

SQRE4G16 ENGINE MANAGEMENT SYSTEM

GENERAL INFORMATION	06-5	P0138-00	06-75
Description	06-5	P0140-00	06-75
System Function	06-6	P2270-00	06-75
Precautions	06-7	P2271-00	06-75
Specifications	06-8	P0201-00	06-82
Tools	06-8	P0202-00	06-82
ECM Terminal Definition	06-10	P0203-00	06-82
Circuit Diagram	06-12	P0204-00	06-82
		P0261-00	06-82
DIAGNOSIS & TESTING	06-20	P0262-00	06-82
Diagnostic Help	06-20	P0264-00	06-82
Intermittent DTC Troubleshooting	06-20	P0265-00	06-82
Ground Inspection	06-20	P0267-00	06-82
Throttle Self-learning	06-21	P0268-00	06-82
Diagnostic Trouble Code (DTC)		P0271-00	06-82
Chart	06-22	P1106-00	06-90
ECM Power Supply Circuit &		P1100-00	06-90
Ground Circuit Testing	06-26	P1110-00	06-90
P0030-00	06-34	P1111-00	06-90
P0031-00	06-34	P2106-00	06-90
P0032-00	06-34	P0606-00	06-90
P0053-00	06-34	P1101-00	06-95
P0036-00	06-40	P1102-00	06-95
P0037-00	06-40	P1103-00	06-95
P0038-00	06-40	P1104-00	06-95
P0054-00	06-40	P2122-00	06-101
P0105-00	06-46	P2123-00	06-101
P0106-00	06-46	P2127-00	06-101
P0107-00	06-46	P2128-00	06-101
P0108-00	06-46	P2138-00	06-101
P0112-00	06-53	P0300-00	06-107
P0113-00	06-53	P0301-00	06-107
P0116-00	06-58	P0302-00	06-107
P0117-00	06-58	P0303-00	06-107
P0118-00	06-58	P0304-00	06-107
P0121-00	06-63	P0219-00	06-115
P0122-00	06-63	P0322-00	06-115
P0123-00	06-63	P0327-00	06-120
P0130-00	06-69	P0328-00	06-120
P0131-00	06-69	P0341-00	06-124
P0132-00	06-69	P0346-00	06-124
P0133-00	06-69	P0420-00	06-130
P0134-00	06-69	P0444-00	06-133
P2195-00	06-69	P0458-00	06-133
P2196-00	06-69	P0459-00	06-133
P0136-00	06-75	P0660-00	06-140
P0137-00	06-75		

P0661-00	06-140	ON-VEHICLE SERVICE	06-267
P0662-00	06-140	Intake/Exhaust VVT Control Valve	06-267
P0480-00	06-147	Description	06-267
P0481-00	06-147	Operation	06-267
P0691-00	06-147	Removal	06-267
P0692-00	06-147	Installation	06-267
P0693-00	06-147	Coolant Temperature Sensor	06-268
P0694-00	06-147	Description	06-268
P0560-00	06-154	Operation	06-268
P0562-00	06-154	Removal	06-268
P0563-00	06-154	Installation	06-268
P0627-00	06-161	Knock Sensor	06-269
P0628-00	06-161	Description	06-269
P0629-00	06-161	Operation	06-269
P0645-00	06-165	Removal	06-269
P0646-00	06-165	Installation	06-269
P0647-00	06-165	Oxygen Sensor	06-270
P0688-00	06-169	Description	06-270
P0604-00	06-174	Operation	06-270
P0605-00	06-174	Removal & Installation -	
P1615-00	06-176	Upstream Oxygen Sensor	06-270
P1616-00	06-176	Removal & Installation -	
P1617-00	06-176	Downstream Oxygen Sensor	06-270
P1618-00	06-176	Camshaft Position Sensor	06-271
P1619-00	06-176	Description	06-271
U0101-87	06-178	Operation	06-271
U0129-87	06-181	Removal	06-271
U0140-87	06-184	Installation	06-271
U0155-87	06-187	Crankshaft Position Sensor	06-272
U0164-87	06-191	Description	06-272
U0167-87	06-195	Operation	06-272
P000A-00	06-198	Removal	06-272
P000B-00	06-198	Installation	06-272
P0010-00	06-201	Intake Pressure/	
P2088-00	06-201	Temperature Sensor	06-273
P2089-00	06-201	Description	06-273
P0013-00	06-201	Operation	06-273
P2090-00	06-201	Removal	06-273
P2091-00	06-201	Installation	06-273
P0012-00	06-208	Ignition Coil	06-274
P0015-00	06-208	Description	06-274
P0016-00	06-211	Operation	06-274
P0018-00	06-211	Removal & Installation	06-274
P0571-00	06-219	Variable Intake Solenoid Valve	06-275
P0704-00	06-224	Description	06-275
P0221-00	06-228	Operation	06-275
P0222-00	06-228	Removal & Installation	06-275
P0223-00	06-228	Electronic Accelerator Pedal	
Engine Problem Symptom		Sensor	06-276
Diagnosis	06-234	Description	06-276

Operation	06-276	Operation	06-279
Removal & Installation	06-276	Removal & Installation	06-279
Electric Fuel Pump	06-277	Canister Solenoid Valve	06-280
Description	06-277	Description	06-280
Operation	06-277	Operation	06-280
Removal & Installation	06-277	Removal & Installation	06-280
Fuel Injector	06-278	Engine Control Module (ECM)	06-281
Description	06-278	Description	06-281
Operation	06-278	Operation	06-281
Removal & Installation	06-278	Removal	06-281
Electric Throttle Assembly	06-279	Installation	06-281
Description	06-279		

GENERAL INFORMATION

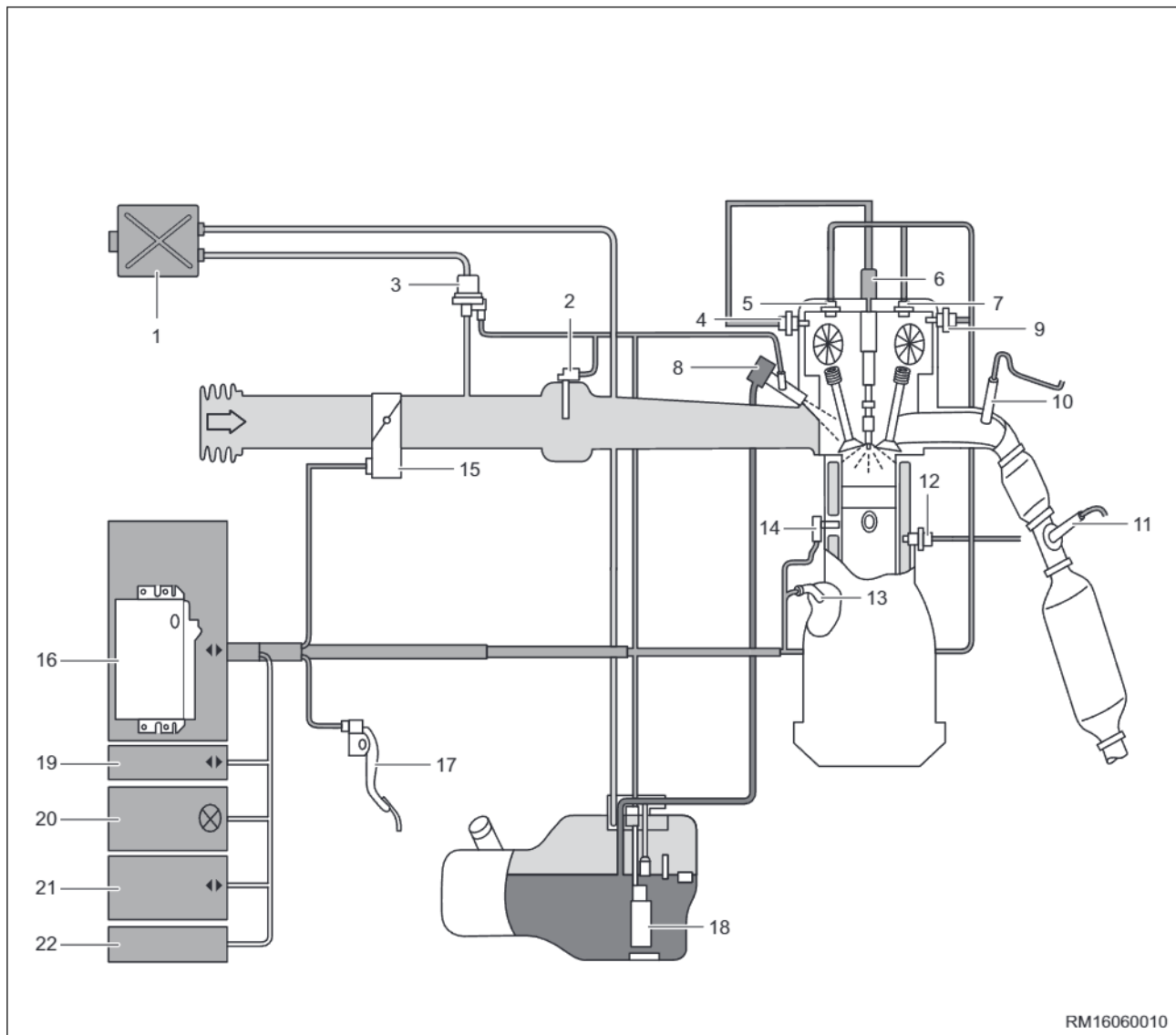
Description

The engine of M16 model adopts UAES engine management system. This system mainly consists of Engine Control Module (ECM), sensors and actuators, which controls intake air amount, injection volume and ignition timing, etc. when engine is operating.

In the engine management system, sensors are used as the input part to measure various physical signals (temperature and pressure, etc.), and converts them into corresponding electrical signals; the function of ECM is to receive the input signals from sensors and perform calculation according to set procedure, producing corresponding control signals and outputting them to power drive circuit. The power drive circuit drives each actuator to perform various actions, thus making the engine run according to the preset program.

Also, the trouble diagnosis system of ECM monitors each component and control function in this system. Once detecting and confirming a fault, it will store the trouble code and recall "Limp Home" function. When detecting that fault has been eliminated, it will return to use normal value.

Basic Components of Engine Management System



1 - Canister	2 - Intake Pressure/Temperature Sensor
3 - Canister Solenoid Valve	4 - Intake VVT Control Valve
5 - Camshaft Position Sensor (Intake)	6 - Ignition Coil
7 - Camshaft Position Sensor (Exhaust)	8 - Injector
9 - Exhaust VVT Control Valve	10 - Upstream Oxygen Sensor
11 - Downstream Oxygen Sensor	12 - Coolant Temperature Sensor
13 - Crankshaft Position Sensor	14 - Knock Sensor
15 - Electronic Throttle	16 - Engine Control Module (ECM)
17 - Electronic Accelerator Pedal	18 - Electric Fuel Pump
19 - CAN	20 - Malfunction Warning Light
21 - Diagnostic Interface	22 - Engine Immobilizer System

System Function

- Calculate air flow
ECM calculates air flow entering the cylinder by signals from intake pressure/temperature sensor, and then adjusts injection volume to make air-fuel ratio meet the requirements of various operating conditions.
- Measure crankshaft position and engine speed
ECM determines the crankshaft position and engine speed according to signals from crankshaft position sensor, and accurately controls the engine ignition and injection timing.
- Determine operating sequence of cylinders
ECM recognizes the top dead center of No.1 cylinder by camshaft position sensor, so as to determine the operating sequence of cylinders.
- Fuel control
There are two modes of fuel control: closed-loop fuel control and open-loop fuel control. Closed-loop fuel control can accurately regulate the air-fuel ratio of engine, thus effectively controlling emissions. Open-loop fuel control is applied when engine is starting or warming up and when oxygen sensor is malfunctioning.
- Ignition control
Ignition control system of this engine adopts group control.
- Knock control
When a knocking is detected by knock sensor, system will calculate the ignition advance angle that needs to be delayed or advanced according to current operating conditions and knock intensity and adjust the ignition angle, thus avoiding or reducing knocking.
- Emission control
Three-way catalytic converter can convert engine exhaust gas into harmless gas and discharge it into atmosphere. When engine temperature becomes normal after warming up, ECM will activate closed-loop fuel control to correct the air-fuel ratio, thus realizing the optimum conversion efficiency of three-way catalytic converter.
- Three-way catalytic converter protection
Engine management system has the function to protect three-way catalytic converter. ECM estimates the three-way catalytic converter temperature according to engine operating conditions. When it is estimated that exhaust temperature will exceed the converter's maximum permissible temperature for a long time, ECM will automatically activate the protection function of three-way catalytic converter to keep the temperature normal.

- System voltage protection

When system voltage becomes extremely high due to charging system malfunction, engine management system will activate the protection program to limit engine speed, thus avoiding damage to ECM and battery.

Precautions

General service requirements

- Only digital multimeter can be used to perform inspection for engine management system.
- Use genuine components to perform service work, otherwise appropriate engine management system operation cannot be guaranteed.
- Only use unleaded gasoline during servicing.
- Please observe normative service and diagnostic flowchart to perform service work.
- Never disassemble components of engine management system during servicing.
- When holding electronic elements (ECM and sensor etc.) during servicing, take extra care not to drop them on the ground.
- Set up a consciousness of environmental protection and dispose of the waste effectively that is produced during servicing.

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Precautions during servicing

1. Do not causally remove any engine management system component or its connector from its installation position to prevent damaging accidentally, or foreign matter, such as moisture, oil from entering connectors, which will affect the normal operation of engine management system.
2. Be sure to turn ignition switch off when disconnecting and connecting connectors. Otherwise electronic elements may be damaged.
3. When simulating hot operating condition of malfunction and performing other service work that may cause temperature to rise, never allow ECM temperature to exceed 80°C.
4. As the supplying pressure of fuel system is high (approximately 400 kPa), all fuel pipes are high pressure resistant pipe. Fuel pressure in fuel lines is still high even when engine is not running. Therefore, be careful not to casually remove fuel pipes during servicing; when it is necessary to service fuel system, discharge pressure in the fuel system before removing fuel pipes. The way to discharge pressure is as follows:
Remove fuel pump relay, start engine and idle it until the engine stops running by itself. Then try to start engine 2 - 3 times to ensure fuel pressure is discharged completely. Removal of fuel pipes and replacement of fuel filter should be performed in a well-ventilated area by professional service men.
5. Do not energize electric fuel pump when removing it from fuel tank to prevent electric sparks, which will cause a fire.
6. Running test for fuel pump is prohibited when it is empty or in water; otherwise it will shorten the service life. Never connect the positive and negative of fuel pump in reverse.
7. When checking ignition system, only perform spark jump test when it is necessary and duration should be shortened as much as possible. Do not open throttle during test; otherwise a large amount of unburned gasoline will enter the exhaust pipe, causing damage to the three-way catalytic converter.
8. As idling adjustment is performed by engine management system completely, manual adjustment is not required. Accelerator pedal stopper screw of throttle body has been adjusted at the factory, and users are not allowed to change its original position.
9. Do not connect battery with its polarity reversed to prevent damage to electronic elements. This system adopts negative ground.
10. Never remove battery cable when engine is running.
11. The positive, negative battery cables and ECM must be removed before performing welding on vehicle.
12. Do not puncture wire outer coat to detect electric signals input and output by components.



Specifications

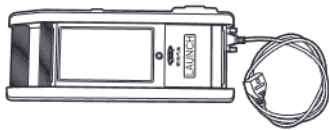
Torque Specifications

Description	Torque (N·m)
Coolant Temperature Sensor	14 ± 1
Intake Pressure/Temperature Sensor Fixing Bolt	6 ± 1
Knock Sensor Fixing Bolt	20 ± 5
Crankshaft Position Sensor Fixing Bolt	8 ± 2
Camshaft Position Sensor Fixing Bolt	8 ± 1
VVT Control Valve Fixing Bolt	8 ± 2
ECM Fixing Bolt	7 ± 1

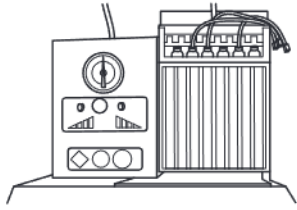
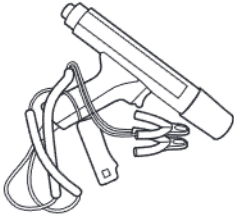
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Tools

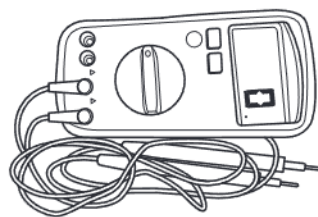
Special Tool

X-431 3G Diagnostic Tester	 RCH0000001
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General Tools

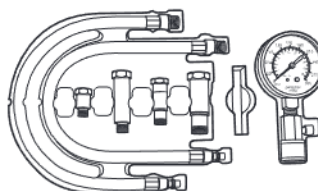
Fuel Injector Cleaning Analyzer	 RCH0000062
Ignition Timing Light	 RCH0000016

Digital Multimeter



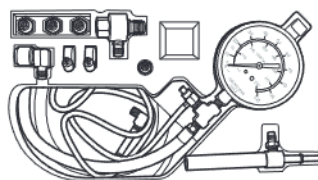
RCH0000002

Cylinder Pressure Gauge



RCH0000044

Fuel Pressure Gauge



RCH0000048

Oscilloscope



RCH0000061

ECM Terminal Definition

ECM connector 1

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	-	25	Knock Sensor B
2	-	26	Knock Sensor A
3	Injector 2	27	Intake Pressure Sensor
4	Injector 1	28	-
5	Variable Camshaft Timing Valve (Exhaust)	29	Camshaft Position Sensor (Intake)
6	Variable Intake Valve	30	Canister Solenoid Valve
7	Variable Camshaft Timing Valve (Intake)	31	Sensor Ground
8	Injector 3	32	Crankshaft Position Sensor A
9	Upstream Oxygen Sensor Heater	33	Crankshaft Position Sensor B
10	Injector 4	34	5 V Power Supply 1
11	Throttle Actuator (+)	35	Ignition Coil Drive
12	-	36	Ignition Coil Drive
13	Throttle Position Sensor 1	37	Engine Coolant Temperature Sensor
14	Throttle Position Sensor 2	38	Intake Temperature Sensor
15	-	39	-
16	Oxygen Sensor Ground	40	Upstream Oxygen Sensor
17	-	41	Camshaft Position Sensor (Exhaust)
18	-	42	Alternator
19	-	43	Throttle 5 V Power Supply
20	Ground	44	-
21	Sensor Ground	45	5 V Power Supply
22	Throttle Ground	46	-
23	Throttle Actuator (-)	47	ECM Ground 4
24	-	48	ECM Ground 3

ECM connector 2

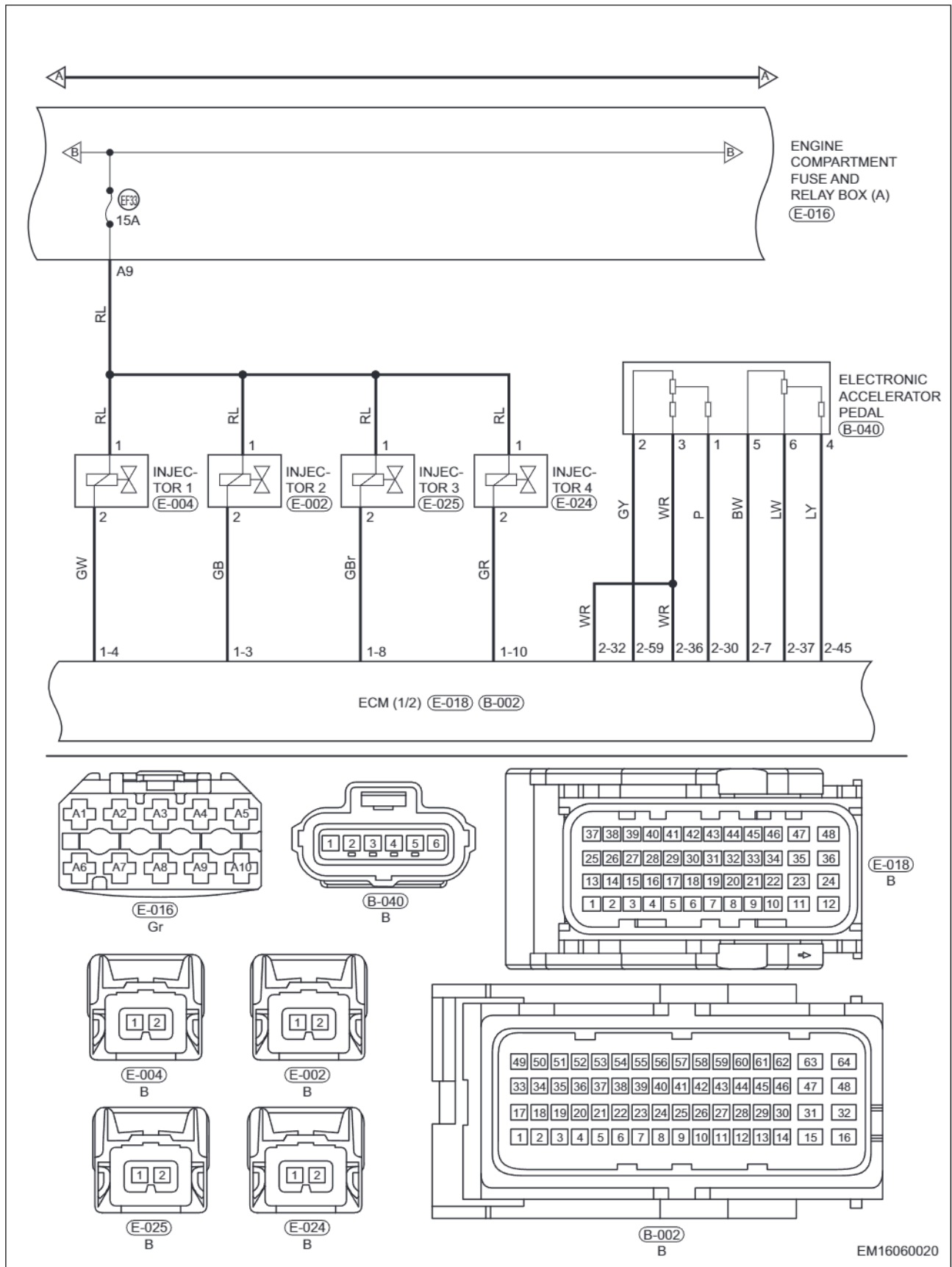
Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	CAN-H1	33	-
2	-	34	-
3	-	35	Ignition switch (ON)
4	-	36	5 V Power Supply
5	Main Relay Coil	37	5 V Power Supply
6	Clutch Switch (MT)	38	-
7	Electronic Accelerator Pedal Position Sensor 1 Ground	39	-
8	-	40	-
9	-	41	Fuel Pump Relay Coil
10	-	42	-
11	-	43	Oxygen Sensor Ground
12	-	44	-
13	-	45	Electronic Accelerator Pedal Position Sensor 1
14	-	46	-
15	Noncontinuous Power Supply	47	-
16	Noncontinuous Power Supply	48	Downstream Oxygen Sensor Heater
17	CAN-L1	49	-
18	-	50	-
19	-	51	-
20	Battery Continuous Power Supply	52	-
21	Downstream Oxygen Sensor	53	A/C Pressure Switch (High/Low)
22	-	54	-
23	Brake Switch	55	-
24	A/C Pressure Switch (Medium)	56	Fan Control (High)
25	Brake Light Switch	57	-
26	-	58	A/C Compressor Relay Coil
27	-	59	Electronic Accelerator Pedal Position Sensor 2 Ground
28	A/C Switch	60	-
29	-	61	-
30	Electronic Accelerator Pedal Position Sensor 2	62	-
31	Fan Control (Low)	63	ECM Ground 2
32	5 V Power Supply	64	ECM Ground 1

06

Engine Management System (Page 1 of 8)



Engine Management System (Page 2 of 8)

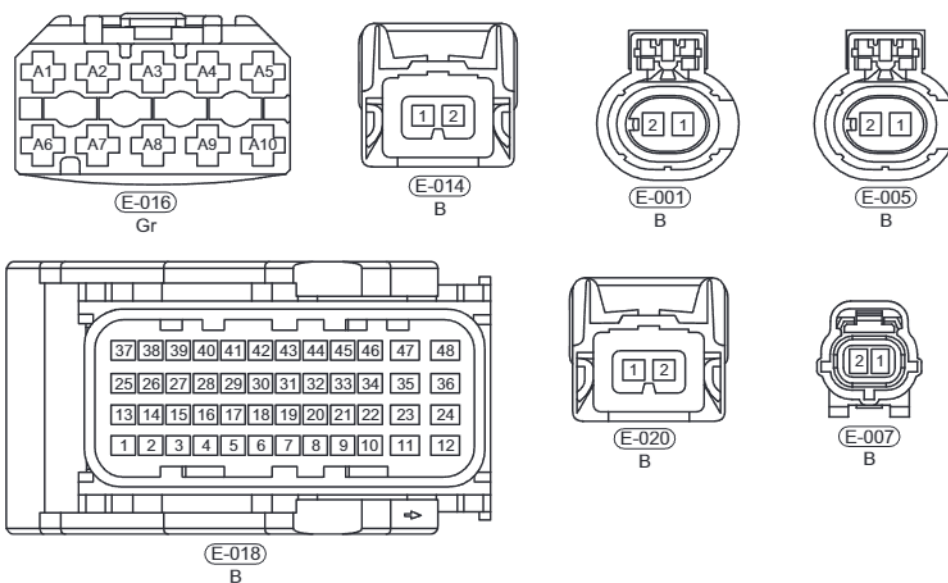
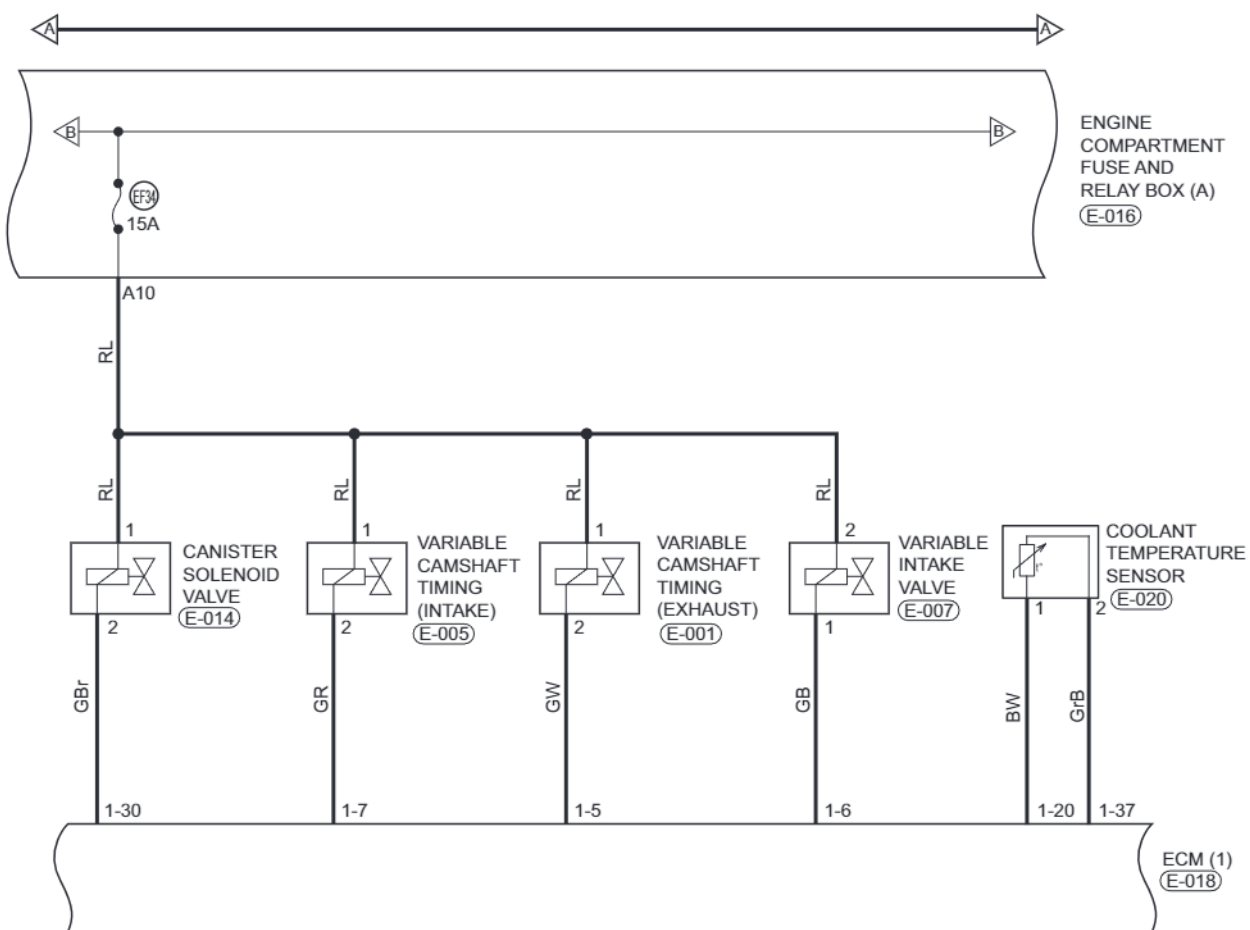


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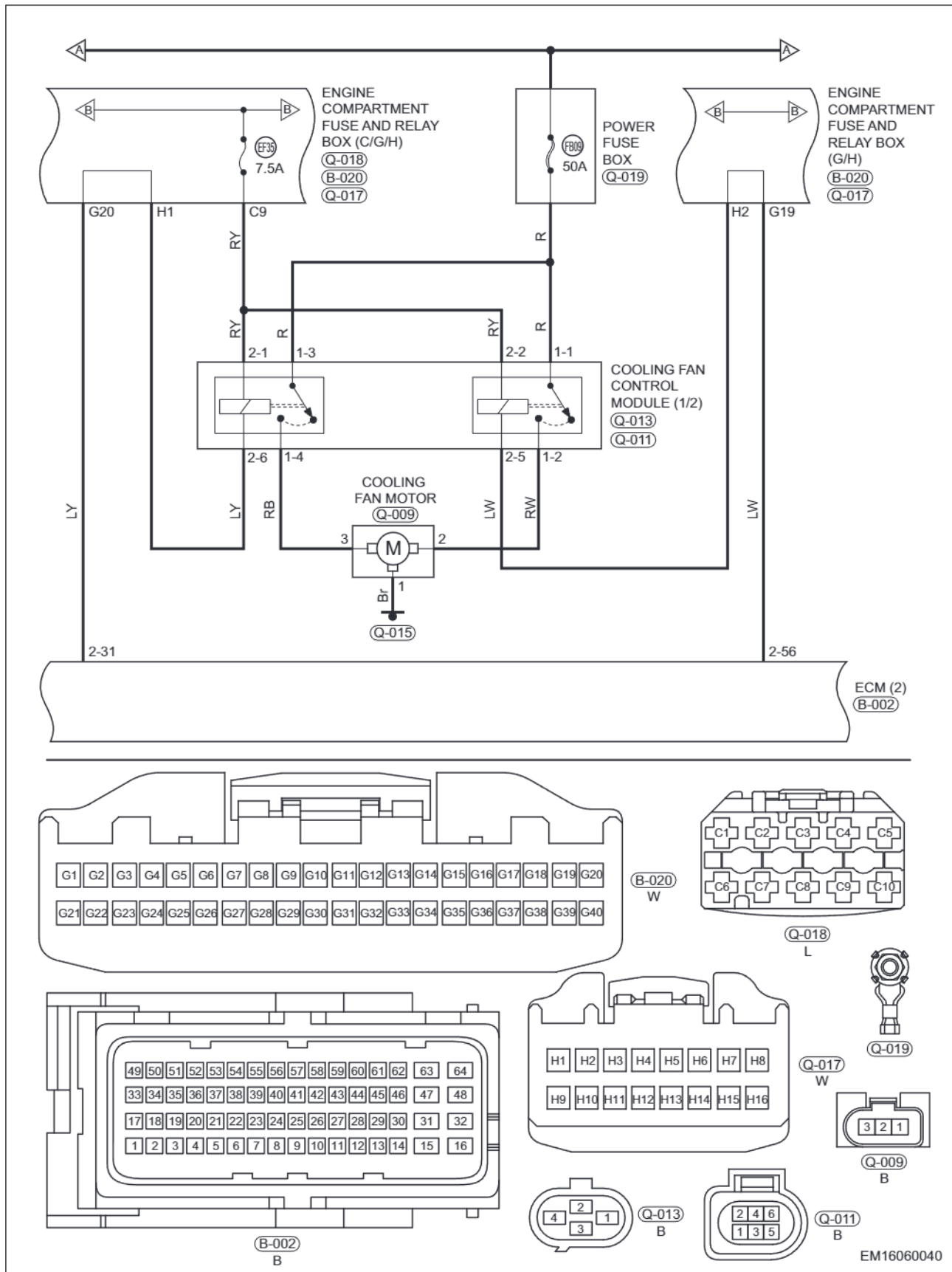
Engine Management System (Page 3 of 8)

06



EM16060030

Engine Management System (Page 4 of 8)

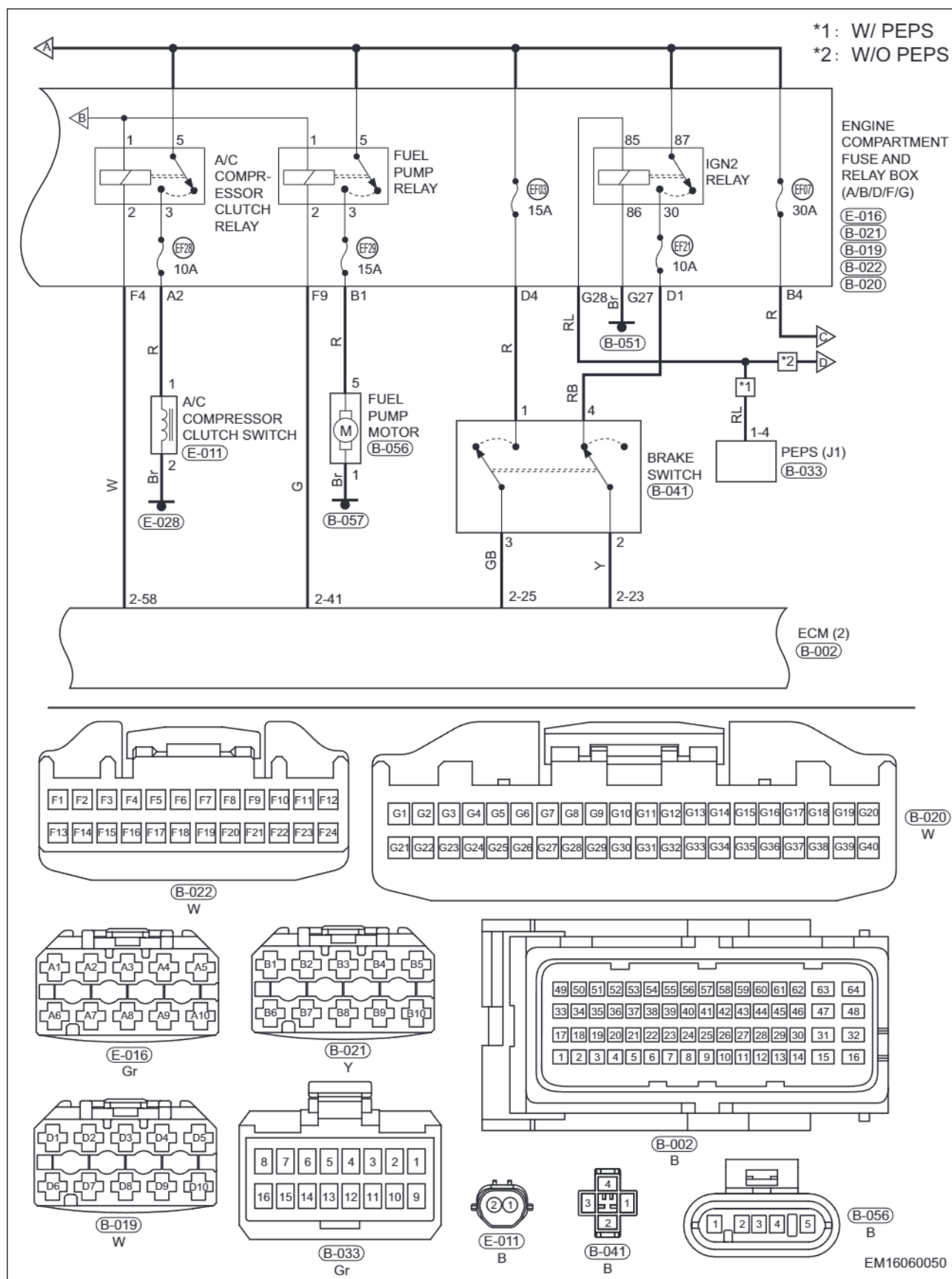


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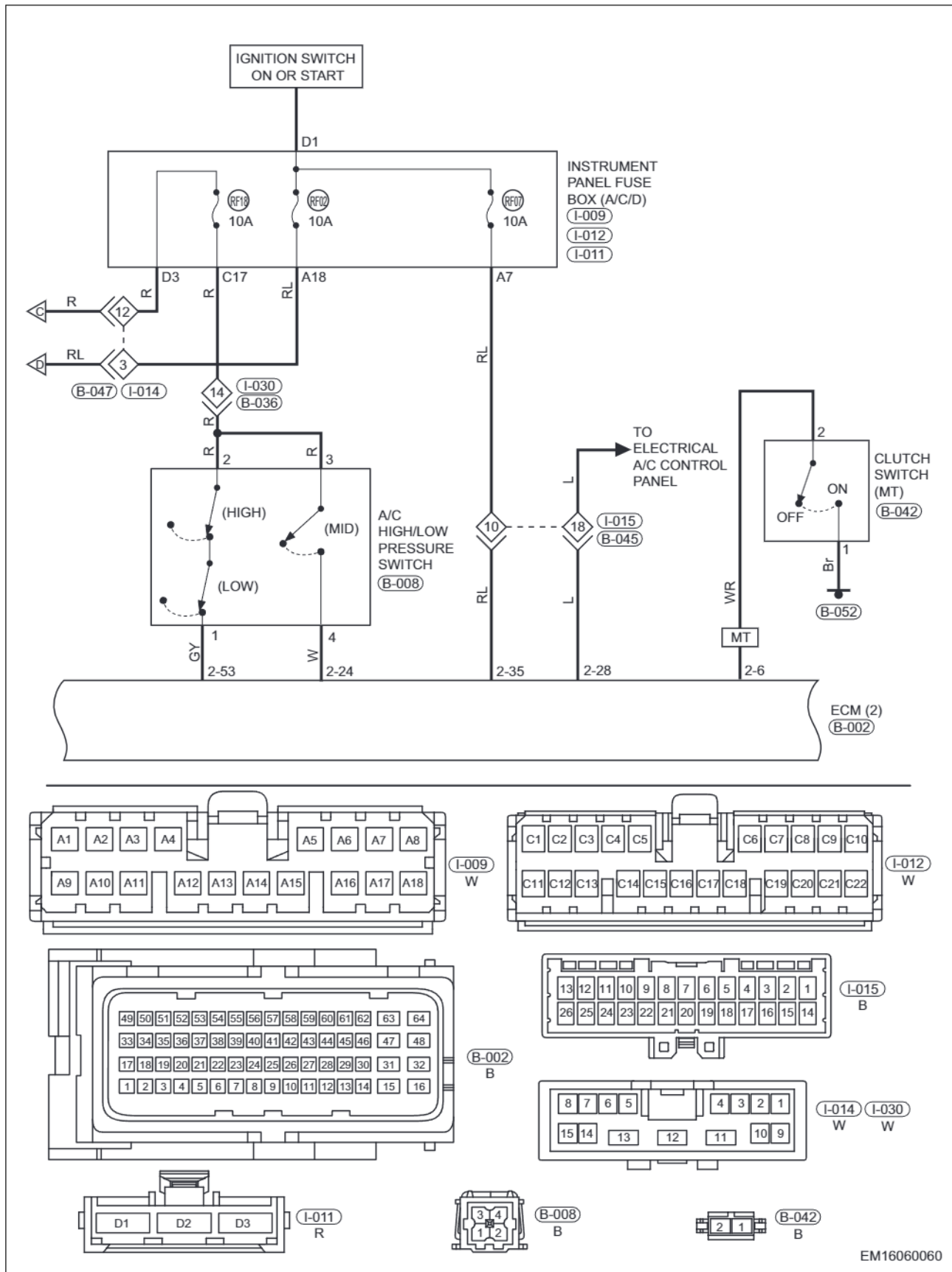


Engine Management System (Page 5 of 8)

06

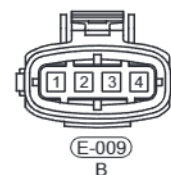
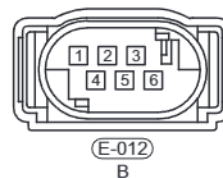
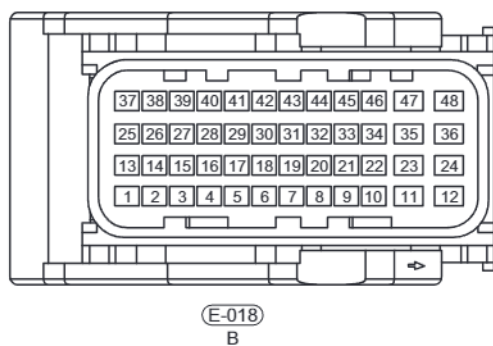
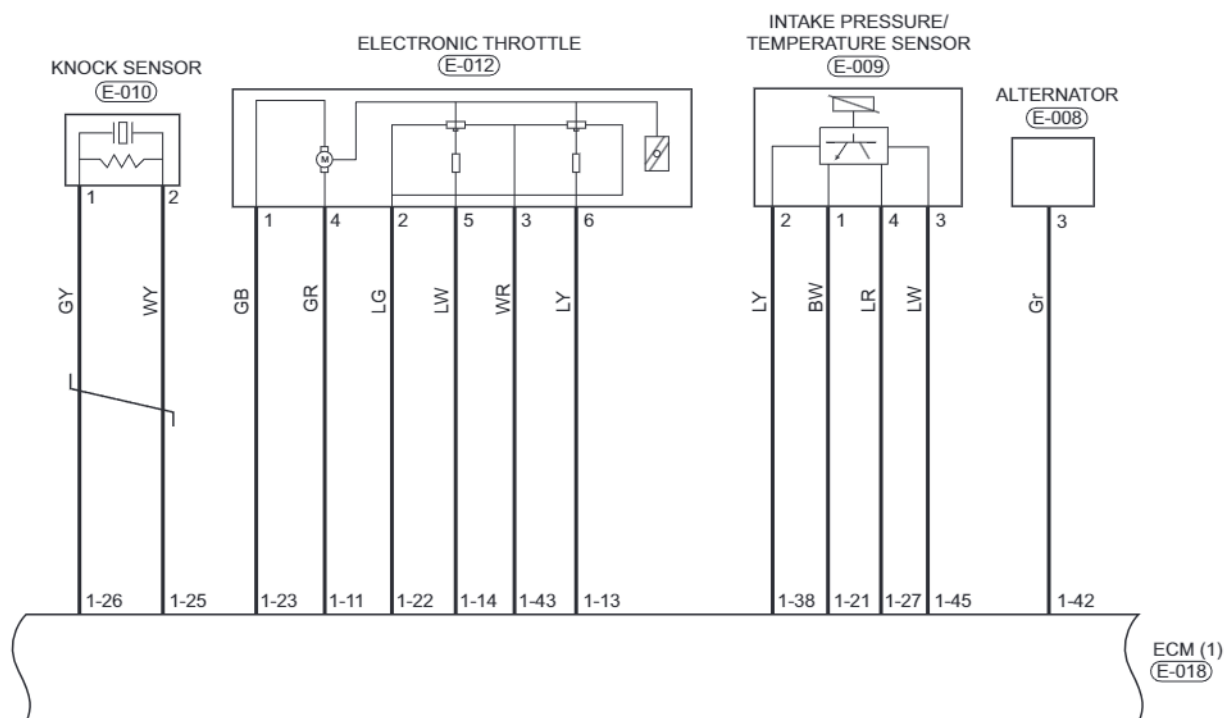


Engine Management System (Page 6 of 8)



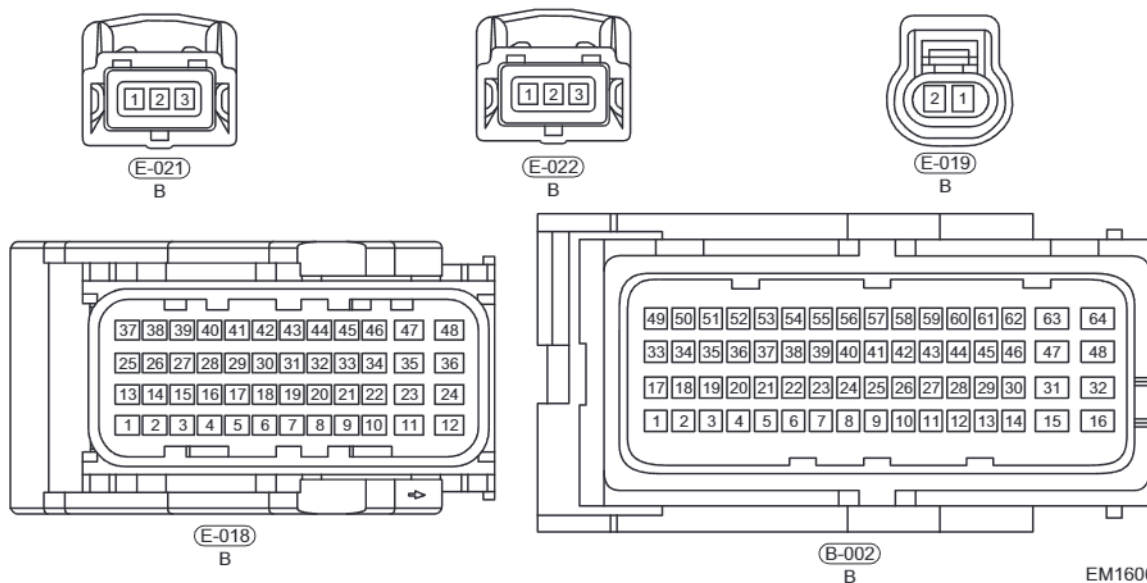
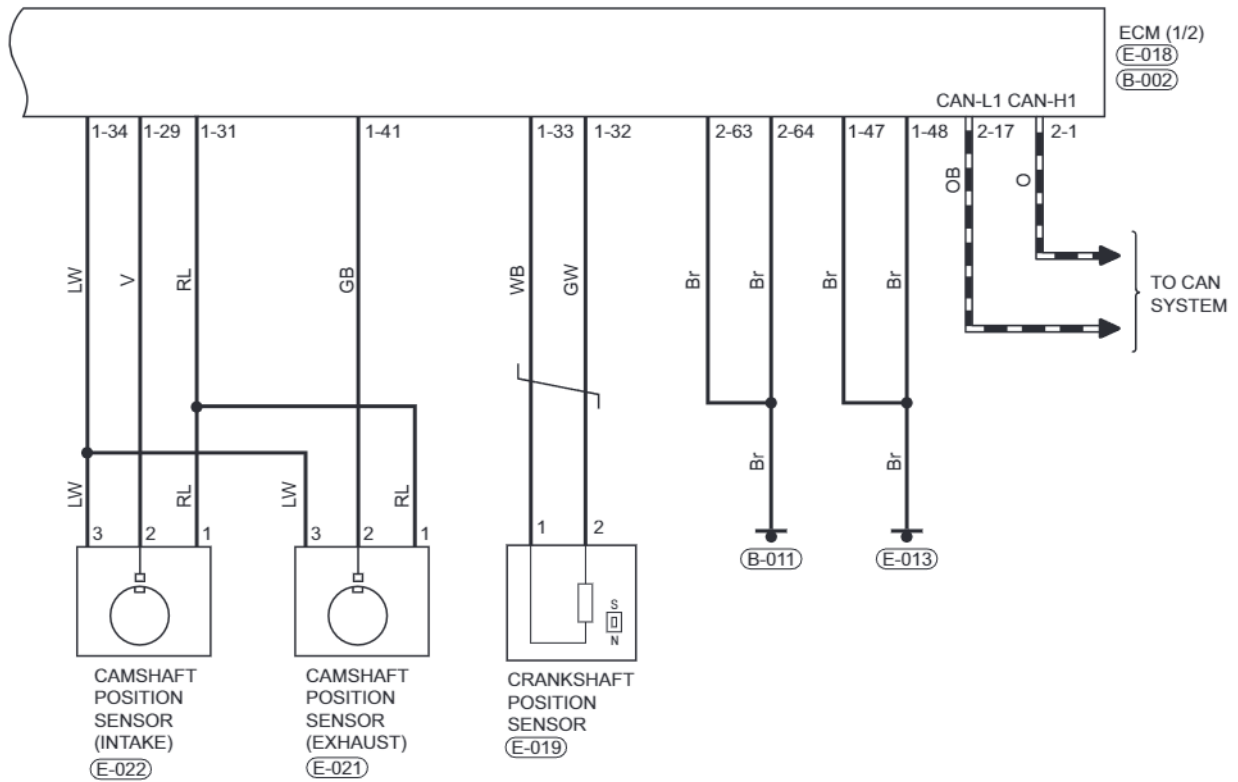
Engine Management System (Page 7 of 8)

06



EM16060070

Engine Management System (Page 8 of 8)



EM16060080

DIAGNOSIS & TESTING

Diagnostic Help

1. Connect X-431 3G Diagnostic tester (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
2. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
3. If DTC cannot be deleted, the malfunction is current.
4. Only use a digital multimeter to measure the voltage of electronic system.
5. Refer to any Technical Bulletin that may apply to the malfunction.
6. Visually check related wire harness.
7. Check and clean all Engine Control Module (ECM) ground points related to current DTC.
8. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

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Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the following:

- Check if connectors are loose.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Monitor X-431 3G diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if related circuit signal is interrupted.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggle test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect sensors and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Use data recorder and/or oscilloscope to help diagnose intermittent malfunctions.
- Remove the Engine Control Module (ECM) from malfunctioning vehicle and install it to a new vehicle to perform a test. If DTC cannot be cleared, ECM is malfunctioning. If DTC can be cleared, reinstall ECM to original vehicle.

Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) can increase resistance which will change the way in which a circuit works.

Electrical control circuits are very sensitive to proper grounding. A loose or corroded ground point can seriously affect control circuit. Check the ground points as follows:

1. Remove ground bolt or nut.
2. Check all contact surfaces for tarnish, dirt and rust, etc.
3. Clean as necessary to ensure that contacting is in good condition.
4. Reinstall ground bolt or nut securely.
5. Check if add-on accessories interfere with ground circuit.
6. If several wire harnesses are crimped into one ground eyelet terminal, check if they are installed correctly. Make sure all wire harnesses are clean, securely fastened and providing a good ground path.

Throttle Self-learning

Perform throttle self-learning in the following conditions:

- Battery is removed and negative battery cable is disconnected.
- ECM is replaced.
- ECM is disconnected and reconnected.
- Throttle is replaced or cleaned.

Throttle self-learning conditions:

- Engine intake temperature $> 5^{\circ}\text{C}$
- $100.5^{\circ}\text{C} > \text{coolant temperature} > 5^{\circ}\text{C}$
- Engine speed not more than 250 rpm
- Vehicle speed = 0 km/h
- Battery voltage $> 10\text{ V}$
- Accelerator pedal opening angle $< 14.9\%$

Throttle self-learning procedures:

Turn ignition switch off and then to ON. Wait for 1 minute to finish throttle self-learning.

