALLATION SERVICE POINT

>>A<< INITIALISATION PROCEDURE

Turn the ignition switch on then off, and keep it off for at least 10 seconds.