Diagnostic Trouble Code (DTC) Chart

DTC Code	DTC Definition
P000A-00	"A" Camshaft Position Slow Response
P000B-00	"B" Camshaft Position Slow Response
P0010-00	"A" Camshaft Position Actuator Circuit/Open
P0012-00	"A" Camshaft Position - Timing Over-Retarded
P0013-00	"B" Camshaft Position - Actuator Circuit/Open
P0015-00	"B" Camshaft Position - Timing Over-Retarded
P0016-00	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A
P0018-00	Crankshaft Position - Camshaft Position Correlation Bank 2 Sensor A
P0030-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 1)
P0031-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 1) Low
P0032-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 1) High
P0036-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 2)
P0037-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 2) Low
P0038-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 2) High
P0053-00	O2 Sensor Heater Resistance (Bank 1 (1) Sensor 1)
P0054-00	O2 Sensor Heater Resistance (Bank 1 (1) Sensor 2)
P0105-00	Manifold Absolute Pressure/Barometric Pressure Circuit
P0106-00	Manifold Abs. Pressure or Bar. Pressure Range/Performance
P0107-00	Manifold Abs. Pressure or Bar. Pressure Low Input
P0108-00	Manifold Abs. Pressure or Bar. Pressure High Input
P0112-00	Intake Air Temp. Circ. Low Input
P0113-00	Intake Air Temp. Circ. High Input
P0116-00	Engine Coolant Temp. Circ. Range/Performance
P0117-00	Engine Coolant Temp. Circ. Low Input
P0118-00	Engine Coolant Temp. Circ. High Input
P0121-00	Throttle/Pedal Pos. Sensor A Circ. Range/Performance
P0122-00	Throttle/Pedal Pos. Sensor A Circ. Low Input
P0123-00	Throttle/Pedal Pos. Sensor A Circ. High Input
P0130-00	O2 Sensor Circ., Bank 1-Sensor 1 Malfunction
P0131-00	O2 Sensor Circ., Bank 1-Sensor 1 Low Voltage
P0132-00	O2 Sensor Circ., Bank 1-Sensor 1 High Voltage
P0133-00	O2 Sensor Circ., Bank 1-Sensor 1 Slow Response
P0134-00	O2 Sensor Circ., Bank 1-Sensor 1 No Activity Detected
P0136-00	O2 Sensor Circ., Bank 1-Sensor 2 Malfunction
P0137-00	O2 Sensor Circ., Bank 1-Sensor 2 Low Voltage
P0138-00	O2 Sensor Circ., Bank 1-Sensor 2 High Voltage

DTC Code	DTC Definition
P0140-00	O2 Sensor Circ., Bank 1 - Sensor 2 No Activity Detected
P0170-00	Fuel Trim, Bank 1 Malfunction
P0171-00	Fuel Trim, Bank 1 System Too Lean
P0172-00	Fuel Trim, Bank 1 System Too Rich
P0201-00	Cylinder 1 - Injector Circuit
P0202-00	Cylinder 2 - Injector Circuit
P0203-00	Cylinder 3 - Injector Circuit
P0204-00	Cylinder 4 - Injector Circuit
P0219-00	Engine Overspeed Condition
P0223-00	Throttle/Pedal Position Sensor/Switch B High Input
P0222-00	Throttle/Pedal Position Sensor/Switch B Low Input
P0221-00	Throttle/Pedal Position Sensor/Switch B Range/Performance
P0261-00	Cylinder 1 - Injector Circuit Low
P0262-00	Cylinder 1 - Injector Circuit High
P0264-00	Cylinder 2 - Injector Circuit Low
P0265-00	Cylinder 2 - Injector Circuit High
P0267-00	Cylinder 3 - Injector Circuit Low
P0268-00	Cylinder 3 - Injector Circuit High
P0271-00	Cylinder 4 - Injector Circuit High
P0300-00	Random/Multiple Cylinder Misfire Detected
P0301-00	Cyl.1 Misfire Detected
P0302-00	Cyl.2 Misfire Detected
P0303-00	Cyl.3 Misfire Detected
P0304-00	Cyl.4 Misfire Detected
P0322-00	Ign./Distributor Eng. Speed Inp. Circ. No Signal
P0327-00	Knock Sensor 1 Circ. Low Input
P0328-00	Knock Sensor 1 Circ. High Input
P0341-00	Camshaft Pos. Sensor Circ. Range/Performance
P0346-00	Camshaft Pos. Sensor Circ. Range/Performance (Bank 2)
P0420-00	Catalyst System, Bank 1 Efficiency Below Threshold
P0444-00	Evaporative Emiss. System Purge Control Valve Circ. Open
P0458-00	Evaporative Emission System Purge Control Valve Circuit Low
P0459-00	Evaporative Emission System Purge Control Valve Circuit High
P0480-00	Cooling Fan 1 Control Circuit
P0481-00	Cooling Fan 2 Control Circuit
P0501-00	Vehicle Speed Sensor Range/Performance
P0506-00	Idle Control System RPM Lower than Expected

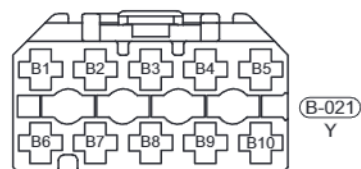
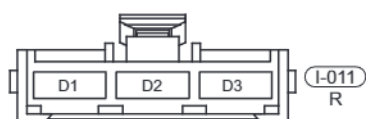
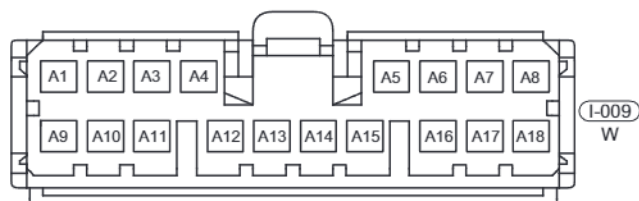
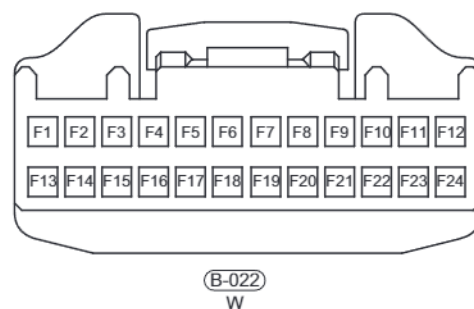
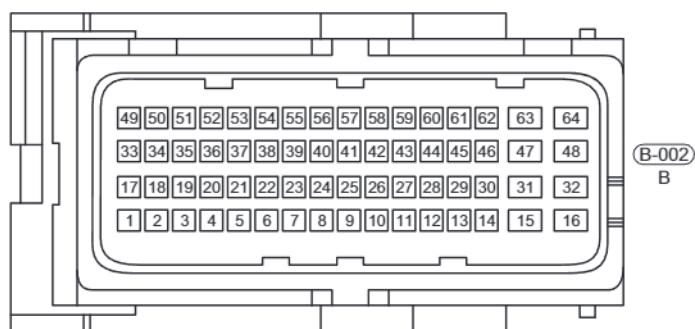
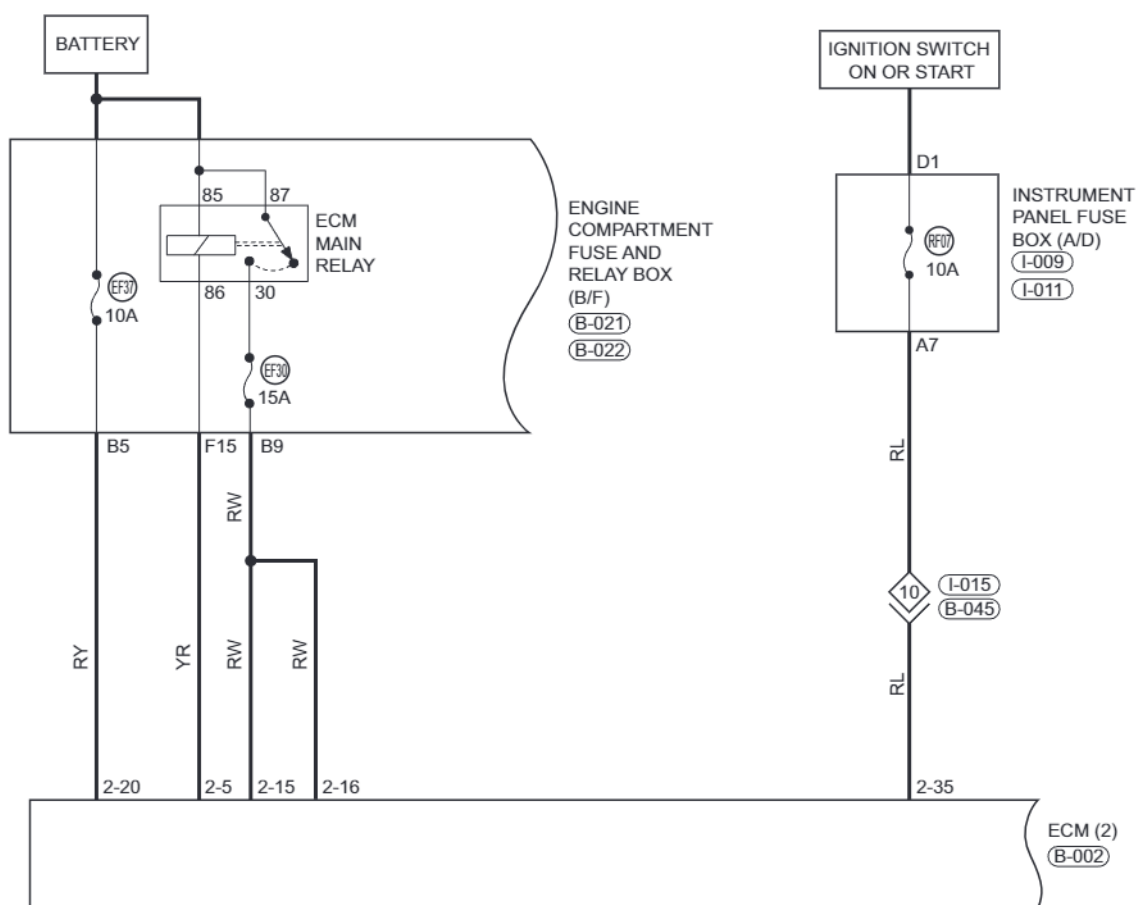
DTC Code	DTC Definition
P0507-00	Idle Control System RPM Higher than Expected
P0560-00	System Voltage Malfunction
P0562-00	System Voltage Low Voltage
P0563-00	System Voltage High Voltage
P0571-00	Brake Switch "A" Circuit
P0604-00	Internal Contr. Module Random Access Memory (RAM) Error
P0605-00	Internal Contr. Module ROM Test Error
P0606-00	ECM/PCM Processor
P0627-00	Fuel Pump "A" Control Circuit /Open
P0628-00	Fuel Pump "A" Control Circuit Low
P0629-00	Fuel Pump "A" Control Circuit High
P0645-00	A/C Clutch Relais Circuit
P0646-00	A/C Clutch Relay Control Circuit Low
P0647-00	A/C Clutch Relay Control Circuit High
P0660-00	Intake Manifold Tuning Valve Control Circuit/Open (Bank 1)
P0661-00	Intake Manifold Tuning Valve Control Circuit Low (Bank 1)
P0662-00	Intake Manifold Tuning Valve Control Circuit High (Bank 1)
P0688-00	EMC/PCM Power Relay Sense Circuit Open
P0691-00	Cooling Fan 1 Control Circuit Low
P0692-00	Cooling Fan 1 Control Circuit High
P0693-00	Cooling Fan 2 Control Circuit Low
P0694-00	Cooling Fan 2 Control Circuit High
P0704-00	Clutch Switch Input Circuit
P1100-00	Engine Torque Control Adaption at Limit
P1101-00	Idle Speed Contr. Throttle Pos. Low Voltage During Adaptation
P1102-00	Idle Speed Contr. Throttle Pos. Adaptation Malfunction
P1103-00	Idle Speed Control Throttle Position lower Limit Not Attained
P1104-00	Idle Speed Contr. Throttle Pos. adaptation Not Started
P1106-00	Throttle Pos. Contr. Malfunction
P1110-00	Throttle Actuator Electrical Malfunction (MT only)
P1111-00	Idle Speed Control Throttle Position Mechanical Malfunction
P1615-00	ECM Status Unknown
P1616-00	Authentication Not OK
P1617-00	No Response from SIM During Challenge Period
P1618-00	Fail to Write EOL Confiditional Data into EEPROM
P1619-00	ECM Not Programmed (Virgin State)
P2088-00	"A" Camshaft Position Actuator Control Circuit Low

DTC Code	DTC Definition
P2089-00	"A" Camshaft Position Actuator Control Circuit High
P2090-00	"B" Camshaft Position Actuator Control Circuit Low
P2091-00	"B" Camshaft Position Actuator Control Circuit High
P2106-00	Throttle Actuator Control System Forced Limited Power
P2122-00	Throttle/Pedal Pos. Sens./Switch D Circuit Low Input
P2123-00	Throttle/Pedal Pos. Sens./Switch D Circuit High Input
P2127-00	Throttle/Pedal Pos. Sens./Switch E Circuit Low Input
P2128-00	Throttle/Pedal Pos. Sens./Switch E Circuit High Input
P2138-00	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation
P2177-00	System Too Lean off Idle
P2178-00	System Too Rich off Idle
P2187-00	System Too Lean at Idle
P2188-00	System Too Rich at Idle
P2195-00	O2 Sensor Signal Stuck Lean; Bank 1 Sensor 1
P2196-00	O2 Sensor Signal Stuck Rich; Bank 1 Sensor 1
P2270-00	O2 Sensor Signal Stuck Lean; Bank 1 Sensor 2
P2271-00	O2 Sensor Signal Stuck Rich; Bank 1 Sensor 2
U0001-00	High Speed CAN Defective
U0101-87	Lost Communication with TCM (CVT only)
U0129-87	Lost Communication with BSM
U0140-87	Lost Communication with BCM
U0155-87	Lost Communication with ICM
U0164-87	Lost Communication with CLM
U0167-87	Lost Communication with IMMO

ECM Power Supply Circuit & Ground Circuit Testing

Power Supply Circuit

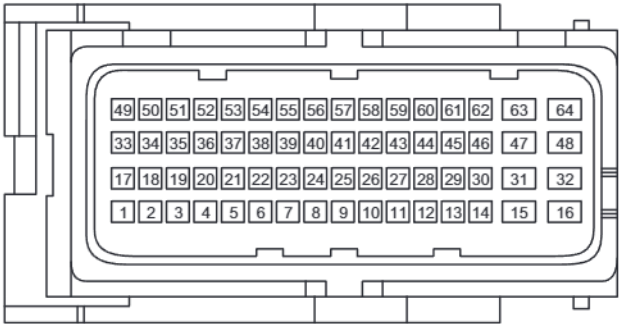
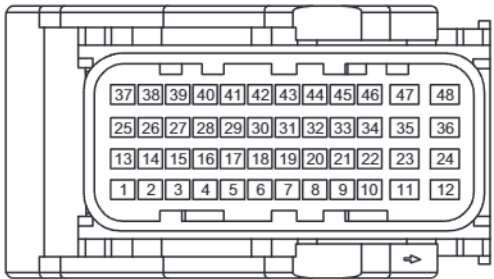
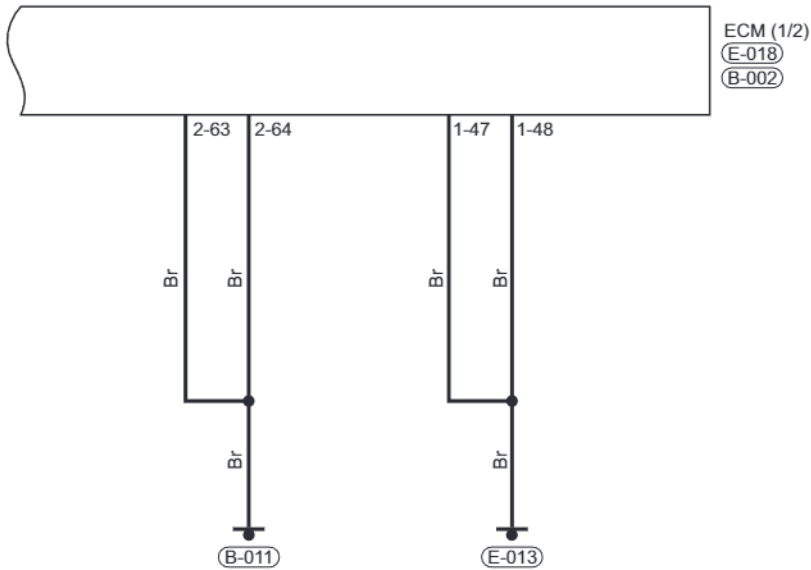
06



EM16063000

Ground Circuit

06



EM16063001



DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using diagnostic tester, select Read Datastream.
- If datastream is not detected, malfunction indicated by datastream is current. Go to diagnosis procedure - Step 1.
- If datastream is detected, malfunction indicated by datastream is intermittent ([See page 06-20](#)).

Diagnosis Procedure

1 Check ECM power supply circuit

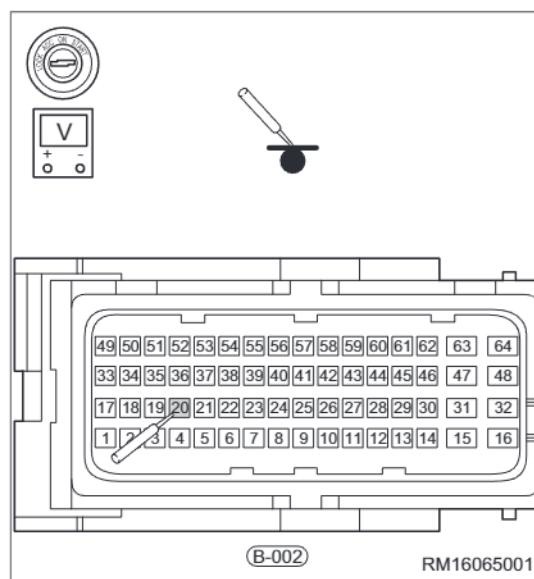
06

- Turn ignition switch off.
- Disconnect the ECM connector B-002.
- Check the voltage between terminal of ECM connector B-002 and body ground.

Multimeter Connection	Condition	Specified Condition
B-002 (20) - Body ground	Always	11 to 14 V

OK

Go to step 4



NG

2 Check ECM fuse

- Unplug the ECM fuse EF37 (10 A) from engine compartment fuse and relay box.
- Check the resistance of fuse.

Standard resistance: less than 1 Ω

NG

Replace ECM fuse

OK

3 Check wire harness and connector (ECM - engine compartment fuse and relay box)

- Disconnect the engine compartment fuse and relay box connector B-021.
- Check the wire harness between connector terminals on wire harness side.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (20) - B-021 (B5)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (20) or B-021 (B5) - Body ground	Always	No continuity
B-002 (20) or B-021 (B5) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector

OK

Repair or replace engine compartment fuse and relay box or wire harness (engine compartment fuse and relay box - battery)

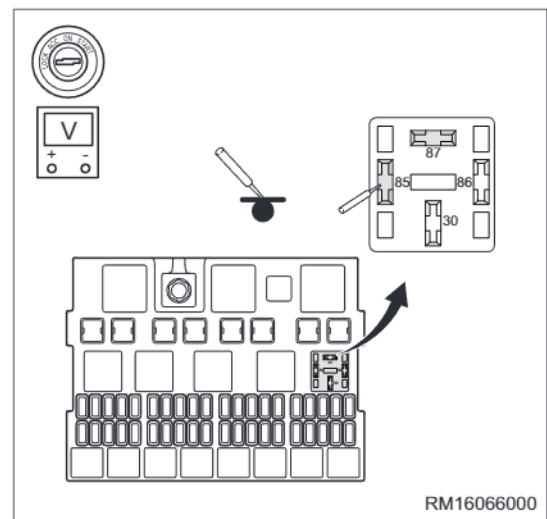
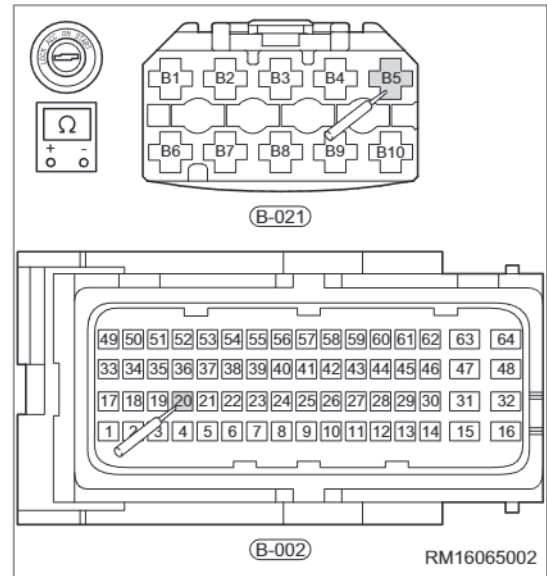
4 Check main relay circuit voltage

- Remove the main relay from engine compartment fuse and relay box.
- Check the voltage between terminals of main relay and body ground.

Multimeter Connection	Condition	Specified Condition
Main relay terminals 85 and 87 (engine compartment fuse and relay box side) - Body ground	Always	11 to 14 V

NG

Repair or replace wire harness or connector (main relay - battery)



06

OK

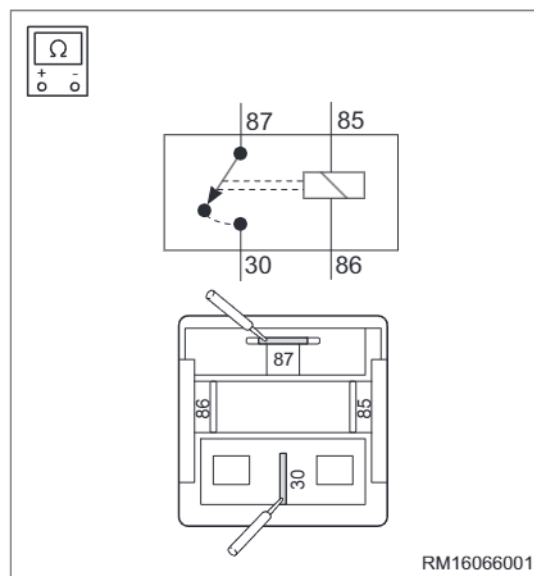
5 Check main relay and fuse EF30

- a. Check if fuse EF30 is normal.
b. Check for continuity between terminals of main relay.

Multimeter Connection	Condition	Specified Condition
Terminal 30 - Terminal 87	Always	No continuity
Terminal 30 - Terminal 87	Always	Continuity (when battery voltage is applied between terminals 85 and 86)

NG

Replace fuse or main relay



OK

6 Check wire harness and connector (ECM - engine compartment fuse and relay box)

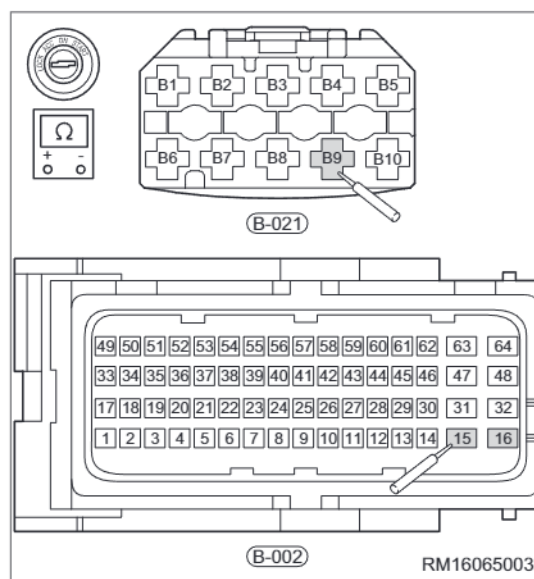
- a. Check the wire harness between connector terminals.
b. Disconnect the engine compartment fuse and relay box connectors B-021 and B-022.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (15, 16) - B-021 (B9)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (15, 16) or B-021 (B9) - Body ground	Always	No continuity
B-002 (15, 16) or B-021 (B9) - Battery positive	Always	No continuity



Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (5) - B-022 (F15)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (5) or B-022 (F15) - Body ground	Always	No continuity
B-002 (5) or B-022 (F15) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector

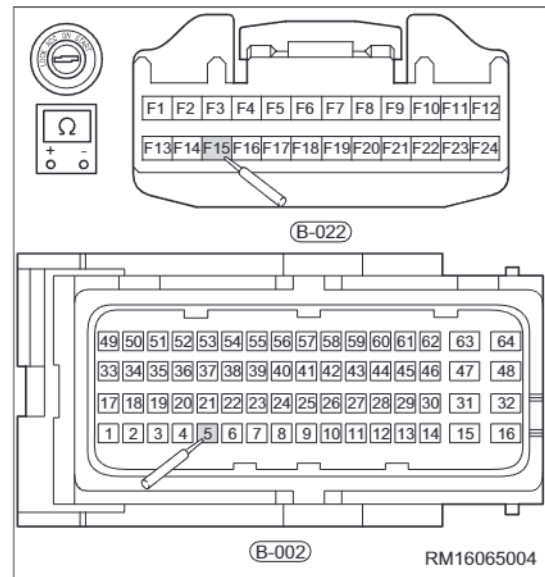
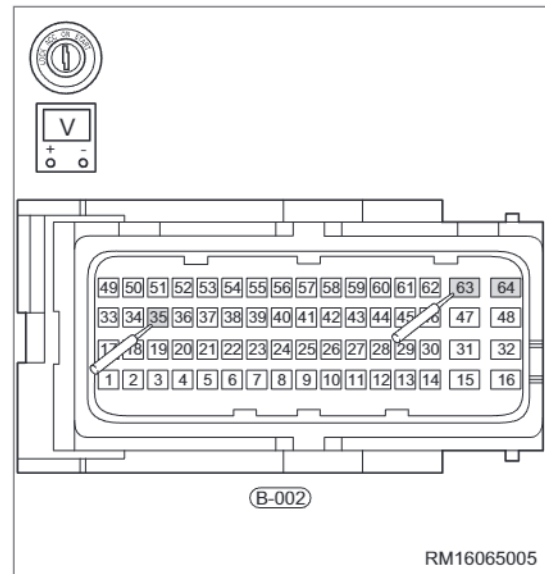
OK**7****Check ECM power supply circuit (ignition switch voltage)**

- Turn ignition switch to ON.
- Check the voltage between terminals of ECM connector.

Multimeter Connection	Condition	Specified Condition
B-002 (35) - B-002 (63, 64)	Ignition switch ON	11 to 14 V

OK

Replace ECM

**06****NG**

8 Check ECM fuse

- Unplug the fuse RF07 (10 A) from instrument panel fuse box.
- Check the resistance of fuse.

Standard resistance: less than 1 Ω

NG

Replace ECM fuse

OK

9 Check wire harness and connector (ECM - instrument panel fuse box and body ground)

06

- Disconnect the instrument pane fuse box connector I-009.
- Check the wire harness between connector terminals on wire harness side.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (35) - I-009 (A7)	Always	Continuity

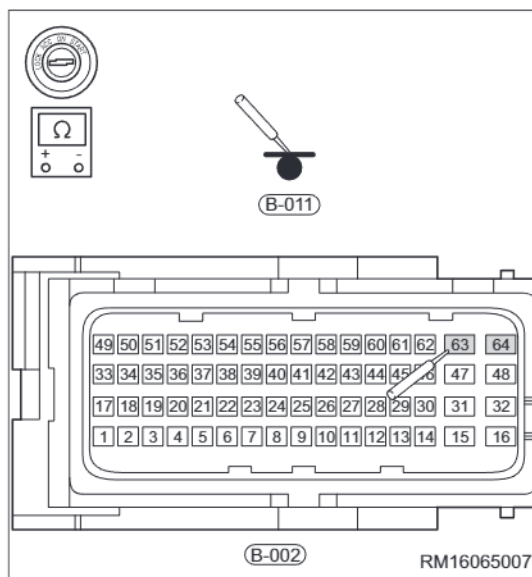
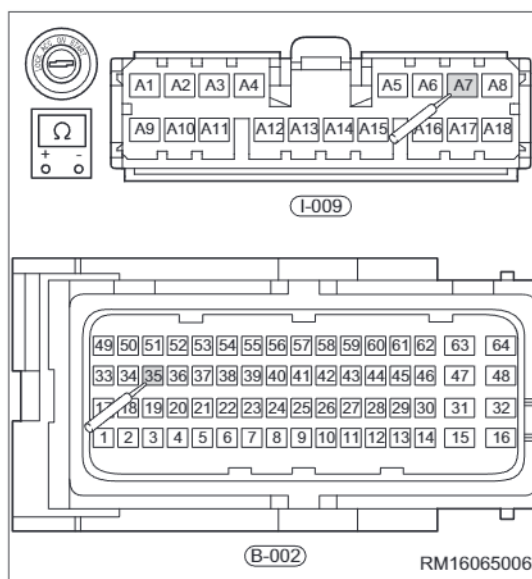
Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (35) or I-009 (A7) - Body ground	Always	No continuity
B-002 (35) or I-009 (A7) - Battery positive	Always	No continuity

- Disconnect the ECM ground points B-011 and E-013.
- Check the ECM ground points (See page 06-20).
- Check the ECM ground wire harness.

Check for Open

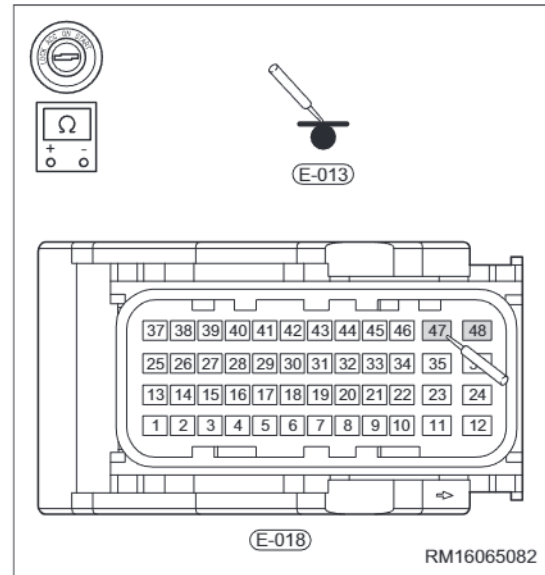
Multimeter Connection	Condition	Specified Condition
B-002 (63, 64) - B-011	Always	Continuity



Multimeter Connection	Condition	Specified Condition
E-018 (47, 48) - E-013	Always	Continuity

NG

Repair or replace wire harness or connector



06

OK

10

Check ignition switch assembly ([See page 15-75](#)) (w/o PEPS)
Check IGN1 relay, fuse EF19 and PEPS system (w/ PEPS)

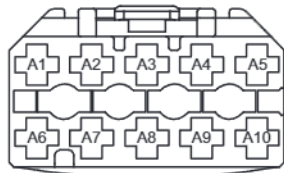
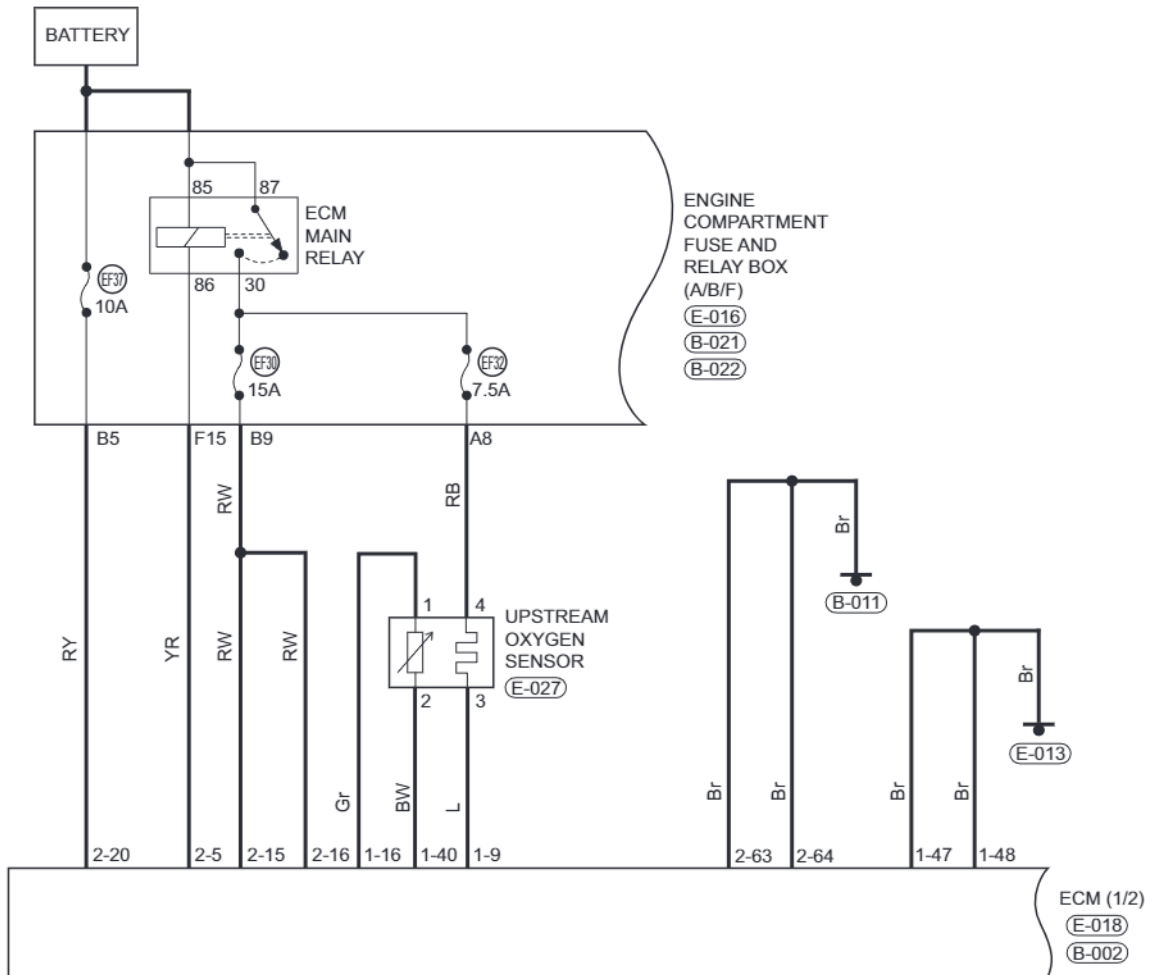
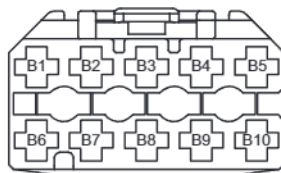
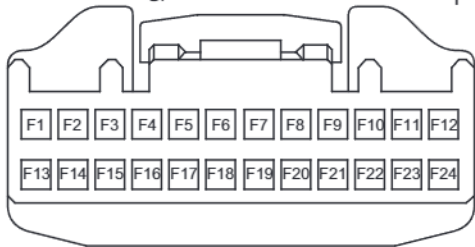
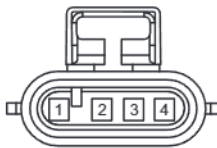
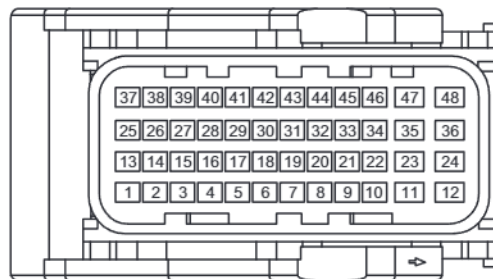
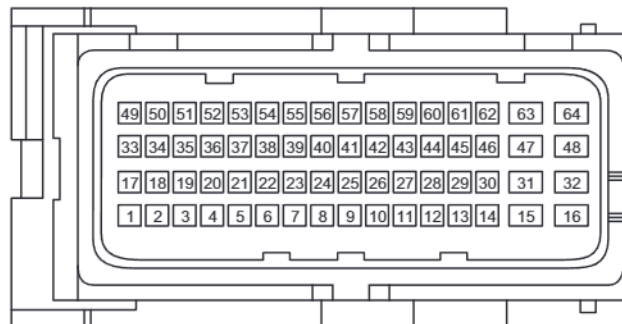
NG

Replace ignition switch assembly (w/o PEPS)
Replace IGN1 relay, fuse EF19 and PEPS system (w/ PEPS)

OK

Repair or replace instrument panel fuse box or wire harness (instrument panel fuse box - ignition switch) (w/o PEPS)
Repair or replace instrument panel fuse box or wire harness (instrument panel fuse box - engine compartment fuse and relay box) (w/ PEPS)

DTC	P0030-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 1)
DTC	P0031-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 1) Low
DTC	P0032-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 1) High
DTC	P0053-00	O2 Sensor Heater Resistance (Bank 1 (1) Sensor 1)


(E-016)
Gr

(B-021)
Y

(B-022)
W

(E-027)
B

(E-018)
B

(B-002)
B

EM16063002

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0030-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 1)	Ignition switch ON Engine running	- Upstream oxygen sensor - Wire harness or connector - Fuse - ECM
P0031-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 1) Low		
P0032-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 1) High		
P0053-00	O2 Sensor Heater Resistance (Bank 1 (1) Sensor 1)		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

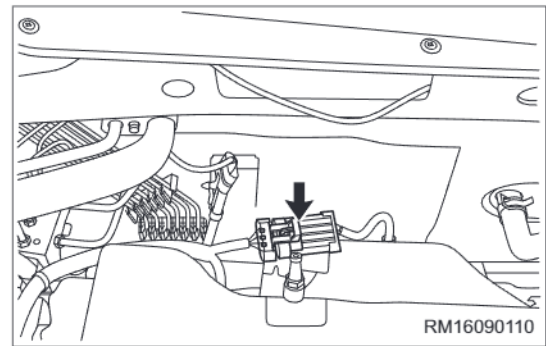
OK

2 Check upstream oxygen sensor connector

- a. Disconnect the upstream oxygen sensor connector E-027.
- b. Check the upstream oxygen sensor connector.

NG

Repair or replace connector



OK

3

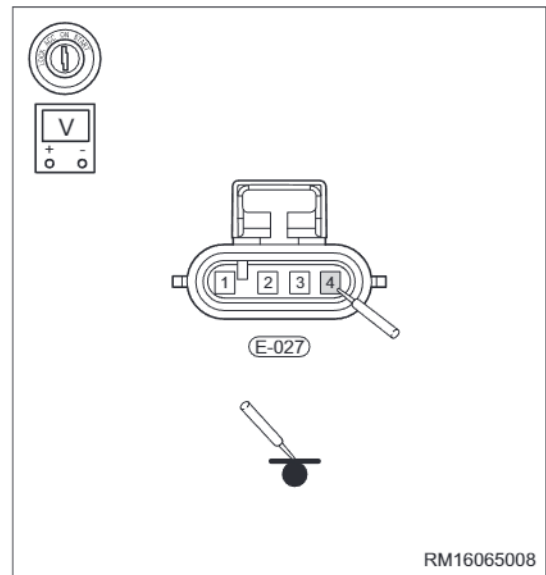
Check upstream oxygen sensor heater power supply voltage

- a. Turn ignition switch to ON.
- b. Check the voltage between terminal 4 of upstream oxygen sensor connector E-027 and body ground.

Multimeter Connection	Condition	Specified Condition
E-027 (4) - Body ground	Ignition switch ON	11 to 14 V

OK

Go to step 5



NG

4

Check upstream oxygen sensor power supply circuit

- Turn ignition switch to LOCK.
- Check the fuse EF32 and main relay.
- Disconnect the engine compartment fuse and relay box connector E-016.
- Check the wire harness between upstream oxygen sensor connector terminal and engine compartment fuse and relay box connector terminal.

Check for Open

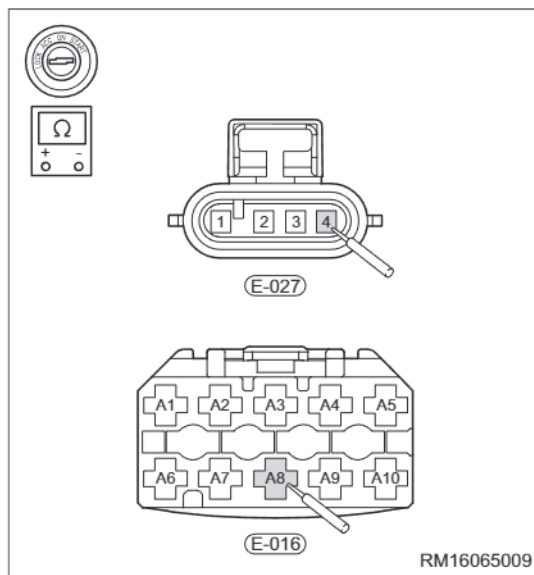
Multimeter Connection	Condition	Specified Condition
E-027 (4) - E-016 (A8)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-027 (4) or E-016 (A8) - Body ground	Always	No continuity
E-027 (4) or E-016 (A8) - Battery positive	Always	No continuity

NG

Replace fuse, main relay, wire harness or connector (upstream oxygen sensor - engine compartment fuse and relay box)

OK**5****Check upstream oxygen sensor heater control circuit**

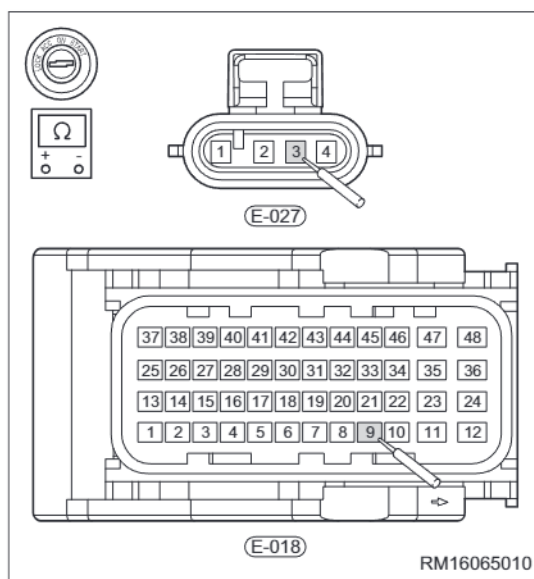
- Disconnect the ECM connector E-018.
- Check the wire harness between upstream oxygen sensor connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-027 (3) - E-018 (9)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-027 (3) or E-018 (9) - Body ground	Always	No continuity



Multimeter Connection	Condition	Specified Condition
E-027 (3) or E-018 (9) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (upstream oxygen sensor - ECM)

OK

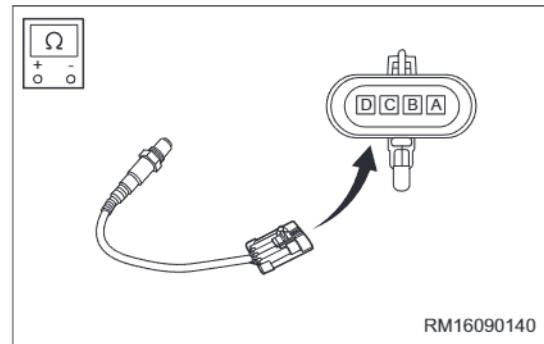
6

Check upstream oxygen sensor heater

06

- a. Measure the resistance of upstream oxygen sensor.

Multimeter Connection	Condition	Specified Condition
Terminal C - Terminal D	20°C	7 - 11 Ω
Terminal A - Terminal C Terminal A - Terminal D Terminal B - Terminal C Terminal B - Terminal D	Always	No continuity



NG

Replace upstream oxygen sensor

OK

7

Check for DTCs

- a. Using X-431 3G diagnostic tester, read ECM DTC.
b. Refer to "DTC confirmation procedure".
c. Check if DTC P0030-00, P0031-00, P0032-00 or P0053-00 still exists.

NG

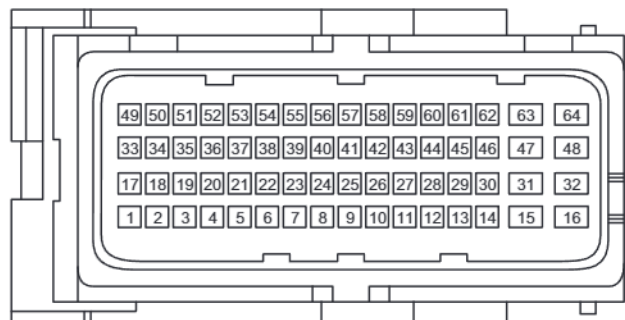
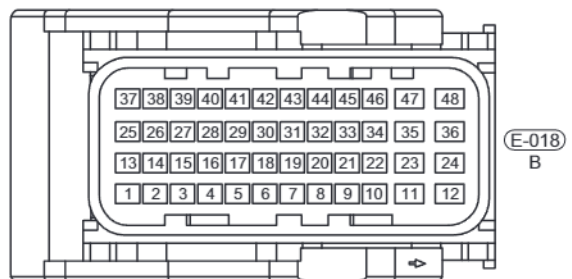
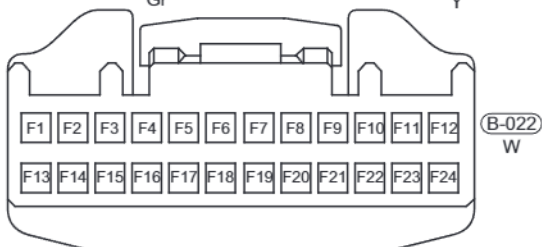
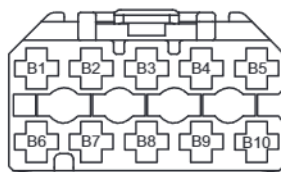
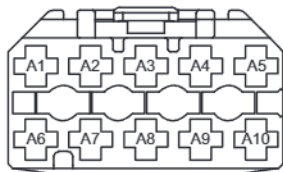
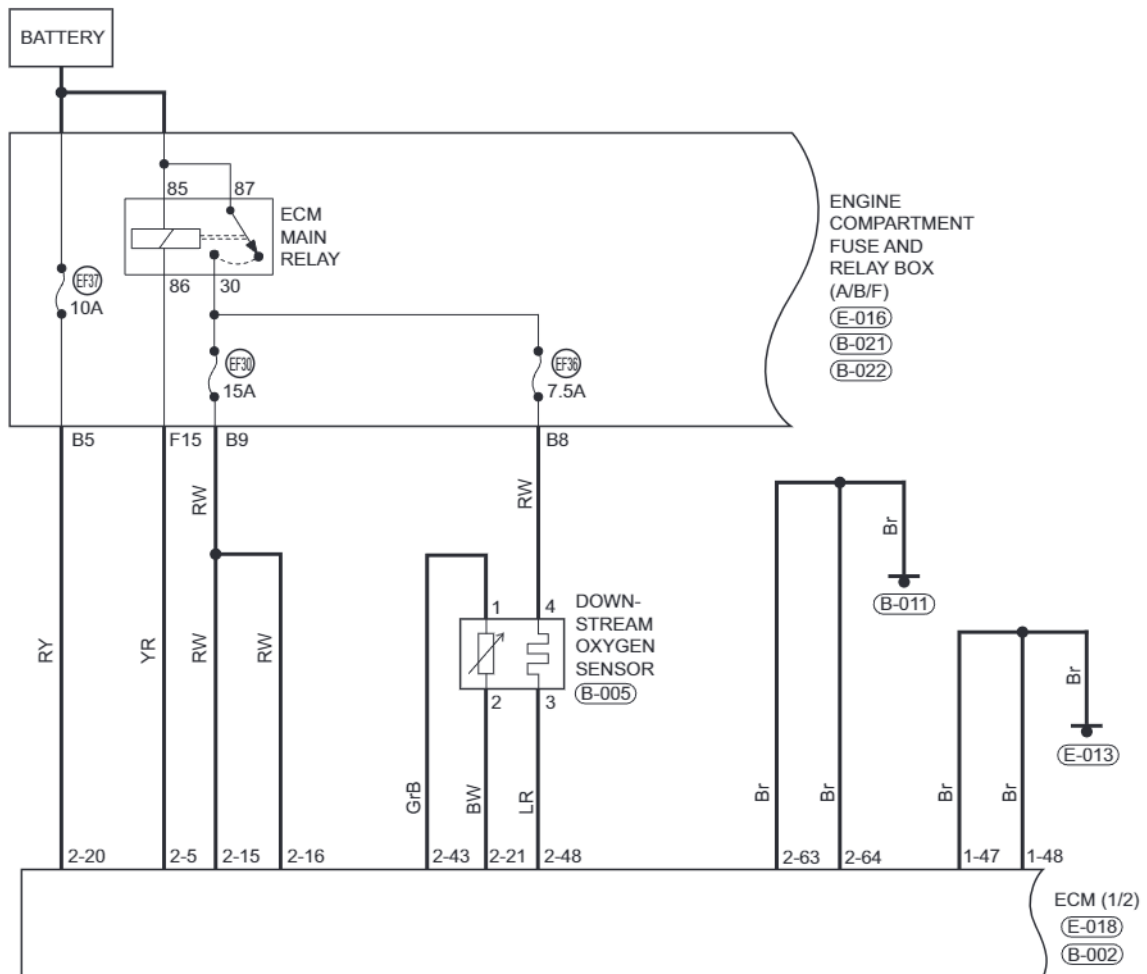
Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0036-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 2)
DTC	P0037-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 2) Low
DTC	P0038-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 2) High
DTC	P0054-00	O2 Sensor Heater Resistance (Bank 1 (1) Sensor 2)



EM16063003

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0036-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 2)	Ignition switch ON Engine running	- Downstream oxygen sensor - Wire harness or connector - Fuse - ECM
P0037-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 2) Low		
P0038-00	O2 Sensor Heater Contr. Circ. (Bank 1 (1) Sensor 2) High		
P0054-00	O2 Sensor Heater Resistance (Bank 1 (1) Sensor 2)		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

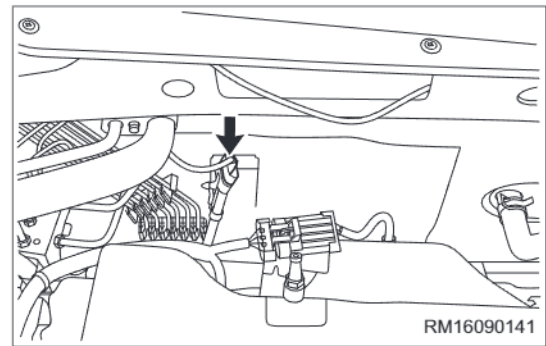
OK

2 Check downstream oxygen sensor connector

- a. Disconnect the downstream oxygen sensor connector B-005.
- b. Check the downstream oxygen sensor connector.

NG

Repair or replace connector



OK

3

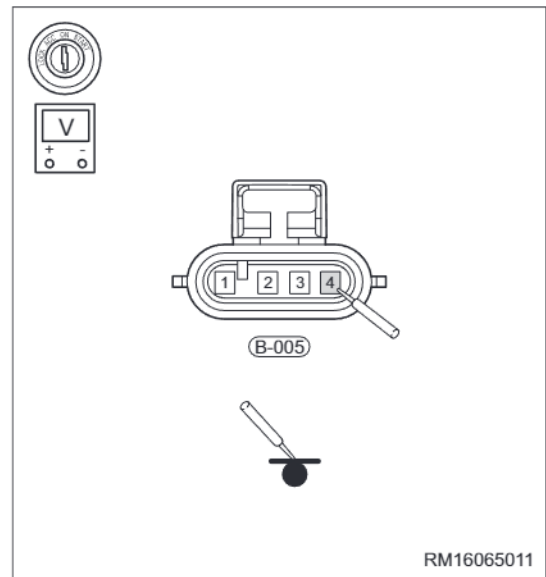
Check downstream oxygen sensor heater power supply voltage

- a. Turn ignition switch to ON.
- b. Check the voltage between terminal 4 of downstream oxygen sensor connector B-005 and body ground.

Multimeter Connection	Condition	Specified Condition
B-005 (4) - Body ground	Ignition switch ON	11 to 14 V

OK

Go to step 5



NG

4

Check downstream oxygen sensor power supply circuit

06

- Turn ignition switch to LOCK.
- Check the fuse EF36 and main relay.
- Disconnect the engine compartment fuse and relay box connector B-021.
- Check the wire harness between upstream oxygen sensor connector terminal and engine compartment fuse and relay box connector terminal.

Check for Open

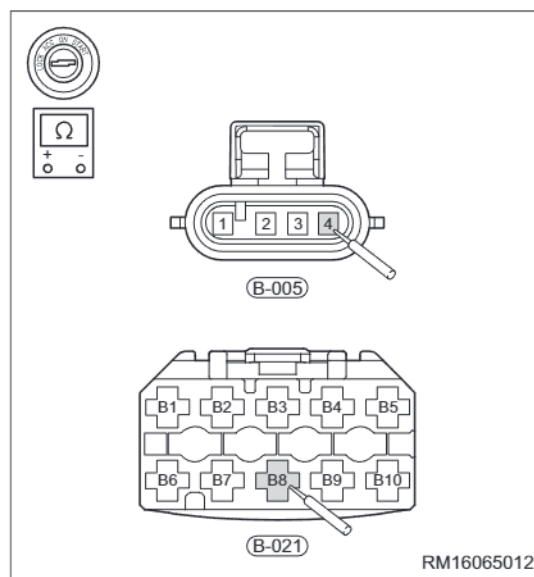
Multimeter Connection	Condition	Specified Condition
B-005 (4) - B-021 (B8)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-005 (4) or B-021 (B8) - Body ground	Always	No continuity
B-005 (4) or B-021 (B8) - Battery positive	Always	No continuity

NG

Replace fuse, main relay, wire harness or connector (downstream oxygen sensor - engine compartment fuse and relay box)

OK**5****Check downstream oxygen sensor heater control circuit**

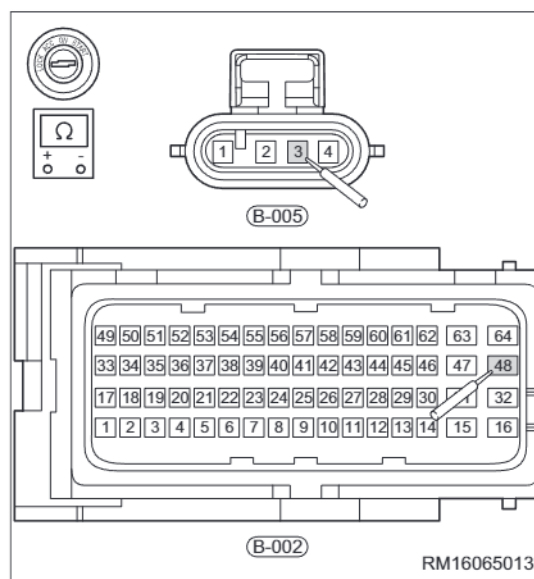
- Disconnect the ECM connector B-002.
- Check the wire harness between downstream oxygen sensor connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-005 (3) - B-002 (48)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-005 (3) or B-002 (48) - Body ground	Always	No continuity



Multimeter Connection	Condition	Specified Condition
B-005 (3) or B-002 (48) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (downstream oxygen sensor - ECM)

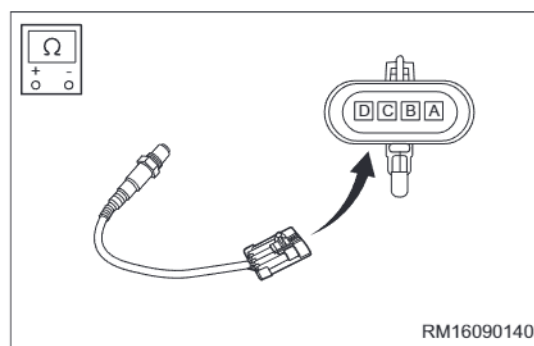
OK

6 Check downstream oxygen sensor heater

06

- a. Measure the resistance of downstream oxygen sensor.

Multimeter Connection	Condition	Specified Condition
Terminal C - Terminal D	20°C	7 - 11 Ω
Terminal A - Terminal C Terminal A - Terminal D Terminal B - Terminal C Terminal B - Terminal D	Always	No continuity



NG

Replace downstream oxygen sensor

OK

7 Check for DTCs

- a. Using X-431 3G diagnostic tester, read ECM DTC.
b. Refer to "DTC confirmation procedure".
c. Check if DTC P0036-00, P0037-00, P0038-00 or P0054-00 still exists.

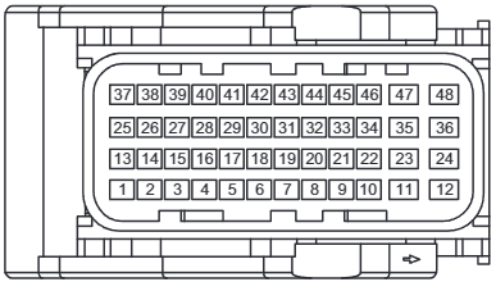
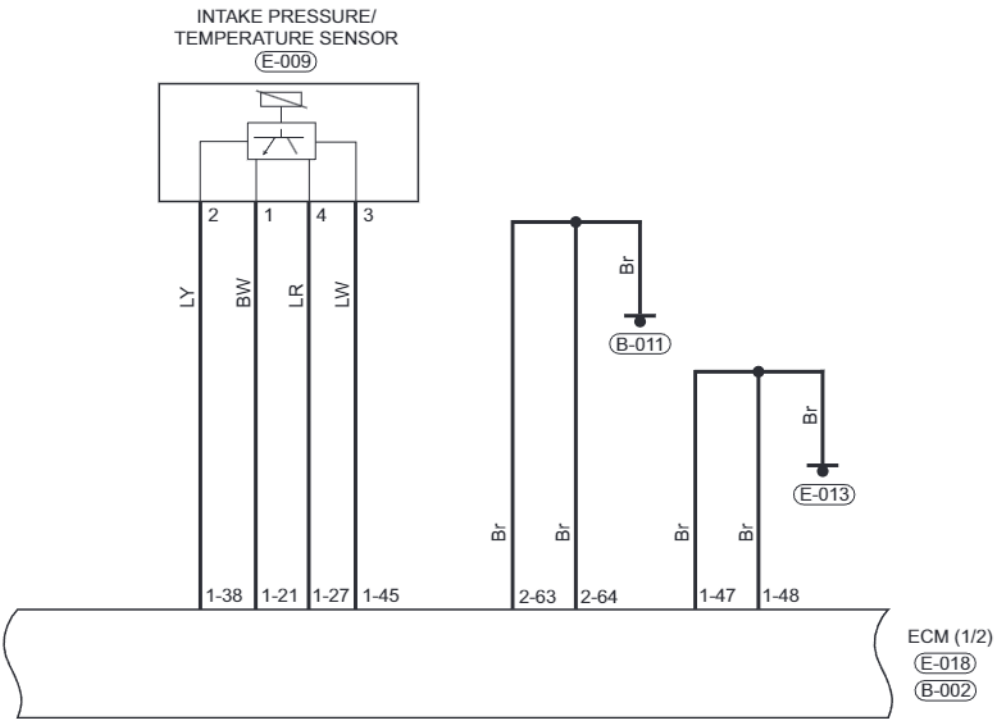
NG

Replace ECM

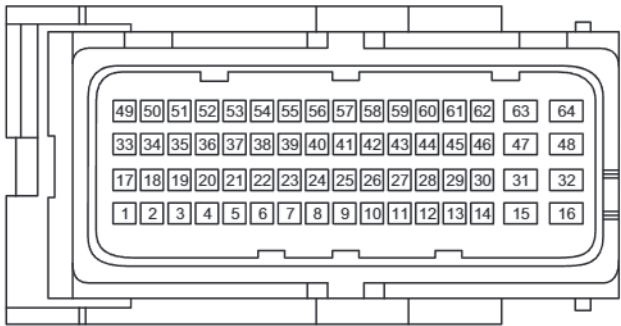
OK

System is operating normally.
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0105-00	Manifold Absolute Pressure/Barometric Pressure Circuit
DTC	P0106-00	Manifold Abs. Pressure or Bar. Pressure Range/ Performance
DTC	P0107-00	Manifold Abs. Pressure or Bar. Pressure Low Input
DTC	P0108-00	Manifold Abs. Pressure or Bar. Pressure High Input



(E-018)
B



(B-002)
B



(E-009)
B

EM16063004

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0105-00	Manifold Absolute Pressure/Barometric Pressure Circuit	Ignition switch ON Engine running	- Intake pressure sensor - Wire harness or connector - ECM
P0106-00	Manifold Abs. Pressure or Bar. Pressure Range/Performance		
P0107-00	Manifold Abs. Pressure or Bar. Pressure Low Input		
P0108-00	Manifold Abs. Pressure or Bar. Pressure High Input		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

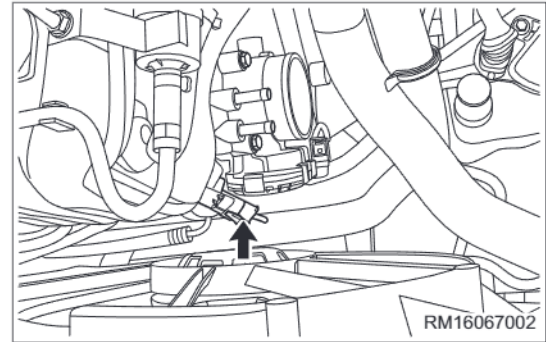
OK

2 Check intake pressure/temperature sensor connector

- Disconnect the intake pressure/temperature sensor connector E-009.
- Check if intake pressure/temperature sensor connector is damaged.

NG

Repair or replace connector



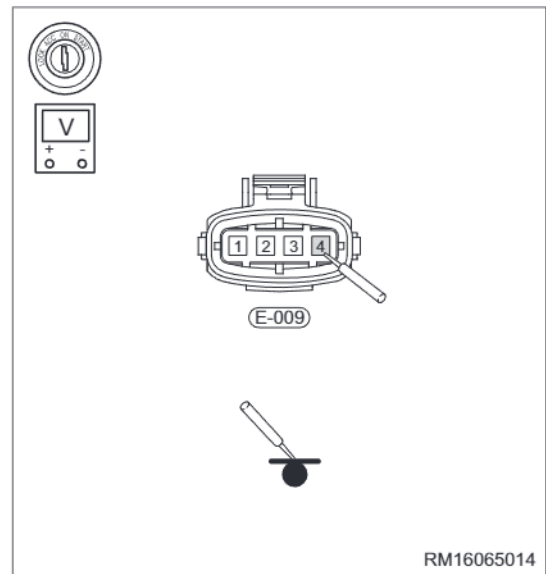
OK

06

3 Check intake pressure sensor signal voltage

- Connect the intake pressure/temperature sensor connector E-009.
- Turn ignition switch to ON and start engine.
- Using a multimeter, measure the voltage between terminal 4 of connector E-009 and body ground.

Multimeter Connection	Condition	Specified Condition
E-009 (4) - Body ground	Idle	Voltage is about 1.3 V (value changes with model)
	Rapidly depress accelerator pedal	Maximum instantaneous voltage is about 4 V (value changes with model)



OK

Go to step 8

NG

4 Check intake pressure sensor power supply voltage

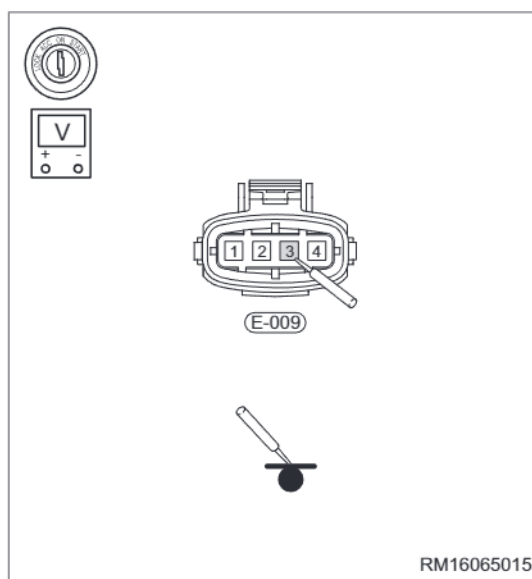
- Disconnect the intake pressure/temperature sensor connector E-009.
- Check the voltage between connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
E-009 (3) - Body ground	Ignition switch ON	5 V

OK

Go to step 6

06



RM16065015

NG

5 Check intake pressure sensor power supply circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector E-018.
- Check the wire harness between connector terminals.

Check for Open

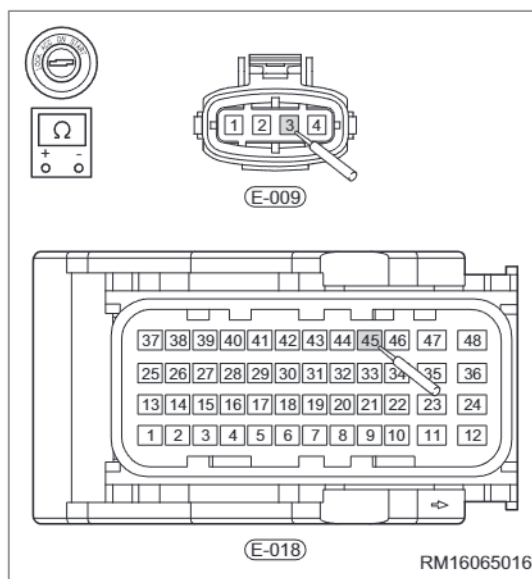
Multimeter Connection	Condition	Specified Condition
E-009 (3) - E-018 (45)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-009 (3) or E-018 (45) - Body ground	Always	No continuity
E-009 (3) or E-018 (45) - Battery positive	Always	No continuity

NG

Replace wire harness or connector (intake pressure/temperature sensor - ECM)



RM16065016

OK

6 Check intake pressure sensor signal circuit

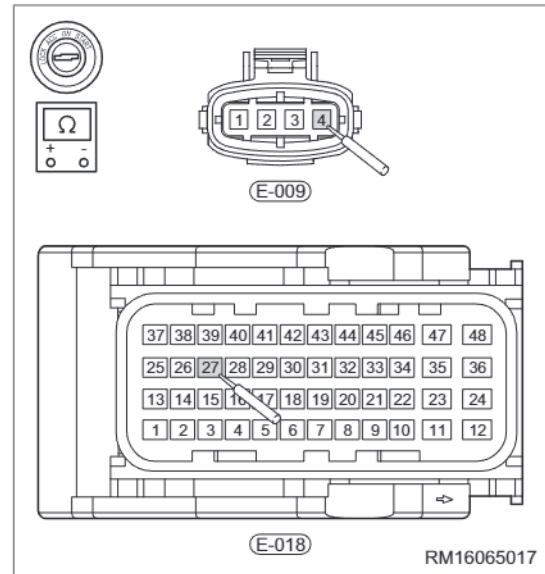
- a. Check the wire harness between intake pressure/temperature sensor connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-009 (4) - E-018 (27)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-009 (4) or E-018 (27) - Body ground	Always	No continuity
E-009 (4) or E-018 (27) - Battery positive	Always	No continuity



NG

Repair or replace wire harness or connector (intake pressure/temperature sensor - ECM)

OK

7 Check intake pressure sensor

- a. Remove the intake pressure/temperature sensor.
b. Check sensor connection part for debris and damage.

NG

Clean or replace intake pressure/temperature sensor

OK

06

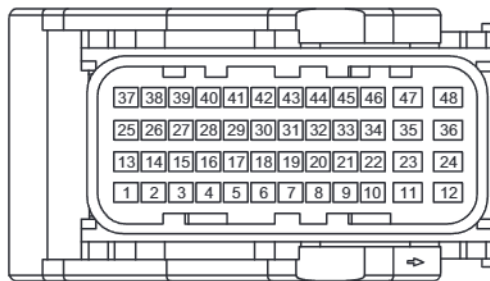
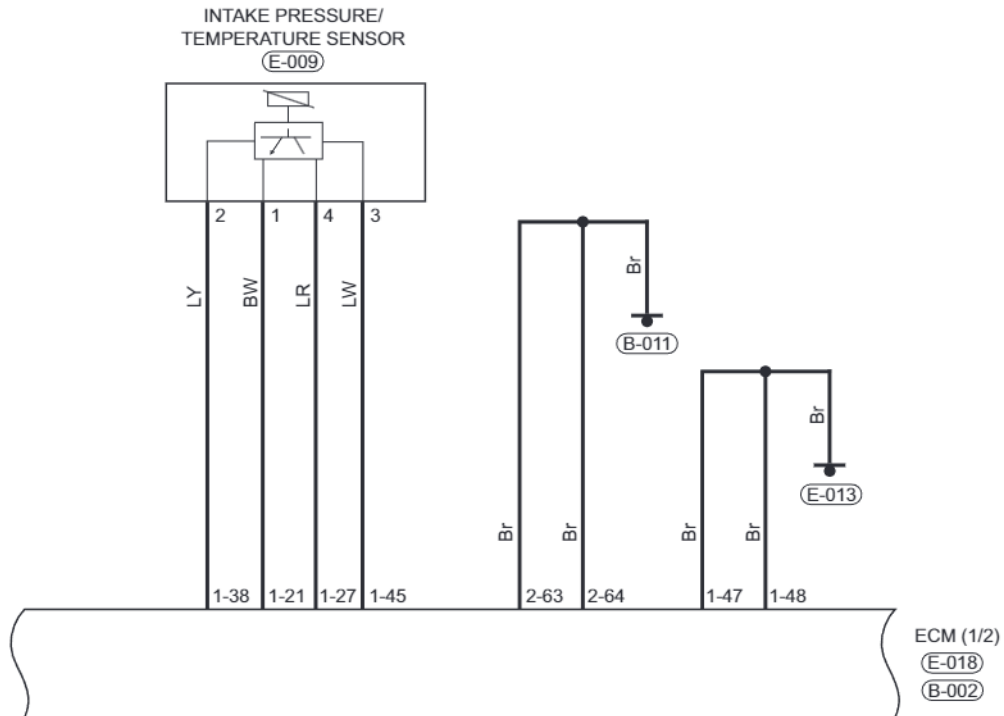
8**Check for DTCs**

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P0105-00, P0106-00, P0107-00 or P0108-00 still exists.

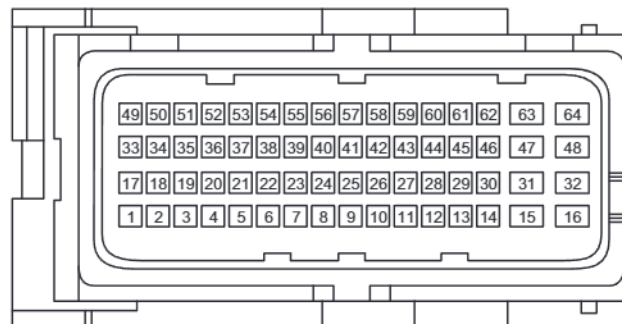
NG**Replace ECM****OK****System is operating normally.****Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.****06**

DTC	P0112-00	Intake Air Temp. Circ. Low Input
-----	----------	----------------------------------

DTC	P0113-00	Intake Air Temp. Circ. High Input
-----	----------	-----------------------------------



(E-018)
B



(B-002)
B



(E-009)
B

EM16063004

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0112-00	Intake Air Temp. Circ. Low Input	Ignition switch ON Engine running	- Intake temperature sensor - Wire harness or connector - ECM
P0113-00	Intake Air Temp. Circ. High Input		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

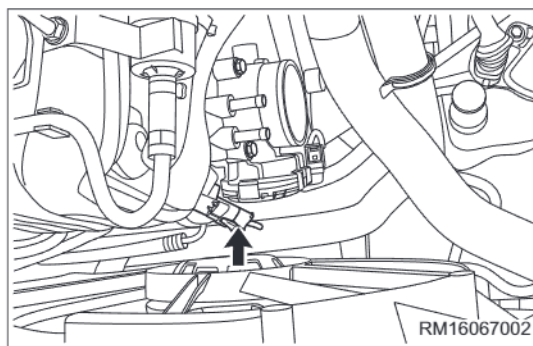
OK

2 Check intake pressure/temperature sensor connector

- Disconnect the intake pressure/temperature sensor connector E-009.
- Check if intake pressure/temperature sensor connector is damaged.

NG

Repair or replace connector



OK

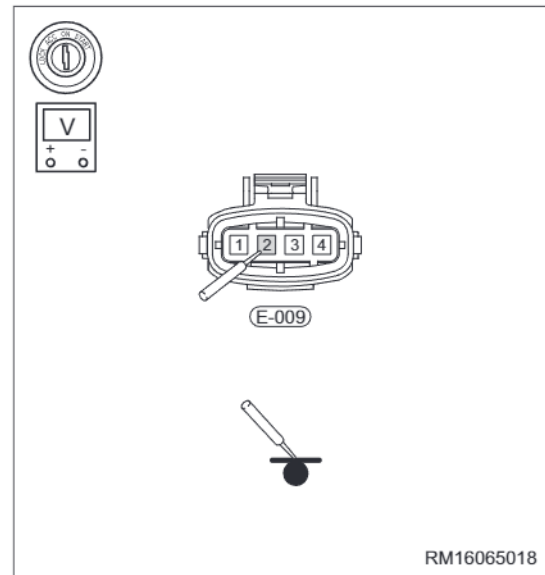
3 Check intake temperature sensor voltage

- Disconnect the intake pressure/temperature sensor connector E-009.
- Turn ignition switch to ON.
- Check the voltage between connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
E-009 (2) - Body ground	Ignition switch ON	5 V

OK

Go to step 5



RM16065018

NG

4 Check intake temperature sensor signal circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector E-018.
- Check the wire harness between connector terminal and ECM connector terminal.

Check for Open

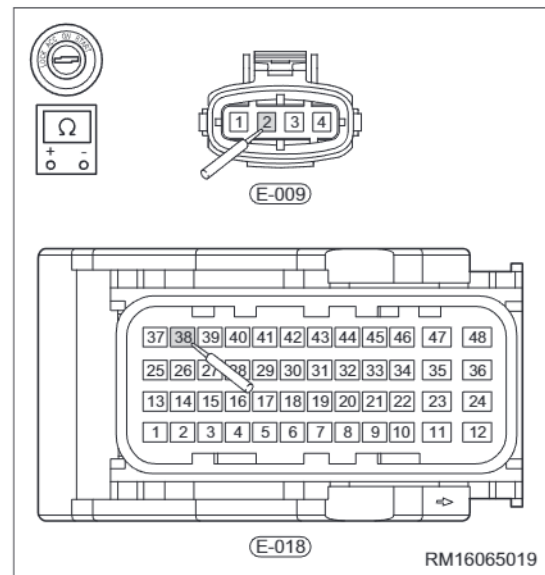
Multimeter Connection	Condition	Specified Condition
E-009 (2) - E-018 (38)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-009 (2) or E-018(38) - Body ground	Always	No continuity
E-009 (2) or E-018 (38) - Battery positive	Always	No continuity

NG

Replace wire harness or connector (intake pressure/temperature sensor - ECM)



RM16065019

06

OK

5 Check intake temperature sensor ground circuit

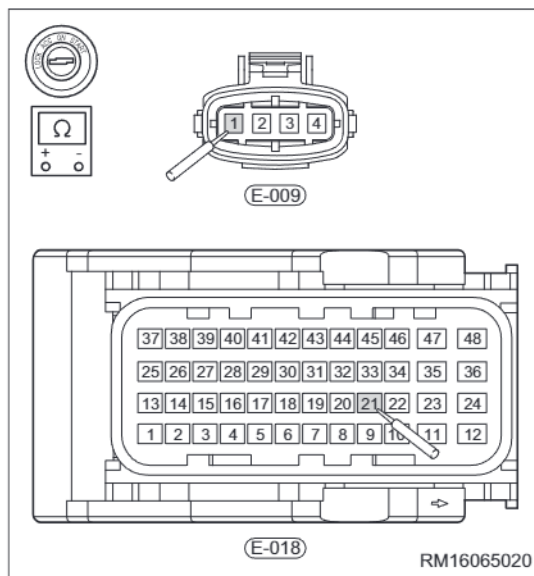
- a. Check the wire harness between connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-009 (1) - E-018 (21)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-009 (1) or E-018(21) - Body ground	Always	No continuity
E-009 (1) or E-018 (21) - Battery positive	Always	No continuity



NG

Repair or replace wire harness or connector (intake pressure/temperature sensor - ECM)

OK

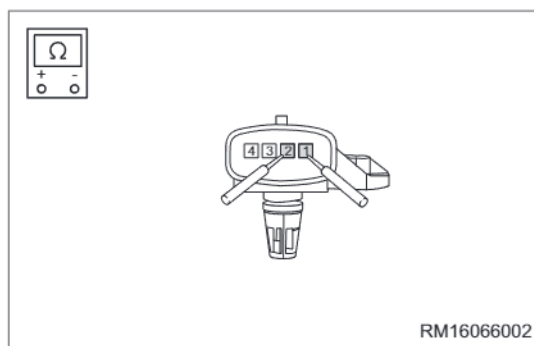
6 Check intake temperature sensor

- a. Remove the intake pressure/temperature sensor.
b. Check the resistance of intake temperature sensor.

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Always	2.5 kΩ ± 5% (20°C)

NG

Replace intake pressure/temperature sensor



OK

7 Check for DTCs

- a. Using X-431 3G diagnostic tester, read ECM DTC.
b. Refer to "DTC confirmation procedure".
c. Check if DTC P0112-00 or P0113-00 still exists.

NG

Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

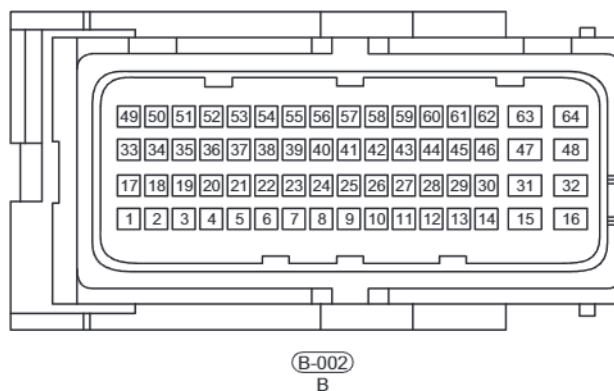
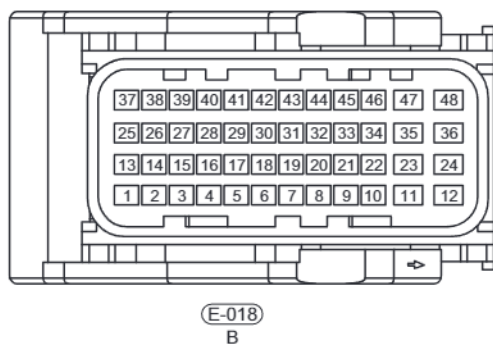
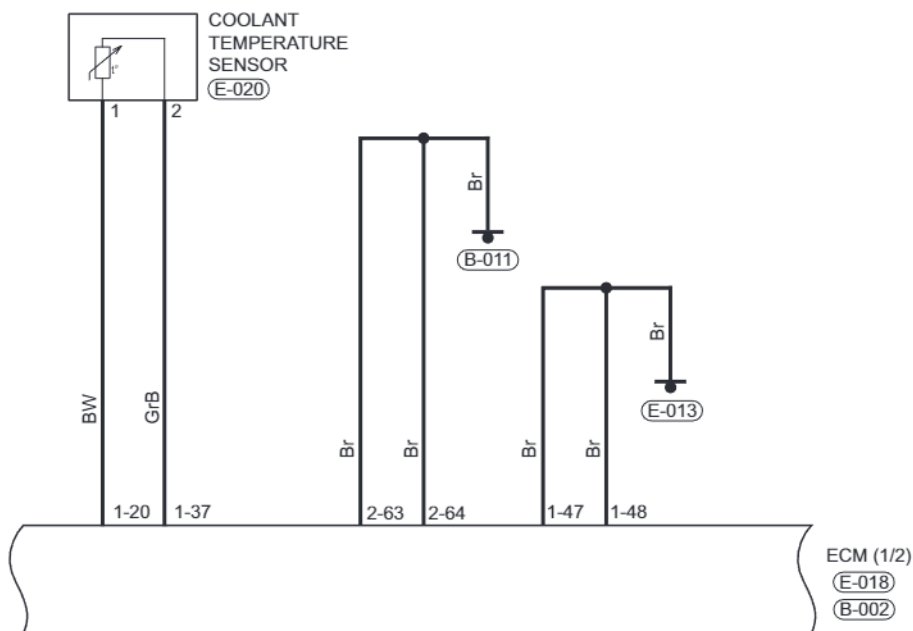
06

DTC	P0116-00	Engine Coolant Temp. Circ. Range/Performance
-----	----------	--

DTC	P0117-00	Engine Coolant Temp. Circ. Low Input
-----	----------	--------------------------------------

DTC	P0118-00	Engine Coolant Temp. Circ. High Input
-----	----------	---------------------------------------

06



EM16063005

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0116-00	Engine Coolant Temp. Circ. Range/Performance	Ignition switch ON Engine running	- Engine coolant temperature sensor - Wire harness or connector - ECM
P0117-00	Engine Coolant Temp. Circ. Low Input		
P0118-00	Engine Coolant Temp. Circ. High Input		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

06

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

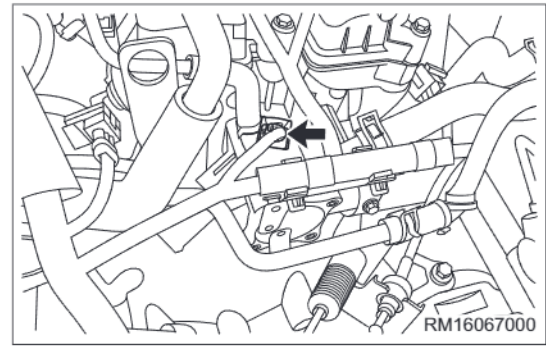
OK

2 Check engine coolant temperature sensor connector

- Disconnect the engine coolant temperature sensor connector E-0020.
- Check the engine coolant temperature sensor connector.

NG

Repair or replace connector



OK

06

3

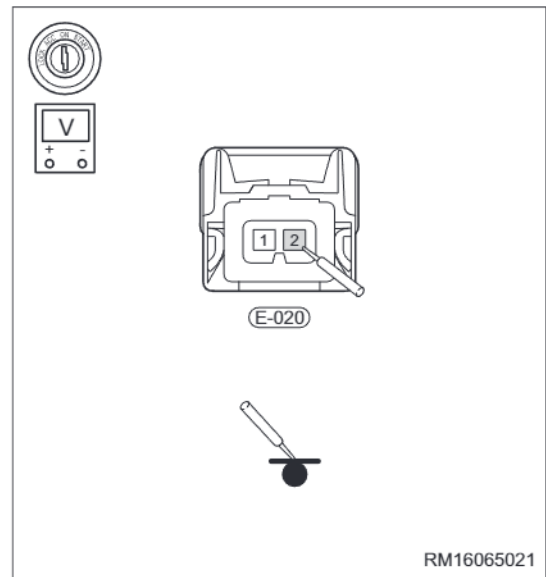
Check engine coolant temperature sensor power supply voltage

- Turn ignition switch to ON.
- Check the voltage between engine coolant temperature sensor terminal and body ground.

Multimeter Connection	Condition	Specified Condition
E-020 (2) - Body ground	Ignition switch ON	5 V

OK

Go to step 5



NG

4 Check engine coolant temperature sensor power supply circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector E-018.
- Check the wire harness between engine coolant temperature sensor connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-020 (2) - E-018 (37)	Always	Continuity

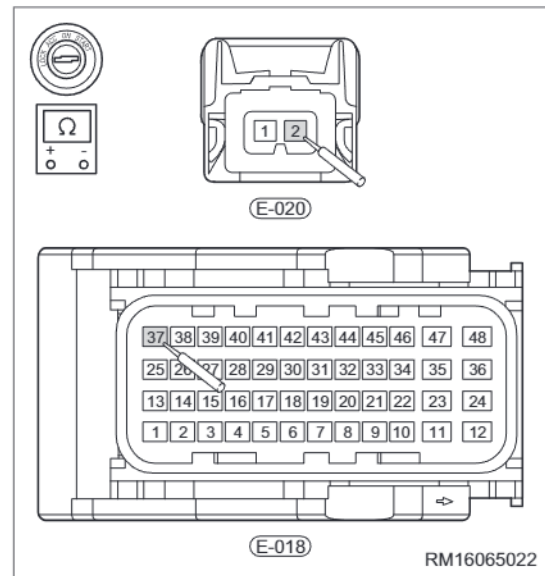
Check for Short

Multimeter Connection	Condition	Specified Condition
E-020 (2) or E-018 (37) - Body ground	Always	No continuity
E-020 (2) or E-018 (37) - Battery positive	Always	No continuity

NG

Replace wire harness or connector (engine coolant temperature sensor - ECM)

OK



5 Check engine coolant temperature sensor ground circuit

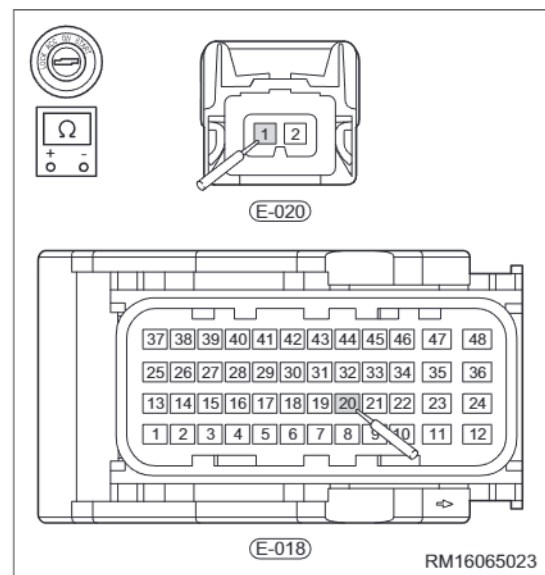
- Check the wire harness between engine coolant temperature sensor connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-020 (1) - E-018 (20)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-020 (1) or E-018 (20) - Body ground	Always	No continuity



Multimeter Connection	Condition	Specified Condition
E-020 (1) or E-018 (20) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (engine coolant temperature sensor - ECM)

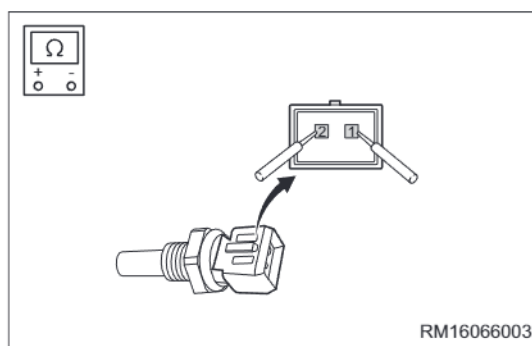
OK

06

6 Check engine coolant temperature sensor

- Remove the engine coolant temperature sensor.
- Check the engine coolant temperature sensor.

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Always	Resistance is $2.5\text{ k}\Omega \pm 5\%$ (20°C), 300 - 400 Ω in boiled water (value changes with boiled water temperature)



NG

Replace engine coolant temperature sensor

OK

7 Check for DTCs

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0116-00, P0117-00 or P0118-00 still exists.

NG

Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0121-00	Throttle/Pedal Pos. Sensor A Circ. Range/Performance	Ignition switch ON Engine running	- Throttle position sensor 1 - Wire harness or connector - ECM
P0122-00	Throttle/Pedal Pos. Sensor A Circ. Low Input		
P0123-00	Throttle/Pedal Pos. Sensor A Circ. High Input		

06

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure**1****Check ECM ground point**

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

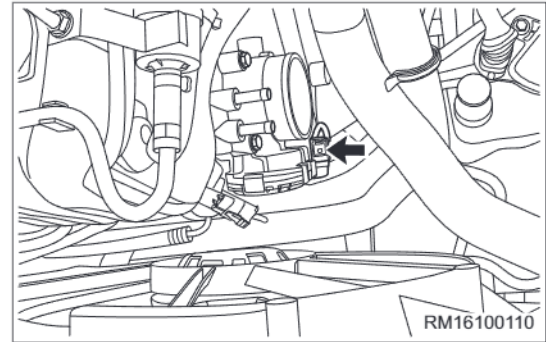
OK

2 Check electronic throttle connector

- Disconnect electronic throttle connector E-012.
- Check electronic throttle connector.

NG

Repair or replace connector



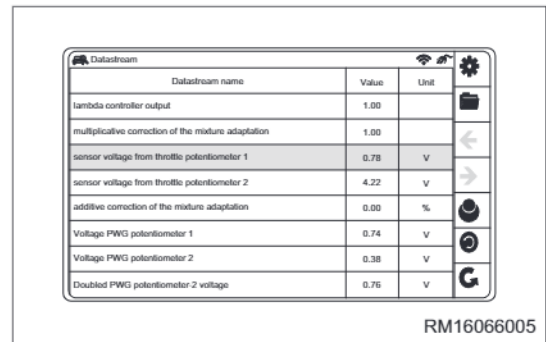
OK

06

3 Check throttle position sensor 1 signal voltage

- Connect the electronic throttle connector E-012.
- Turn ignition switch to ON.
- Using diagnostic tester, check the signal voltage of throttle position sensor 1.

Condition	Standard Value (V)
Accelerator pedal released	0.78
Accelerator pedal depressed	4.22



OK

Go to step 8

NG

4 Check throttle position sensor power supply voltage

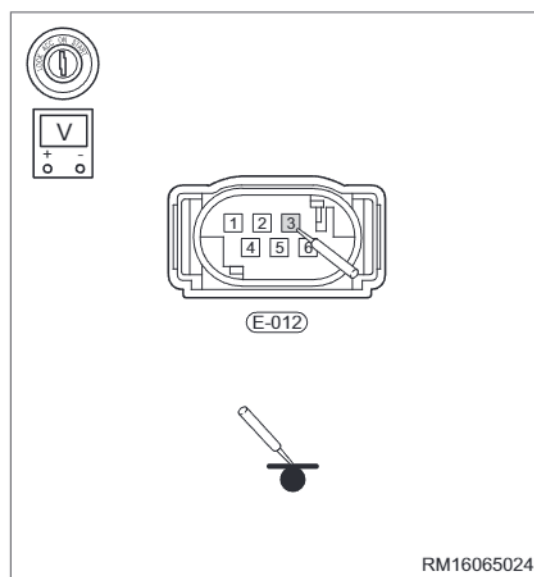
- Turn ignition switch to LOCK.
- Disconnect electronic throttle connector E-012.
- Turn ignition switch to ON and check the voltage between electronic throttle connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
E-012 (3) - Body ground	Ignition switch ON	5 V

OK

Go to step 6

06



NG

5 Check throttle position sensor power supply circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector E-018.
- Check the wire harness between electronic throttle connector terminal and ECM connector terminal.

Check for Open

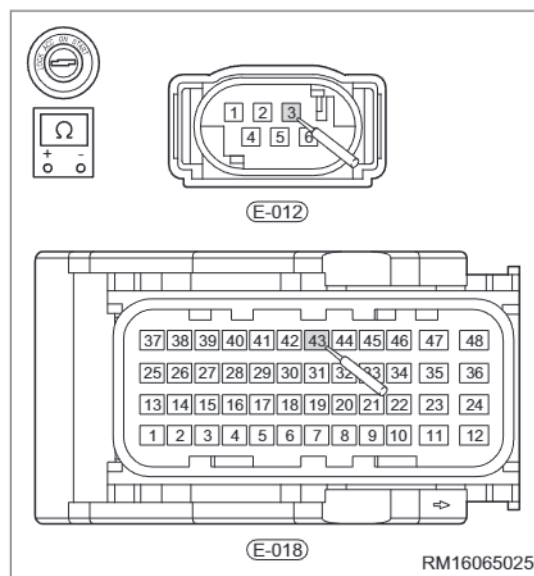
Multimeter Connection	Condition	Specified Condition
E-012 (3) - E-018 (43)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-012 (3) or E-018 (43) - Body ground	Always	No continuity
E-012 (3) or E-018 (43) - Battery positive	Always	No continuity

NG

Replace wire harness or connector (electronic throttle - ECM)



OK

6**Check throttle position sensor 1 signal circuit and ground circuit**

- a. Check the wire harness between electronic throttle connector terminal and ECM connector terminal.

Check for Open

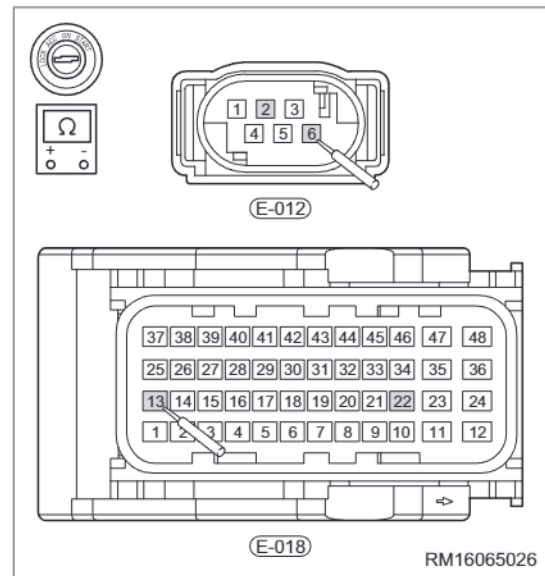
Multimeter Connection	Condition	Specified Condition
E-012 (6) - E-018 (13)	Always	Continuity
E-012 (2) - E-018 (22)		Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-012 (6) or E-018 (13) - Body ground	Always	No continuity
E-012 (6) or E-018 (13) - Battery positive		No continuity
E-012 (2) or E-018 (22) - Body ground		No continuity
E-012 (2) or E-018 (22) - Battery positive		No continuity

NG

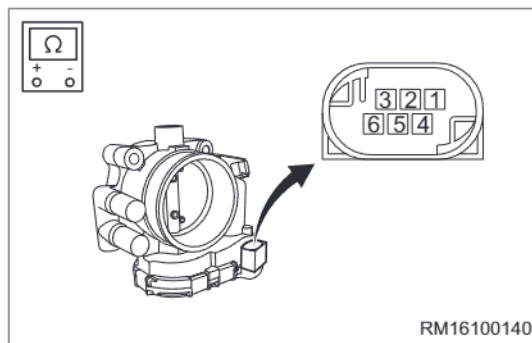
Repair or replace wire harness or connector (electronic throttle - ECM)

**06****OK**

7**Check electronic throttle**

- Check electronic throttle for carbon deposits and foreign matter accumulation inside.
- Check if throttle valve body is stuck.
- Check the resistance of electronic throttle.

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 2	At normal temperature	1.067 k Ω
Terminal 6 - Terminal 2	Throttle valve is rotated	Resistance increases as throttle valve opens
Terminal 6 - Terminal 3		Resistance decreases as throttle valve opens

**NG**

Clean or replace electronic throttle assembly, and go to next step

OK**8****Check for DTCs**

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0121-00, P0122-00 or P0123-00 still exists.

NG

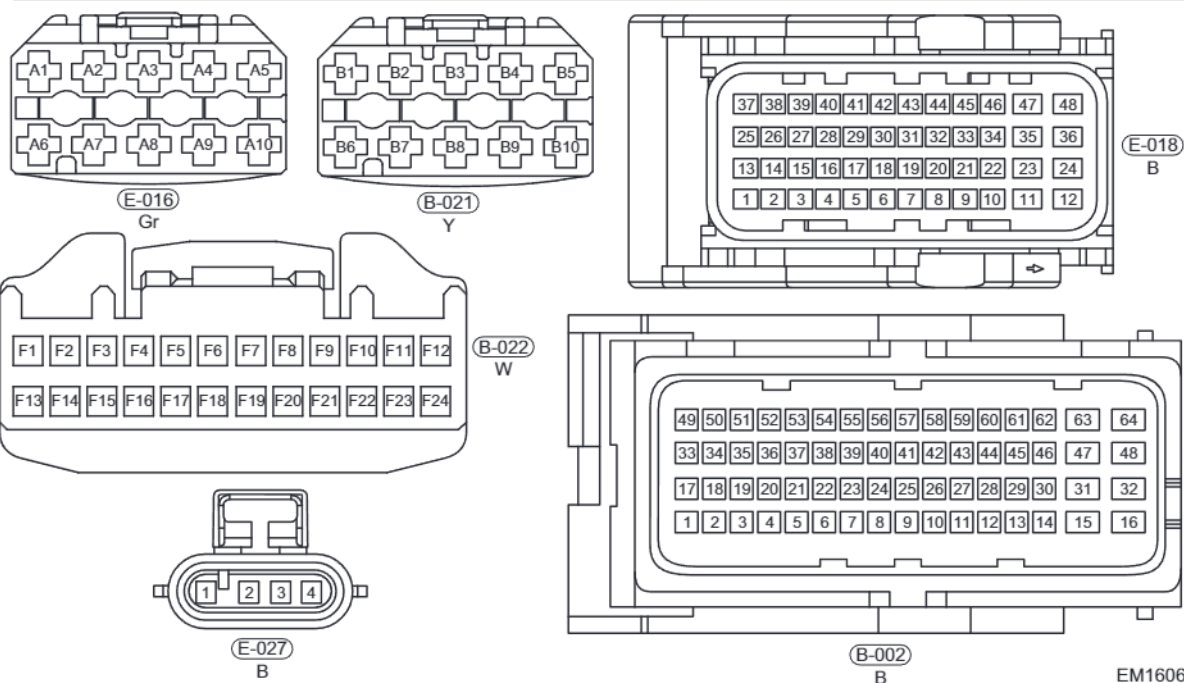
Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0130-00	O2 Sensor Circ., Bank 1-Sensor 1 Malfunction
DTC	P0131-00	O2 Sensor Circ., Bank 1-Sensor 1 Low Voltage
DTC	P0132-00	O2 Sensor Circ., Bank 1-Sensor 1 High Voltage
DTC	P0133-00	O2 Sensor Circ., Bank 1-Sensor 1 Slow Response
DTC	P0134-00	O2 Sensor Circ., Bank 1-Sensor 1 No Activity Detected
DTC	P2195-00	O2 Sensor Signal Stuck Lean; Bank 1 Sensor 1
DTC	P2196-00	O2 Sensor Signal Stuck Rich; Bank 1 Sensor 1



DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0130-00	O2 Sensor Circ., Bank 1 - Sensor 1 Malfunction	Ignition switch ON Engine running	- Upstream oxygen sensor - Wire harness or connector - ECM
P0131-00	O2 Sensor Circ., Bank 1 - Sensor 1 Low Voltage		
P0132-00	O2 Sensor Circ., Bank 1 - Sensor 1 High Voltage		
P0133-00	O2 Sensor Circ., Bank 1 - Sensor 1 Slow Response		
P0134-00	O2 Sensor Circ., Bank 1 - Sensor 1 No Activity Detected		
P2195-00	O2 Sensor Signal Stuck Lean; Bank 1 Sensor 1		
P2196-00	O2 Sensor Signal Stuck Rich; Bank 1 Sensor 1		

06

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point



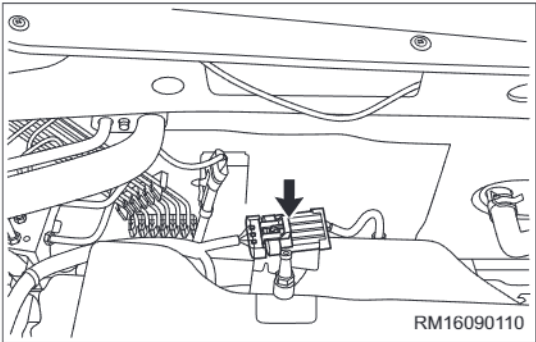
OK

2 Check upstream oxygen sensor connector

- a. Disconnect the upstream oxygen sensor connector E-027.
- b. Check the upstream oxygen sensor connector.

NG

Repair or replace connector



OK

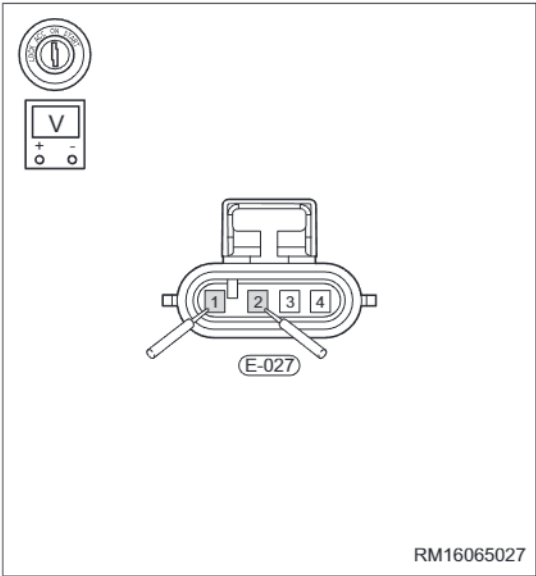
3 Check upstream oxygen sensor signal

- a. Connect the upstream oxygen sensor connector E-027.
- b. Turn ignition switch to ON, start engine and idle it for about 3 minutes.
- c. Using a multimeter, measure the voltage between terminals 2 and 1 of connector E-027.

Multimeter Connection	Condition	Specified Condition
E-027 (2) - E-027 (1)	Engine running	Fluctuates fast between 0.1 and 0.9 V (when operating temperature is 350°C)

OK

Go to step 7



NG

4 Check upstream oxygen sensor signal circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector E-018.
- Disconnect the upstream oxygen sensor connector E-027.
- Check the wire harness between upstream oxygen sensor connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-027 (2) - E-018 (40)	Always	Continuity

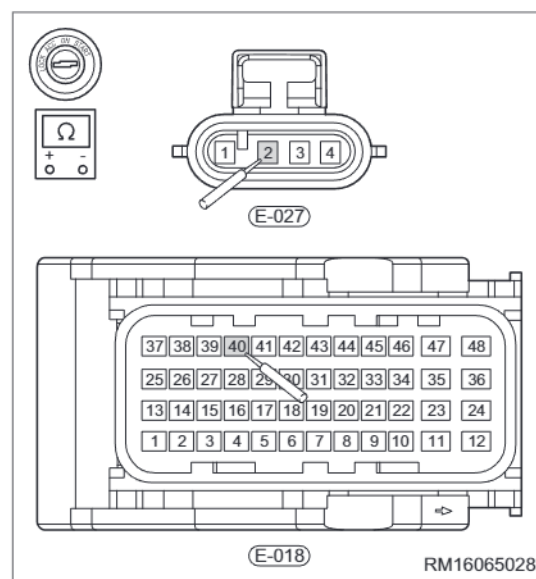
Check for Short

Multimeter Connection	Condition	Specified Condition
E-027 (2) or E-018 (40) - Body ground	Always	No continuity
E-027 (2) or E-018 (40) - Battery positive	Always	No continuity

NG

Replace wire harness or connector
(upstream oxygen sensor - ECM)

OK



5 Check upstream oxygen sensor ground circuit

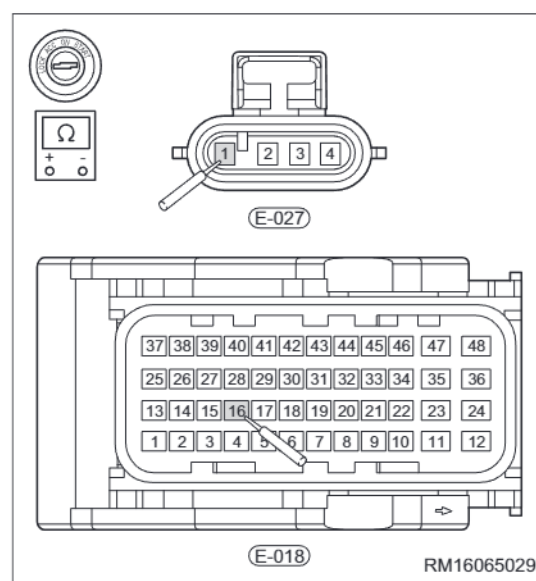
- Check the wire harness between upstream oxygen sensor connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-027 (1) - E-018 (16)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-027 (1) or E-018 (16) - Body ground	Always	No continuity
E-027 (1) or E-018 (16) - Battery positive	Always	No continuity



NG

Repair or replace wire harness or connector
(upstream oxygen sensor - ECM)

OK

6

Check upstream oxygen sensor

- a. Remove the upstream oxygen sensor.
- b. Check upstream oxygen sensor for the following problems.
 - Moisture enters the internal of sensor, temperature changes greatly or probe is broken.
 - Oxygen sensor is "poisoned" (Pb, S, Br and Si etc.).

NG

Replace upstream oxygen sensor

OK

7

Check for DTCs

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P0130-00, P0131-00, P0132-00, P0133-00, P0134-00, P2195-00 or P2196-00 still exists.

NG

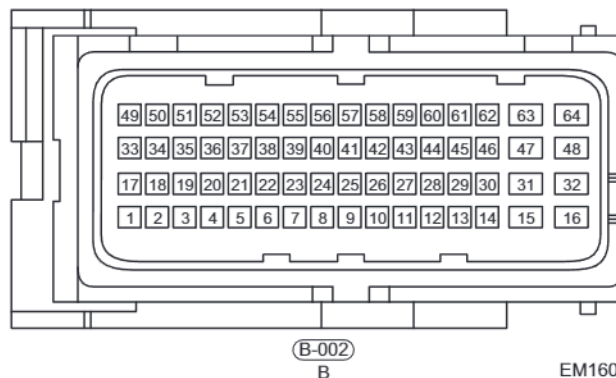
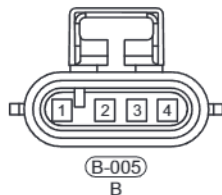
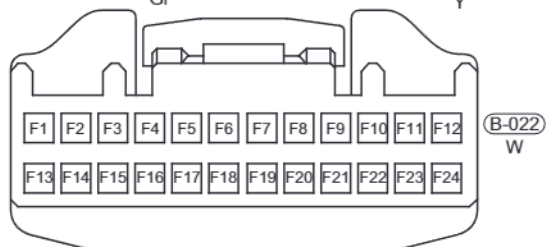
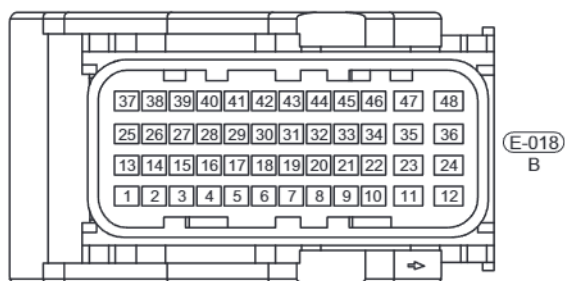
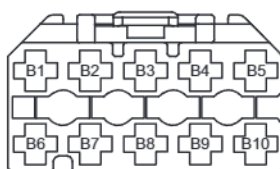
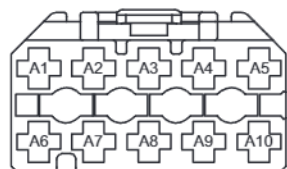
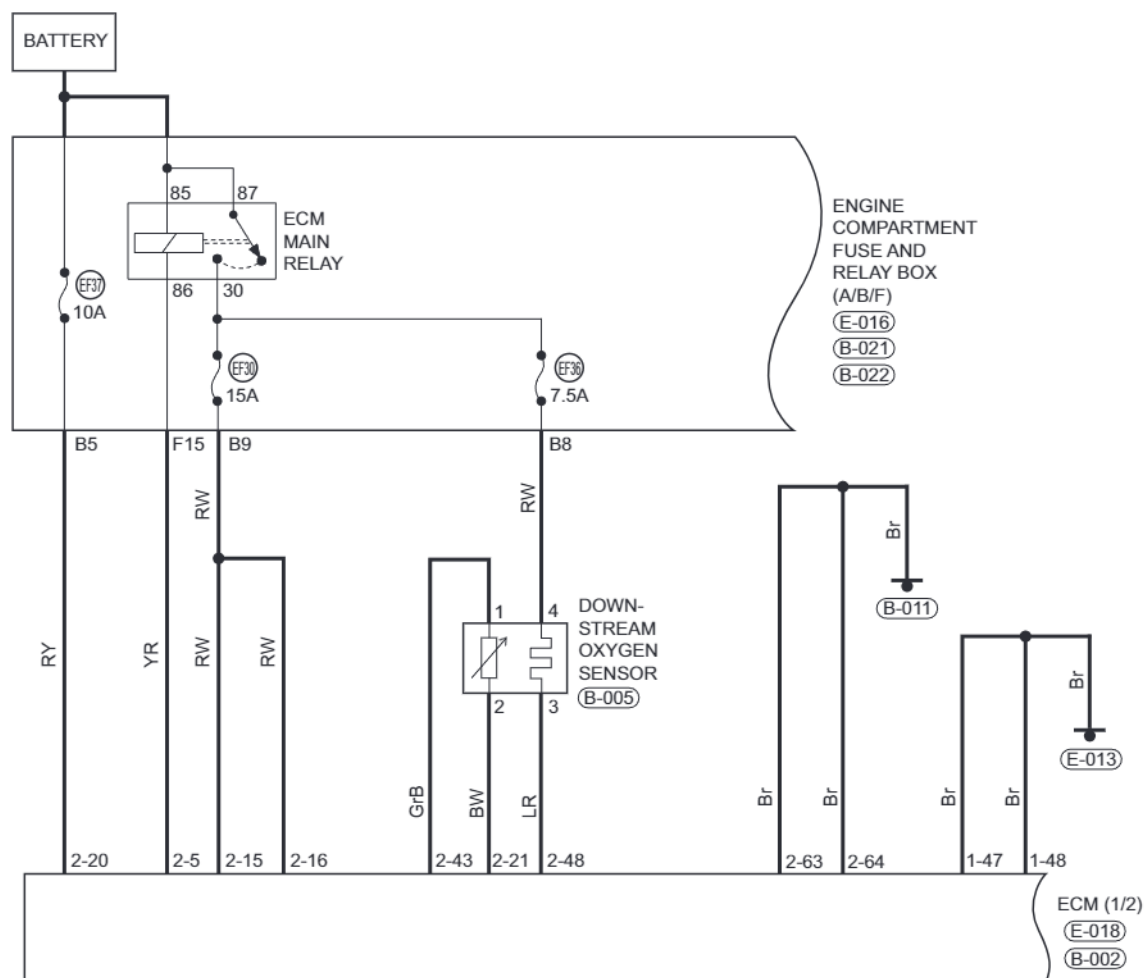
Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0136-00	O2 Sensor Circ., Bank 1-Sensor 2 Malfunction
DTC	P0137-00	O2 Sensor Circ., Bank 1-Sensor 2 Low Voltage
DTC	P0138-00	O2 Sensor Circ., Bank 1-Sensor 2 High Voltage
DTC	P0140-00	O2 Sensor Circ., Bank 1-Sensor 2 No Activity Detected
DTC	P2270-00	O2 Sensor Signal Stuck Lean; Bank 1 Sensor 2
DTC	P2271-00	O2 Sensor Signal Stuck Rich; Bank 1 Sensor 2



EM16063003

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0136-00	O2 Sensor Circ., Bank 1 - Sensor 2 Malfunction	Ignition switch ON Engine running	- Downstream oxygen sensor - Wire harness or connector - ECM
P0137-00	O2 Sensor Circ., Bank 1 - Sensor 2 Low Voltage		
P0138-00	O2 Sensor Circ., Bank 1 - Sensor 2 High Voltage		
P0140-00	O2 Sensor Circ., Bank 1 - Sensor 2 No Activity Detected		
P2270-00	O2 Sensor Signal Stuck Lean; Bank 1 Sensor 2		
P2271-00	O2 Sensor Signal Stuck Rich; Bank 1 Sensor 2		

06

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

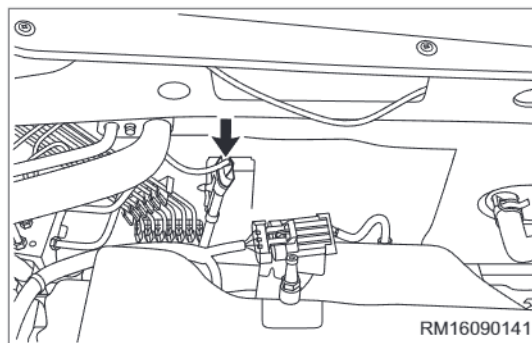


2 Check downstream oxygen sensor connector

- Disconnect the downstream oxygen sensor connector B-005.
- Check the downstream oxygen sensor connector.

NG

Repair or replace connector



OK

06

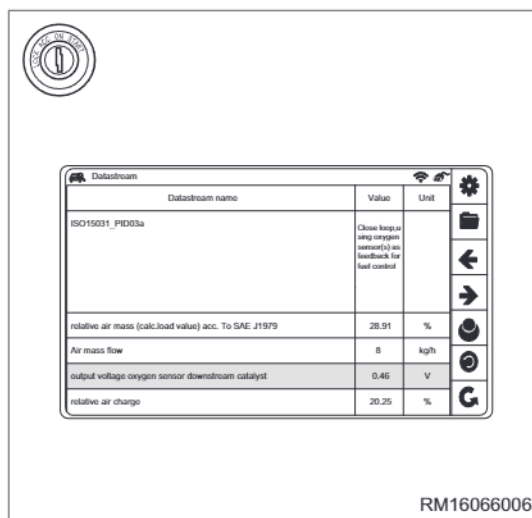
3 Check downstream oxygen sensor signal

- Connect the downstream oxygen sensor connector B-005.
- Turn ignition switch to ON, start engine and idle it for about 3 minutes.
- Using diagnostic tester, check the downstream oxygen sensor signal voltage, or using multimeter, measure the voltage between terminals 2 and 1 of connector B-005.

Multimeter Connection	Condition	Specified Condition
B-005 (2) - B-005 (1)	Engine running	Fluctuates slightly at about 0.45 V

OK

Go to step 7



NG

4 Check downstream oxygen sensor signal circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector B-002.
- Disconnect the downstream oxygen sensor connector B-005.
- Check the wire harness between downstream oxygen sensor connector terminal and ECM connector terminal.

Check for Open

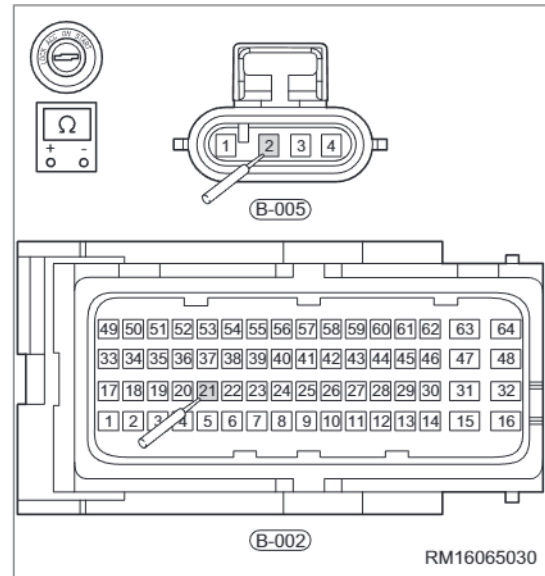
Multimeter Connection	Condition	Specified Condition
B-005 (2) - B-002 (21)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-005 (2) or B-002 (21) - Body ground	Always	No continuity
B-005 (2) or B-002 (21) - Battery positive	Always	No continuity

NG

Replace wire harness or connector
(downstream oxygen sensor - ECM)



06

OK

5 Check downstream oxygen sensor ground circuit

- a. Check the wire harness between downstream oxygen sensor connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-005 (1) - B-002 (43)	Always	Continuity

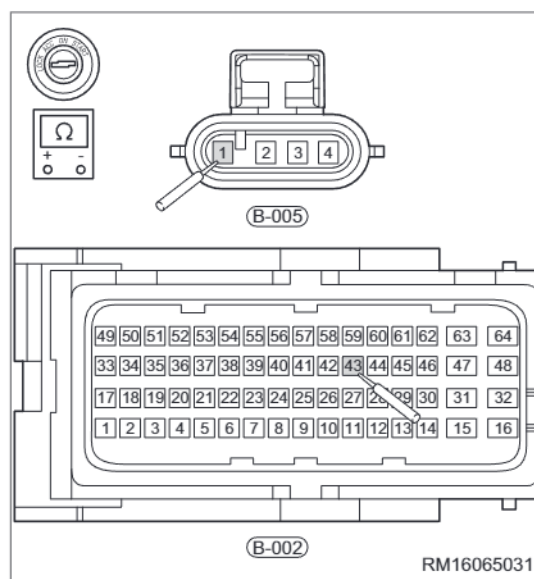
Check for Short

Multimeter Connection	Condition	Specified Condition
B-005 (1) or B-002 (43) - Body ground	Always	No continuity
B-005 (1) or B-002 (43) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (downstream oxygen sensor - ECM)

OK



6 Check downstream oxygen sensor

- a. Remove the downstream oxygen sensor.
- b. Check downstream oxygen sensor for the following problems.
- Moisture enters the internal of sensor, temperature changes greatly or probe is broken.
 - Oxygen sensor is "poisoned" (Pb, S, Br and Si etc.).

NG

Replace downstream oxygen sensor

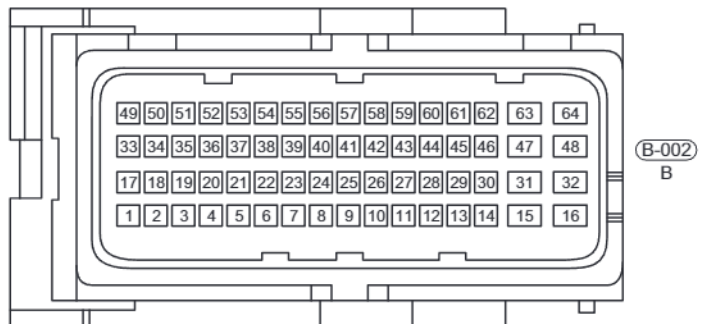
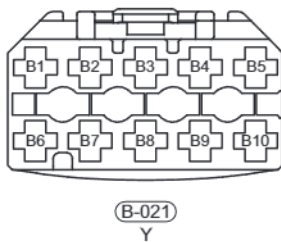
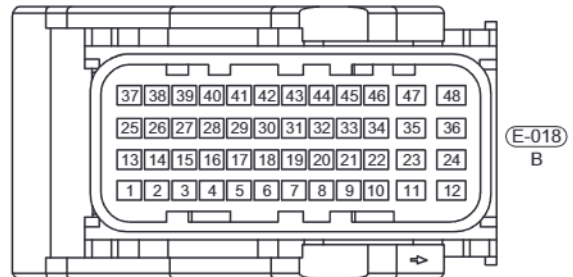
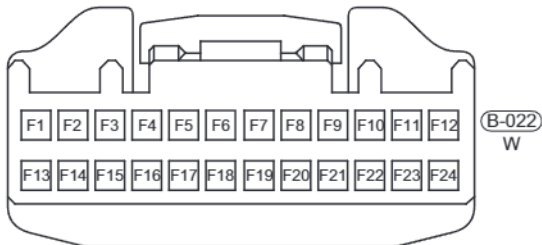
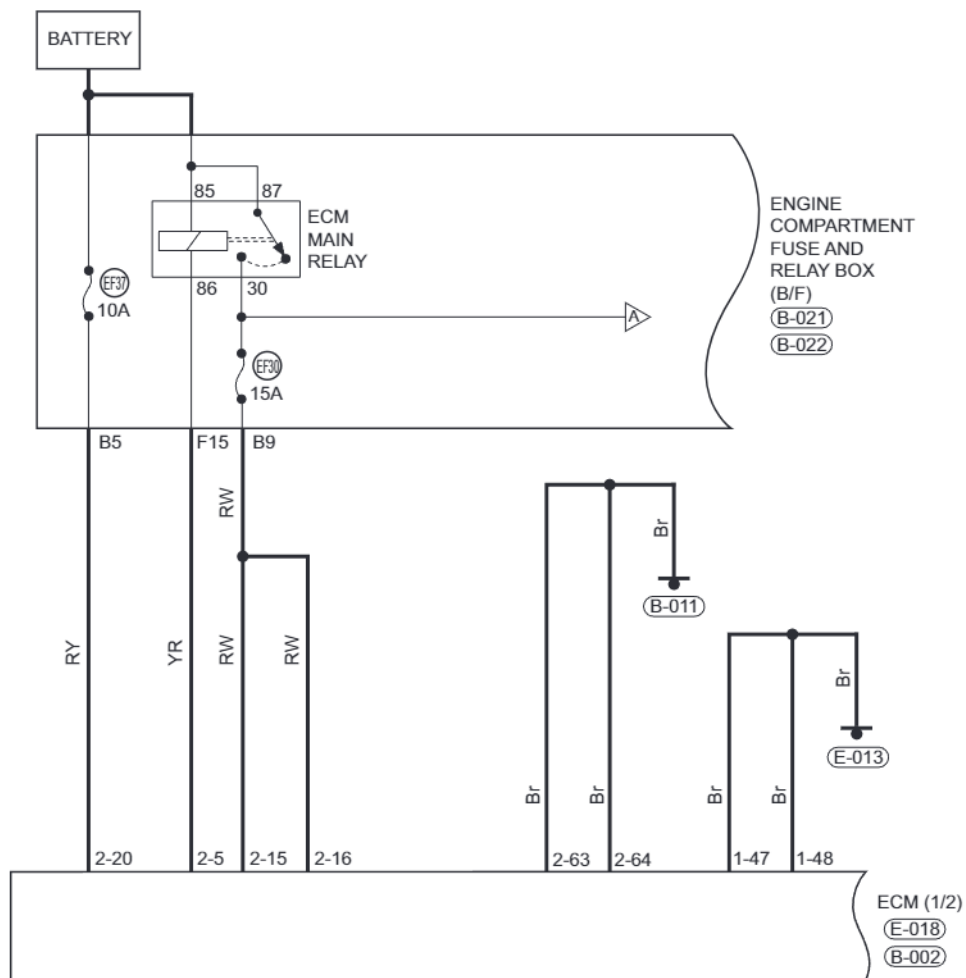
OK

7**Check for DTCs**

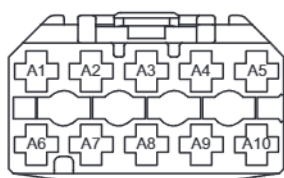
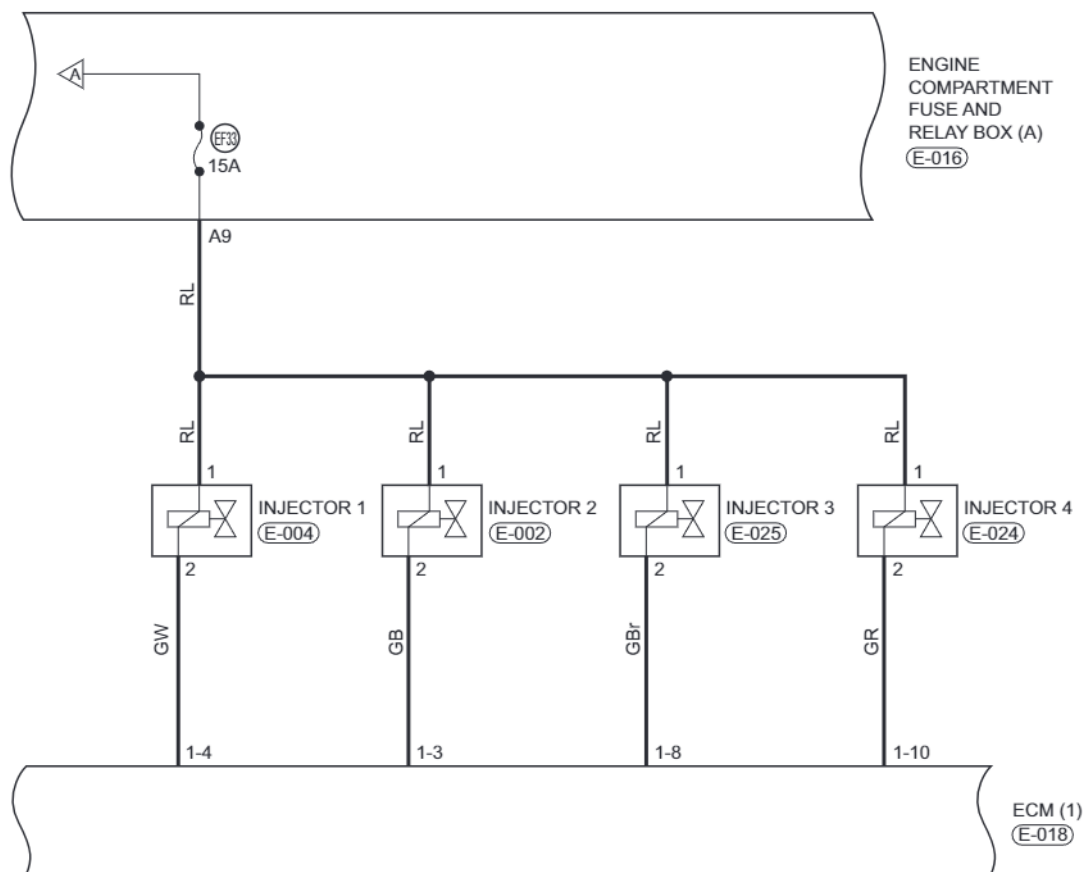
- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P0136-00, P0137-00, P0138-00, P0140-00, P2270-00 or P2271-00 still exists.

NG**Replace ECM****OK****System is operating normally.****Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.****06**

DTC	P0201-00	Cylinder 1 - Injector Circuit
DTC	P0202-00	Cylinder 2 - Injector Circuit
DTC	P0203-00	Cylinder 3 - Injector Circuit
DTC	P0204-00	Cylinder 4 - Injector Circuit
DTC	P0261-00	Cylinder 1 - Injector Circuit Low
DTC	P0262-00	Cylinder 1 - Injector Circuit High
DTC	P0264-00	Cylinder 2 - Injector Circuit Low
DTC	P0265-00	Cylinder 2 - Injector Circuit High
DTC	P0267-00	Cylinder 3 - Injector Circuit Low
DTC	P0268-00	Cylinder 3 - Injector Circuit High
DTC	P0271-00	Cylinder 4 - Injector Circuit High



EM16063007



(E-016)
Gr



(E-018)
B



(E-004)
B



(E-002)
B



(E-025)
B



(E-024)
B

EM16063008

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0201-00	Cylinder 1 - Injector Circuit	Ignition switch ON	• Injector • Wire harness or connector • ECM
P0202-00	Cylinder 2 - Injector Circuit		
P0203-00	Cylinder 3 - Injector Circuit		
P0204-00	Cylinder 4 - Injector Circuit		
P0261-00	Cylinder 1 - Injector Circuit Low		
P0262-00	Cylinder 1 - Injector Circuit High		
P0264-00	Cylinder 2 - Injector Circuit Low		
P0265-00	Cylinder 2 - Injector Circuit High		
P0267-00	Cylinder 3 - Injector Circuit Low		
P0268-00	Cylinder 3 - Injector Circuit High		
P0271-00	Cylinder 4 - Injector Circuit High		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).



NG

Repair or replace ground wire harness or ground point

OK

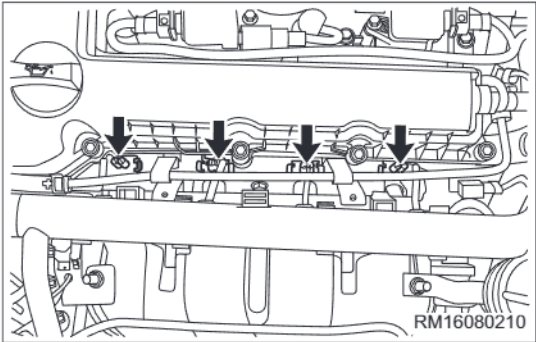
2

Check injector connector of each cylinder

- a. Disconnect the injector connector of each cylinder.
b. Check the injector connectors.

NG

Repair or replace connector



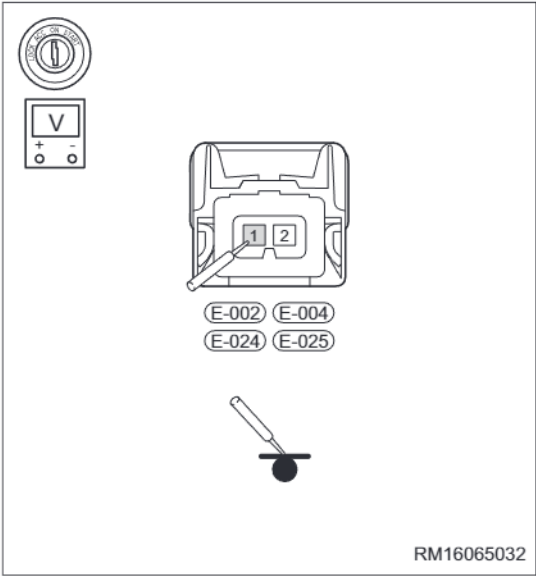
OK

3

Check injector power supply voltage of each cylinder

- a. Separately disconnect No.1, 2, 3 and 4 cylinder injector connectors E-004, E-002, E-025 and E-024.
b. Turn ignition switch to ON.
c. Check the voltage between injector connector terminal of each cylinder and body ground.

Multimeter Connection	Condition	Specified Condition
E-004 (1) - Body ground	Ignition switch ON	11 to 14 V
E-002 (1) - Body ground		
E-025 (1) - Body ground		
E-024 (1) - Body ground		



OK

Go to step 5

NG

4 Check injector power supply circuit of each cylinder

- Turn ignition switch to LOCK.
- Check the fuse EF33 and main relay.
- Disconnect the engine compartment fuse and relay box connector E-016.
- Check the wire harness between injector connector terminals and engine compartment fuse and relay box connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-004 (1), E-002 (1), E-025 (1), E-024 (1) - E-016 (A9)	Always	Continuity

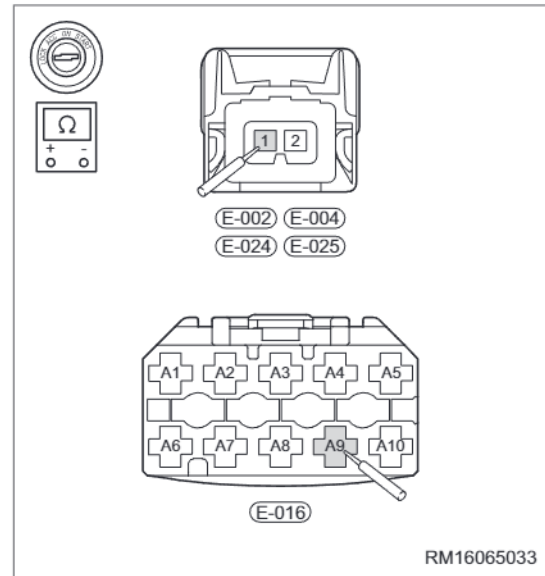
Check for Short

Multimeter Connection	Condition	Specified Condition
E-004 (1), E-002 (1), E-025 (1), E-024 (1) or E-016 (A9) - Body ground	Always	No continuity
E-004 (1), E-002 (1), E-025 (1), E-024 (1) or E-016 (A9) - Battery positive		

NG

Repair or replace wire harness or connector (injector - engine compartment fuse and relay box)

OK



06

5 Check injector control circuit of each cylinder

- Disconnect the ECM connector E-018.
- Check the wire harness between injector connector terminals and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-004 (2) - E-018 (4)	Always	Continuity
E-002 (2) - E-018 (3)		
E-025 (2) - E-018 (8)		
E-024 (2) - E-018 (10)		

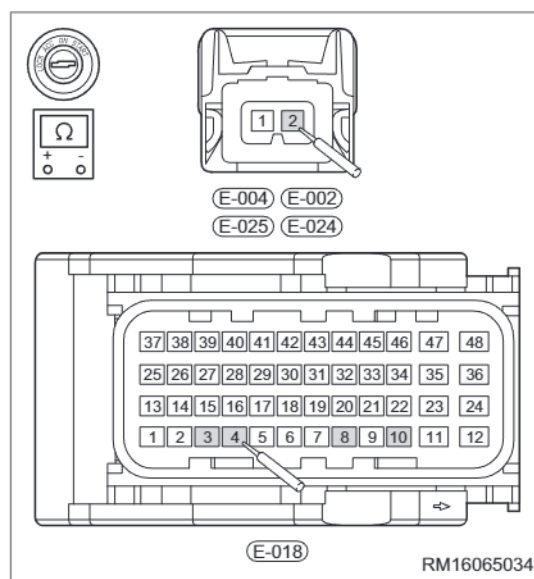
Check for Short

Multimeter Connection	Condition	Specified Condition
E-004 (2), E-002 (2), E-025 (2), E-024 (2) or E-018 (4, 3, 8, 10) - Body ground	Always	No continuity
E-004 (2), E-002 (2), E-025 (2), E-024 (2) or E-018 (4, 3, 8, 10) - Battery positive		

NG

Repair or replace wire harness or connector (injector - ECM)

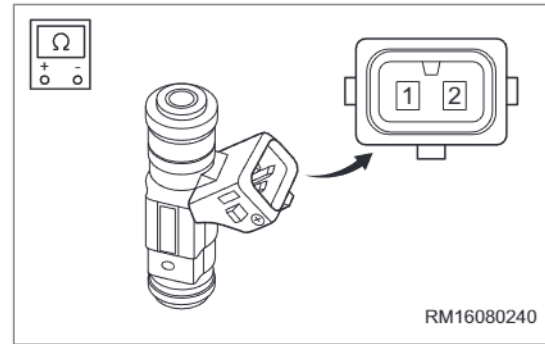
OK



6 Check injector

- a. Check the resistance of injector.

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Always	12 Ω (20°C)

NG**Replace injector****OK****06****7 Check for DTCs**

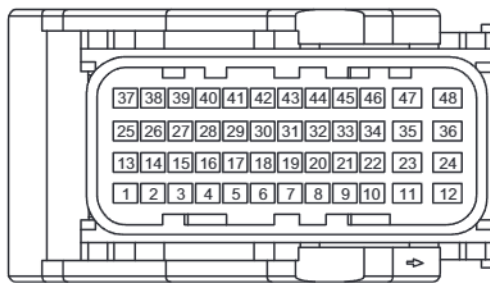
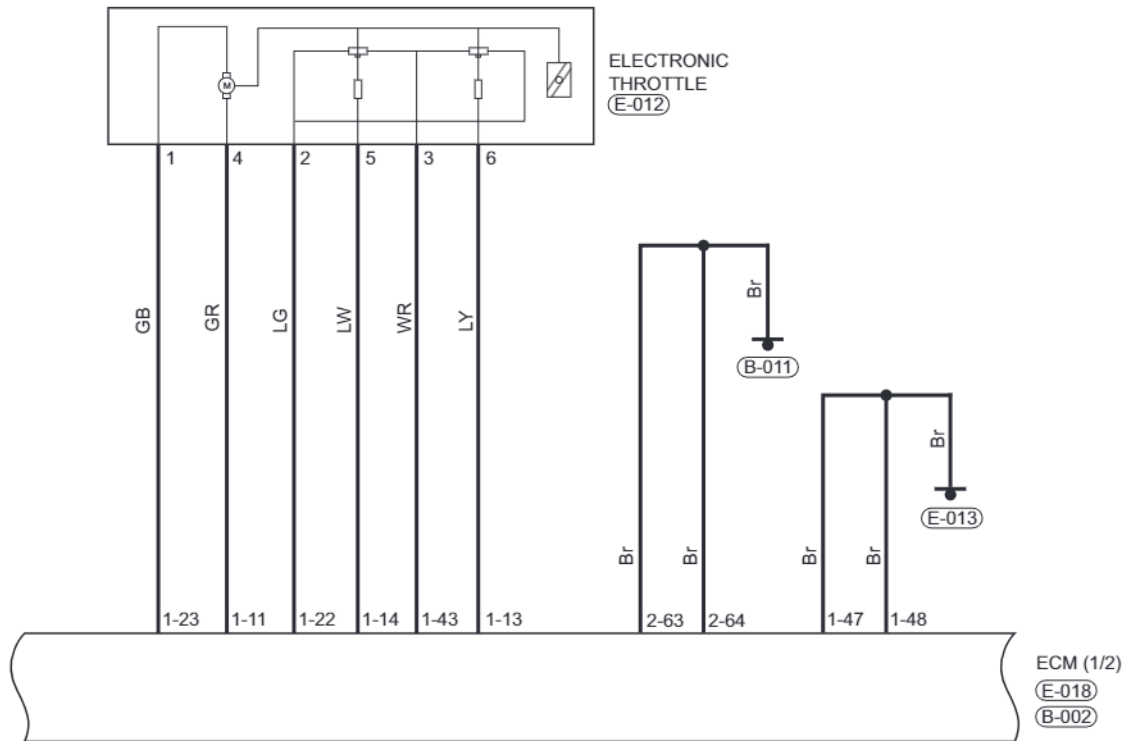
- a. Using X-431 3G diagnostic tester, read ECM DTC.
 b. Refer to "DTC confirmation procedure".
 c. Check if DTC P0201-00, P0202-00, P0203-00, P0204-00, P0261-00, P0262-00, P0264-00, P0265-00, P0267-00, P0268-00 or P0271-00 still exists.

NG**Replace ECM****OK**

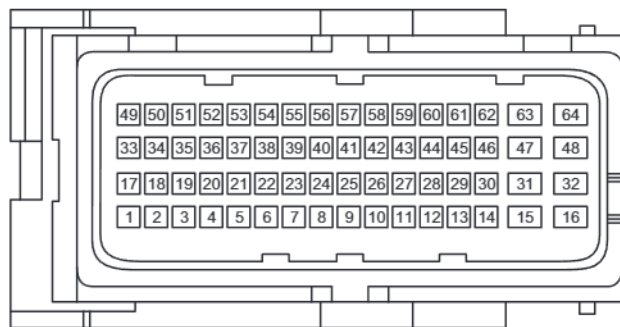
System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

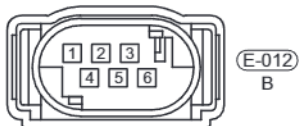
DTC	P1106-00	Throttle Pos. Contr. Malfunction
DTC	P1100-00	Engine Torque Control Adaption at Limit
DTC	P1110-00	Throttle Actuator Electrical Malfunction (MT only)
DTC	P1111-00	Idle Speed Control Throttle Position Mechanical Malfunction
DTC	P2106-00	Throttle Actuator Control System Forced Limited Power
DTC	P0606-00	ECM/PCM Processor



(E-018)
B



(B-002)
B



(E-012)
B

EM16063006

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P1106-00	Throttle Pos. Contr. Malfunction	Ignition switch ON	- Electronic throttle - Wire harness or connector - ECM
P1100-00	Engine Torque Control Adaption at Limit		
P1110-00	Throttle Actuator Electrical Malfunction (MT only)		
P1111-00	Idle Speed Control Throttle Position Mechanical Malfunction		
P2106-00	Throttle Actuator Control System Forced Limited Power		
P0606-00	ECM/PCM Processor		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

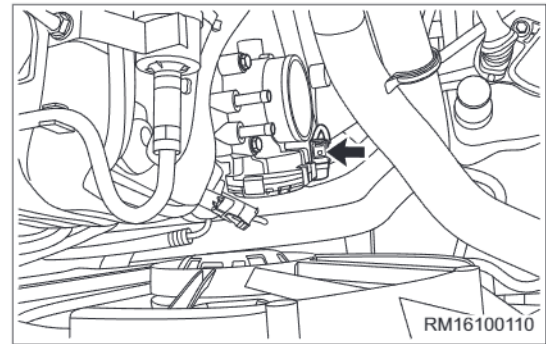
NG

Repair or replace ground wire harness or ground point

OK

2 Check electronic throttle connector

- a. Disconnect electronic throttle connector E-012.
- b. Check electronic throttle connector.

NG**Repair or replace connector****OK****06****3 Perform electronic throttle self-learning procedures**

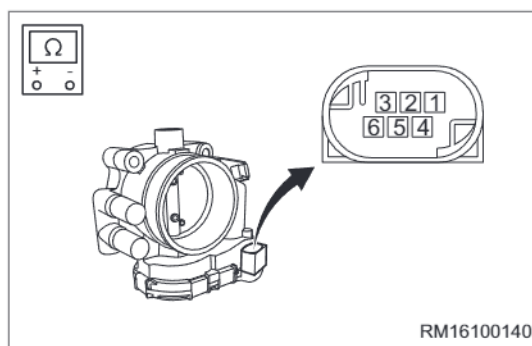
- a. Connect the electronic throttle connector E-012.
- b. Perform electronic throttle self-learning procedures ([See page 06-21](#)).
- c. Using X-431 3G diagnostic tester, read ECM DTC.
- d. Check if DTC P1106-00, P1100-00, P1110-00, P1111-00, P2106-00 or P0606-00 still exists.

OK**System is operating normally.
Reassemble vehicle and perform a road
test to confirm that malfunction reported
by customer has been repaired.****NG**

4 Check electronic throttle

- Check electronic throttle for carbon deposits and foreign matter accumulation inside.
- Check if throttle valve body is stuck.
- Check the resistance of electronic throttle.

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 2	At normal temperature	1.067 k Ω
Terminal 6 - Terminal 2	Throttle valve is rotated	Resistance increases as throttle valve opens
Terminal 6 - Terminal 3		Resistance decreases as throttle valve opens
Terminal 5 - Terminal 2		Resistance decreases as throttle valve opens
Terminal 5 - Terminal 3		Resistance increases as throttle valve opens

**NG**

Clean or replace electronic throttle assembly, and go to next step

OK**5 Check for DTCs**

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if P1106-00, P1100-00, P1110-00, P1111-00, P2106-00 or P0606-00 still exists.

NG

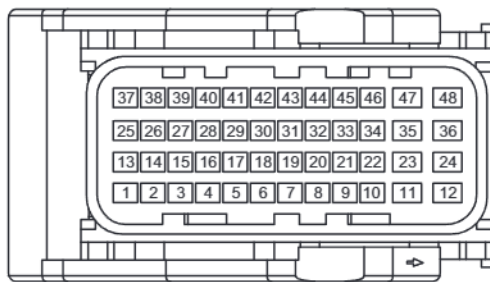
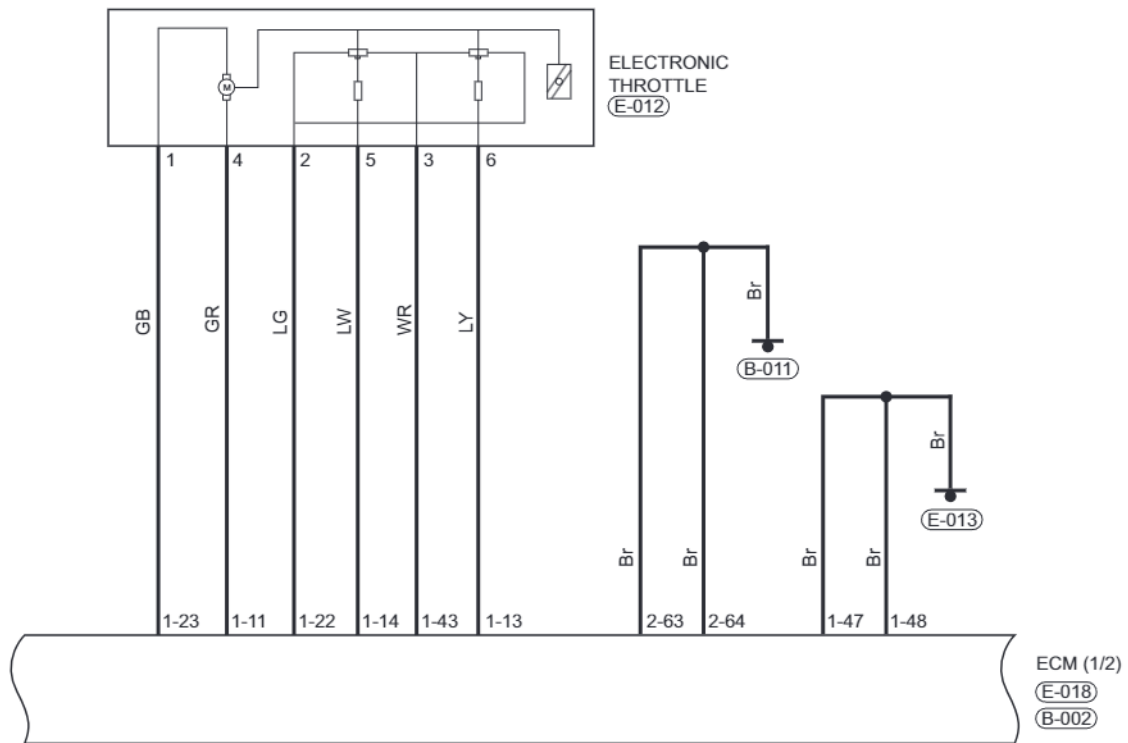
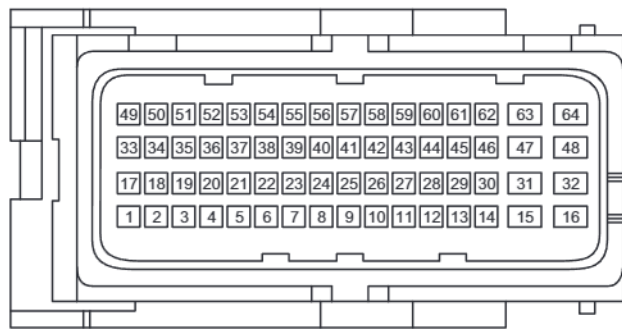
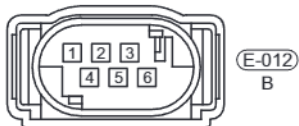
Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P1101-00	Idle Speed Contr. Throttle Pos. Low Voltage During Adaptation
DTC	P1102-00	Idle Speed Contr. Throttle Pos. Adaptation Malfunction
DTC	P1103-00	Idle Speed Control Throttle Position lower Limit Not Attained
DTC	P1104-00	Idle Speed Contr. Throttle Pos. adaptation Not Started


(E-018)
B

(B-002)
B

(E-012)
B

EM16063006

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P1101-00	Idle Speed Contr. Throttle Pos. Low Voltage During Adaptation	Ignition switch ON	- Electronic throttle - Wire harness or connector - ECM
P1102-00	Idle Speed Contr. Throttle Pos. Adaptation Malfunction		
P1103-00	Idle Speed Control Throttle Position lower Limit Not Attained		
P1104-00	Idle Speed Contr. Throttle Pos. adaptation Not Started		

06

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

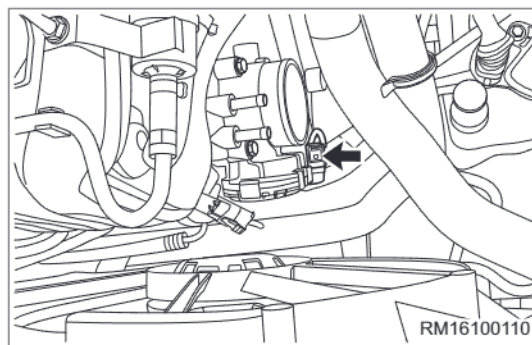
NG

Repair or replace ground wire harness or ground point

OK

2 Check electronic throttle connector

- Disconnect electronic throttle connector E-012.
- Check electronic throttle connector.

NG**Repair or replace connector****OK****06****3 Perform electronic throttle self-learning procedures**

- Connect the electronic throttle connector E-012.
- Perform electronic throttle self-learning procedures ([See page 06-21](#)).
- Using X-431 3G diagnostic tester, read ECM DTC.
- Check if DTC P1101-00, P1102-00, P1103-00 or P1104-00 still exists.

OK

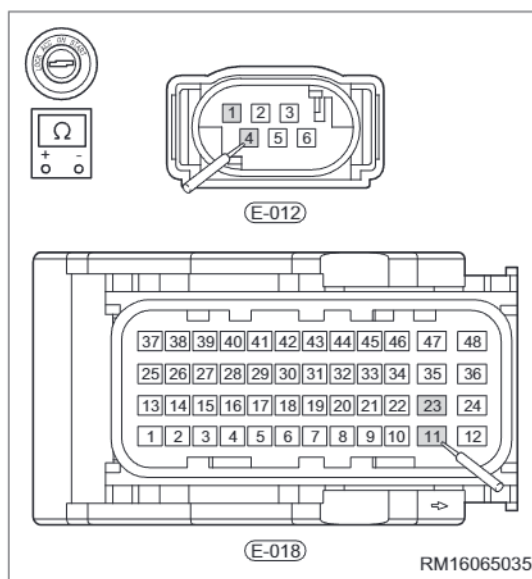
**System is operating normally.
Reassemble vehicle and perform a road
test to confirm that malfunction reported
by customer has been repaired.**

NG**4 Check electronic throttle actuator circuit**

- Turn ignition switch to LOCK.
- Disconnect electronic throttle connector E-012.
- Disconnect the ECM connector E-018.
- Check the wire harness between connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-018 (23) - E-012 (1)	Always	Continuity
E-018 (11) - E-012 (4)	Always	Continuity



Check for Short

Multimeter Connection	Condition	Specified Condition
E-018 (23) or E-012 (1) - Body ground	Always	No continuity
E-018 (23) or E-012 (1) - Battery positive	Always	No continuity
E-018 (11) or E-012 (4) - Body ground	Always	No continuity
E-018 (11) or E-012 (4) - Battery positive	Always	No continuity

NG

Repair or replace related wire harness

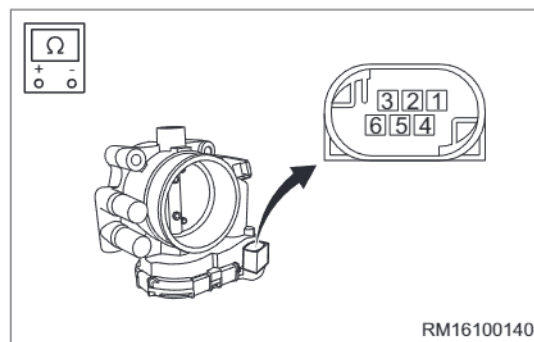
OK

5

Check electronic throttle

- Check electronic throttle for carbon deposits and foreign matter accumulation inside.
- Check if throttle valve body is stuck.
- Check the resistance of electronic throttle.

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 2	At normal temperature	1.067 k Ω
Terminal 6 - Terminal 2	Throttle valve is rotated	Resistance increases as throttle valve opens
Terminal 6 - Terminal 3		Resistance decreases as throttle valve opens
Terminal 5 - Terminal 2		Resistance decreases as throttle valve opens
Terminal 5 - Terminal 3		Resistance increases as throttle valve opens



NG

Clean or replace electronic throttle assembly, and go to next step

OK

6

Check for DTCs

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if P1101-00, P1102-00, P1103-00, or P1104-00 still exists.

NG

Replace ECM

OK

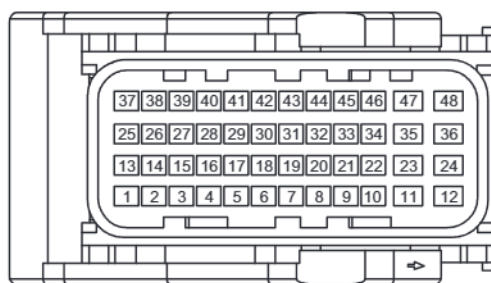
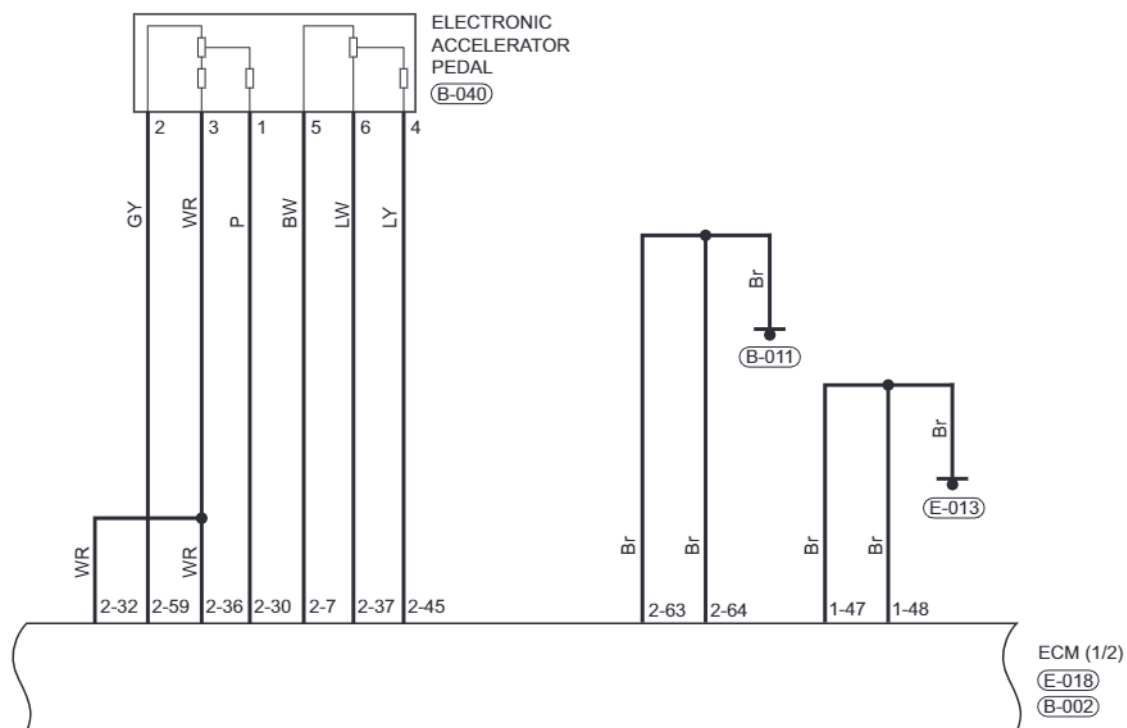
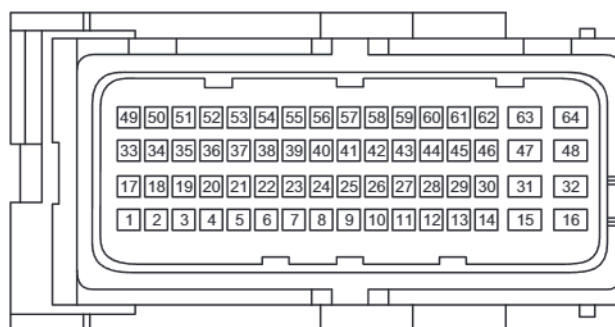
06

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P2122-00	Throttle/Pedal Pos. Sens./Switch D Circuit Low Input
DTC	P2123-00	Throttle/Pedal Pos. Sens./Switch D Circuit High Input
DTC	P2127-00	Throttle/Pedal Pos. Sens./Switch E Circuit Low Input
DTC	P2128-00	Throttle/Pedal Pos. Sens./Switch E Circuit High Input
DTC	P2138-00	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation

06

(E-018)
B(B-002)
B(B-040)
B

EM16063009

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P2122-00	Throttle/Pedal Pos. Sens./Switch D Circuit Low Input	Ignition switch ON	- Electronic accelerator pedal position sensor - Wire harness or connector - ECM
P2123-00	Throttle/Pedal Pos. Sens./Switch D Circuit High Input		
P2127-00	Throttle/Pedal Pos. Sens./Switch E Circuit Low Input		
P2128-00	Throttle/Pedal Pos. Sens./Switch E Circuit High Input		
P2138-00	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation		

06

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

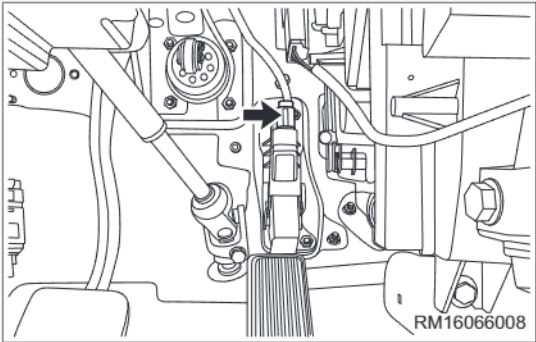
2

Check electronic accelerator pedal connector

- a. Disconnect the electronic accelerator pedal connector B-040.
- b. Check the electronic accelerator pedal connector.

NG

Repair or replace connector



OK

06

3

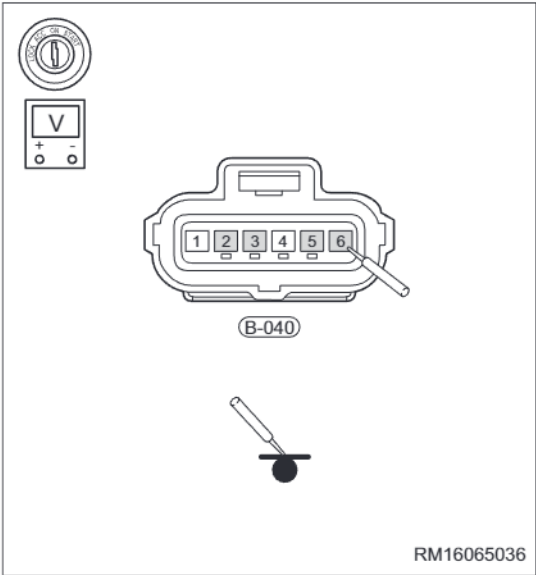
Check electronic accelerator pedal voltage

- a. Turn ignition switch to ON.
- b. Check the voltage between terminals of connector.

Multimeter Connection	Condition	Specified Condition
B-040 (3) - Body ground	Ignition switch ON	5 V
B-040 (6) - Body ground		
B-040 (2) - Body ground		0 V
B-040 (5) - Body ground		

NG

Repair or replace related wire harness



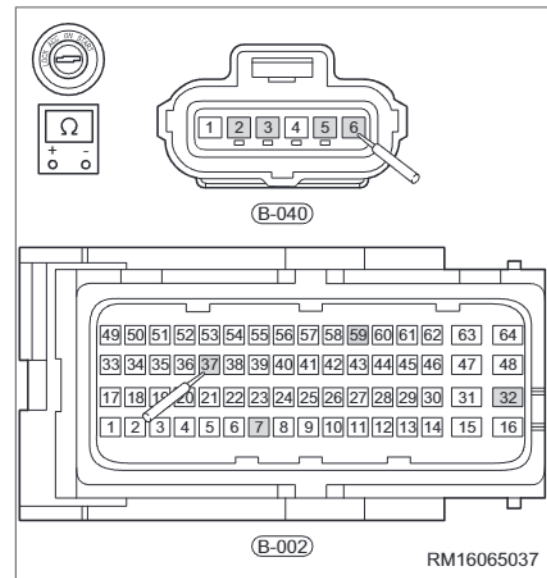
OK

4 Check electronic accelerator pedal circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector B-002.
- Check the wire harness between connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-040 (2) - B-002 (59)	Always	Continuity
B-040 (3) - B-002 (32)		
B-040 (5) - B-002 (7)		
B-040 (6) - B-002 (37)		



Check for Short

Multimeter Connection	Condition	Specified Condition
B-040 (2) or B-002 (59) - Body ground	Always	No continuity
B-040 (2) or B-002 (59) - Battery positive		
B-040 (3) or B-002 (32) - Body ground		
B-040 (3) or B-002 (32) - Battery positive		
B-040 (5) or B-002 (7) - Body ground		
B-040 (5) or B-002 (7) - Battery positive		
B-040 (6) or B-002 (37) - Body ground		
B-040 (6) or B-002 (37) - Battery positive		

NG

Repair or replace related wire harness
(electronic accelerator pedal - ECM)

06

OK

5 Check electronic accelerator pedal sensor circuit

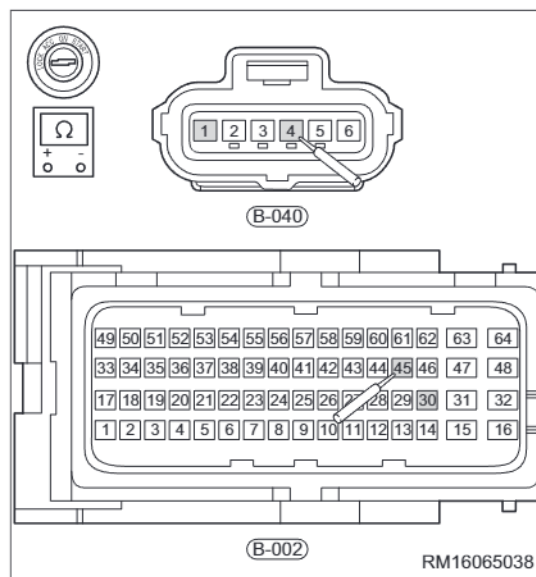
- a. Check the wire harness between connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-040 (1) - B-002 (30)	Always	Continuity
B-040 (4) - B-002 (45)		

Check for Short

Multimeter Connection	Condition	Specified Condition
B-040 (1) or B-002 (30) - Body ground	Always	No continuity
B-040 (1) or B-002 (30) - Battery positive		
B-040 (4) or B-002 (45) - Body ground		
B-040 (4) or B-002 (45) - Battery positive		



NG

Replace wire harness or connector
(electronic accelerator pedal - ECM)

OK

6 Replace electronic accelerator pedal, and then check for DTCs again

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P2122-00, P2123-00, P2127-00, P2128-00 or P2138-00 still exists.

NG

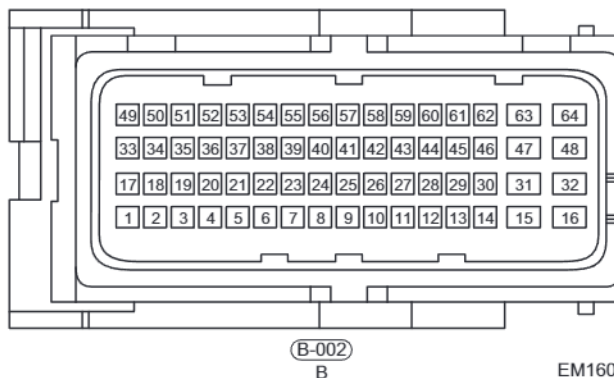
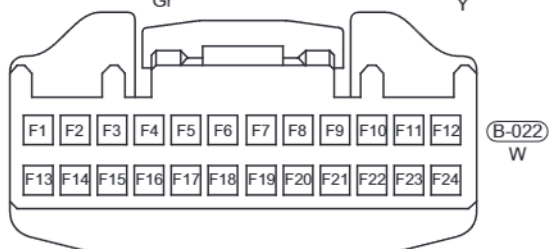
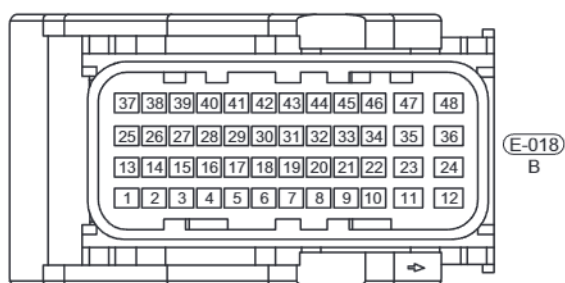
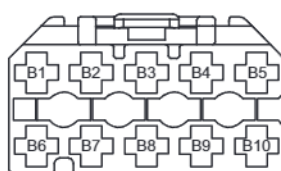
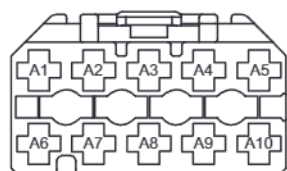
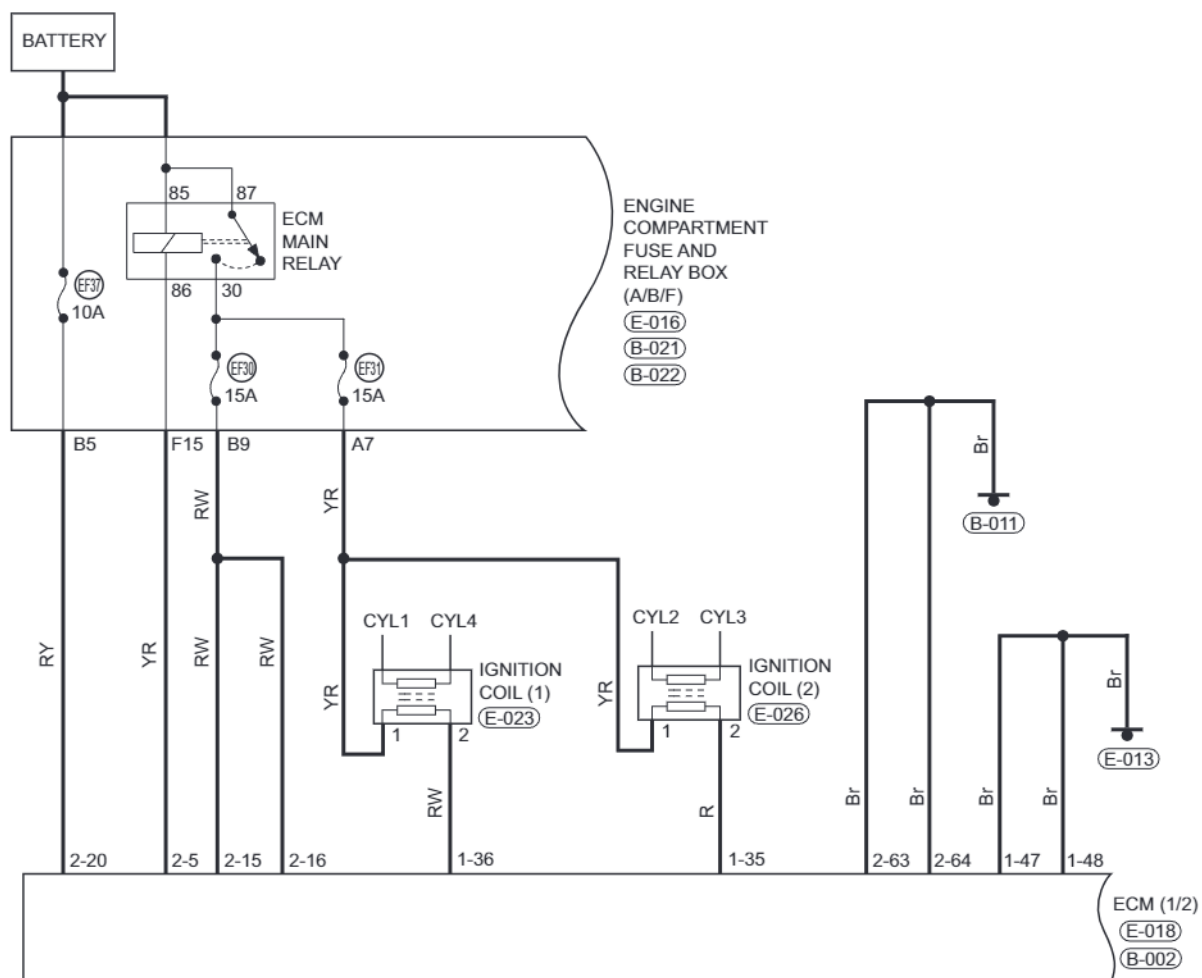
Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0300-00	Random/Multiple Cylinder Misfire Detected
DTC	P0301-00	Cyl.1 Misfire Detected
DTC	P0302-00	Cyl.2 Misfire Detected
DTC	P0303-00	Cyl.3 Misfire Detected
DTC	P0304-00	Cyl.4 Misfire Detected



EM16063010

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0300-00	Random/Multiple Cylinder Misfire Detected	Engine running	- Ignition coil - Spark plug - Wire harness or connector - ECM
P0301-00	Cyl.1 Misfire Detected		
P0302-00	Cyl.2 Misfire Detected		
P0303-00	Cyl.3 Misfire Detected		
P0304-00	Cyl.4 Misfire Detected		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

06

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

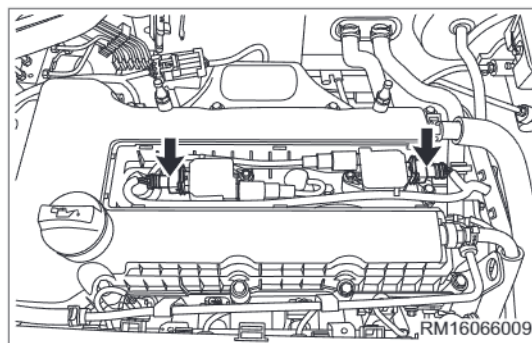
NG

Repair or replace ground wire harness or ground point

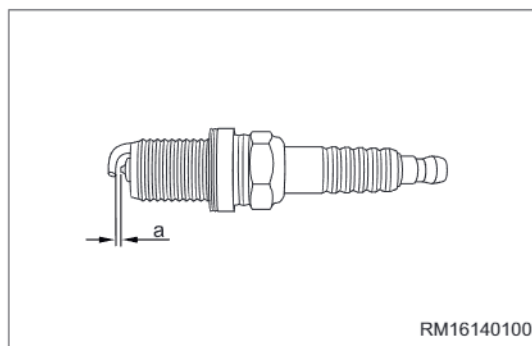
OK

2 Check ignition coil connector

- Turn ignition switch to LOCK.
- Disconnect the ignition coil connectors E-023 and E-026.
- Check the ignition coil connectors.

NG**Repair or replace connector****OK****06****3 Check spark plug of misfiring cylinder**

- Remove the spark plug of misfiring cylinder.
- Check the spark plug for burns, cracks or deposits.
- Check the spark plug gap.

OK: 0.8 - 0.9 mm**NG****Clean or replace spark plug****OK****4 Check spark**

- Connect the ignition coil connector.
- Connect the spark plug with ignition cable, and ground the spark plug housing.
- Start and run the engine for no more than 2 seconds, and check if spark is generated.

NG**Go to step 6****OK**

5 Check compression of misfiring cylinder

- a. Measure the compression of misfiring cylinder (See page 07-18).

NG

Check engine to confirm cause of low compression

OK

Check injectors, valve clearance, intake system and fuel pressure, etc. of misfiring cylinder

6 Check spark of misfiring cylinder with a normally functioning spark plug

- a. Replace the spark plug with a normally functioning one.
 b. Perform spark test.
- Connect the spark plug with ignition cable, and ground the spark plug housing.
 - Start and run the engine for no more than 2 seconds, and check if spark is generated.

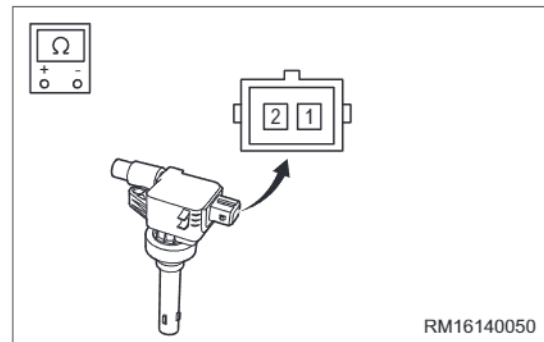
OK

Replace spark plug

NG**7 Check ignition coil**

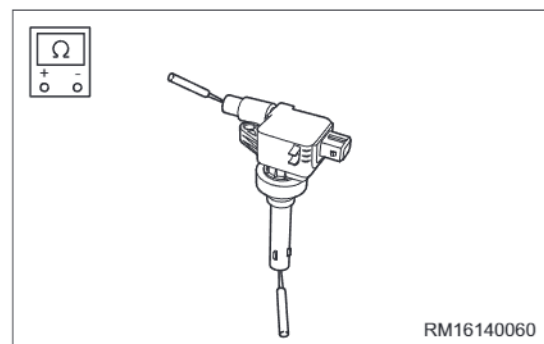
- a. Check the resistance of primary winding of ignition coil.

Multimeter Connection	Condition	Specification (Ω)
Terminal 1 - Terminal 2	At normal temperature ($25 \pm 5^\circ\text{C}$)	0.7 - 0.9



- b. Check the resistance of secondary winding of ignition coil.

Multimeter Connection	Condition	Specification (k Ω)
Posts of high-voltage cable	At normal temperature ($25 \pm 5^\circ\text{C}$)	9.68 - 12.32

**NG**

Replace ignition coil

OK

8 Check ignition coil power supply voltage

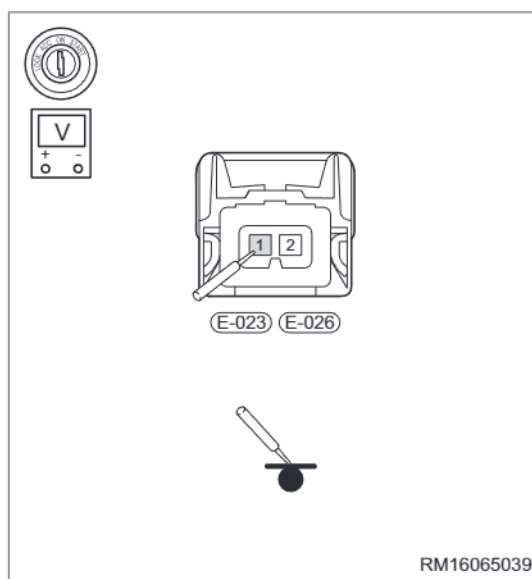
- Turn ignition switch to ON.
- Check the voltage between ignition coil connector terminals and body ground.

Multimeter Connection	Condition	Specified Condition
E-023 (1) - Body ground	Ignition switch ON	11 to 14 V
E-026 (1) - Body ground		

06

OK

Go to step 10



RM16065039

NG

9 Check ignition coil power supply circuit

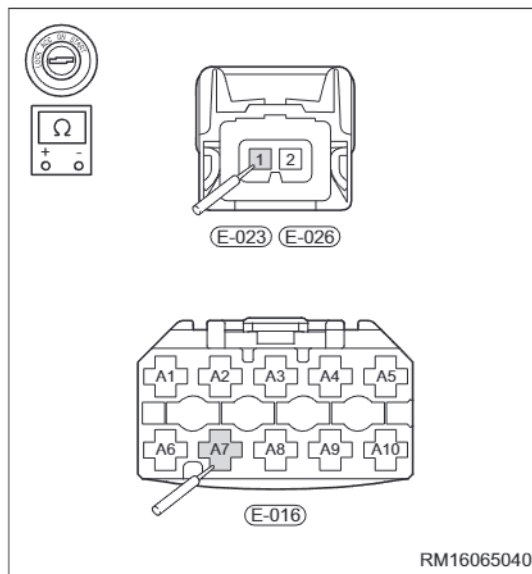
- Turn ignition switch to LOCK.
- Check the fuse EF31 and main relay.
- Check the wire harness between ignition coil connector terminals and engine compartment fuse and relay box connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-023 (1), E-026 (1) - E-016 (A7)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-023 (1), E-026 (1) or E-016 (A7) - Body ground	Always	No continuity
E-023 (1), E-026 (1) or E-016 (A7) - Battery positive	Always	No continuity



RM16065040

NG

Replace wire harness or connector
(ignition coil - engine compartment fuse
and relay box)

OK

10 Check ignition coil control circuit

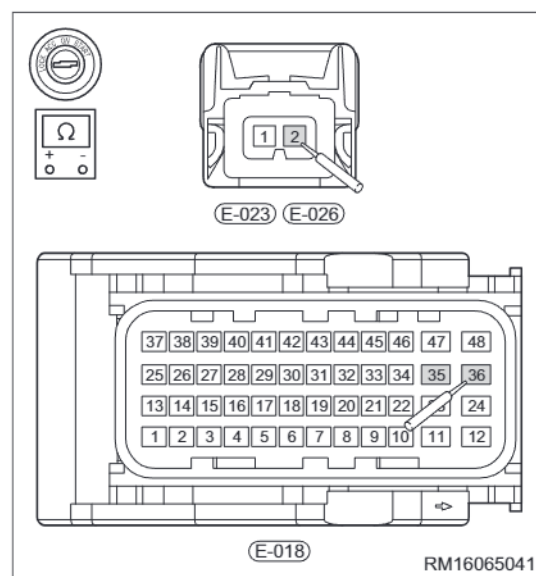
- Turn ignition switch to LOCK.
- Disconnect the ECM connector E-018.
- Check the wire harness between ignition coil connector terminals and ECM connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-023 (2) - E-018 (36)	Always	Continuity
E-026 (2) - E-018 (35)		

Check for Short

Multimeter Connection	Condition	Specified Condition
E-023 (2) or E-018 (36) - Body ground	Always	No continuity
E-023 (2) or E-018 (36) - Battery positive	Always	No continuity
E-026 (2) or E-018 (35) - Body ground	Always	No continuity
E-026 (2) or E-018 (35) - Battery positive	Always	No continuity



NG

Repair or replace wire harness or connector (ignition coil - ECM)

OK

11 Check for DTCs

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0300-00, P0301-00, P0302-00, P0303-00 or P0304-00 still exists.

NG

Replace ECM

OK

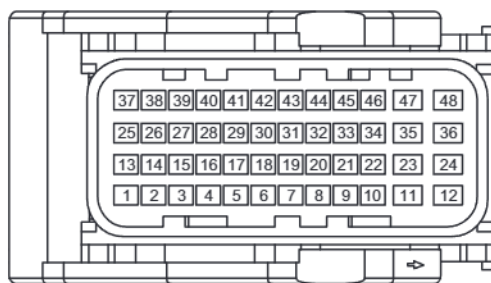
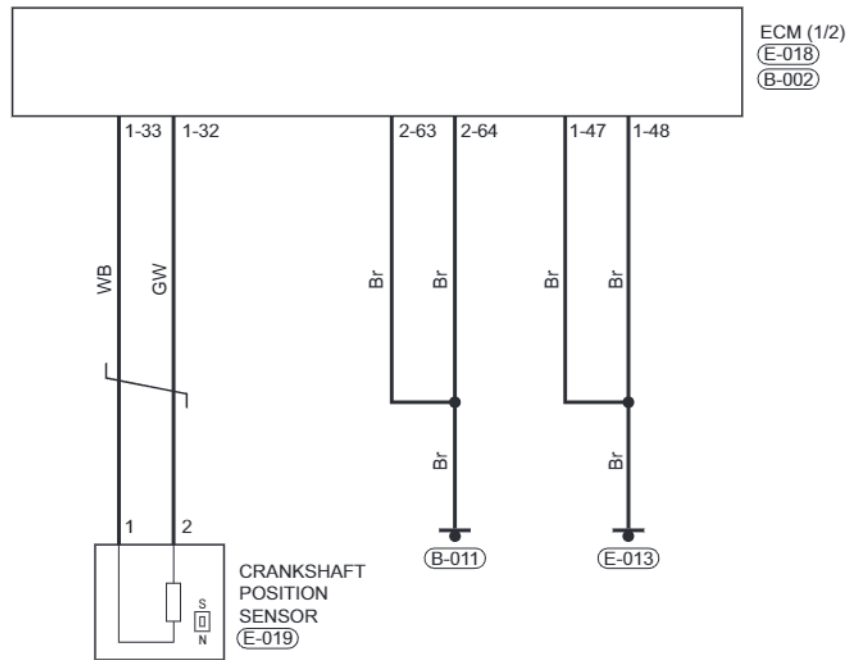
06

System is operating normally.

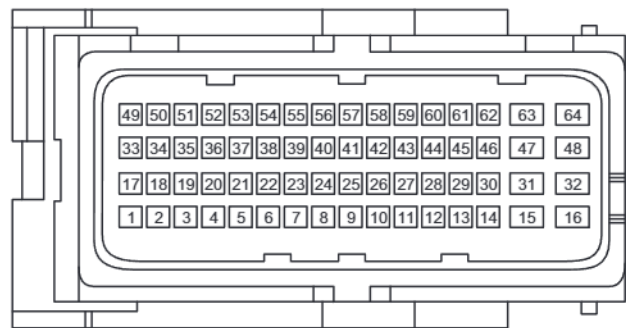
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0219-00	Engine Overspeed Condition
-----	----------	----------------------------

DTC	P0322-00	Ign./Distributor Eng. Speed Inp. Circ. No Signal
-----	----------	--



(E-018)
B



(B-002)
B



(E-019)
B

EM16063011

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0219-00	Engine Overspeed Condition	Ignition switch ON Engine running	• Crankshaft position sensor • Flywheel gear ring • Wire harness or connector • ECM
P0322-00	Ign./Distributor Eng. Speed Inp. Circ. No Signal		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

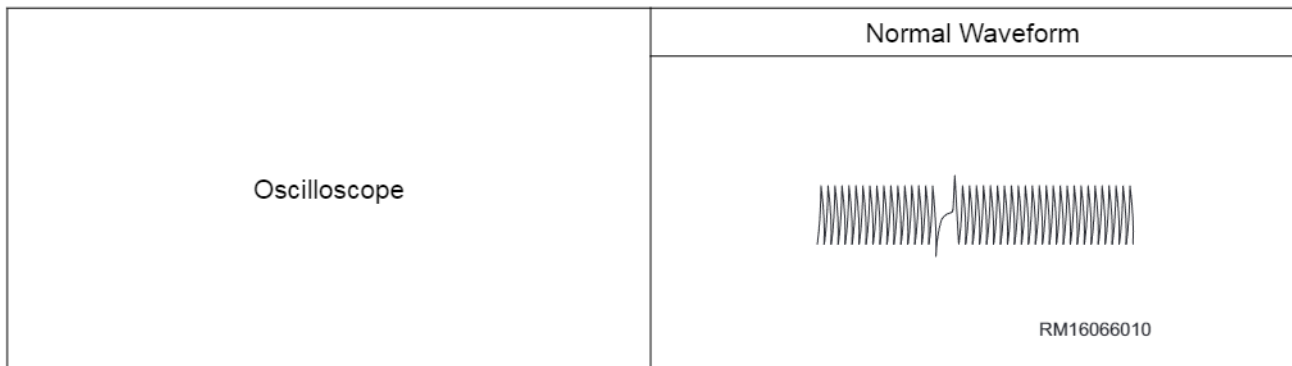
NG

Repair or replace ground wire harness or ground point

OK

2 Check crankshaft position sensor signal waveform

- a. Turn ignition switch to ON, start engine and observe the signal waveform of crankshaft position sensor with an oscilloscope.



06

OK

Go to step 9

NG

3 Check crankshaft position sensor connector

- a. Turn ignition switch to LOCK.
b. Disconnect the crankshaft position sensor connector E-019.
c. Check the crankshaft position sensor connector.

NG

Repair or replace crankshaft position sensor connector

OK

4 Check installation of crankshaft position sensor

- a. Remove the crankshaft position sensor.
b. Check and clean the crankshaft position sensor and installation area, and check for damage, foreign matter or excessive movement, etc. that cause signal incorrectness.

NG

Clean or replace crankshaft position sensor

OK

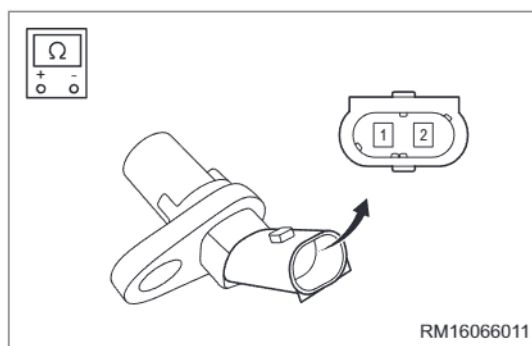
5 Check resistance of crankshaft position sensor

- a. Check the resistance between terminals 1 and 2 of crankshaft position sensor.

Normal resistance: $1200\ \Omega \pm 20\%$ (23°C)

NG

Replace crankshaft position sensor



OK

06

6 Check crankshaft position sensor circuit

- a. Disconnect the ECM connector E-018.
b. Check the wire harness between crankshaft position sensor connector terminals and ECM connector terminals.

Check for Open

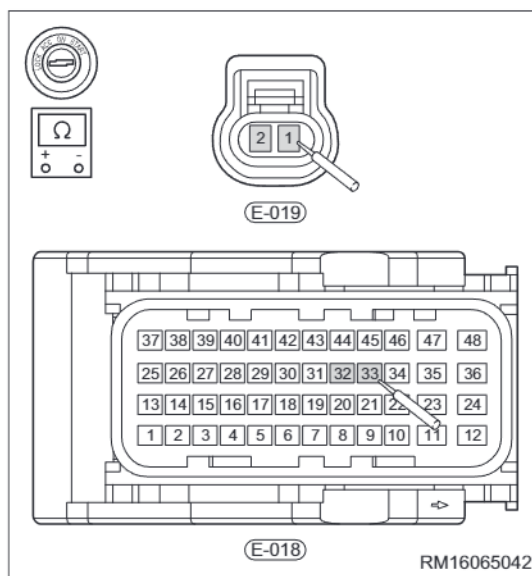
Multimeter Connection	Condition	Specified Condition
E-019 (2) - E-018 (32)	Always	Continuity
E-019 (1) - E-018 (33)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-019 (2) or E-018 (32) - Body ground	Always	No continuity
E-019 (2) or E-018 (32) - Battery positive	Always	No continuity
E-019 (1) or E-018 (33) - Body ground	Always	No continuity
E-019 (1) or E-018 (33) - Battery positive	Always	No continuity

NG

Replace wire harness or connector (crankshaft position sensor - ECM)



OK

7 Install a normal crankshaft position sensor and observe signal waveform

- Install a normal crankshaft position sensor.
- Connect the crankshaft position sensor connector.
- Turn ignition switch to ON, start engine and observe the signal waveform of crankshaft position sensor with an oscilloscope.

OK

Replace crankshaft position sensor

NG

06

8 Check flywheel ring gear

- Turn the crankshaft and check crankshaft and flywheel ring gear for damage or foreign matter, etc. that cause signal incorrectness.

NG

Clear off debris and clean flywheel gear ring. Replace flywheel if necessary

OK

9 Check for DTCs

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0219-00 or P0322-00 still exists.

NG

Replace ECM

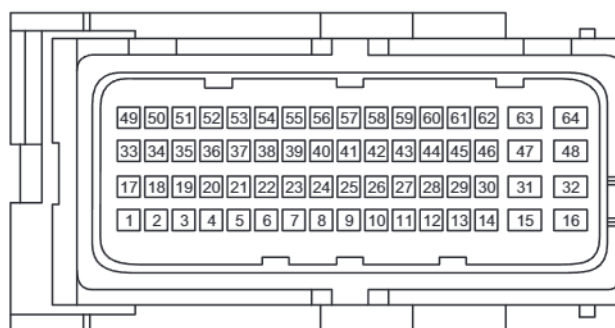
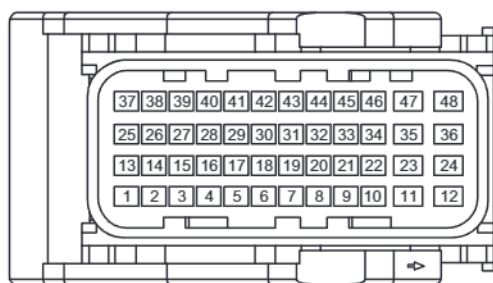
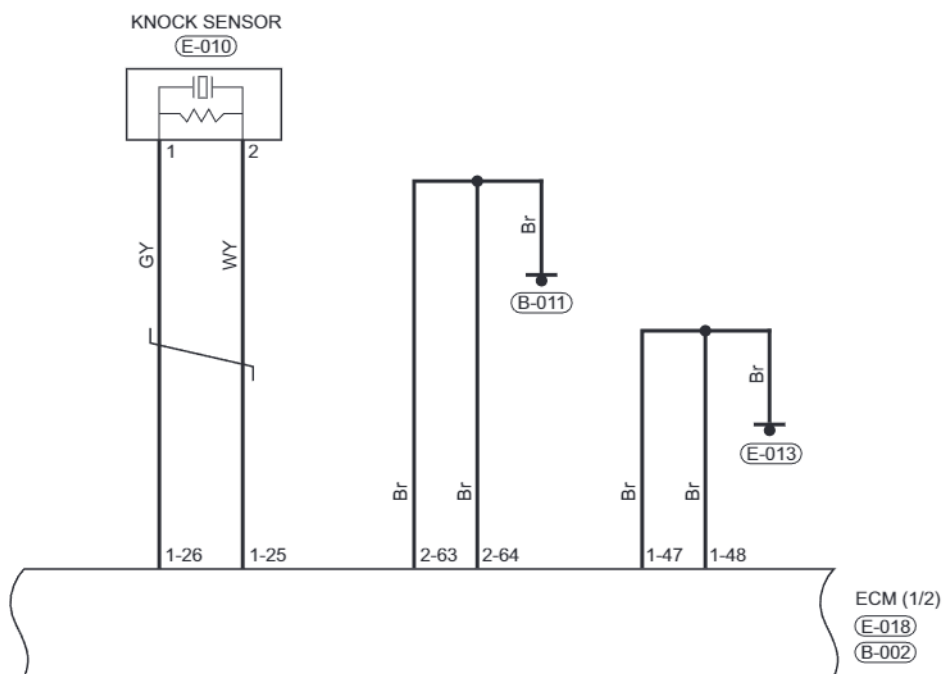
OK

System is operating normally.
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0327-00	Knock Sensor 1 Circ. Low Input
-----	----------	--------------------------------

DTC	P0328-00	Knock Sensor 1 Circ. High Input
-----	----------	---------------------------------

06



EM16063012

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0327-00	Knock Sensor 1 Circ. Low Input	Engine running	- Knock sensor - Wire harness or connector - ECM
P0328-00	Knock Sensor 1 Circ. High Input		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

06

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2 Check knock sensor connector

- Disconnect the knock sensor connector E-010.
- Check the knock sensor connector.

NG

Repair or replace connector

OK



3 Check knock sensor signal circuit

- Disconnect the ECM wire harness connector E-018.
- Check the wire harness between terminals of connectors E-018 and E-010.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-018 (26) - E-010 (1)	Always	Continuity
E-018 (25) - E-010 (2)	Always	Continuity

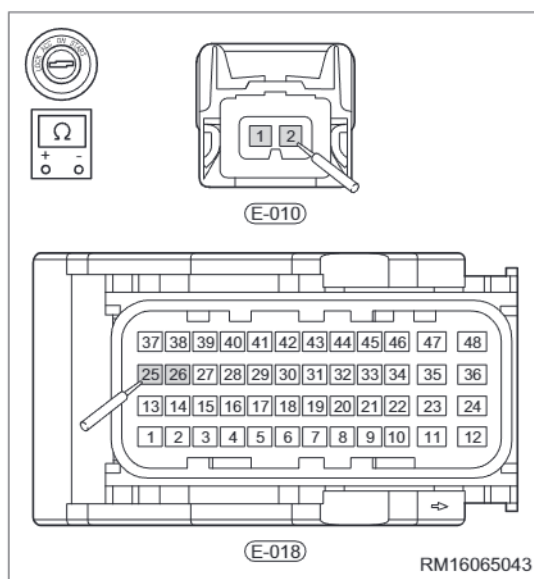
Check for Short

Multimeter Connection	Condition	Specified Condition
E-018 (26) or E-010 (1) - Body ground	Always	No continuity
E-018 (26) or E-010 (1) - Battery positive	Always	No continuity
E-018 (25) or E-010 (2) - Body ground	Always	No continuity
E-018 (25) or E-010 (2) - Battery positive	Always	No continuity

NG

Replace wire harness or connector (knock sensor - ECM)

OK



4 Check installation of knock sensor

- Remove the knock sensor.
- Check installation area of knock sensor, and check for damage, foreign matter or excessive movement, etc. that cause signal incorrectness.

NG

Clean installation area or replace knock sensor

OK

5 Check resistance of knock sensor

- a. Check the resistance between terminals 1 and 2 of knock sensor.

OK: Above 1 MΩ (at normal temperature)

NG

Replace knock sensor

OK

6 Check knock sensor signal

- a. Install the knock sensor.
b. Slightly strike around the knock sensor with a rubber hammer, and measure if voltage is generated between 2 terminals of knock sensor with multimeter (mV) at the same time.

NG

Replace knock sensor

OK

7 Check for DTCs

- a. Using X-431 3G diagnostic tester, read ECM DTC.
b. Refer to "DTC confirmation procedure".
c. Check if DTC P0327-00 or P0328-00 still exists.

NG

Replace ECM

OK

System is operating normally.

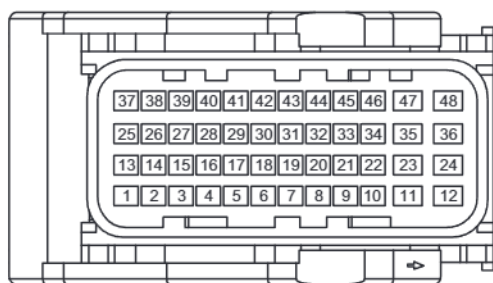
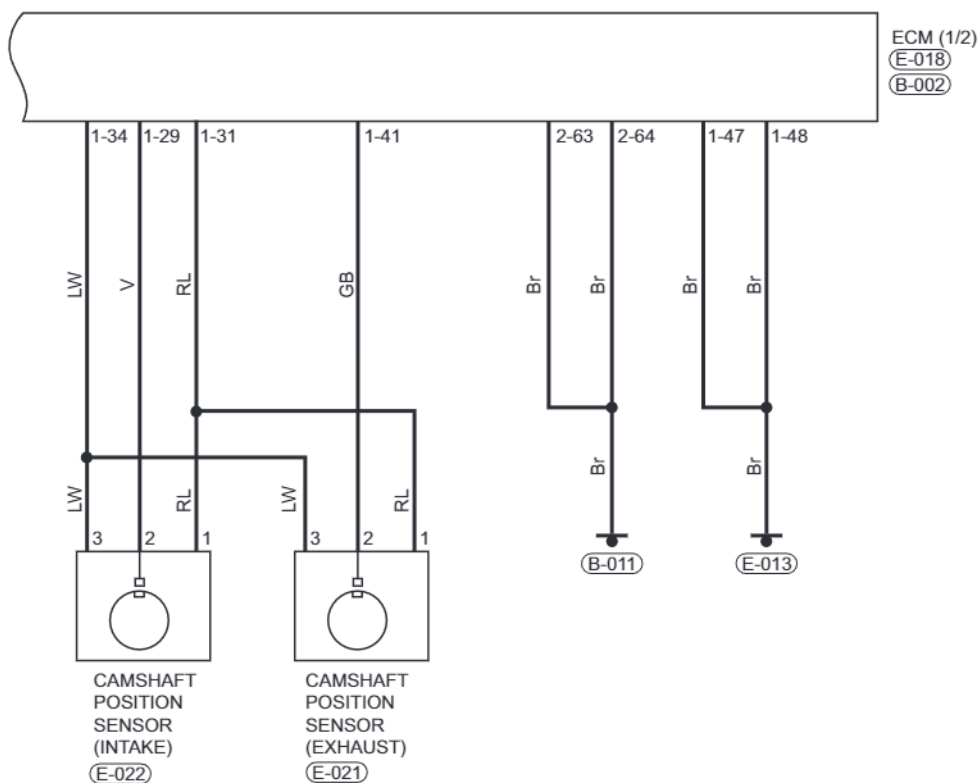
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

06

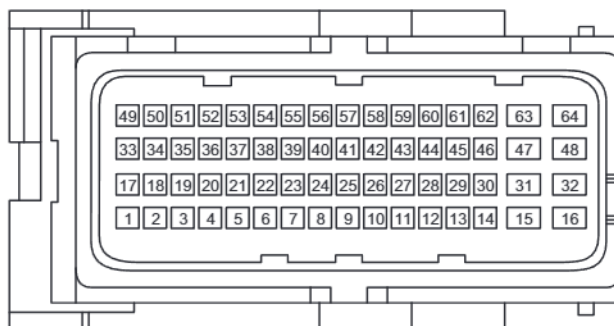
DTC	P0341-00	Camshaft Pos. Sensor Circ. Range/Performance
-----	----------	--

DTC	P0346-00	Camshaft Pos. Sensor Circ. Range/Performance (Bank 2)
-----	----------	---

06



(E-018)
B



(B-002)
B



(E-022)
B



(E-021)
B

EM16063013

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0341-00	Camshaft Pos. Sensor Circ. Range/Performance	Ignition switch ON Engine running	- Camshaft position sensor (intake) - Camshaft position sensor (exhaust) - Camshaft - Wire harness or connector - ECM
P0346-00	Camshaft Pos. Sensor Circ. Range/Performance (Bank 2)		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

06

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

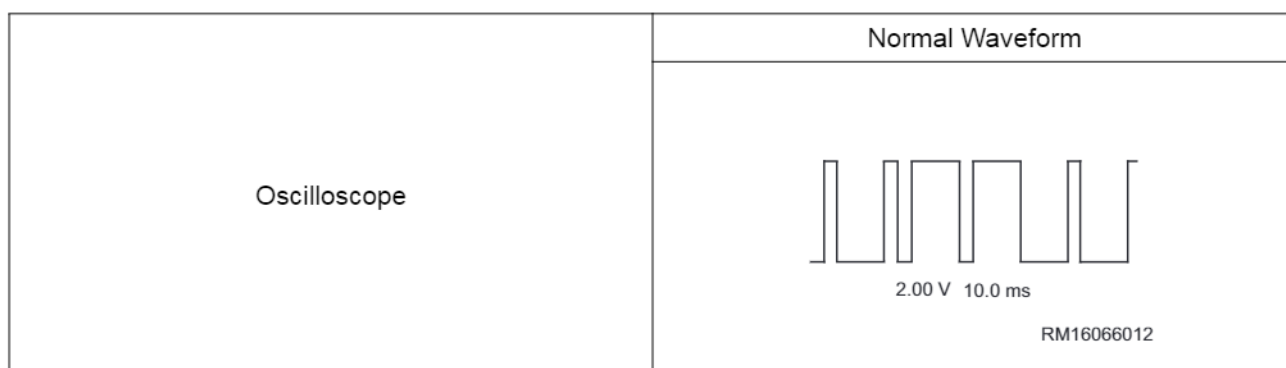
NG

Repair or replace ground wire harness or ground point

OK

2 Check camshaft position sensor signal waveform

- Turn ignition switch to ON, start engine and observe the signal waveform of camshaft position sensor with an oscilloscope.



OK

Go to step 10

06

NG

3

Check camshaft position sensor connector

- a. Turn ignition switch to LOCK.
- b. Disconnect the camshaft position sensor connectors E-022 and E-021.
- c. Check the camshaft position sensor connectors.

NG

Repair or replace camshaft position sensor connector

OK

4

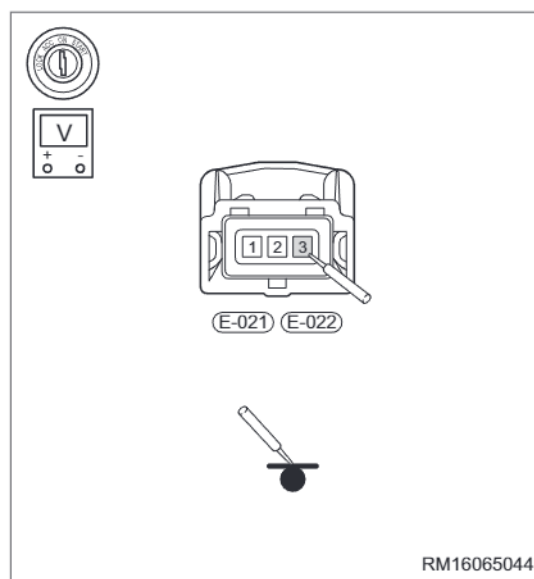
Check camshaft position sensor power supply voltage

- a. Turn ignition switch to ON.
- b. Check the voltage between terminal 3 of camshaft position sensor connector E-022 or E-021 and body ground.

Multimeter Connection	Condition	Specified Condition
E-022 (3) or E-021 (3) - Body ground	Ignition switch ON	5 V

OK

Go to step 6



NG

5

Check camshaft position sensor power supply circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector E-018.
- Check the wire harness between camshaft position sensor connector terminals and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-022 (3) - E-018 (34)	Always	Continuity
E-021 (3) - E-018 (34)	Always	Continuity

Check for Short

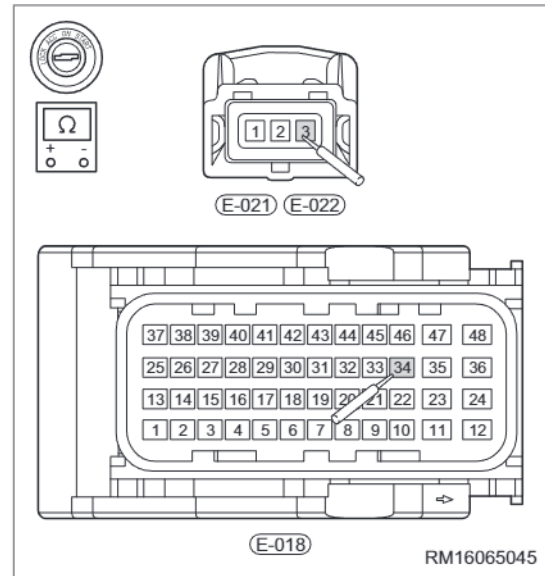
Multimeter Connection	Condition	Specified Condition
E-022 (3), E-021 (3) or E-018 (34) - Body ground	Always	No continuity
E-022 (3), E-021 (3) or E-018 (34) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (camshaft position sensor - ECM)

OK

Replace ECM



06

6

Check camshaft position sensor signal circuit and ground circuit

- a. Check the wire harness between camshaft position sensor connector terminals and ECM connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-022 (2) - E-018 (29)	Always	Continuity
E-021 (2) - E-018 (41)	Always	Continuity
E-022 (1), E-021 (1) - E-018 (31)	Always	Continuity

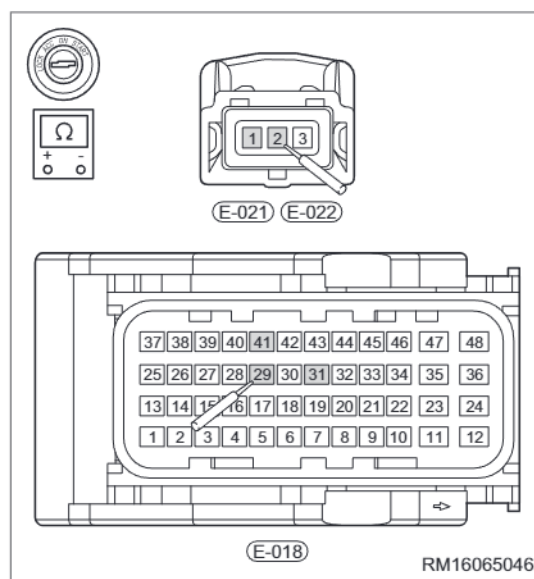
Check for Short

Multimeter Connection	Condition	Specified Condition
E-022 (2) or E-018 (29) - Body ground	Always	No continuity
E-022 (2) or E-018 (29) - Battery positive	Always	No continuity
E-021 (2) or E-018 (41) - Body ground	Always	No continuity
E-021 (2) or E-018 (41) - Battery positive	Always	No continuity
E-022 (1), E-021 (1) or E-018 (31) - Body ground	Always	No continuity
E-022 (1), E-021 (1) or E-018 (31) - Battery positive	Always	No continuity

NG

Replace wire harness or connector
(camshaft position sensor - ECM)

OK



7

Check installation of camshaft position sensor

- a. Remove the camshaft position sensor.
- b. Check and clean the camshaft position sensor and installation area, and check for damage, foreign matter or excessive movement, etc. that cause signal incorrectness.

NG

Clean installation area or replace camshaft position sensor

OK

8

Check camshaft ring gear

- a. Check the camshaft ring gear for damage or foreign matter (such as debris), etc. that cause signal incorrectness.

NG

Remove debris and clean camshaft ring gear or replace camshaft

OK

06

9

Install a normal camshaft position sensor and observe signal waveform

- a. Install a normal camshaft position sensor.
b. Connect the camshaft position sensor connector.
c. Turn ignition switch to ON, start engine and observe the signal waveform of camshaft position sensor with an oscilloscope.

OK

Replace camshaft position sensor

NG

10

Check for DTCs

- a. Using X-431 3G diagnostic tester, read ECM DTC.
b. Refer to "DTC confirmation procedure".
c. Check if DTC P0341-00 or P0346-00 still exists.

NG

Replace ECM

OK

System is operating normally.
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0420-00	Catalyst System, Bank 1 Efficiency Below Threshold
------------	-----------------	---

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0420-00	Catalyst System, Bank 1 Efficiency Below Threshold	Engine running	• Three-way catalytic converter • Leakage in exhaust system • Upstream oxygen sensor • Downstream oxygen sensor • ECM

DTC Confirmation Procedure

06

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

Diagnosis Procedure

1	Check for any other DTCs output (in addition to DTC P0420-00)
----------	--

- Connect X-431 3G diagnostic tester to Data Link Connector (DLC).
- Turn ignition switch to ON, start engine and warm it up to normal operating temperature, and then select Read Code.

Display (DTC Output)	Proceed to
DTC P0420-00	A
DTC P0420-00 and other DTCs	B

B

Go to DTC chart, and perform troubleshooting to other DTCs first

A

2 Read datastream

- a. Read datastream using diagnostic tester.
b. Check datastream below.

Item	OK (Idling)	If it is NG, proceed to
Upstream Oxygen Sensor Voltage	Quickly fluctuates between 0.1 to 0.9 V	A
Downstream Oxygen Sensor Voltage	Fluctuates slightly at about 0.45 V	B
Average Injection Pulse Width	Approximately 2.15 ms	C

A**Replace upstream oxygen sensor****C****Check injector, fuel pressure and other causes for abnormal injection pulse width****B****3 Check exhaust system**

- a. Turn ignition switch to ON and start engine.
b. Check exhaust system for leakage.

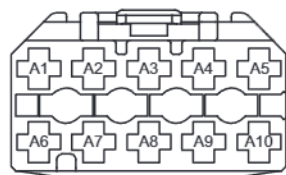
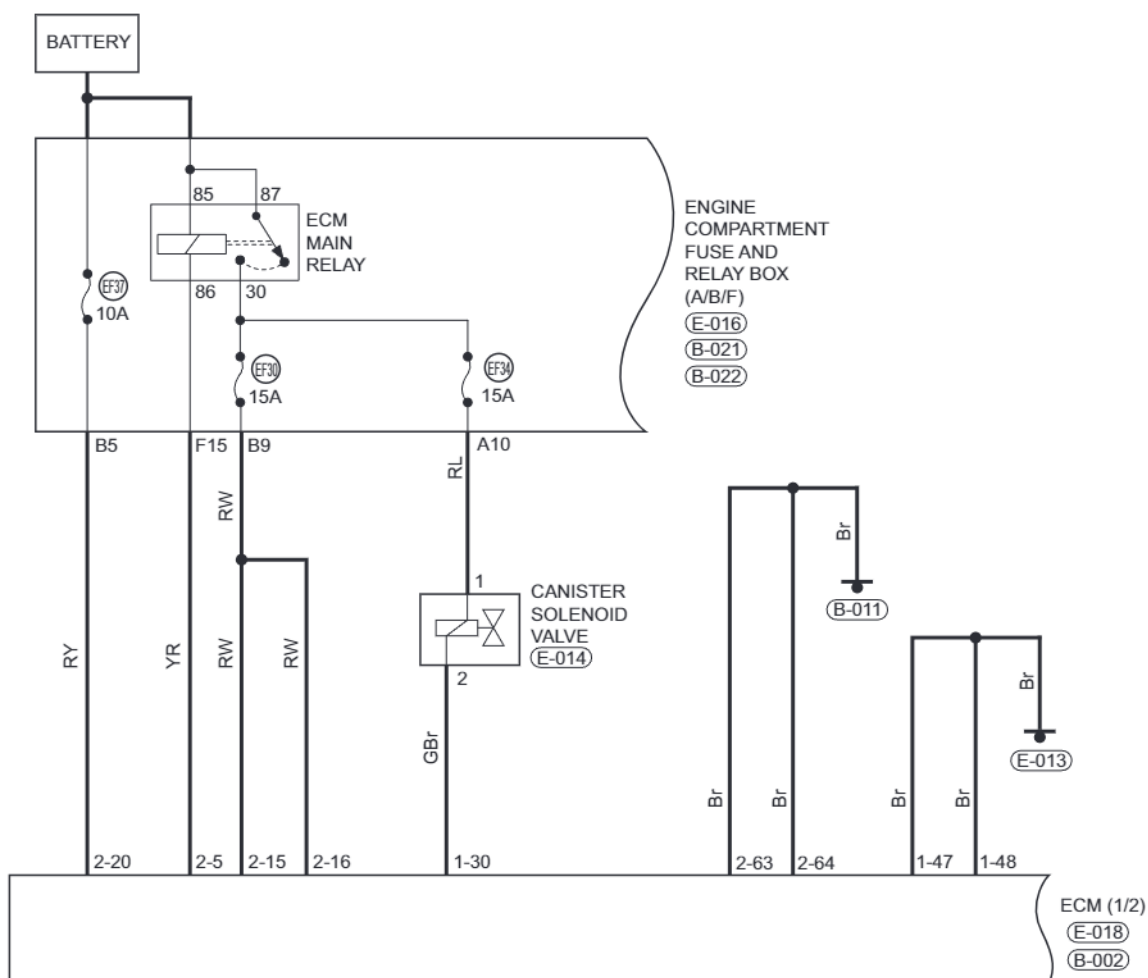
NG**Repair or replace related exhaust system components****OK****4 Check downstream oxygen sensor****NG****Replace downstream oxygen sensor****OK****Replace three-way catalytic converter, and go to step 5****06**

5**Check for DTCs**

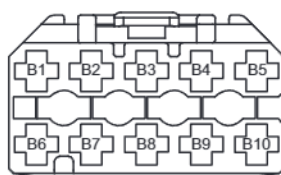
- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P0420-00 still exists.

NG**Replace ECM****OK****System is operating normally.****Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.****06**

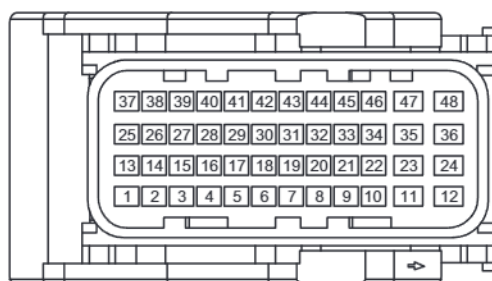
DTC	P0444-00	Evaporative Emiss. System Purge Control Valve Circ. Open
DTC	P0458-00	Evaporative Emission System Purge Control Valve Circuit Low
DTC	P0459-00	Evaporative Emission System Purge Control Valve Circuit High



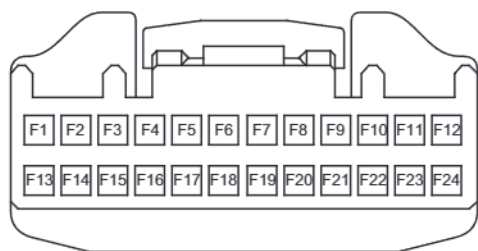
(E-016)
Gr



(B-021)
Y



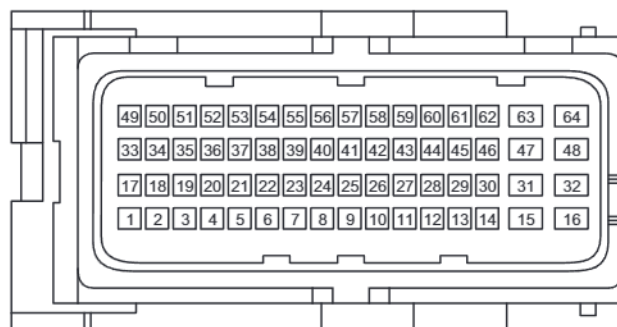
(E-018)
B



(B-022)
W



(E-014)
B



(B-002)
B

EM16063014

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0444-00	Evaporative Emiss. System Purge Control Valve Circ. Open	Ignition switch ON Engine running	• Canister solenoid valve • Wire harness or connector • ECM
P0458-00	Evaporative Emission System Purge Control Valve Circuit Low		
P0459-00	Evaporative Emission System Purge Control Valve Circuit High		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

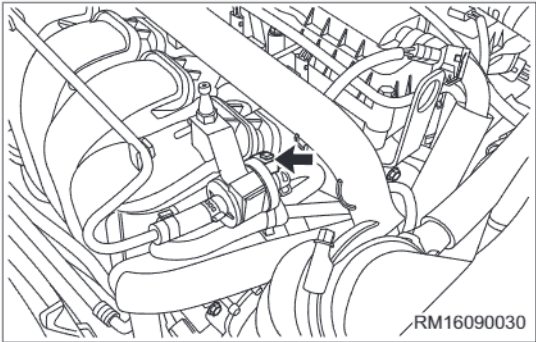
Repair or replace ground wire harness or ground point

OK

2 Check canister solenoid valve connector

- a. Disconnect the canister solenoid valve connector E-014.
- b. Check the canister solenoid valve connector.

NG Repair or replace connector



OK

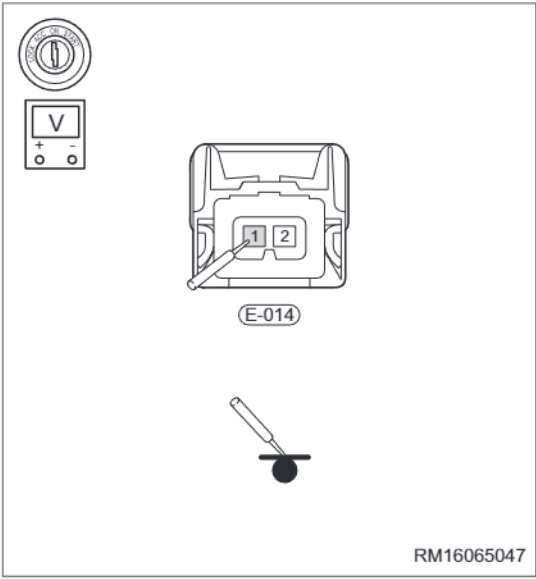
06

3 Check canister solenoid valve power supply voltage

- a. Turn ignition switch to ON.
- b. Check the voltage between canister solenoid valve connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
E-014 (1) - Body ground	Ignition switch ON	11 to 14 V

OK Go to step 5



NG

4 Check canister solenoid valve power supply circuit

- Turn ignition switch to LOCK.
- Check the fuse EF34 and main relay.
- Disconnect the engine compartment fuse and relay box connector E-016.
- Check the wire harness between canister solenoid valve connector terminal and engine compartment fuse and relay box connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-014 (1) - E-016 (A10)	Always	Continuity

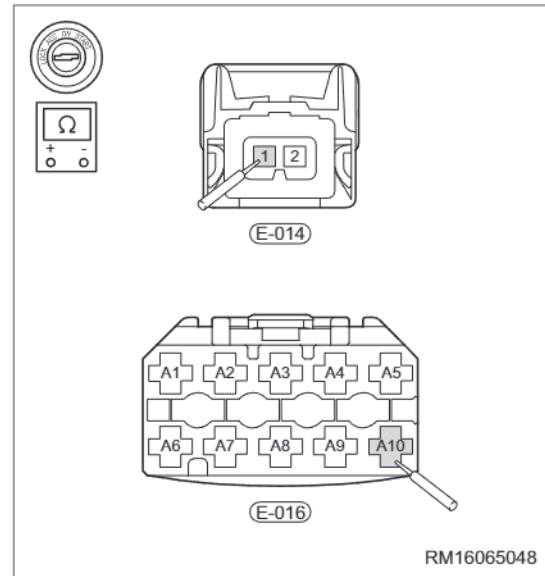
Check for Short

Multimeter Connection	Condition	Specified Condition
E-014 (1) or E-016 (A10) - Body ground	Always	No continuity
E-014 (1) or E-016 (A10) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (canister solenoid valve - engine compartment fuse and relay box)

OK



06

5 Check canister solenoid valve control circuit

- Disconnect the ECM connector E-018.
- Check the wire harness between canister solenoid valve connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-014 (2) - E-018 (30)	Always	Continuity

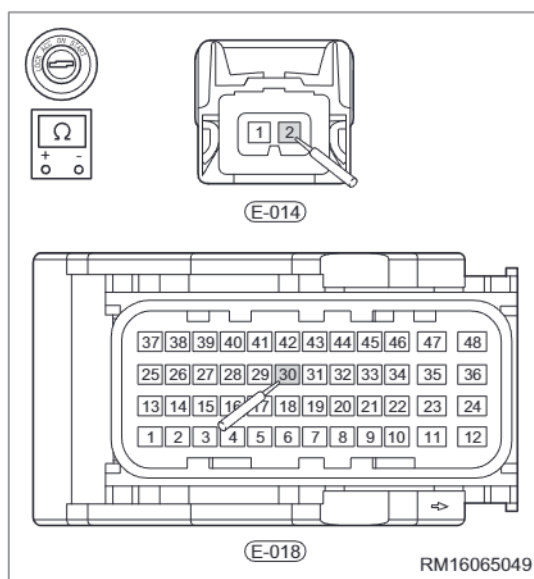
Check for Short

Multimeter Connection	Condition	Specified Condition
E-014 (2) or E-018 (30) - Body ground	Always	No continuity
E-014 (2) or E-018 (30) - Battery positive		

NG

Repair or replace wire harness or connector (canister solenoid valve - ECM)

OK



6 Check canister solenoid valve

- Check the resistance of canister solenoid valve.

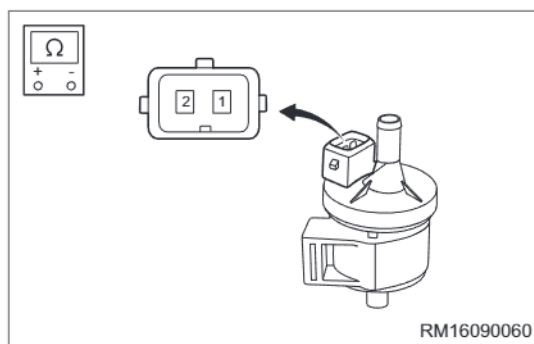
Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Always	$26 \pm 4 \Omega$ (20°C)

- With battery voltage applied between terminals 1 and 2, valve should open when air is sucked into the valve; with battery voltage not applied, valve should close when air is sucked into the valve.

NG

Replace canister solenoid valve

OK

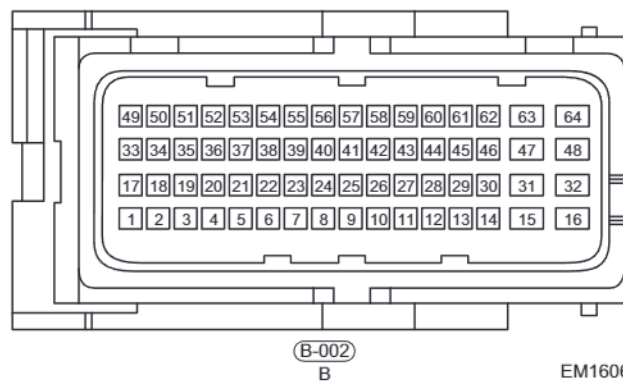
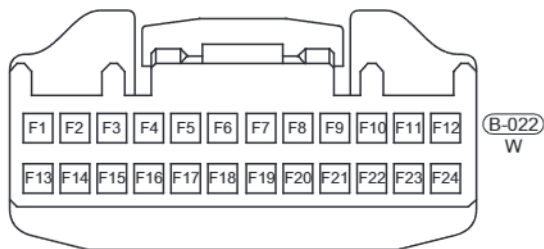
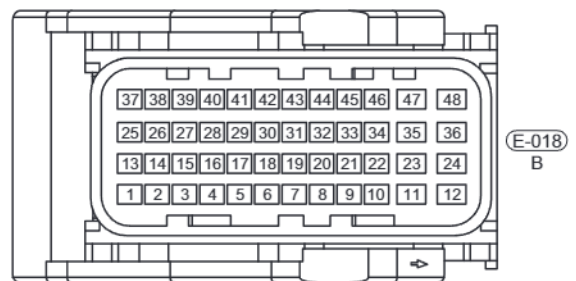
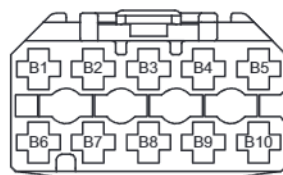
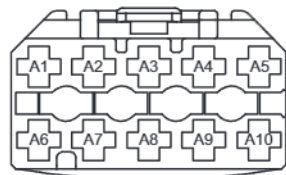
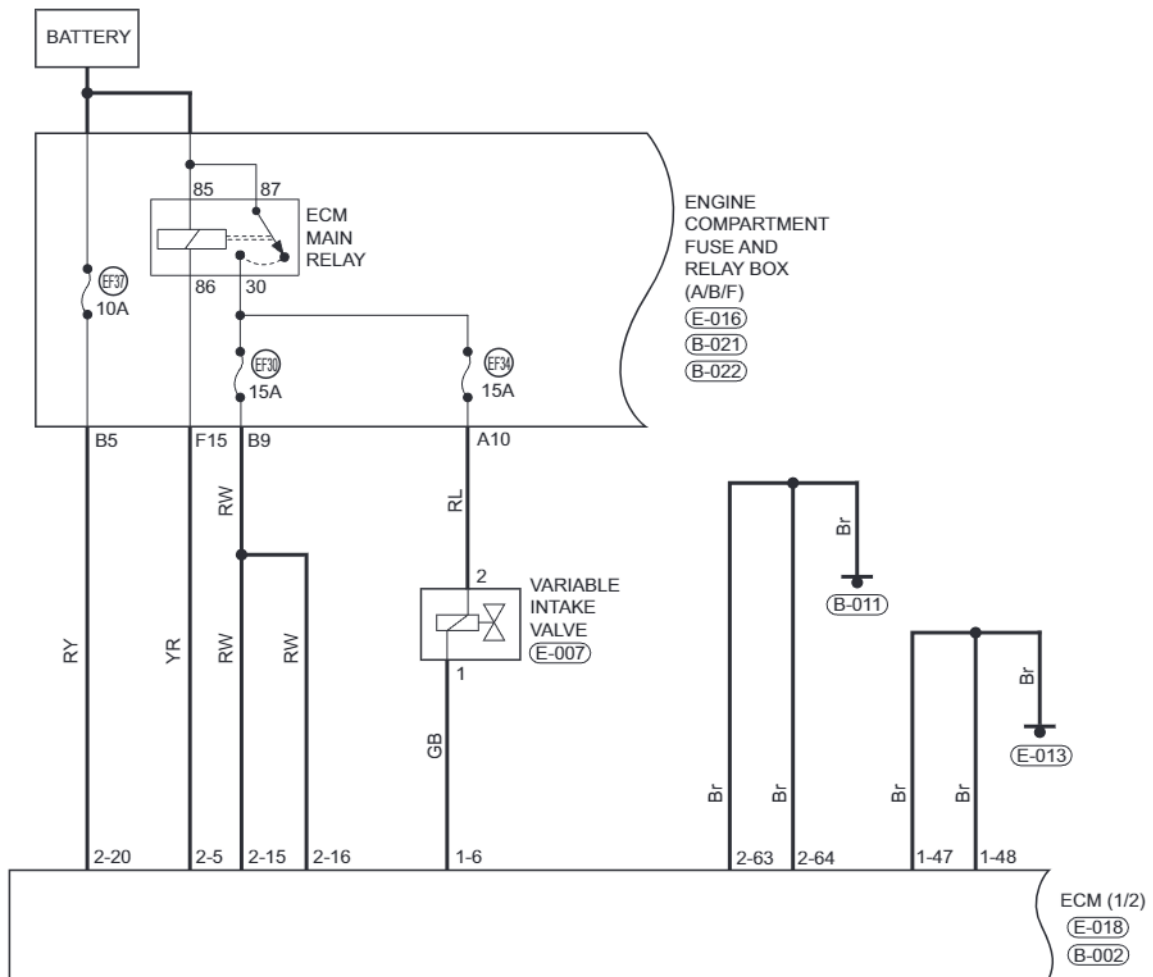


7**Check for DTCs**

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P0444-00, P0458-00 or P0459-00 still exists.

NG**Replace ECM****OK****System is operating normally.****Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.****06**

DTC	P0660-00	Intake Manifold Tuning Valve Control Circuit/Open (Bank 1)
DTC	P0661-00	Intake Manifold Tuning Valve Control Circuit Low (Bank 1)
DTC	P0662-00	Intake Manifold Tuning Valve Control Circuit High (Bank 1)



EM16063015

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0660-00	Intake Manifold Tuning Valve Control Circuit/ Open (Bank 1)	Ignition switch ON Engine running	- Variable intake valve - Wire harness or connector - ECM
P0661-00	Intake Manifold Tuning Valve Control Circuit Low (Bank 1)		
P0662-00	Intake Manifold Tuning Valve Control Circuit High (Bank 1)		

06

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure**1****Check ECM ground point**

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

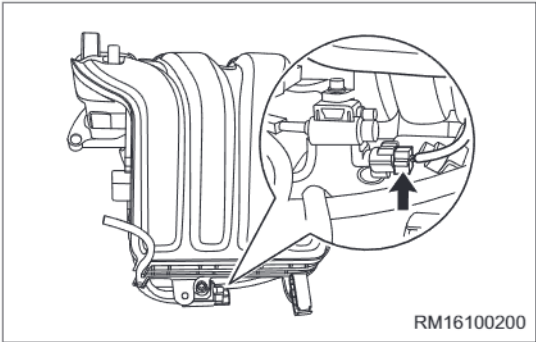
2

Check variable intake valve connector

- a. Disconnect the variable intake valve connector E-007.
- b. Check the variable intake valve connector.

NG

Repair or replace connector



OK

06

3

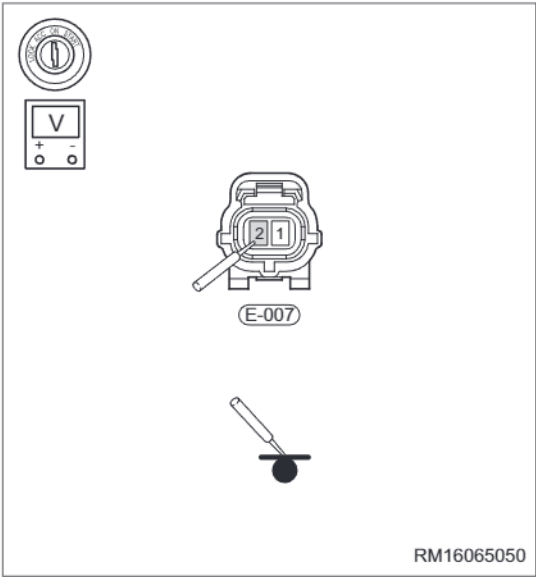
Check variable intake valve power supply voltage

- a. Turn ignition switch to ON.
- b. Check the voltage between variable intake valve connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
E-007 (2) - Body ground	Ignition switch ON	11 to 14 V

OK

Go to step 5



NG

4 Check variable intake valve power supply circuit

- Turn ignition switch to LOCK.
- Check the fuse EF34 and main relay.
- Disconnect the engine compartment fuse and relay box connector E-016.
- Check the wire harness between variable intake valve connector terminal and engine compartment fuse and relay box connector terminal.

Check for Open

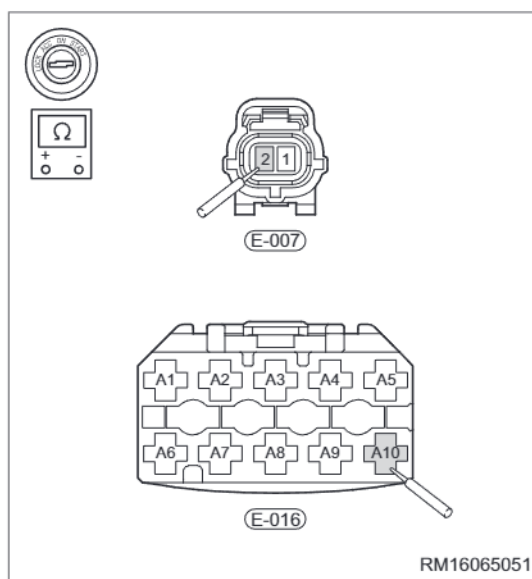
Multimeter Connection	Condition	Specified Condition
E-007 (2) - E-016 (A10)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-007 (2) or E-016 (A10) - Body ground	Always	No continuity
E-007 (2) or E-016 (A10) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (variable intake valve - engine compartment fuse and relay box)

OK

5 Check variable intake valve control circuit

- Disconnect the ECM connector E-018.
- Check the wire harness between variable intake valve connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-007 (1) - E-018 (6)	Always	Continuity

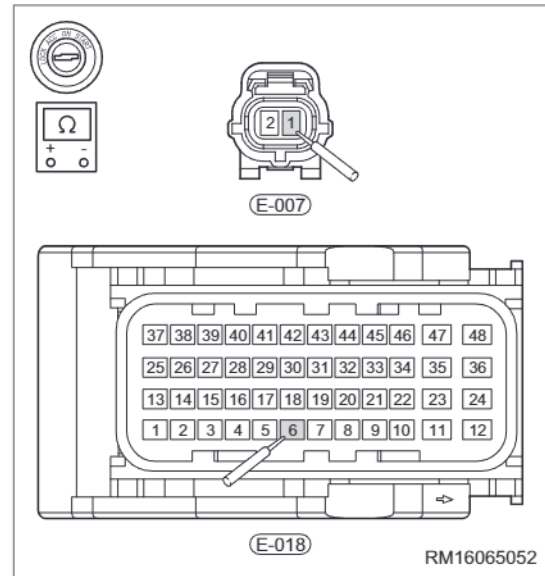
Check for Short

Multimeter Connection	Condition	Specified Condition
E-007 (1) or E-018 (6) - Body ground	Always	No continuity
E-007 (1) or E-018 (6) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (variable intake valve - ECM)

OK

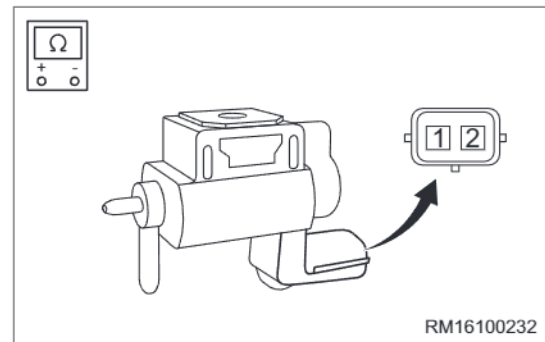


06

6 Check variable intake valve

- Check the resistance of variable intake valve.

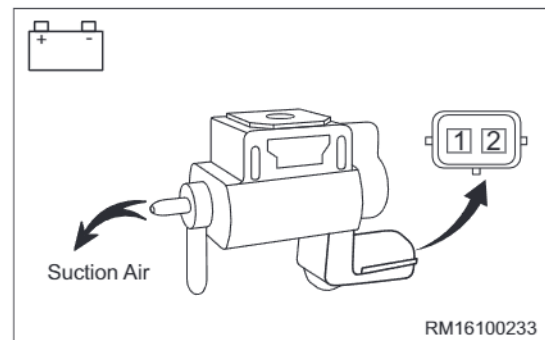
Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Always	30 Ω (at normal temperature)



- With battery voltage applied between terminals 1 and 2, valve should open when air is sucked into the valve; with battery voltage not applied, valve should close when air is sucked into the valve.

NG

Replace variable intake valve



OK

7**Check for DTCs**

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P0660-00, P0661-00 or P0662-00 still exists.

NG

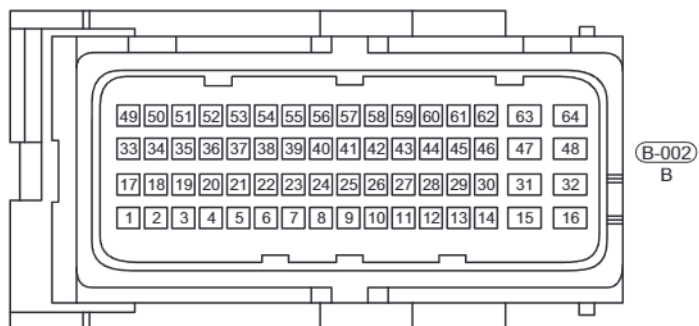
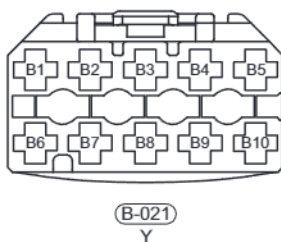
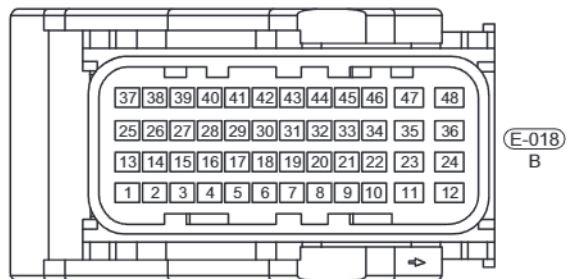
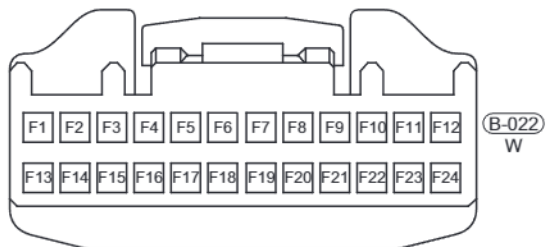
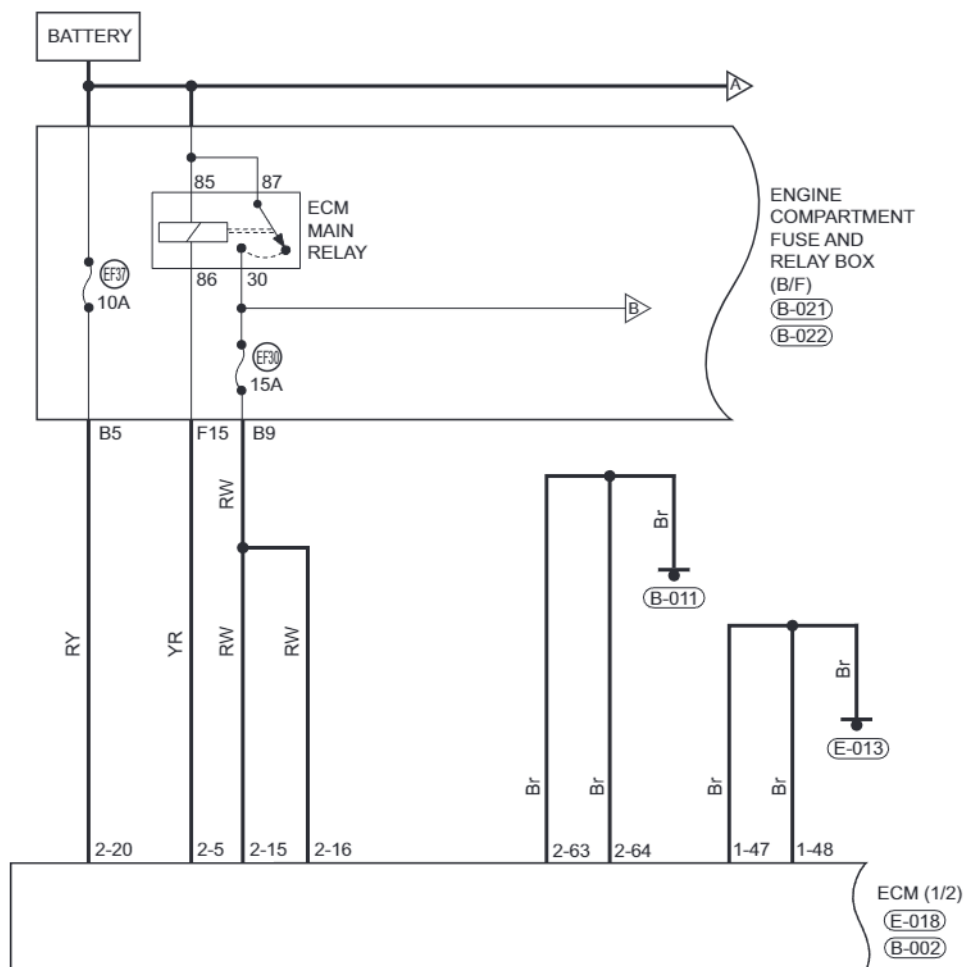
Replace ECM

OK

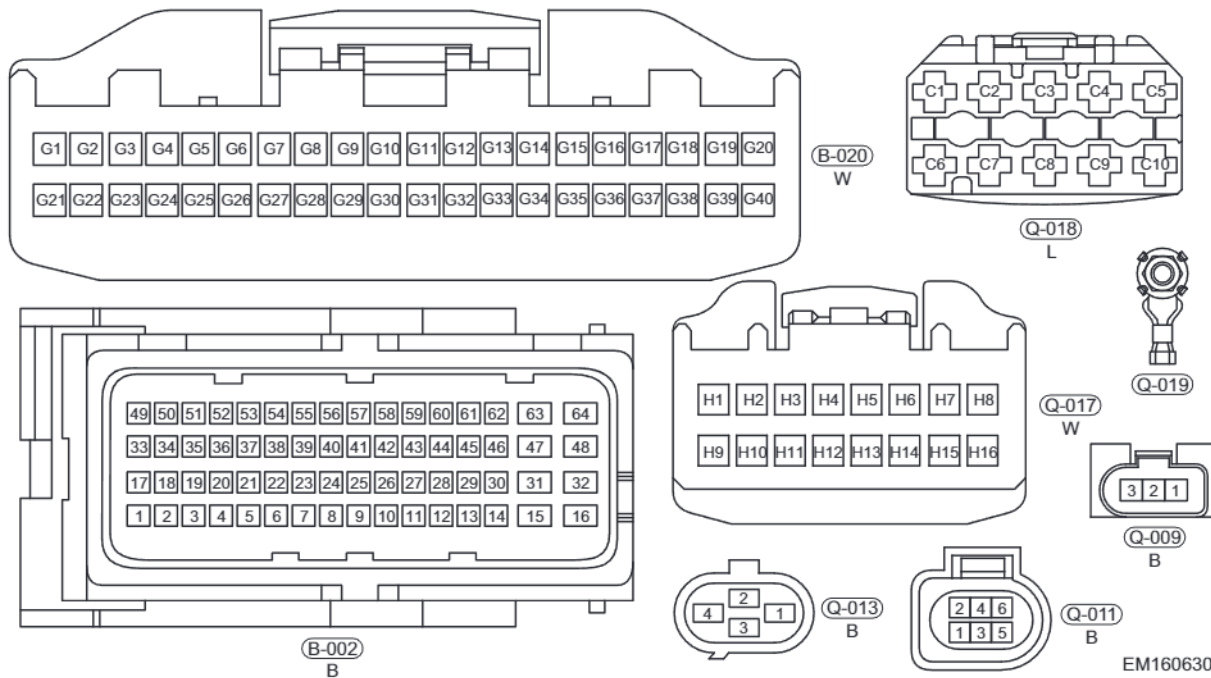
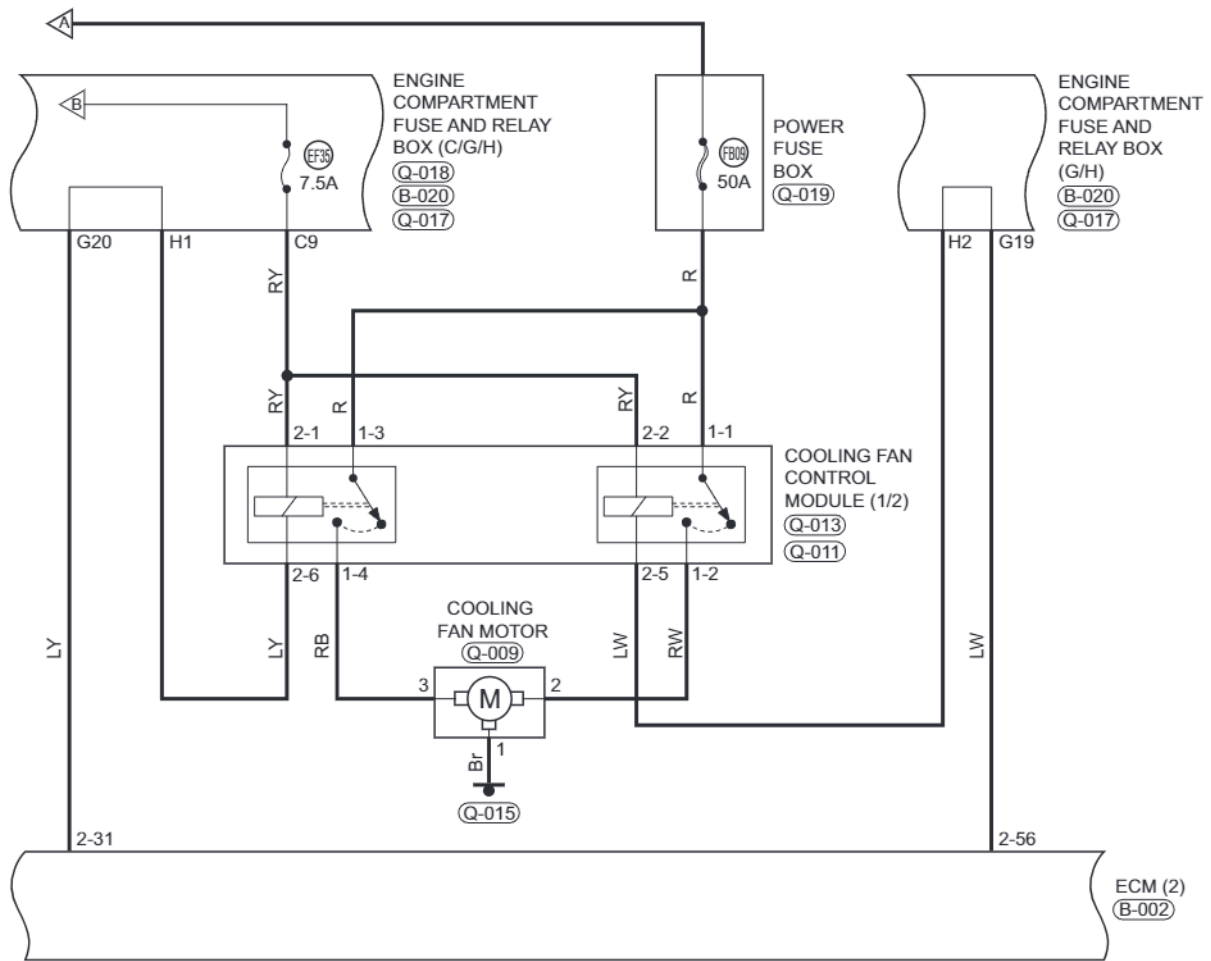
06**System is operating normally.****Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.**

DTC	P0480-00	Cooling Fan 1 Control Circuit
DTC	P0481-00	Cooling Fan 2 Control Circuit
DTC	P0691-00	Cooling Fan 1 Control Circuit Low
DTC	P0692-00	Cooling Fan 1 Control Circuit High
DTC	P0693-00	Cooling Fan 2 Control Circuit Low
DTC	P0694-00	Cooling Fan 2 Control Circuit High

06



EM16063016



EM16063017

DTC	DTC Definition	DTC Detection Condition	Possible Cause
P0480-00	Cooling Fan 1 Control Circuit	Ignition switch ON	• Wire harness or connector • Cooling fan control module (relay) • Fuse • ECM
P0481-00	Cooling Fan 2 Control Circuit		
P0691-00	Cooling Fan 1 Control Circuit Low		
P0692-00	Cooling Fan 1 Control Circuit High		
P0693-00	Cooling Fan 2 Control Circuit Low		
P0694-00	Cooling Fan 2 Control Circuit High		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1	Check ECM ground point
----------	-------------------------------

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

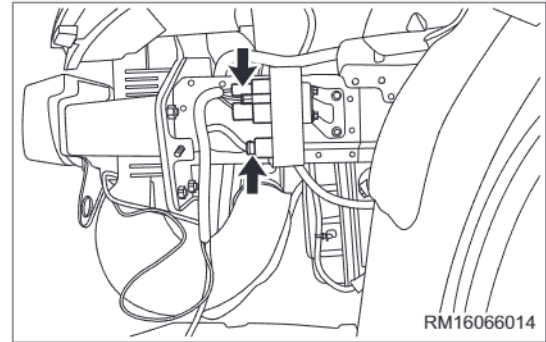
OK

2 Check cooling fan control module connector

- Disconnect the cooling fan control module connectors Q-011 and Q-013.
- Check the cooling fan control module connectors.

NG

Repair or replace connector



OK

06

3 Check cooling fan fuse

- Unplug the cooling fan fuse EF35 from engine compartment fuse and relay box.
- Check if fuse EF35 is normal.

NG

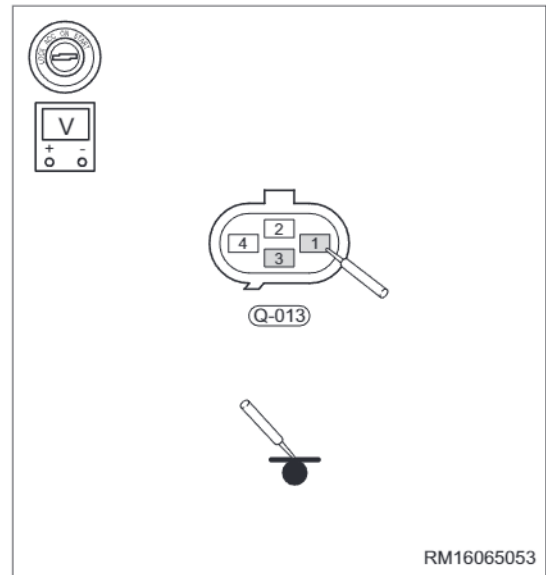
Replace fuse

OK

4 Check cooling fan control module circuit voltage

- Check the voltage of cooling fan control module connector terminals.

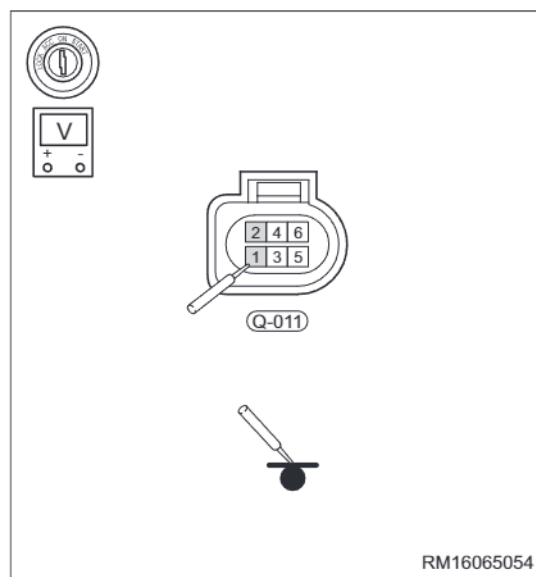
Multimeter Connection	Condition	Specified Condition
Q-013 (1, 3) - Body ground	Always	11 to 14 V



Multimeter Connection	Condition	Specified Condition
Q-011 (1, 2) - Body ground	Ignition switch ON	11 to 14 V

NG

Check engine compartment fuse and relay box, repair or replace wire harness or connector (fan control module - battery)



OK

5 Check cooling fan control circuit

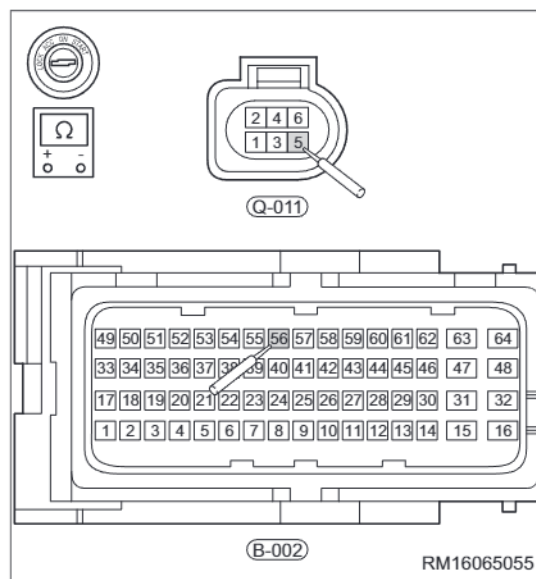
- Disconnect the ECM connector B-002.
- Check the wire harness between fan control module connector and ECM connector.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (56) - Q-011 (5)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (56) or Q-011 (5) - Body ground	Always	No continuity
B-002 (56) or Q-011 (5) - Battery positive	Always	No continuity

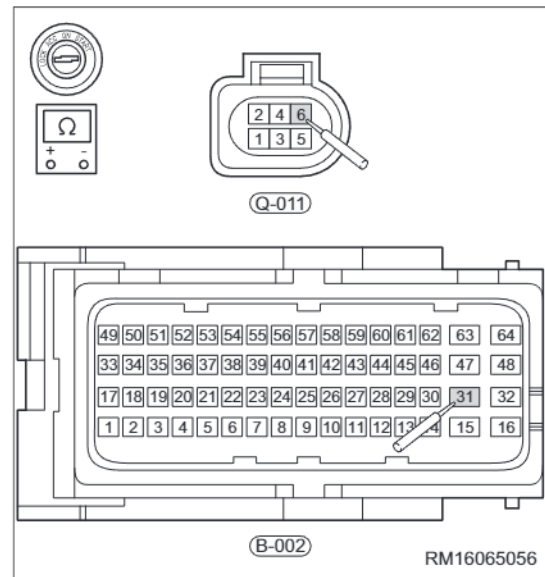


Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (31) - Q-011 (6)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (31) or Q-011 (6) - Body ground	Always	No continuity
B-002 (31) or Q-011 (6) - Battery positive	Always	No continuity

**NG**

Repair or replace wire harness or connector (fan control module - ECM)

OK**6****Replace fan control module, and check for DTCs**

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0480-00, P0481-00, P0691-00, P0692-00, P0693-00 or P0694-00 still exists.

NG**Replace ECM****OK**

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

06

DTC	P0563-00	System Voltage High Voltage
------------	-----------------	------------------------------------



DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0560-00	System Voltage Malfunction	Ignition switch ON Engine running	• Fuse • Wire harness or connector • Battery • Battery terminal • ECM
P0562-00	System Voltage Low Voltage		
P0563-00	System Voltage High Voltage		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

06

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check battery voltage

a. Check if battery voltage is normal.

NG

Recharge or replace battery

OK

2 Check battery terminal

a. Check if battery terminals are loose or corroded.

NG

Tighten or replace battery terminal

OK

3 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 (See page 06-20).

NG

Repair or replace ground wire harness or ground point

OK**4 Check ECM connector****06**

- Disconnect the ECM connectors B-002 and E-018.
- Check ECM connectors.

NG

Repair or replace ECM connector

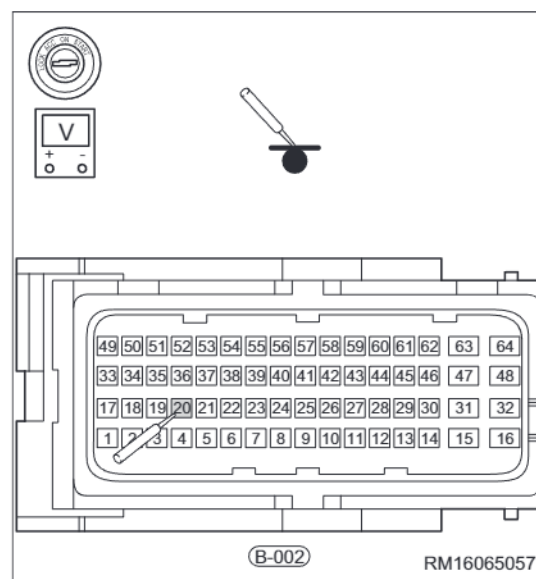
OK**5 Check ECM power supply voltage (battery voltage)**

- Check the voltage between ECM connector B-002 terminal and body ground.

Multimeter Connection	Condition	Specified Condition
B-002 (20) - Body ground	Always	11 to 14 V

OK

Go to step 8

**NG**

6 Check ECM fuse

- Unplug the ECM fuse EF37 (10 A) from engine compartment fuse and relay box.
- Check the resistance of fuse EF37.

Standard resistance: less than 1 Ω

NG

Replace ECM fuse

OK

7 Check wire harness and connector (ECM - engine compartment fuse and relay box)

- Disconnect the engine compartment fuse and relay box connector B-021.
- Check the wire harness between connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (20) - B-021 (B5)	Always	Continuity

Check for Short

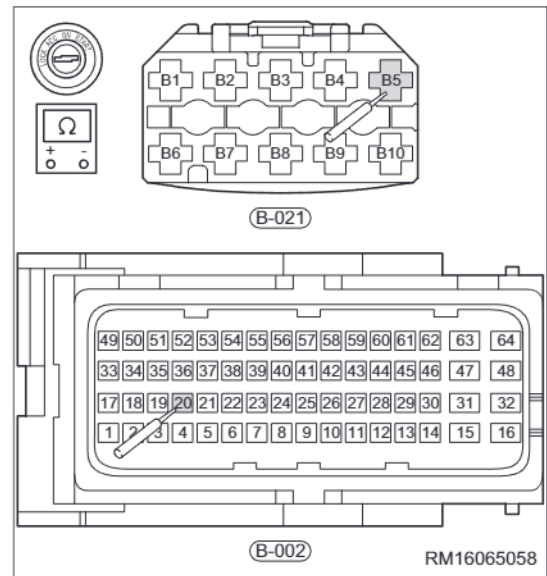
Multimeter Connection	Condition	Specified Condition
B-002 (20) or B-021 (B5) - Body ground	Always	No continuity
B-002 (20) or B-021 (B5) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector

OK

Repair or replace engine compartment fuse and relay box or wire harness (engine compartment fuse and relay box - battery)



06

8 Check ECM power supply voltage (ignition switch voltage)

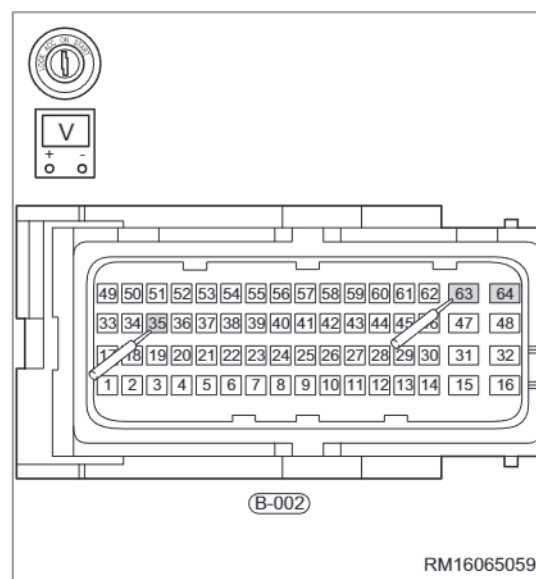
- Turn ignition switch to ON.
- Check the voltage between terminals of ECM connector B-002.

Multimeter Connection	Condition	Specified Condition
B-002 (35) - B-002 (63) or B-002 (64)	Ignition switch ON	11 to 14 V

OK

Go to step 12

06



NG

9 Check ECM fuse

- Unplug the fuse RF07 (10 A) from instrument panel fuse box.
- Check the resistance of fuse RF07.

Standard resistance: less than 1 Ω

NG

Replace fuse

OK

10 Check wire harness and connector (ECM - instrument panel fuse box)

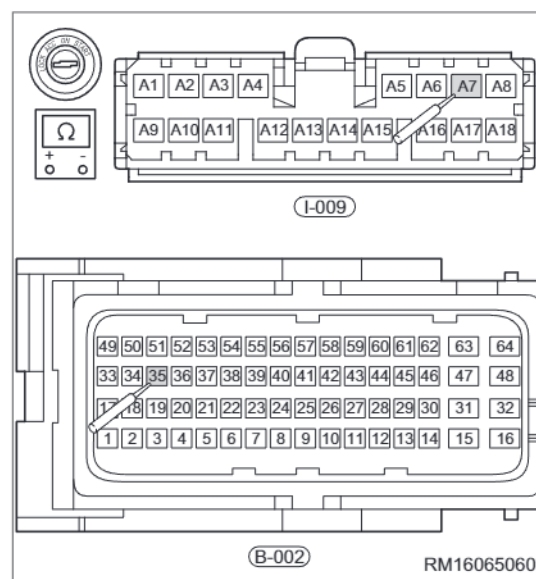
- Disconnect the instrument pane fuse box connector I-009.
- Check the wire harness between ECM and instrument panel fuse box connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (35) - I-009 (A7)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (35) or I-009 (A7) - Body ground	Always	No continuity
B-002 (35) or I-009 (A7) - Battery positive	Always	No continuity

**NG**

Repair or replace wire harness or connector

OK**11 Check ignition switch assembly (See page 15-75) (w/o PEPS)
Check IGN1 relay, fuse EF19 and PEPS system (w/ PEPS)****NG**

Replace ignition switch assembly (w/o PEPS)
Replace IGN1 relay, fuse EF19 and PEPS system (w/ PEPS)

OK

Repair or replace instrument panel fuse box or wire harness (instrument panel fuse box - ignition switch) (w/o PEPS)

Repair or replace instrument panel fuse box or wire harness (instrument panel fuse box - engine compartment fuse and relay box) (w/ PEPS)

12	Check for DTCs
-----------	-----------------------

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P0560-00, P0562-00 or P0563-00 still exists.

NG

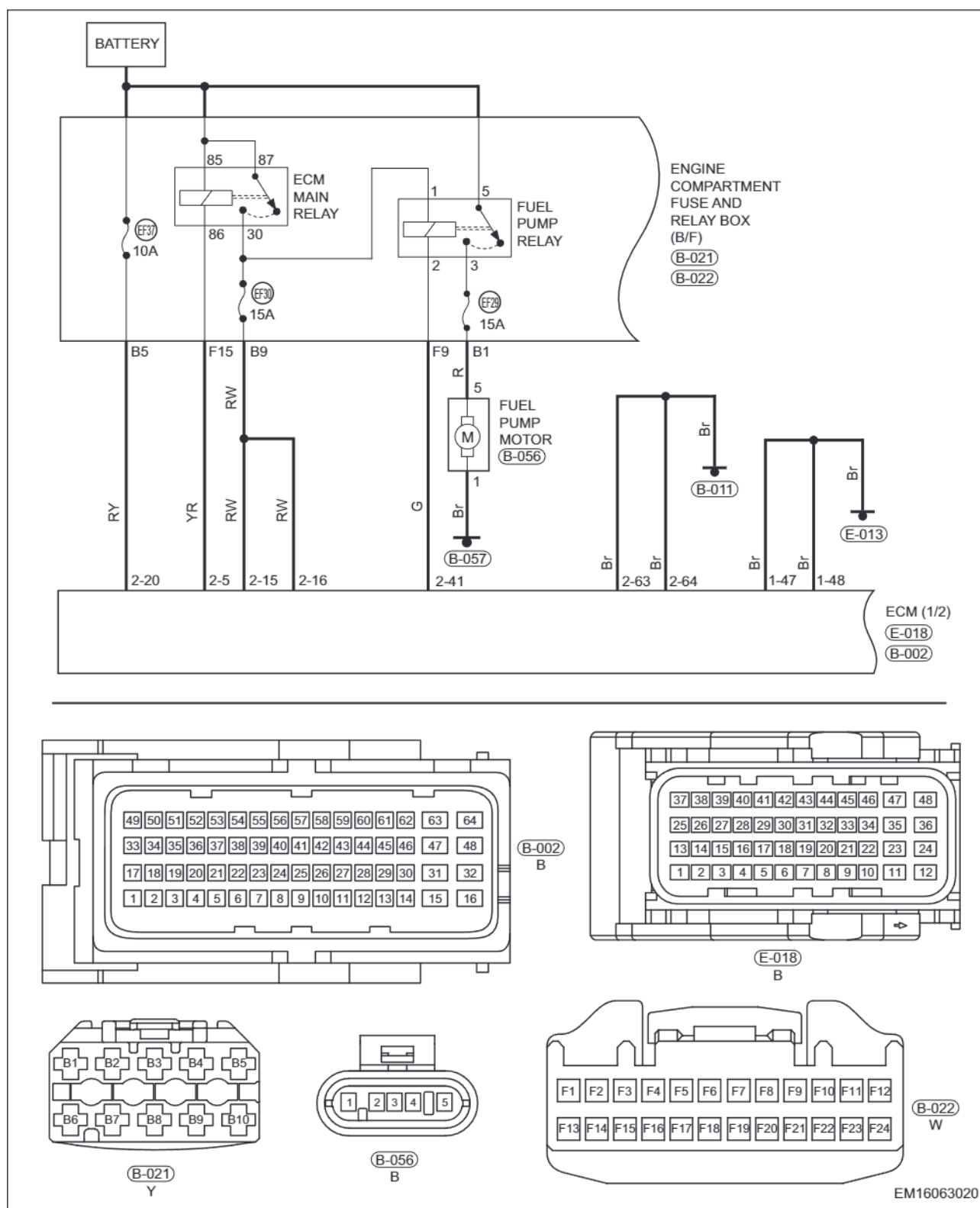
Replace ECM

OK

System is operating normally. Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

06

DTC	P0627-00	Fuel Pump "A" Control Circuit/Open
DTC	P0628-00	Fuel Pump "A" Control Circuit Low
DTC	P0629-00	Fuel Pump "A" Control Circuit High



DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0627-00	Fuel Pump "A" Control Circuit/Open	Ignition switch ON Engine running	- Fuel pump relay - Wire harness or connector - ECM - Engine compartment fuse and relay box
P0628-00	Fuel Pump "A" Control Circuit Low		
P0629-00	Fuel Pump "A" Control Circuit High		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

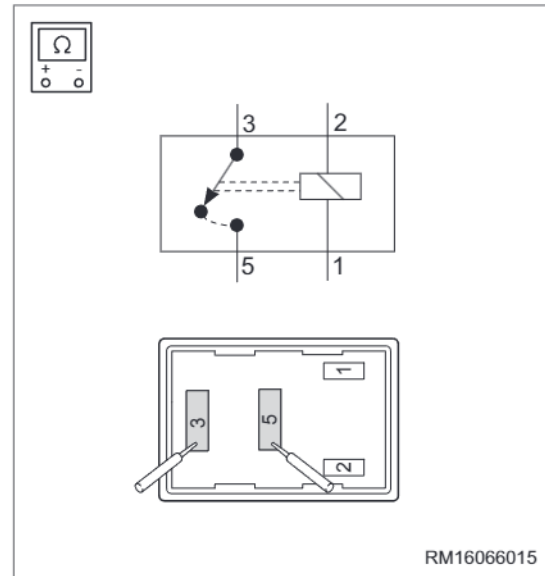
2 Check fuel pump relay

- Remove the fuel pump relay from engine compartment fuse and relay box.
- Check the fuel pump relay terminals.

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 5	Always	No continuity
Terminal 3 - Terminal 5	Always	Continuity (when battery voltage is applied between terminals 1 and 2)

NG

Replace fuel pump relay



RM16066015

OK

3 Check fuel pump relay control circuit

- Disconnect the engine compartment fuse and relay box connector B-022.
- Disconnect the ECM connector B-002.
- Check the wire harness between connector terminals.

Check for Open

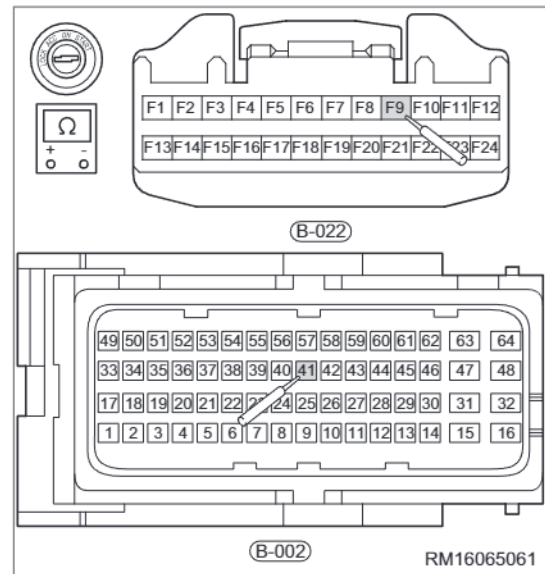
Multimeter Connection	Condition	Specified Condition
B-002 (41) - B-022 (F9)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (41) or B-022 (F9) - Body ground	Always	No continuity
B-002 (41) or B-022 (F9) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (engine compartment fuse and relay box - ECM)



RM16065061

06

OK

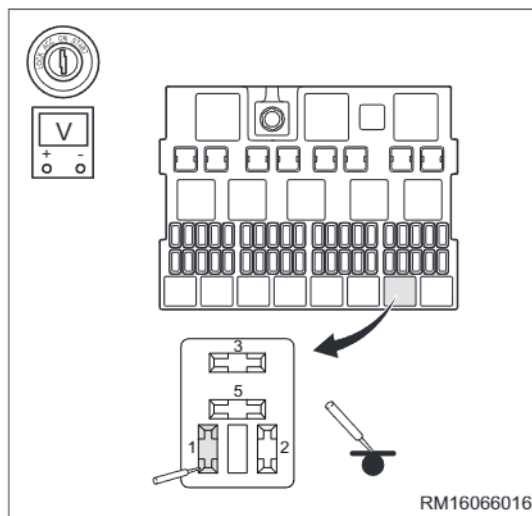
4 Check fuel pump relay terminal voltage

- Turn ignition switch to ON.
- Check the voltage between terminal of fuel pump relay and body ground.

Multimeter Connection	Condition	Specified Condition
Fuel pump relay terminal 1 (engine compartment fuse and relay box side) - Body ground	Ignition switch ON	11 to 14 V

OK

Go to step 6



NG

5 Check main relay

NG

Replace main relay

OK

Repair or replace engine compartment fuse and relay box or wire harness (engine compartment fuse and relay box - battery)

6 Check for DTCs

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0627-00, P0628-00 or P0629-00 still exists.

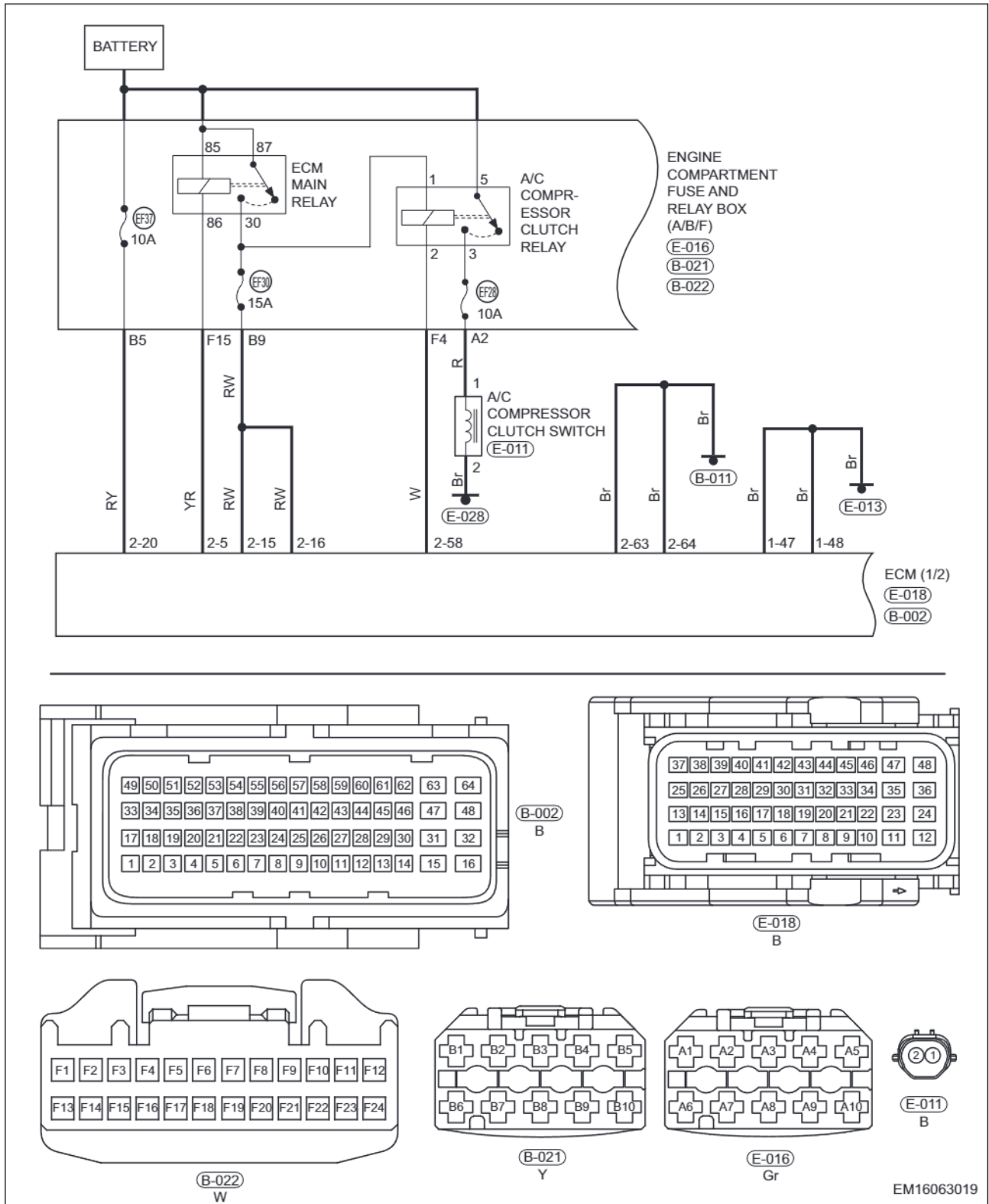
NG

Replace ECM

OK

System is operating normally.
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0645-00	A/C Clutch Relais Circuit
DTC	P0646-00	A/C Clutch Relay Control Circuit Low
DTC	P0647-00	A/C Clutch Relay Control Circuit High



DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0645-00	A/C Clutch Relais Circuit	Ignition switch ON Engine running	• A/C compressor relay • Wire harness or connector • ECM • Engine compartment fuse and relay box
P0646-00	A/C Clutch Relay Control Circuit Low		
P0647-00	A/C Clutch Relay Control Circuit High		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- 06**
- Turn ignition switch to LOCK.
 - Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
 - Turn ignition switch to ON.
 - Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
 - Start engine and warm it up to normal operating temperature, and then select Read Code.
 - If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
 - If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2

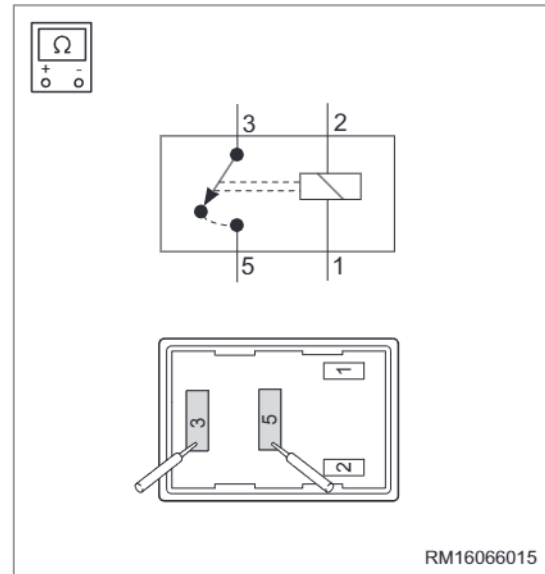
Check A/C compressor relay

- Remove the A/C compressor relay from engine compartment fuse and relay box.
- Check the A/C compressor relay terminals.

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 5	Always	No continuity
Terminal 3 - Terminal 5	Always	Continuity (when battery voltage is applied between terminals 1 and 2)

NG

Replace A/C compressor relay



OK

3

Check A/C compressor relay control circuit

- Disconnect the engine compartment fuse and relay box connector B-022.
- Disconnect the ECM connector B-002.
- Check the wire harness between ECM connector terminal and engine compartment fuse and relay box connector terminal.

Check for Open

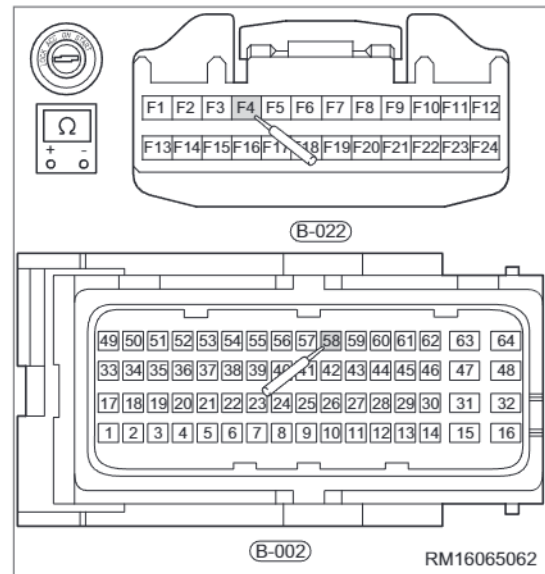
Multimeter Connection	Condition	Specified Condition
B-002 (58) - B-022 (F4)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (58) or B-022 (F4) - Body ground	Always	No continuity
B-002 (58) or B-022 (F4) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (ECM - engine compartment fuse and relay box)

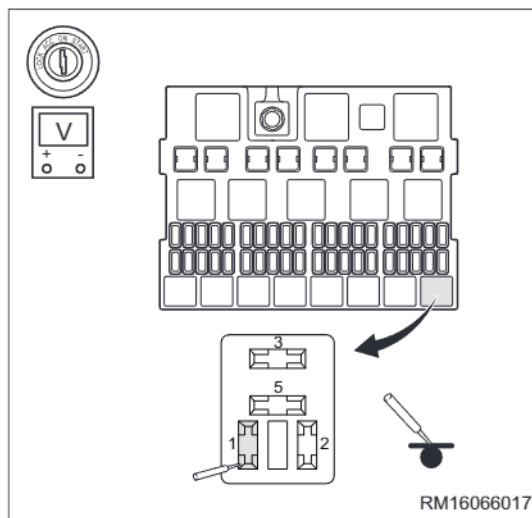


OK

4 Check A/C compressor relay terminal voltage

- Turn ignition switch to ON.
- Check the voltage between terminal of A/C compressor relay terminal and body ground.

Multimeter Connection	Condition	Specified Condition
A/C compressor relay terminal 1 (engine compartment fuse and relay box side) - Body ground	Ignition switch ON	11 to 14 V



OK

Go to step 6

NG

5 Check main relay

NG

Replace main relay

OK

Repair or replace engine compartment fuse and relay box or wire harness (engine compartment fuse and relay box - battery)

6 Check for DTCs

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0645-00, P0646-00 or P0647-00 still exists.

NG

Replace ECM

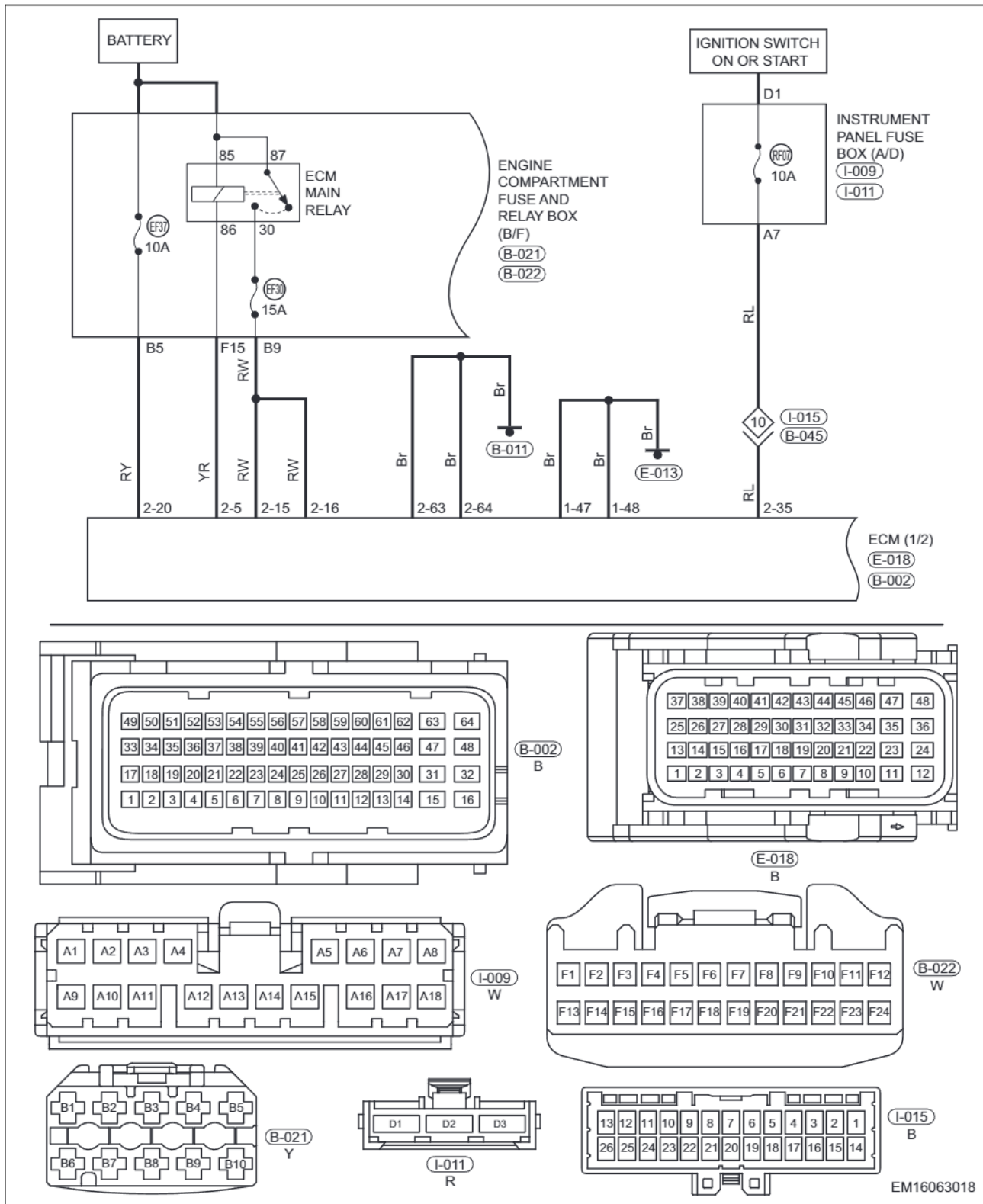
OK

System is operating normally.
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC

P0688-00

EMC/PCM Power Relay Sense Circuit Open



06

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0688-00	EMC/PCM Power Relay Sense Circuit Open	Ignition switch ON	• Main relay • Wire harness or connector • ECM

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using diagnostic tester, select Read Datastream.
- If datastream is not detected, the malfunction indicated through datastream is current. Go to diagnosis procedure - Step 1.
- If datastream is detected, the malfunction indicated through datastream is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

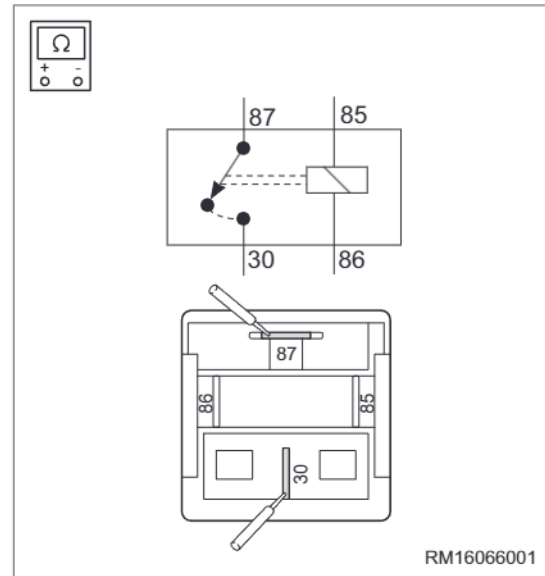
2 Check main relay and fuse

- Remove the main relay and fuse EF30 from engine compartment fuse and relay box.
- Check if fuse EF30 is normal.
- Check for continuity between terminals of main relay.

Multimeter Connection	Condition	Specified Condition
Terminal 30 - Terminal 87	Always	No continuity
Terminal 30 - Terminal 87	Always	Continuity (when battery voltage is applied between terminals 85 and 86)

NG

Replace main relay or fuse



OK

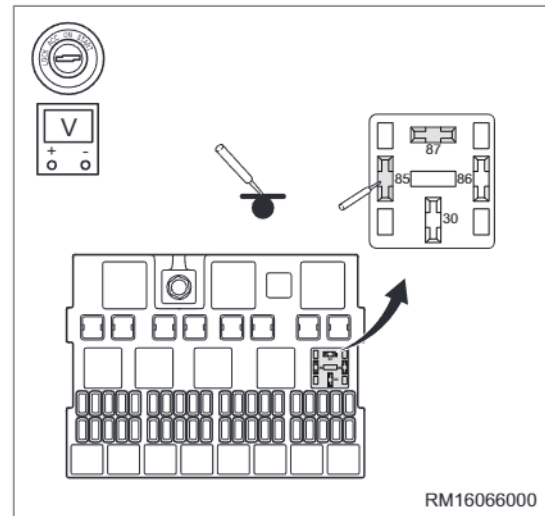
3 Check main relay circuit voltage

- Check the voltage between terminals of main relay (engine compartment fuse and relay box side) and body ground.

Multimeter Connection	Condition	Specified Condition
Main relay terminals 87 and 85 (engine compartment fuse and relay box side) - Body ground	Always	11 to 14 V

NG

Repair or replace wire harness or connector (main relay - battery)



OK

4

Check wire harness and connector (ECM - engine compartment fuse and relay box)

- Disconnect the engine compartment fuse and relay box connectors B-021 and B-022.
- Disconnect the ECM connector B-002.
- Check the wire harness between connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (5) - B-022 (F15)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (5) or B-022 (F15) - Body ground	Always	No continuity
B-002 (5) or B-022 (F15) - Battery positive	Always	No continuity

Check for Open

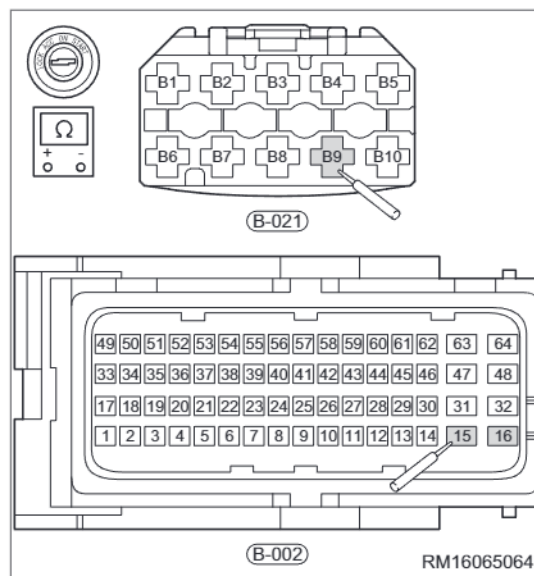
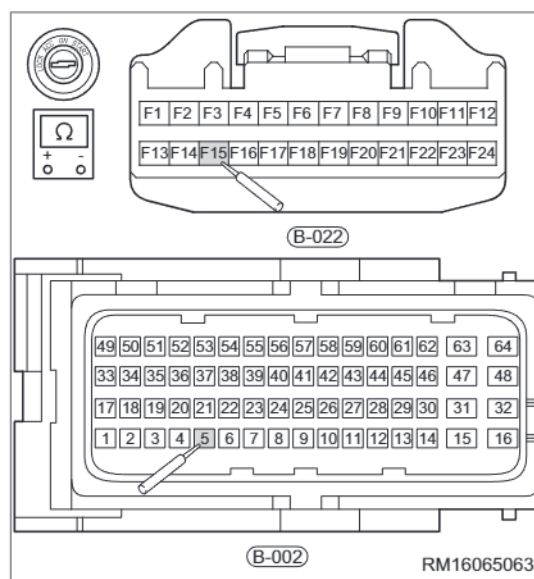
Multimeter Connection	Condition	Specified Condition
B-002 (15) - B-021 (B9)	Always	Continuity
B-002 (16) - B-021 (B9)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (15, 16) or B-021 (B9) - Body ground	Always	No continuity
B-002 (15, 16) or B-021 (B9) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector



OK

5**Check for DTCs**

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P0688-00 still exists.

NG**Replace ECM****OK****System is operating normally.****Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.****06**

DTC	P0604-00	Internal Contr. Module Random Access Memory (RAM) Error
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DTC	P0605-00	Internal Contr. Module ROM Test Error
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DTC Code	DTC Definitions	DTC Detection Condition	Possible Cause
P0604-00	Internal Contr. Module Random Access Memory (RAM) Error	Ignition switch ON	- Wire harness or connector - ECM
P0605-00	Internal Contr. Module ROM Test Error		

06**DTC Confirmation Procedure**

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1	Check ECM ground point
----------	-------------------------------

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2**Check ECM connector**

- a. Disconnect the ECM connectors B-002 and E-018.
- b. Check if connectors are normal.

NG**Repair or replace connector****OK****Replace ECM****06**

DTC	P1615-00	ECM Status Unknown
DTC	P1616-00	Authentication Not OK
DTC	P1617-00	No Response from SIM During Challenge Period
DTC	P1618-00	Fail to Write EOL Confiditional Data into EEPROM
DTC	P1619-00	ECM Not Programmed (Virgin State)

06

DTC Code	DTC Definitions	DTC Detection Condition	Possible Cause
P1615-00	ECM Status Unknown	Ignition switch ON	- Wire harness or connector - ECM
P1616-00	Authentication Not OK		
P1617-00	No Response from SIM During Challenge Period		
P1618-00	Fail to Write EOL Confiditional Data into EEPROM		
P1619-00	ECM Not Programmed (Virgin State)		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1	Check ECM ground point
----------	-------------------------------

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2

Check ECM connector

- a. Disconnect the ECM connectors B-002 and E-018.
- b. Check if connectors are normal.

NG

Repair or replace connector

OK

06

3

Use X-431 3G diagnostic tester to match ECM ([See page 34-9](#)), and check for DTCs again

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P1615-00, P1616-00, P1617-00, P1618-00 or P1619-00 still exists.

NG

Replace ECM

OK

System is operating normally.

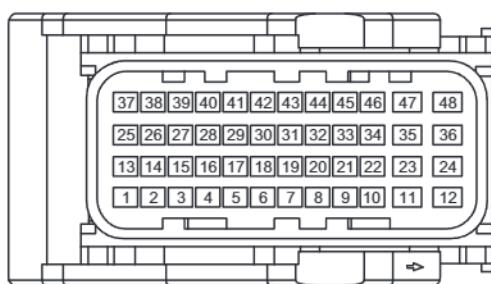
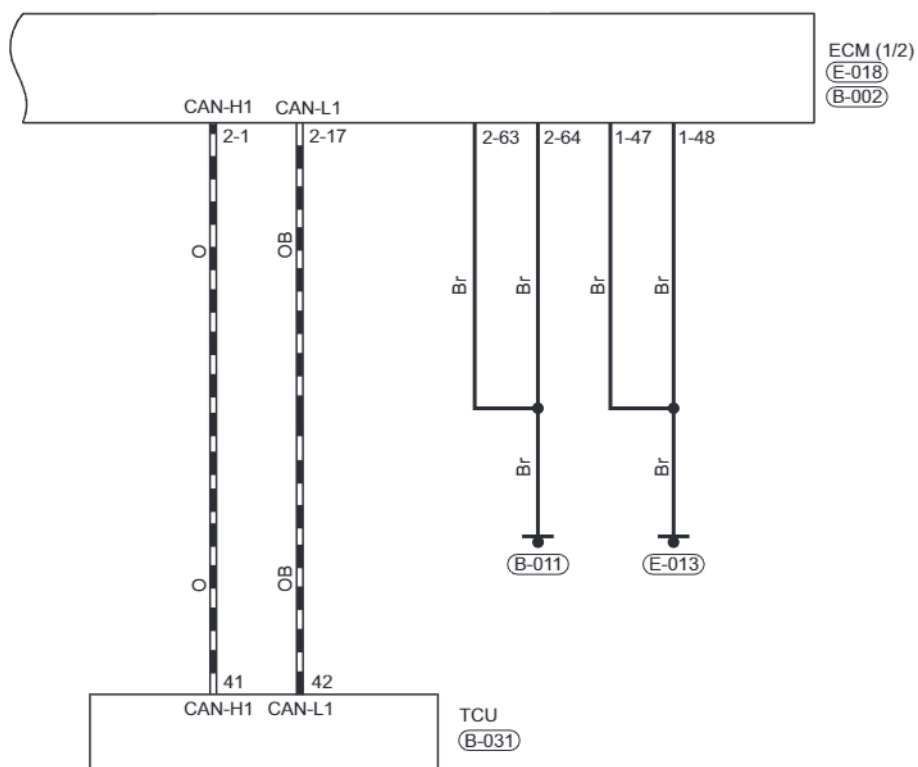
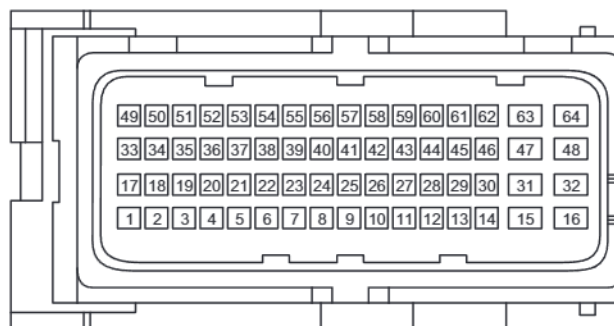
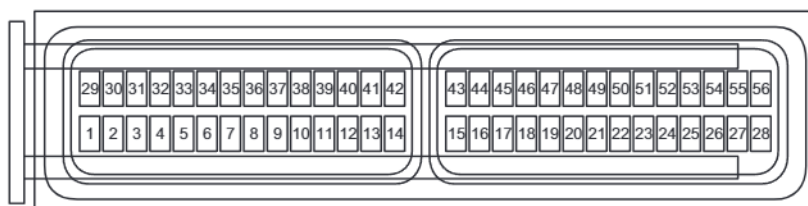
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC

U0101-87

Lost Communication with TCM (CVT only)

06

(E-018)
B(B-002)
B(B-031)
B

EM16063026

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
U0101-87	Lost Communication with TCM (CVT only)	Ignition switch ON Engine running	- CAN line or connector - ECM - TCU

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

06

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2 Check ECM connector and TCU connector

- Disconnect the ECM connector B-002.
- Disconnect the TCU connector B-031.
- Check if connectors are normal.

NG

Repair or replace connector

OK



3 Check CAN line

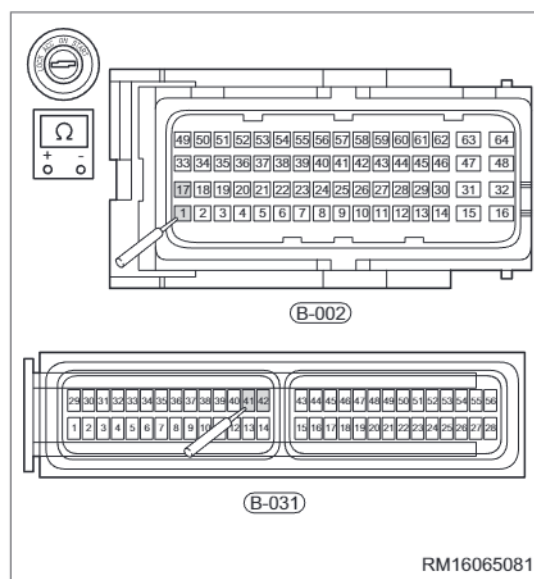
- a. Check the CAN line.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (1) - B-031 (41)	Always	Continuity
B-002 (17) - B-031 (42)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (1) or B-031 (41) - Body ground	Always	No continuity
B-002 (1) or B-031 (41) - Battery positive	Always	No continuity
B-002 (17) or B-031 (42) - Body ground	Always	No continuity
B-002 (17) or B-031 (42) - Battery positive	Always	No continuity



NG

Repair or replace CAN line

OK

4 Replace ECM, and check for DTCs

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC U0101-87 still exists.

NG

Replace TCU

OK

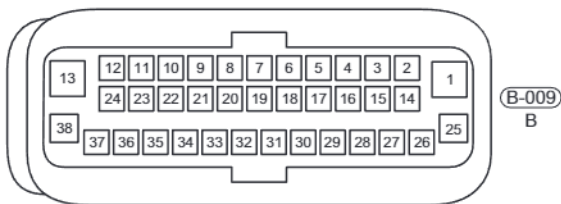
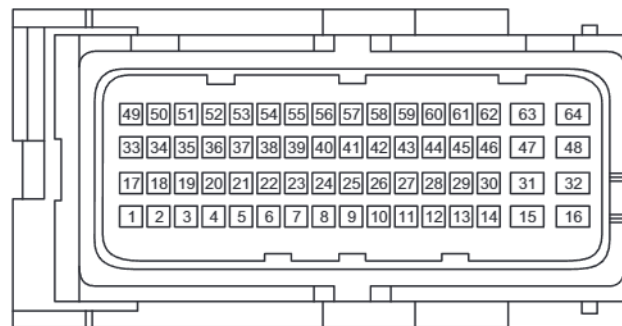
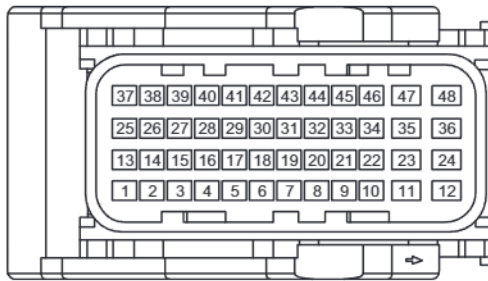
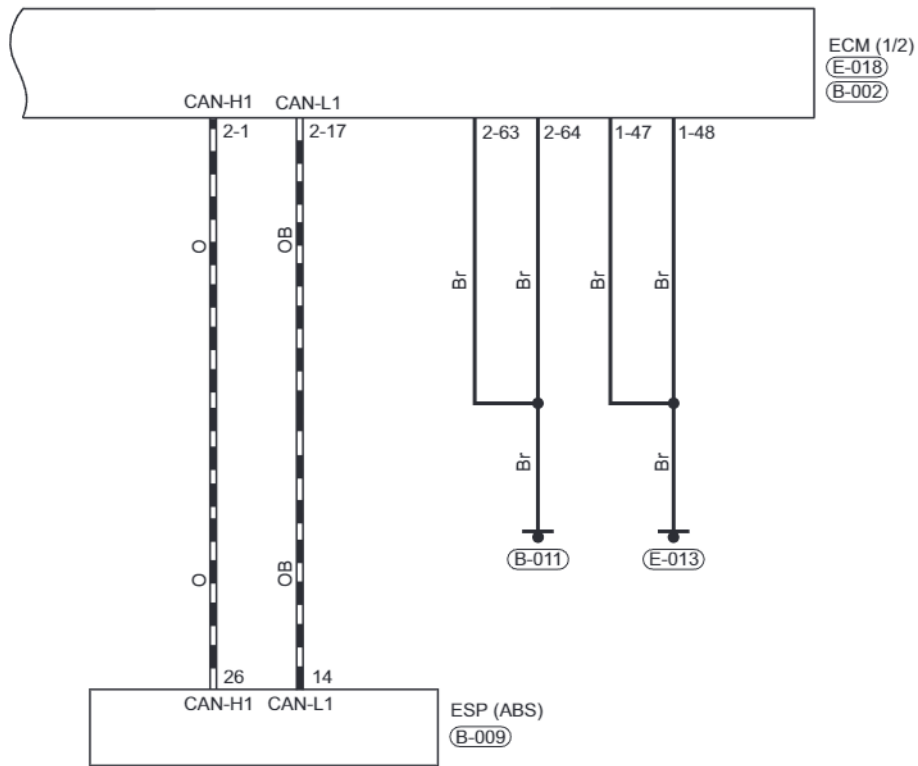
System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC

U0129-87

Lost Communication with BSM



EM16063025

06

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
U0129-87	Lost Communication with BSM	Ignition switch ON Engine running	- CAN line or connector - ECM - ESP (ABS)

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2 Check ECM connector and ESP (ABS) connector

- Disconnect the ECM connector B-002.
- Disconnect the ESP (ABS) connector B-009.
- Check if connectors are normal.

NG

Repair or replace connector

OK

3 Check CAN line

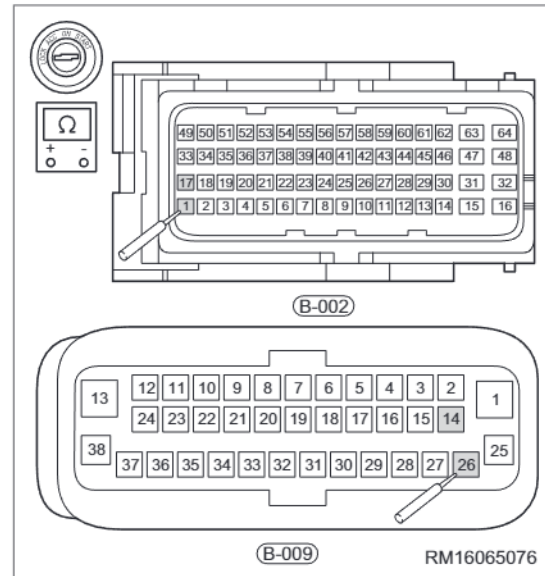
- a. Check the CAN line.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (1) - B-009 (26)	Always	Continuity
B-002 (17) - B-009 (14)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (1) or B-009 (26) - Body ground	Always	No continuity
B-002 (1) or B-009 (26) - Battery positive	Always	No continuity
B-002 (17) or B-009 (14) - Body ground	Always	No continuity
B-002 (17) or B-009 (14) - Battery positive	Always	No continuity



NG

Repair or replace CAN line

OK

4 Replace ECM, and check for DTCs

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC U0129-87 still exists.

NG

Replace EPS (ABS)

OK

System is operating normally.

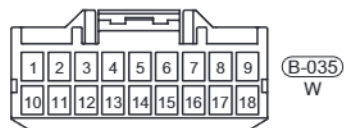
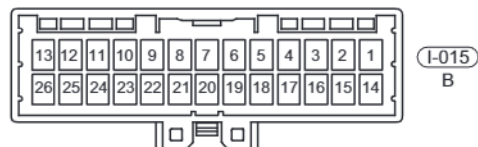
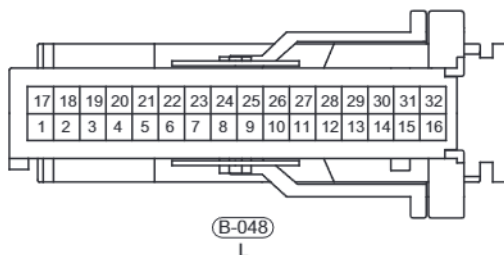
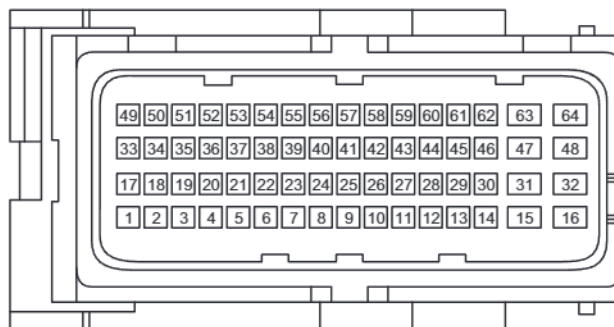
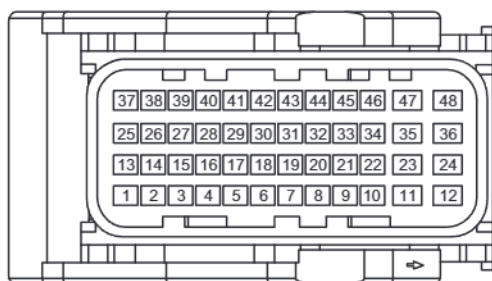
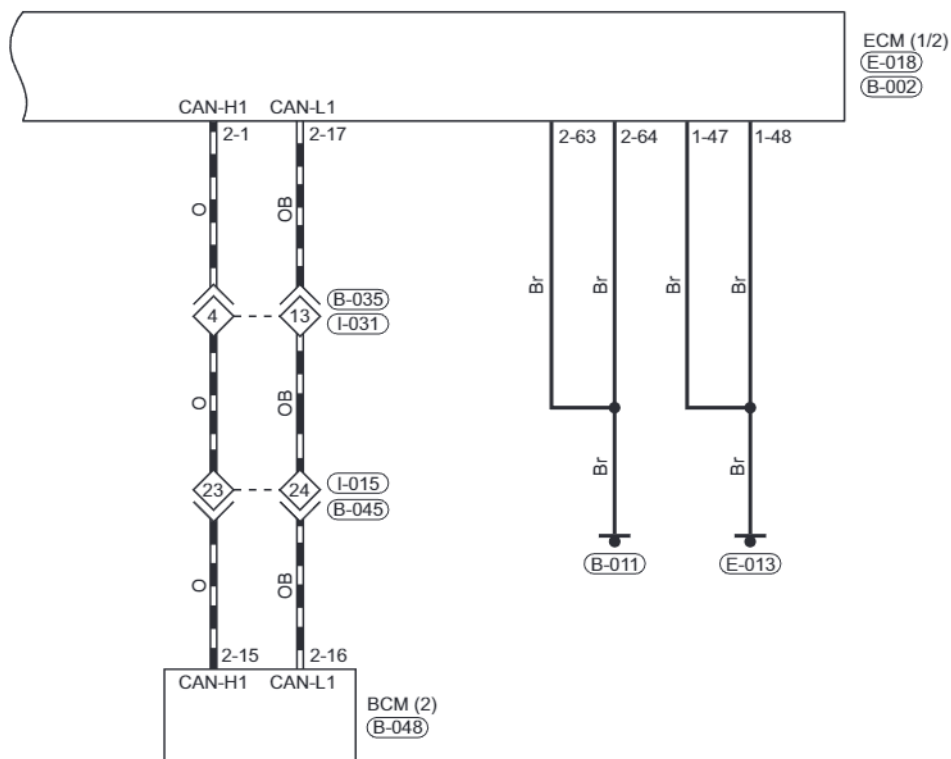
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC

U0140-87

Lost Communication with BCM

06



EM16063028

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
U0140-87	Lost Communication with BCM	Ignition switch ON Engine running	- CAN line or connector - ECM - BCM

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

06

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2 Check ECM connector and BCM connector

- Disconnect the ECM connector B-002.
- Disconnect the BCM connector B-048.
- Check if connectors are normal.

NG

Repair or replace connector

OK

3 Check CAN line

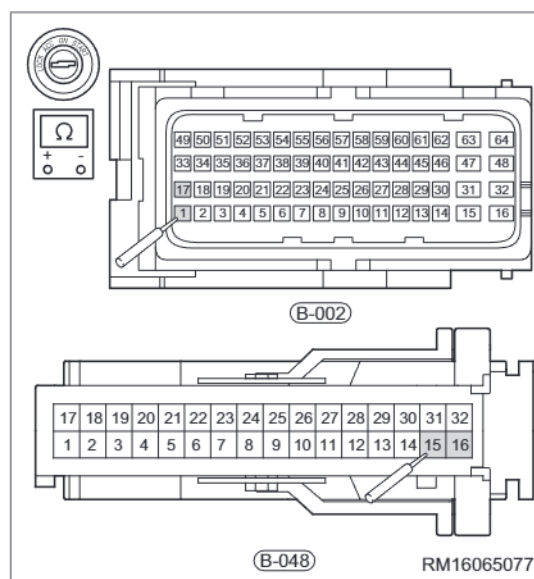
a. Check the CAN line.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (1) - B-048 (15)	Always	Continuity
B-002 (17) - B-048 (16)	Always	Continuity

Check for Short

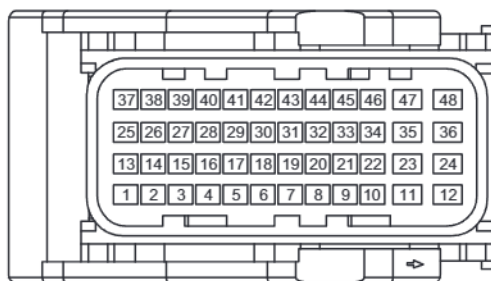
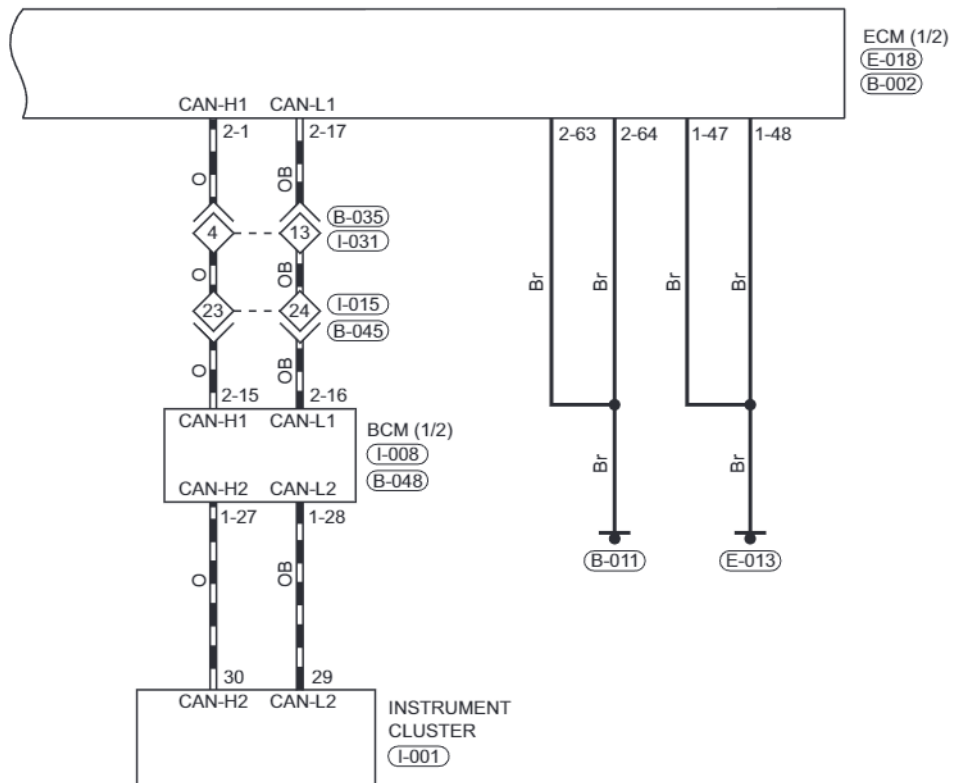
Multimeter Connection	Condition	Specified Condition
B-002 (1) or B-048 (15) - Body ground	Always	No continuity
B-002 (1) or B-048 (15) - Battery positive	Always	No continuity
B-002 (17) or B-048 (16) - Body ground	Always	No continuity
B-002 (17) or B-048 (16) - Battery positive	Always	No continuity

**NG****Repair or replace CAN line****OK****4 Replace ECM, and check for DTCs**

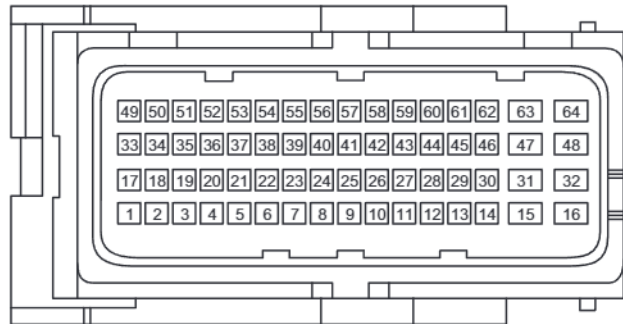
- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC U0140-87 still exists.

NG**Replace BCM control module****OK****System is operating normally.****Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.**

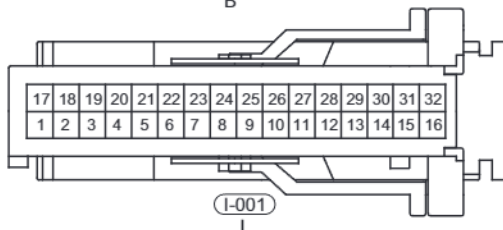
DTC	U0155-87	Lost Communication with ICM
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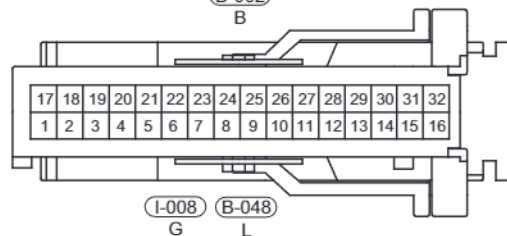
(E-018)
B



(B-002)
B



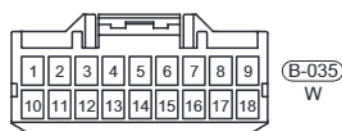
(I-001)
L



(I-008) (B-048)
G L



(I-015)
B



(B-035)
W

EM16063027

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
U0155-87	Lost Communication with ICM	Ignition switch ON Engine running	- CAN line or connector - ECM - ICM - BCM

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2 Check ECM connector, instrument cluster connector and BCM connector

- Disconnect the ECM connector B-002.
- Disconnect the instrument cluster connector I-001.
- Disconnect the BCM connectors I-008 and B-048.
- Check if connectors are normal.

NG

Repair or replace connector

OK

3 Check CAN line (ECM - BCM)

a. Check the CAN line.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (1) - B-048 (15)	Always	Continuity
B-002 (17) - B-048 (16)	Always	Continuity

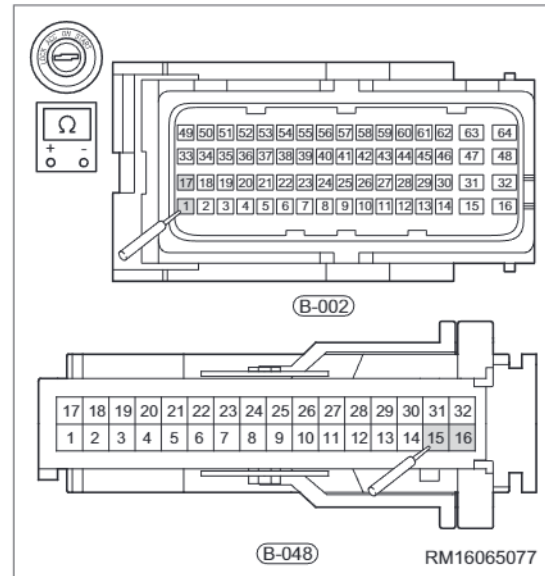
Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (1) or B-048 (15) - Body ground	Always	No continuity
B-002 (1) or B-048 (15) - Battery positive	Always	No continuity
B-002 (17) or B-048 (16) - Body ground	Always	No continuity
B-002 (17) or B-048 (16) - Battery positive	Always	No continuity

NG

Repair or replace CAN line

OK



06

4 Check CAN line (BCM - ICM)

a. Check the CAN line.

Check for Open

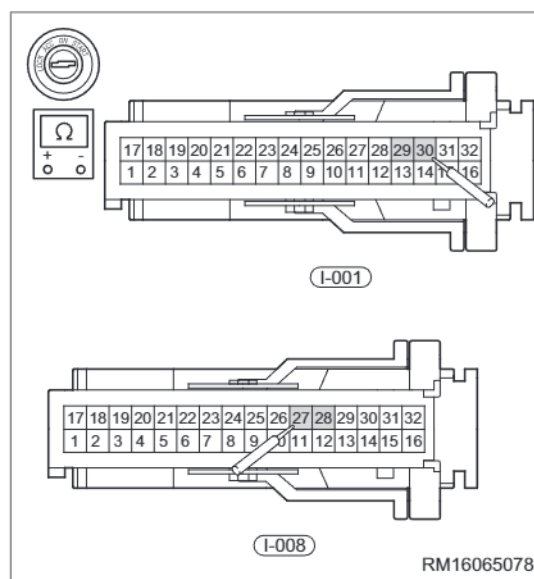
Multimeter Connection	Condition	Specified Condition
I-001 (30) - I-008 (27)	Always	Continuity
I-001 (29) - I-008 (28)	Always	Continuity

Check for Short

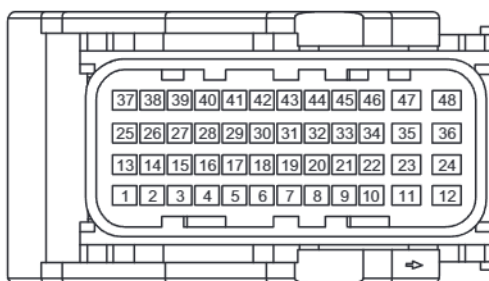
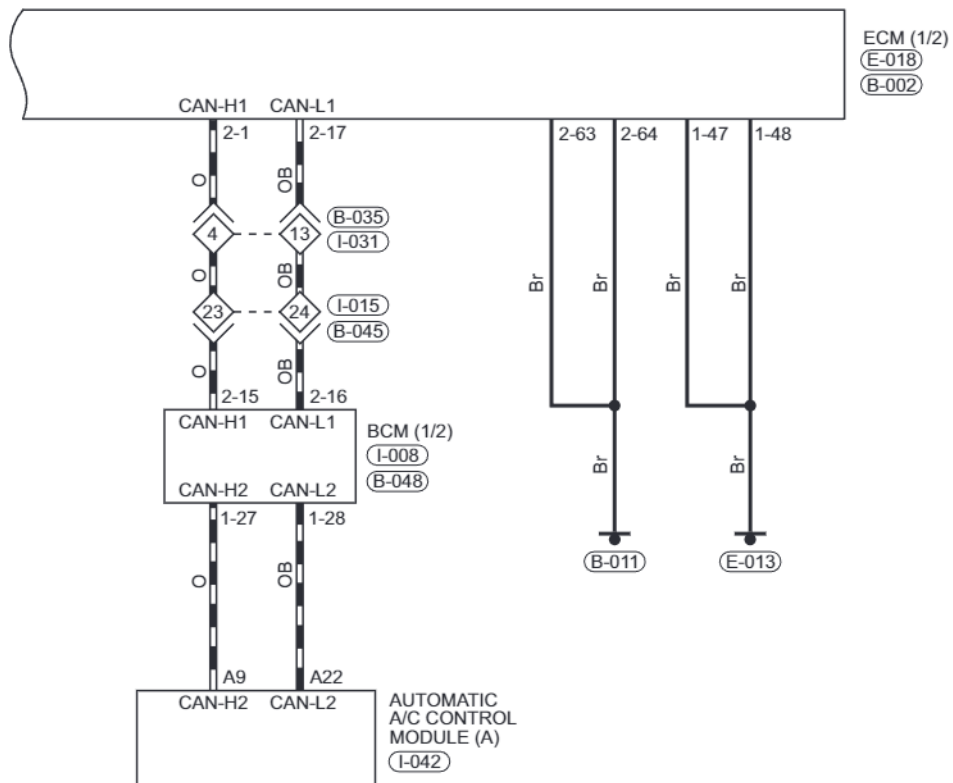
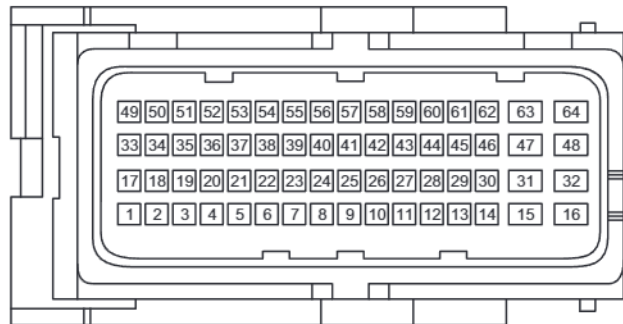
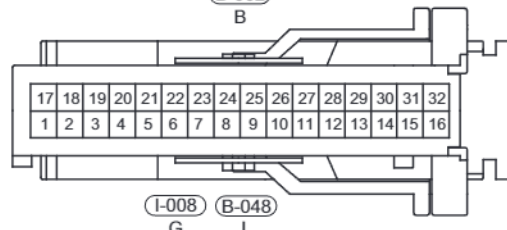
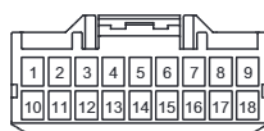
Multimeter Connection	Condition	Specified Condition
I-001 (30) or I-008 (27) - Body ground	Always	No continuity
I-001 (30) or I-008 (27) - Battery positive	Always	No continuity
I-001 (29) or I-008 (28) - Body ground	Always	No continuity
I-001 (29) or I-008 (28) - Battery positive	Always	No continuity

NG**Repair or replace CAN line****OK****5 Replace ECM, and check for DTCs**

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC U0155-87 still exists.

NG**Check or replace BCM and ICM****OK****System is operating normally.****Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.**

DTC	U0164-87	Lost Communication with CLM
-----	----------	-----------------------------

(E-018)
B(B-002)
B(I-042)
W(I-008) (B-048)
G L(I-015)
B(B-035)
W

EM16063029

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
U0164-87	Lost Communication with CLM	Ignition switch ON Engine running	- CAN line or connector - ECM - CLM (A/C control module) - BCM

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2 Check ECM connector, A/C control module connector and BCM connector

- Disconnect the ECM connector B-002.
- Disconnect the A/C control module connector I-042.
- Disconnect the BCM connectors I-008 and B-048.
- Check if connectors are normal.

NG

Repair or replace connector

OK

3 Check CAN line (ECM - BCM)

a. Check the CAN line.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-002 (1) - B-048 (15)	Always	Continuity
B-002 (17) - B-048 (16)	Always	Continuity

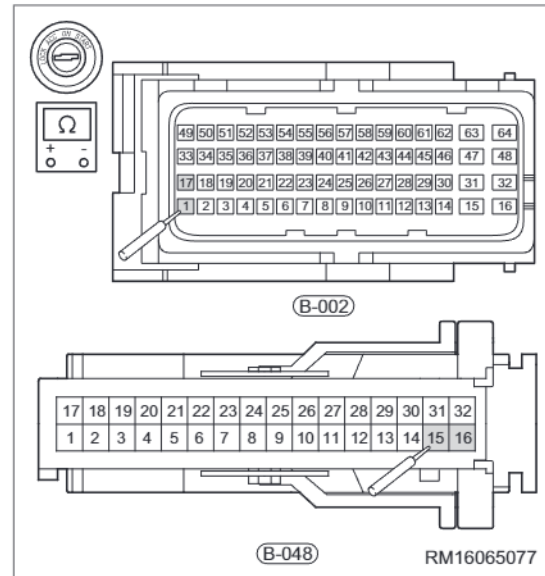
Check for Short

Multimeter Connection	Condition	Specified Condition
B-002 (1) or B-048 (15) - Body ground	Always	No continuity
B-002 (1) or B-048 (15) - Battery positive	Always	No continuity
B-002 (17) or B-048 (16) - Body ground	Always	No continuity
B-002 (17) or B-048 (16) - Battery positive	Always	No continuity

NG

Repair or replace CAN line

OK



06

4 Check CAN line (BCM - A/C control module)

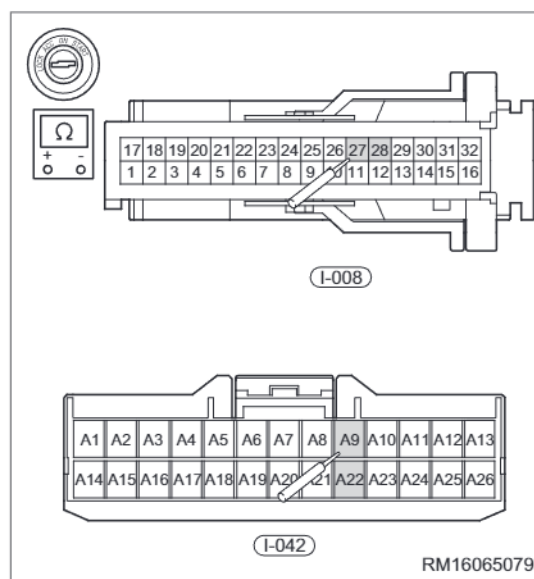
a. Check the CAN line.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-042 (A9) - I-008 (27)	Always	Continuity
I-042 (A22) - I-008 (28)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-042 (A9) or I-008 (27) - Body ground	Always	No continuity
I-042 (A9) or I-008 (27) - Battery positive	Always	No continuity
I-042 (A22) or I-008 (28) - Body ground	Always	No continuity
I-042 (A22) or I-008 (28) - Battery positive	Always	No continuity



NG

Repair or replace CAN line

OK

5 Replace ECM, and check for DTCs

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC U0164-87 still exists.

NG

Check or replace BCM and A/C control module

OK

System is operating normally.

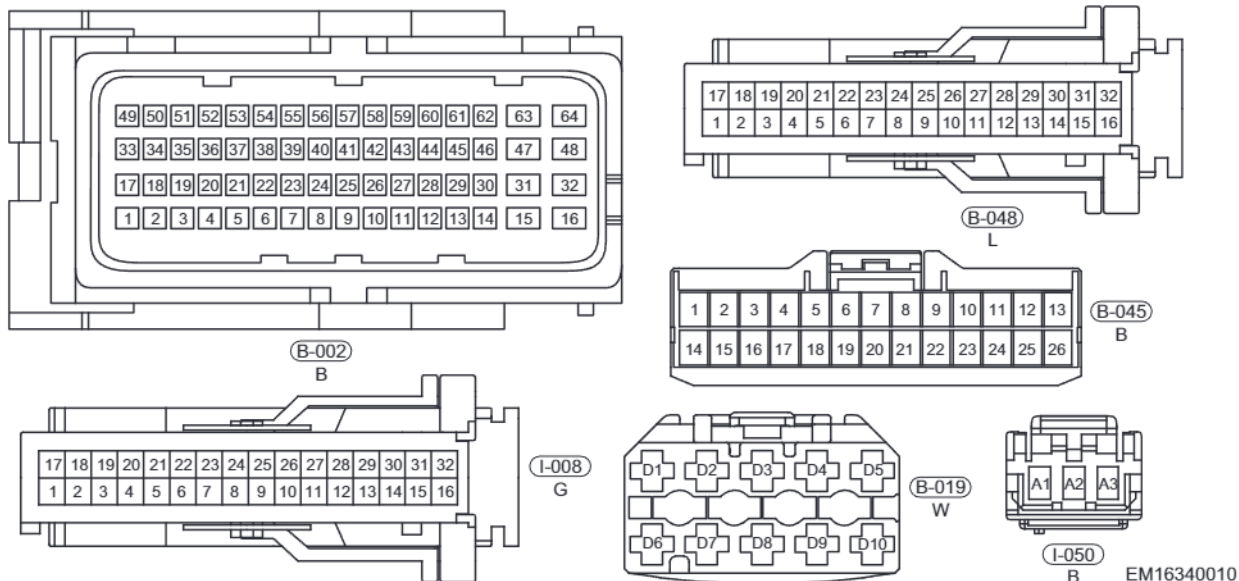
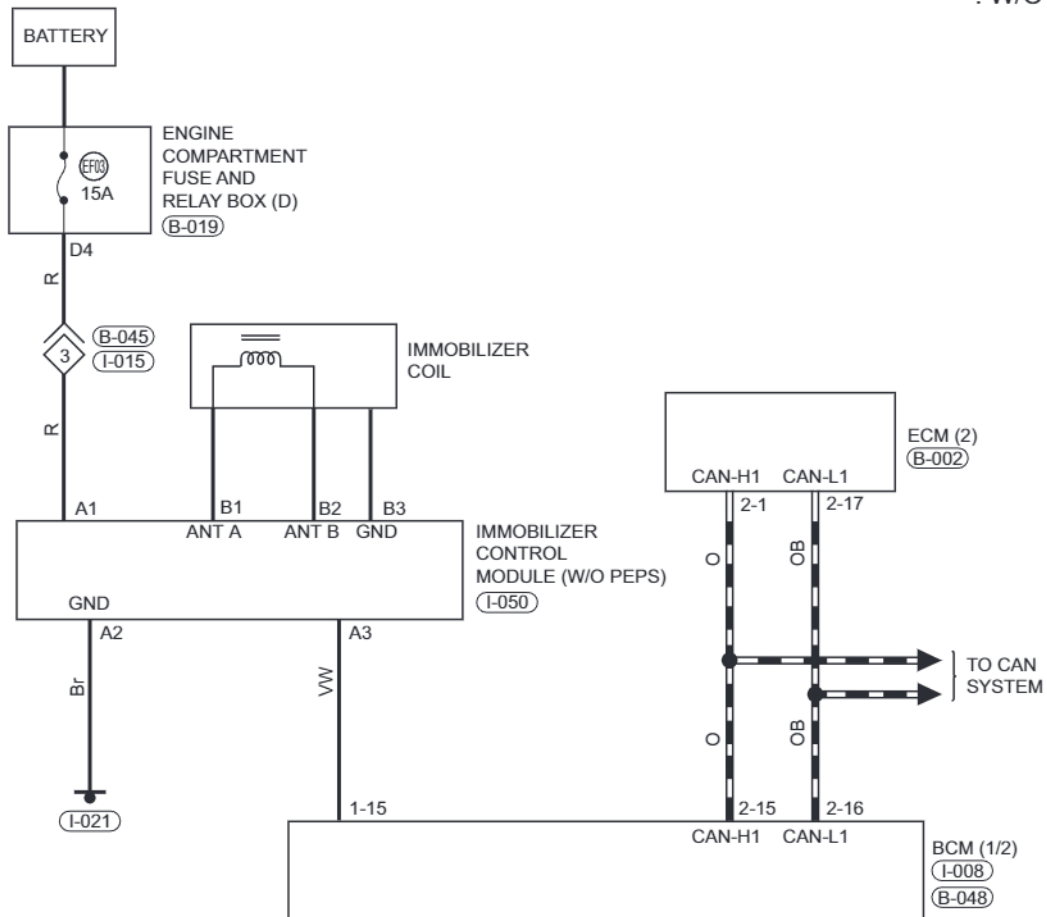
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC

U0167-87

Lost Communication with IMMO

*: W/O PEPS



06

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
U0167-87	Lost Communication with IMMO	Ignition switch ON	- CAN line or connector - ECM - Engine immobilizer control module

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK

2 Check ECM connector and engine immobilizer control module connector

- Disconnect the ECM connector B-002.
- Disconnect the engine immobilizer control module connector I-050.
- Disconnect the BCM connectors I-008 and B-048.
- Check if connectors are normal.

NG

Repair or replace connector

OK

3 Check wire harness (BCM - engine immobilizer control module)

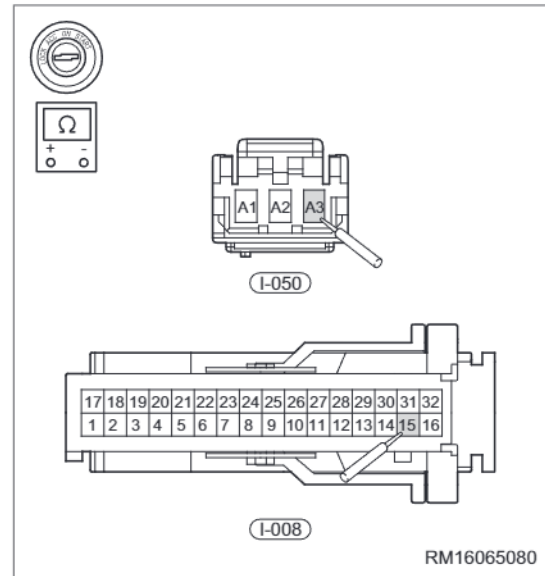
a. Check the wire harness.

Check for Open

Multimeter Connection	Condition	Specified Condition
I-050 (A3) - I-008 (15)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
I-050 (A3) or I-008 (15) - Body ground	Always	No continuity
I-050 (A3) or I-008 (15) - Battery positive	Always	No continuity



NG Repair or replace CAN line

OK

4 Replace ECM, and check for DTCs

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC U0167-87 still exists.

NG Check or replace engine immobilizer control module and BCM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

06

DTC	P000A-00	"A" Camshaft Position Slow Response
------------	-----------------	--

DTC	P000B-00	"B" Camshaft Position Slow Response
------------	-----------------	--

DTC Code	DTC Definitions	DTC Detection Conditions	Possible Cause
P000A-00	"A" Camshaft Position Slow Response	Ignition switch ON Engine running	- Camshaft phaser - VVT control valve - Wire harness or connector - ECM
P000B-00	"B" Camshaft Position Slow Response		

06 DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1	Check ECM ground point
----------	-------------------------------

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

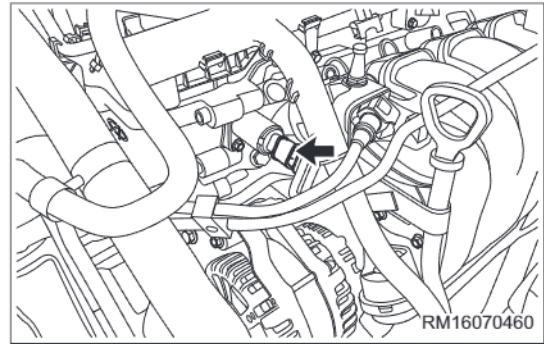
NG

Repair or replace ground wire harness or ground point

OK

2 Check VVT control valve connector

- Disconnect the intake VVT control valve connector E-005.
- Disconnect the exhaust VVT control valve connector E-001.
- Check VVT control valve connectors.

NG**Repair or replace connector**

RM16070460

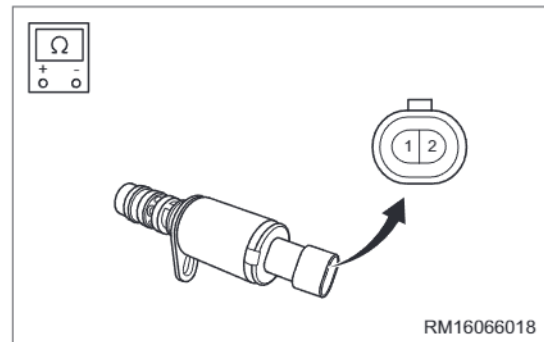
OK**06****3 Check intake/exhaust camshaft phaser**

- Check if intake/exhaust camshaft phaser is blocked or stuck.

NG**Replace intake/exhaust camshaft phaser****OK****4 Check intake/exhaust VVT control valve**

- Turn ignition switch to LOCK.
- Remove intake/exhaust VVT control valve.
- Check intake/exhaust VVT control valve.

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Always	8 Ω



RM16066018

- When battery voltage is applied between terminals 1 and 2, control valve should move quickly.

NG**Replace intake/exhaust VVT control valve****OK**

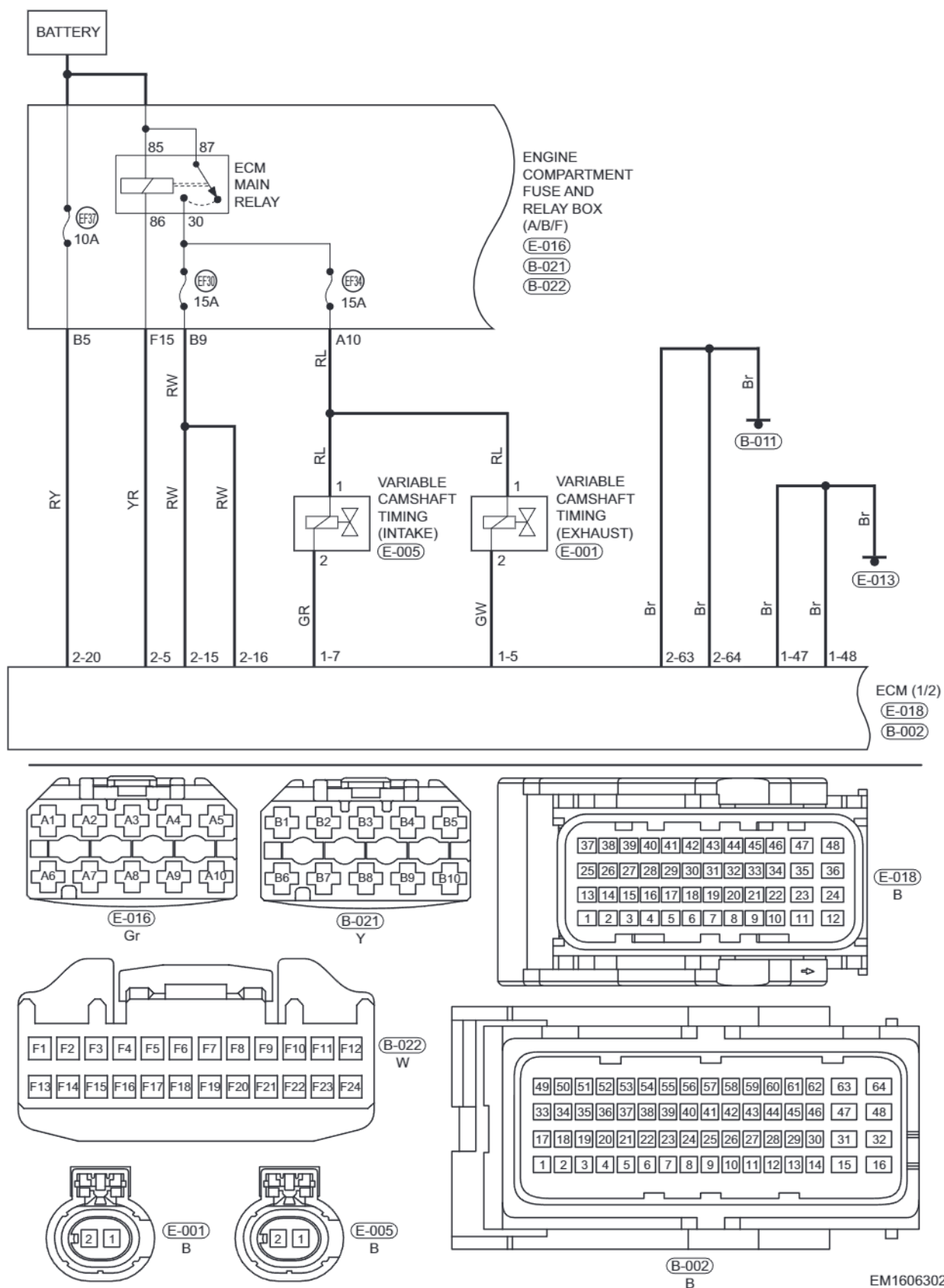
5**Check for DTCs**

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P000A-00 or P000B-00 still exists.

NG**Replace ECM****OK****System is operating normally.****Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.****06**

DTC	P0010-00	"A" Camshaft Position Actuator Circuit/Open
DTC	P2088-00	"A" Camshaft Position Actuator Control Circuit Low
DTC	P2089-00	"A" Camshaft Position Actuator Control Circuit High
DTC	P0013-00	"B" Camshaft Position - Actuator Circuit/Open
DTC	P2090-00	"B" Camshaft Position Actuator Control Circuit Low
DTC	P2091-00	"B" Camshaft Position Actuator Control Circuit High

06



EM16063021

DTC Code	DTC Definitions	DTC Detection Condition	Possible Cause
P0010-00	"A" Camshaft Position Actuator Circuit/Open	Ignition switch ON Engine running	• Wire harness or connector • VVT control valve • ECM
P2088-00	"A" Camshaft Position Actuator Control Circuit Low		
P2089-00	"A" Camshaft Position Actuator Control Circuit High		
P0013-00	"B" Camshaft Position Actuator Circuit/Open		
P2090-00	"B" Camshaft Position Actuator Control Circuit Low		
P2091-00	"B" Camshaft Position Actuator Control Circuit High		

06

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1

Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

OK



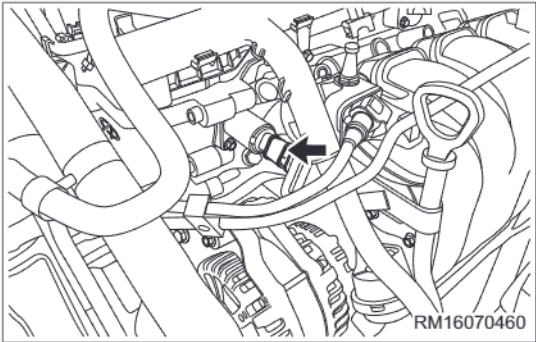
2

Check VVT control valve connector

- a. Disconnect the intake VVT control valve connector E-005.
- b. Disconnect the exhaust VVT control valve connector E-001.
- c. Check VVT control valve connectors.

NG

Repair or replace connector



OK

06

3

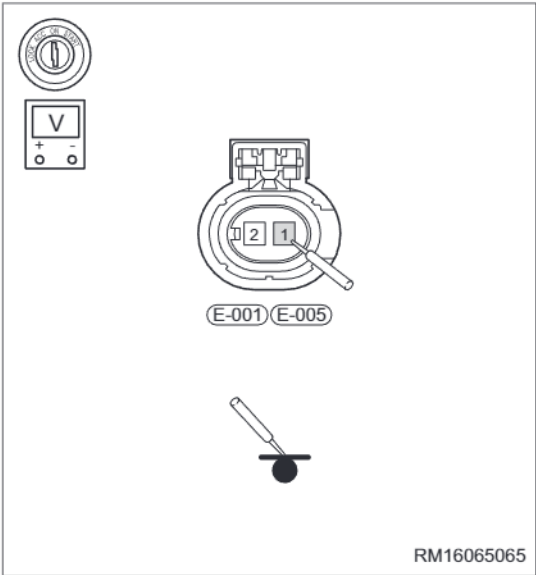
Check VVT control valve power supply voltage

- a. Turn ignition switch to ON.
- b. Check the voltage between connector terminals and body ground.

Multimeter Connection	Condition	Specified Condition
E-005 (1) - Body ground	Ignition switch ON	11 to 14 V
E-001 (1) - Body ground		

OK

Go to step 5



NG

4 Check VVT control valve power supply circuit and fuse EF34

- Turn ignition switch to LOCK.
- Check if fuse EF34 is normal.
- Disconnect the engine compartment fuse and relay box connector E-016.
- Check the wire harness between connector terminals.

Check for Open

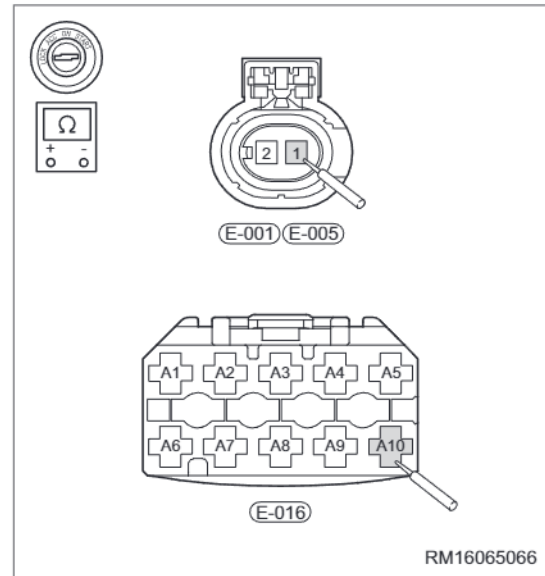
Multimeter Connection	Condition	Specified Condition
E-005 (1) - E-016 (A10)	Always	Continuity
E-001 (1) - E-016 (A10)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-005 (1), E-001 (1) or E-016 (A10) - Body ground	Always	No continuity
E-005 (1), E-001 (1) or E-016 (A10) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (VVT control valve - engine compartment fuse and relay box)



06

OK

5 Check VVT control valve control circuit

- Disconnect the ECM connector E-018.
- Check the wire harness between connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-005 (2) - E-018 (7)	Always	Continuity
E-001 (2) - E-018 (5)	Always	Continuity

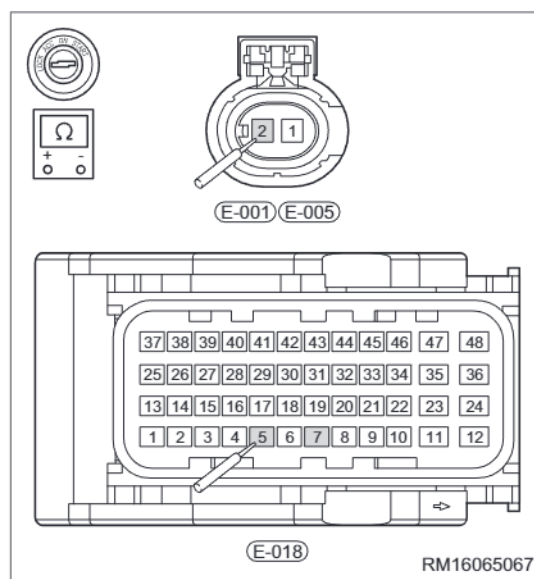
Check for Short

Multimeter Connection	Condition	Specified Condition
E-005 (2) or E-018 (7) - Body ground	Always	No continuity
E-005 (2) or E-018 (7) - Battery positive	Always	No continuity
E-001 (2) or E-018 (5) - Body ground	Always	No continuity
E-001 (2) or E-018 (5) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (VVT control valve - ECM)

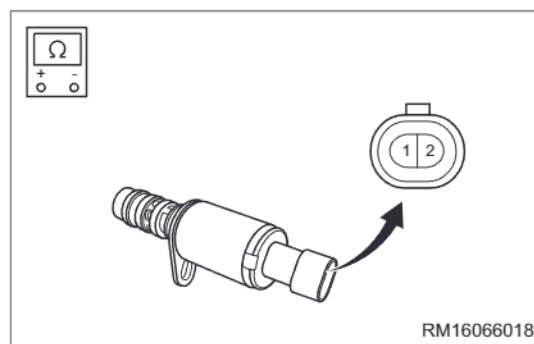
OK



6 Check intake/exhaust VVT control valve

- Remove intake/exhaust VVT control valve.
- Check intake/exhaust VVT control valve.

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Always	8 Ω



- c. When battery voltage is applied between terminals 1 and 2, control valve should move quickly.

NG**Replace intake/exhaust VVT control valve****OK****7****Check for DTCs**

- a. Using X-431 3G diagnostic tester, read ECM DTC.
b. Refer to "DTC confirmation procedure".
c. Check if DTC P0010-00, P2088-00, P2089-00, P0013-00, P2090-00 or P2091-00 still exists.

NG**Replace ECM****OK****06**

**System is operating normally.
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.**

DTC	P0012-00	"A" Camshaft Position - Timing Over-Retarded
------------	-----------------	---

DTC	P0015-00	"B" Camshaft Position - Timing Over-Retarded
------------	-----------------	---

DTC Code	DTC Definitions	DTC Detection Condition	Possible Cause
P0012-00	"A" Camshaft Position - Timing Over-Retarded	Ignition switch ON	- Camshaft phaser - VVT control valve - Wire harness or connector - ECM
P0015-00	"B" Camshaft Position - Timing Over-Retarded	Engine running	

06 DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Start engine and warm it up to normal operating temperature, and then select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1	Check ECM ground point
----------	-------------------------------

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

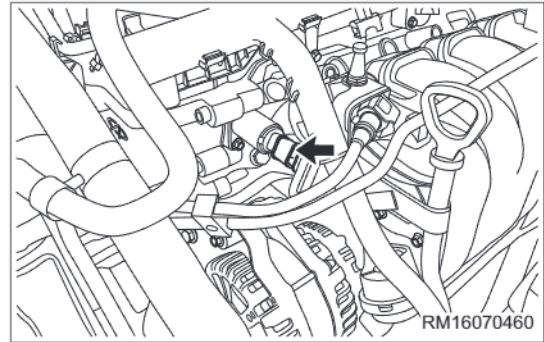
NG

Repair or replace ground wire harness or ground point

OK

2 Check VVT control valve connector

- Disconnect the intake VVT control valve connector E-005.
- Disconnect the exhaust VVT control valve connector E-001.
- Check VVT control valve connectors.

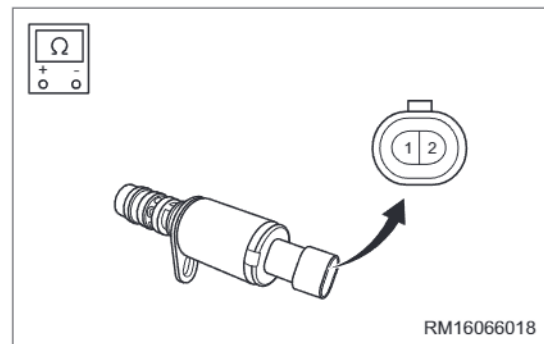
NG**Repair or replace connector****OK****06****3 Check intake/exhaust camshaft phaser**

- Check if intake/exhaust camshaft phaser is blocked or stuck.

NG**Replace intake/exhaust camshaft phaser****OK****4 Check intake/exhaust VVT control valve**

- Remove intake/exhaust VVT control valve.
- Check intake/exhaust VVT control valve.

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	Always	8 Ω



- When battery voltage is applied between terminals 1 and 2, control valve should move quickly.

NG**Replace intake/exhaust VVT control valve****OK****5 Check for DTCs**

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0012-00 or P0015-00 still exists.

NG**Replace ECM**

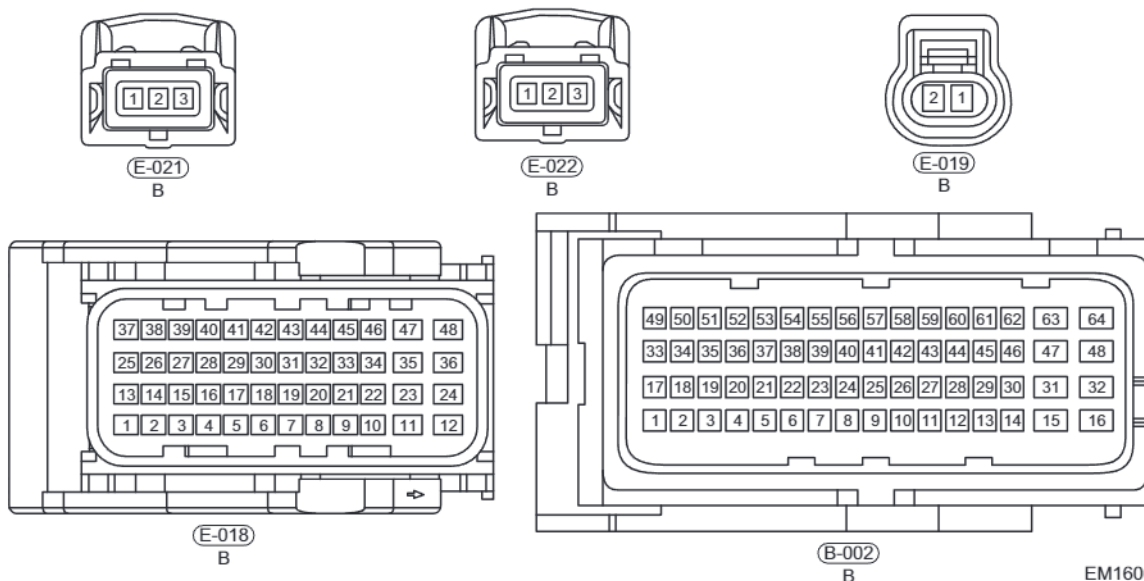
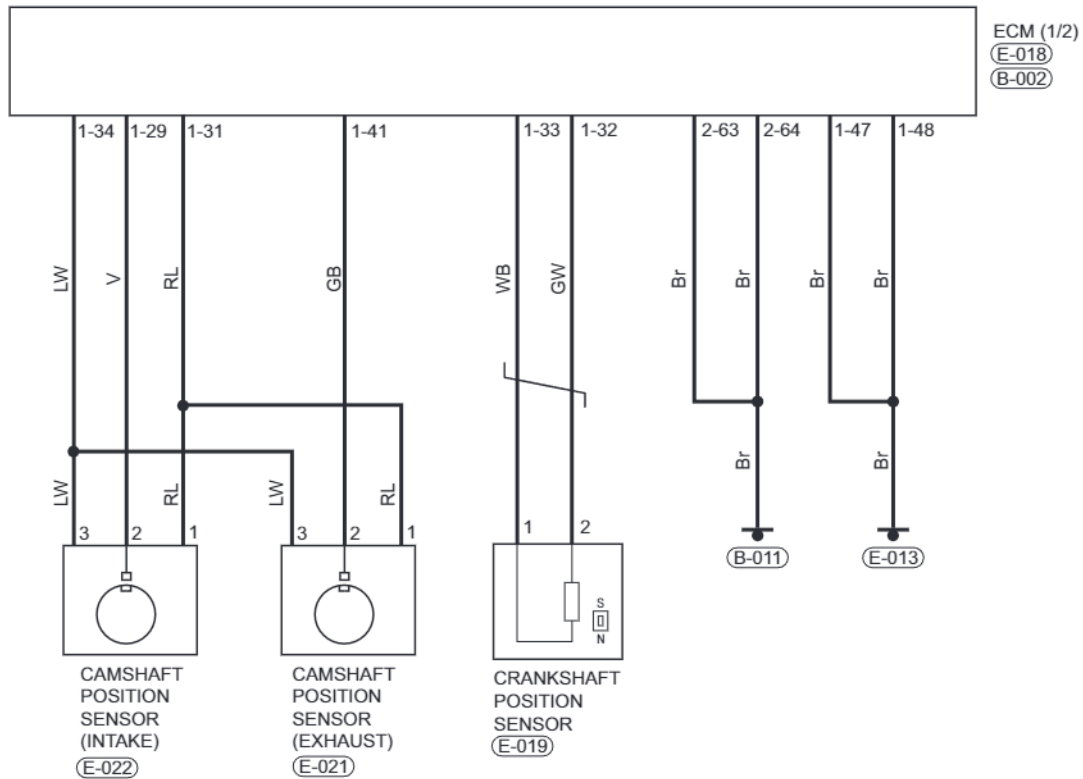
OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0016-00	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A
------------	-----------------	--

DTC	P0018-00	Crankshaft Position - Camshaft Position Correlation Bank 2 Sensor A
------------	-----------------	--



EM16063022

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0016-00	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A	Ignition switch ON Engine running	- Camshaft position sensor - Crankshaft position sensor - Wire harness or connector - Flywheel gear ring - Camshaft gear ring - ECM
P0018-00	Crankshaft Position - Camshaft Position Correlation Bank 2 Sensor A		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- 06**
- Turn ignition switch to LOCK.
 - Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
 - Turn ignition switch to ON.
 - Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
 - Select Read Code.
 - If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
 - If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

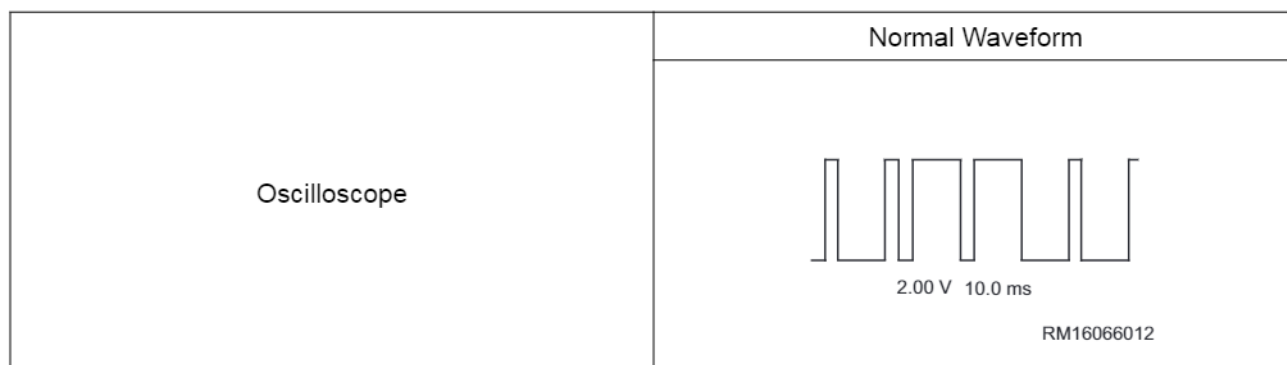
NG

Repair or replace ground wire harness or ground point

OK

2 Check camshaft position sensor signal waveform

- a. Turn ignition switch to ON, start engine and observe the signal waveform of camshaft position sensor with an oscilloscope.



06

OK

Go to step 8

NG

3 Check camshaft position sensor

- a. Remove the camshaft position sensor.
b. Check and clean the camshaft position sensor and installation area, and check for damage, foreign matter or excessive movement, etc. that cause signal incorrectness.

NG

Clean installation area or replace camshaft position sensor

OK

4 Check camshaft position sensor connector

- a. Disconnect the intake camshaft position sensor connector E-022.
b. Disconnect the exhaust camshaft position sensor connector E-021.
c. Check the camshaft position sensor connectors.

NG

Repair or replace connector

OK

5 Check camshaft position sensor power supply voltage

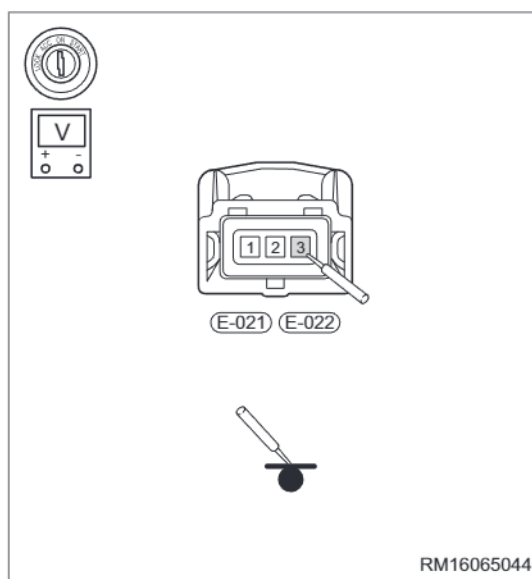
- Turn ignition switch to ON.
- Check the voltage between terminal 3 of camshaft position sensor connector E-022 or E-021 and body ground.

Multimeter Connection	Condition	Specified Condition
E-022 (3) or E-021 (3) - Body ground	Ignition switch ON	5 V

06

OK

Go to step 7



NG

6 Check camshaft position sensor power supply circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector E-018.
- Check the wire harness between camshaft position sensor connector terminals and ECM connector terminal.

Check for Open

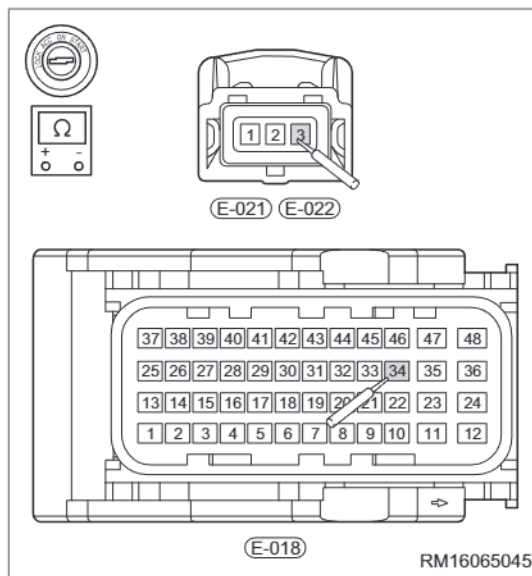
Multimeter Connection	Condition	Specified Condition
E-022 (3) - E-018 (34)	Always	Continuity
E-021 (3) - E-018 (34)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-022 (3), E-021 (3) or E-018 (34) - Body ground	Always	No continuity
E-022 (3), E-021 (3) or E-018 (34) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (camshaft position sensor - ECM)



OK

Replace ECM

7 Check camshaft position sensor signal circuit and ground circuit

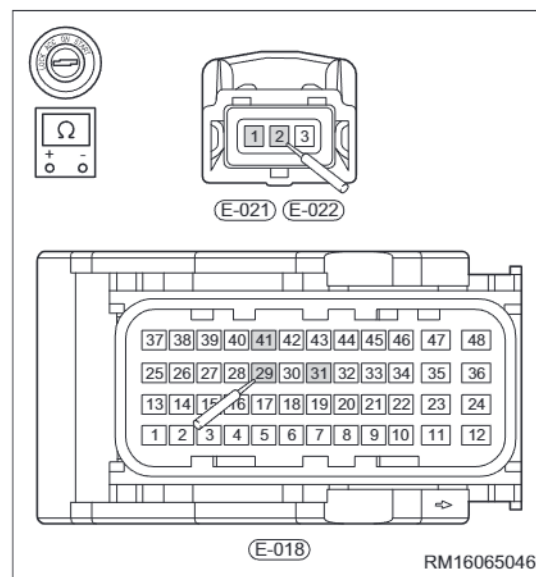
- a. Check the wire harness between camshaft position sensor connector terminals and ECM connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-022 (2) - E-018 (29)	Always	Continuity
E-021 (2) - E-018 (41)	Always	Continuity
E-022 (1), E-021 (1) - E-018 (31)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-022 (2) or E-018 (29) - Body ground	Always	No continuity
E-022 (2) or E-018 (29) - Battery positive	Always	No continuity
E-021 (2) or E-018 (41) - Body ground	Always	No continuity
E-021 (2) or E-018 (41) - Battery positive	Always	No continuity
E-022 (1), E-021 (1) or E-018 (31) - Body ground	Always	No continuity
E-022 (1), E-021 (1) or E-018 (31) - Battery positive	Always	No continuity



06

NG

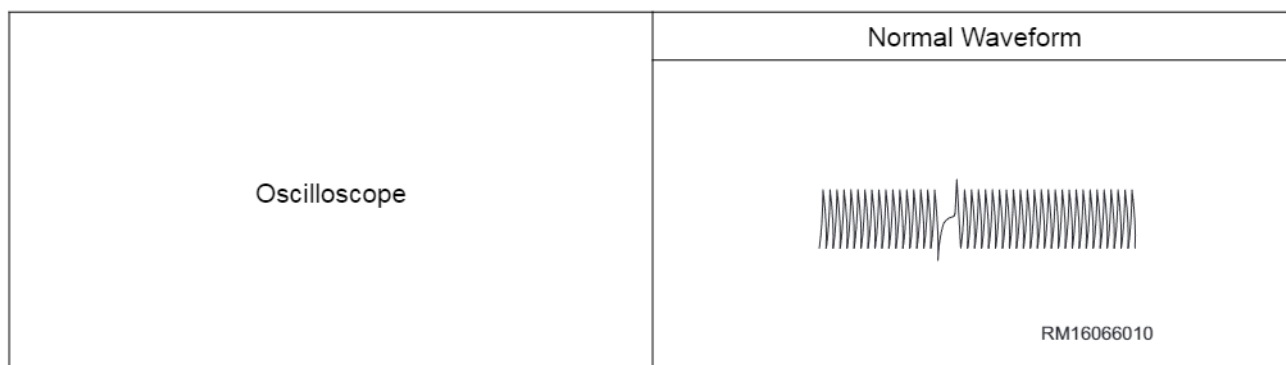
Repair or replace wire harness or connector (camshaft position sensor - ECM)

OK



8 Check crankshaft position sensor signal waveform

- a. Turn ignition switch to ON, start engine and observe the signal waveform of crankshaft position sensor with an oscilloscope.



OK

Go to step 15

NG

9 Check crankshaft position sensor connector

- a. Turn ignition switch to LOCK.
b. Disconnect the crankshaft position sensor connector E-019.
c. Check the crankshaft position sensor connector.

NG

Repair or replace crankshaft position sensor connector

OK

10 Check installation of crankshaft position sensor

- a. Remove the crankshaft position sensor.
b. Check and clean the crankshaft position sensor and installation area, and check for damage, foreign matter or excessive movement, etc. that cause signal incorrectness.

NG

Clean or replace crankshaft position sensor

OK

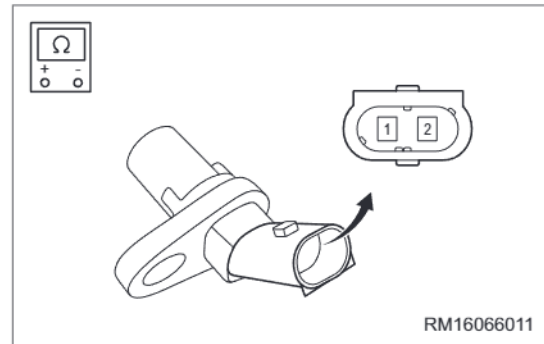
11 Check crankshaft position sensor resistance

- a. Check the resistance between terminals 1 and 2 of crankshaft position sensor.

Normal resistance: $1200\ \Omega \pm 20\%$ (23°)

NG

Replace crankshaft position sensor



OK

06

12 Check crankshaft position sensor circuit

- a. Disconnect the ECM connector E-018.
- b. Check the wire harness between crankshaft position sensor connector terminals and ECM connector terminals.

Check for Open

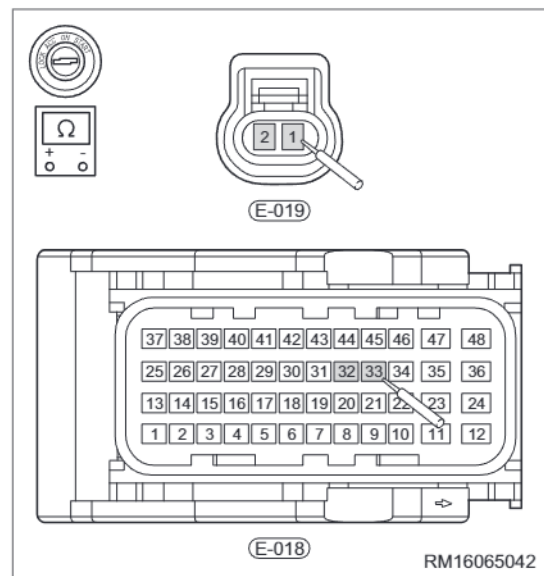
Multimeter Connection	Condition	Specified Condition
E-019 (1) - E-018 (33)	Always	Continuity
E-019 (2) - E-018 (32)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-019 (1) or E-018 (33) - Body ground	Always	No continuity
E-019 (1) or E-018 (33) - Battery positive	Always	No continuity
E-019 (2) or E-018 (32) - Body ground	Always	No continuity
E-019 (2) or E-018 (32) - Battery positive	Always	No continuity

NG

Replace wire harness or connector (crankshaft position sensor - ECM)



OK

13 Check crankshaft and flywheel gear ring

- a. Turn the crankshaft and check the crankshaft and flywheel ring gear for damage or foreign matter, etc. that cause signal incorrectness

NG

Clear off debris and clean flywheel gear ring. Replace flywheel if necessary

OK

06**14** Check engine timing

- a. Check for timing deviation.

NG

Correct engine timing

OK

15 Check for DTCs

- a. Using X-431 3G diagnostic tester, read ECM DTC.
b. Refer to "DTC confirmation procedure".
c. Check if DTC P0016-00 or P0018-00 still exists.

NG

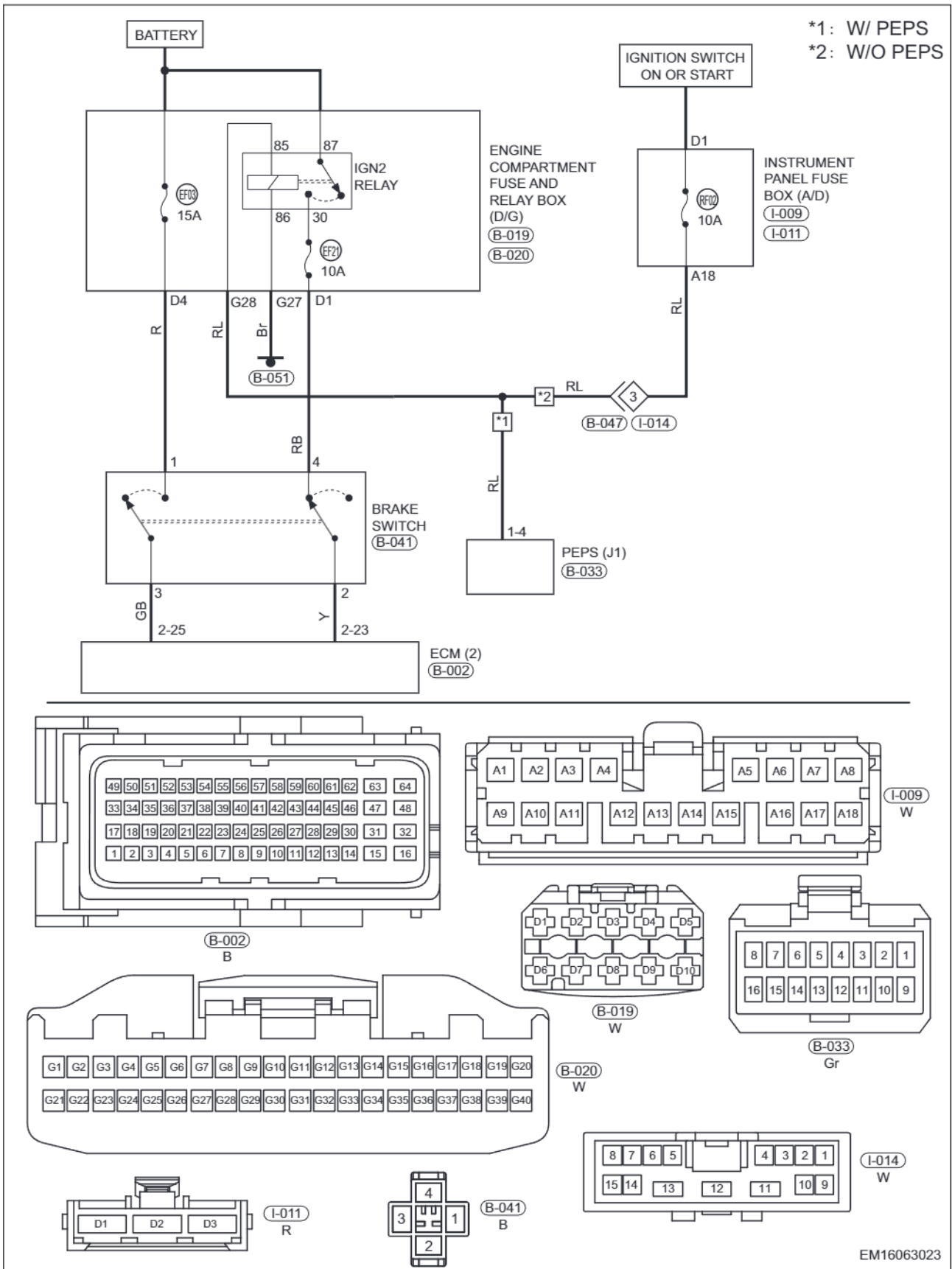
Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

DTC	P0571-00	Brake Switch "A" Circuit
-----	----------	--------------------------



EM16063023

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0571-00	Brake Switch "A" Circuit	Ignition switch ON	• Brake switch • Fuse • Wire harness or connector • ECM

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

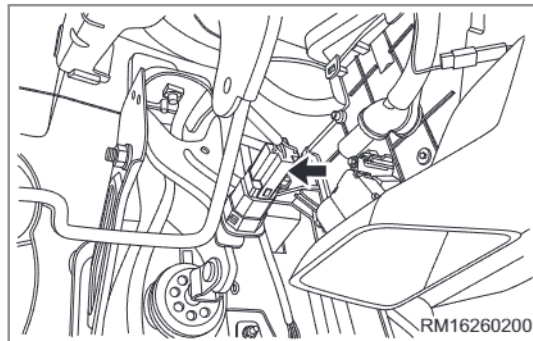
OK

2 Check brake switch connector

- Disconnect the brake switch connector B-041.
- Check the brake switch connector.

NG

Repair or replace connector

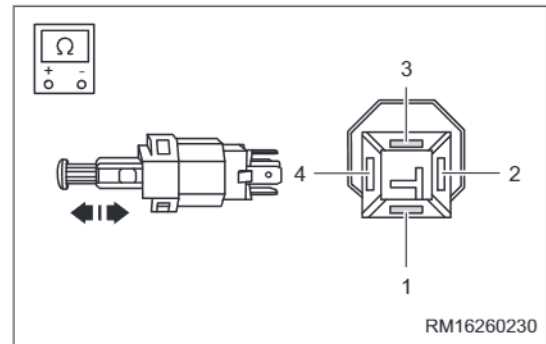


OK

3 Check brake switch

- Remove the brake switch.
- Check the brake switch.

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 3	Brake pedal depressed (switch pin released)	Continuity
Terminal 4 - Terminal 2		No continuity
Terminal 1 - Terminal 3	Brake pedal released (switch pin pushed)	No continuity
Terminal 4 - Terminal 2		Continuity



06

NG

Replace brake switch

OK

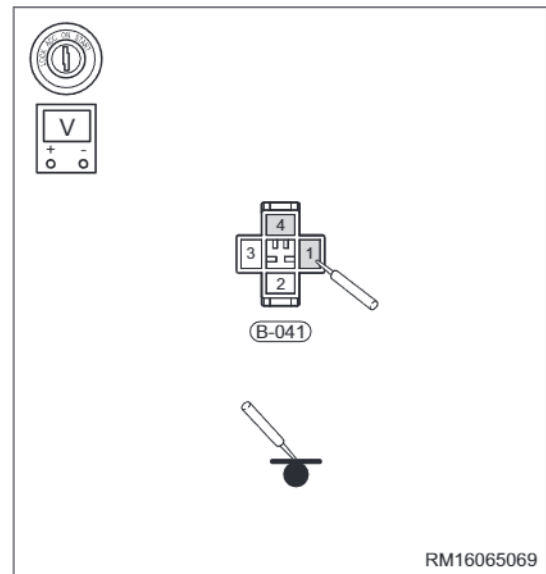
4 Check brake switch power supply voltage

- Turn ignition switch to ON and check the voltage between terminal 1 of brake switch connector and body ground.
- Turn ignition switch to ON and check the voltage between terminal 4 of brake switch connector and body ground.

Multimeter Connection	Condition	Specified Condition
B-041 (1) - Body ground	Ignition switch ON	11 to 14 V
B-041 (4) - Body ground		

OK

Go to step 6



NG

5 Check brake switch power supply circuit

- Turn ignition switch to LOCK.
- Check the fuses EF03 and EF21.
- Disconnect the engine compartment fuse and relay box connector B-019.
- Check the wire harness between brake switch connector terminals and engine compartment fuse and relay box connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-041 (1) - B-019 (D4)	Always	Continuity
B-041 (4) - B-019 (D1)	Always	Continuity

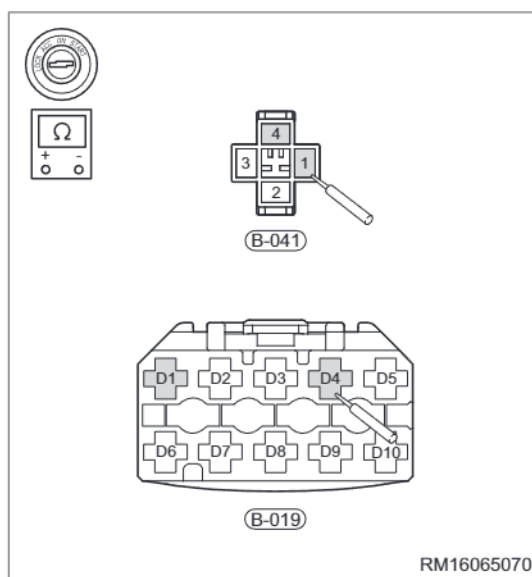
Check for Short

Multimeter Connection	Condition	Specified Condition
B-041 (1) or B-019 (D4) - Body ground	Always	No continuity
B-041 (1) or B-019 (D4) - Battery positive	Always	No continuity
B-041 (4) or B-019 (D1) - Body ground	Always	No continuity
B-041 (4) or B-019 (D1) - Battery positive	Always	No continuity

NG

Replace fuse
Repair or replace wire harness or connector (brake switch - engine compartment fuse and relay box)

OK



6 Check brake switch control circuit

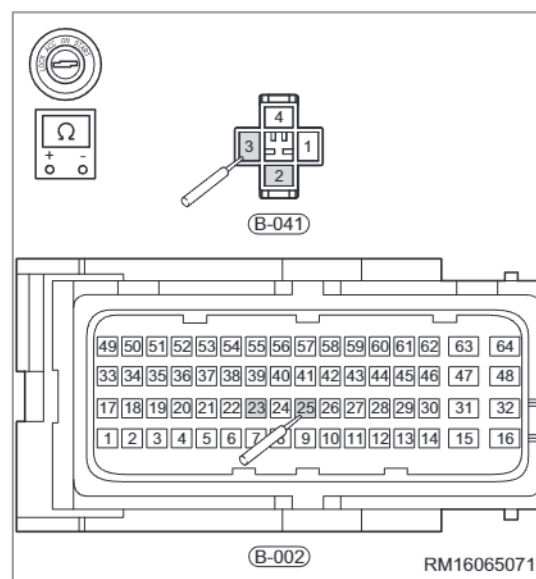
- Disconnect the ECM connector B-002.
- Check the wire harness between brake switch connector terminals and ECM connector terminals.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-041 (3) - B-002 (25)	Always	Continuity
B-041 (2) - B-002 (23)		

Check for Short

Multimeter Connection	Condition	Specified Condition
B-041 (3) or B-002 (25) - Body ground	Always	No continuity
B-041 (3) or B-002 (25) - Battery positive	Always	No continuity
B-041 (2) or B-002 (23) - Body ground	Always	No continuity
B-041 (2) or B-002 (23) - Battery positive	Always	No continuity

**NG**

Repair or replace wire harness or connector (brake switch - ECM)

OK**7 Check for DTCs**

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0571-00 still exists.

NG

Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

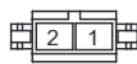
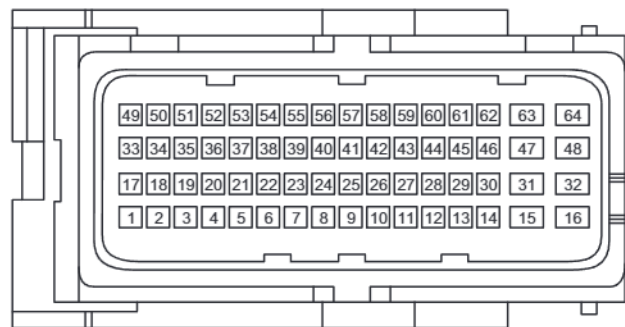
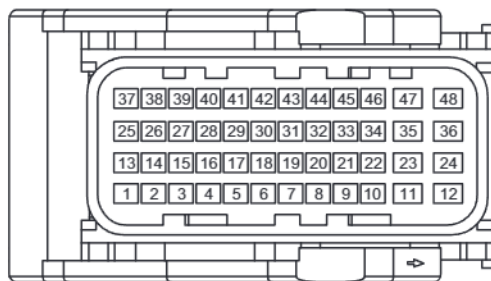
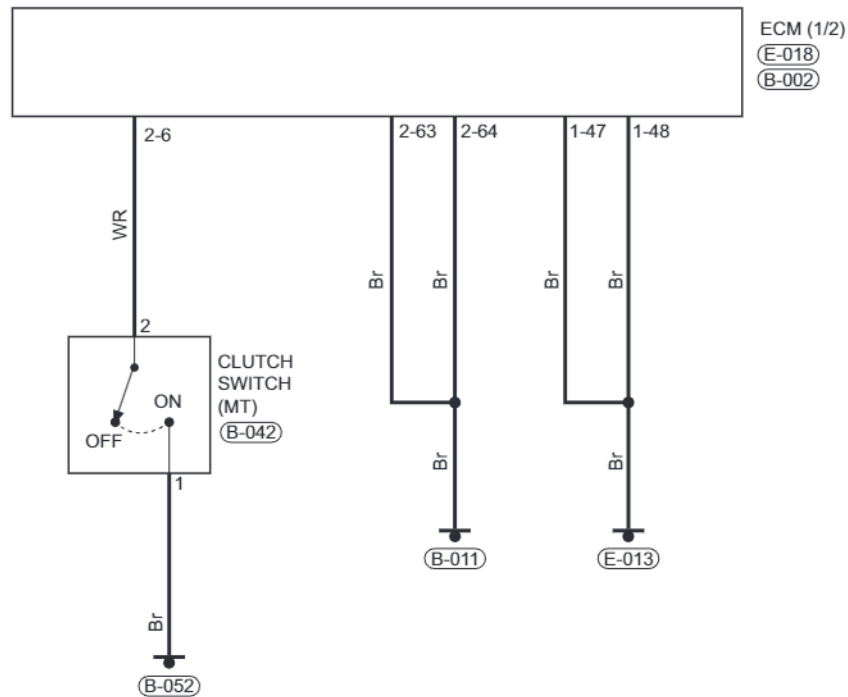
06

DTC

P0704-00

Clutch Switch Input Circuit

06



EM16063024

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0704-00	Clutch Switch Input Circuit	Ignition switch ON	- Clutch switch - Wire harness or connector - ECM

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

06

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

NG

Repair or replace ground wire harness or ground point

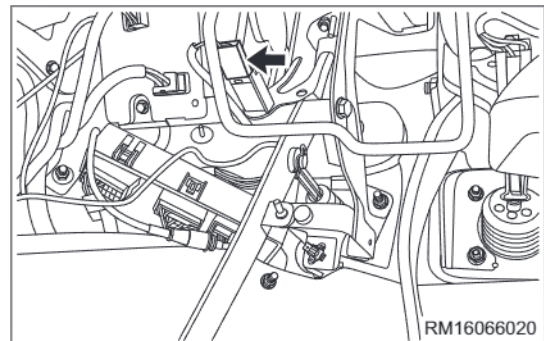
OK

2 Check clutch switch connector

- Disconnect the clutch switch connector B-042.
- Check the clutch switch connector.

NG

Repair or replace connector



OK

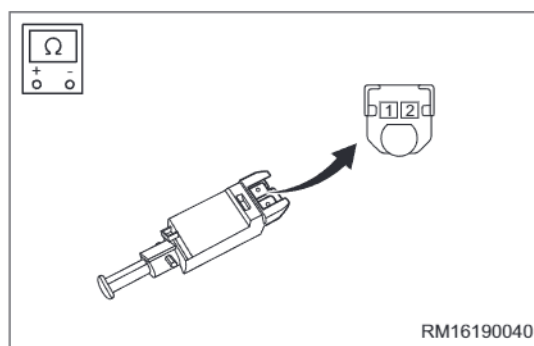
3 Check clutch switch

- Remove the clutch switch.
- Check the clutch switch.

Multimeter Connection	Condition	Specified Condition
Terminal 1 - Terminal 2	ON (not pushed)	Continuity
	OFF (pushed)	No continuity

NG

Replace clutch switch



OK

06

4 Check clutch switch circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector B-002.
- Check the wire harness between clutch switch connector terminal and ECM connector terminal.

Check for Open

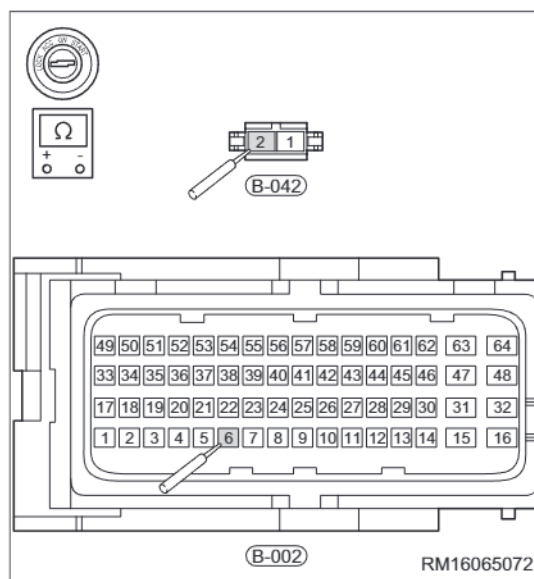
Multimeter Connection	Condition	Specified Condition
B-042 (2) - B-002 (6)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
B-042 (2) or B-002 (6) - Body ground	Always	No continuity
B-042 (2) or B-002 (6) - Battery positive		

NG

Repair or replace wire harness or connector (clutch switch - ECM)



OK

5 Check clutch switch ground circuit

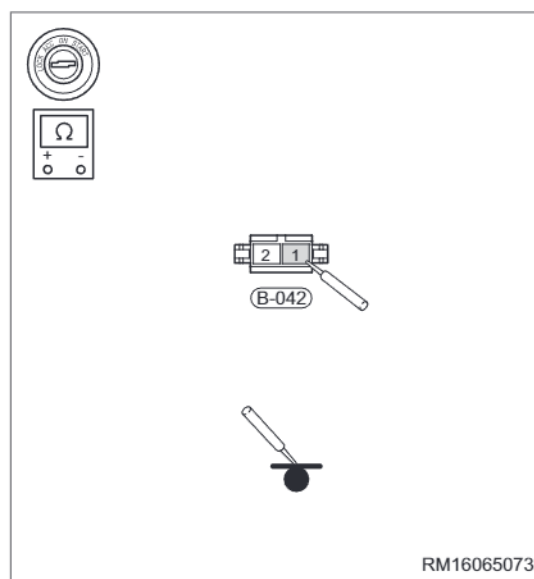
- Check the ground point B-052 (See page 06-20).
- Check the wire harness between clutch switch connector terminal and body ground.

Check for Open

Multimeter Connection	Condition	Specified Condition
B-042 (1) - Body ground	Always	Continuity

NG

Repair or replace wire harness or connector (clutch switch - body ground)

**OK****6 Check for DTCs**

- Using X-431 3G diagnostic tester, read ECM DTC.
- Refer to "DTC confirmation procedure".
- Check if DTC P0704-00 still exists.

NG

Replace ECM

OK

System is operating normally.

Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.

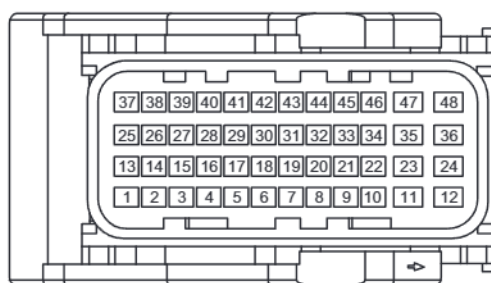
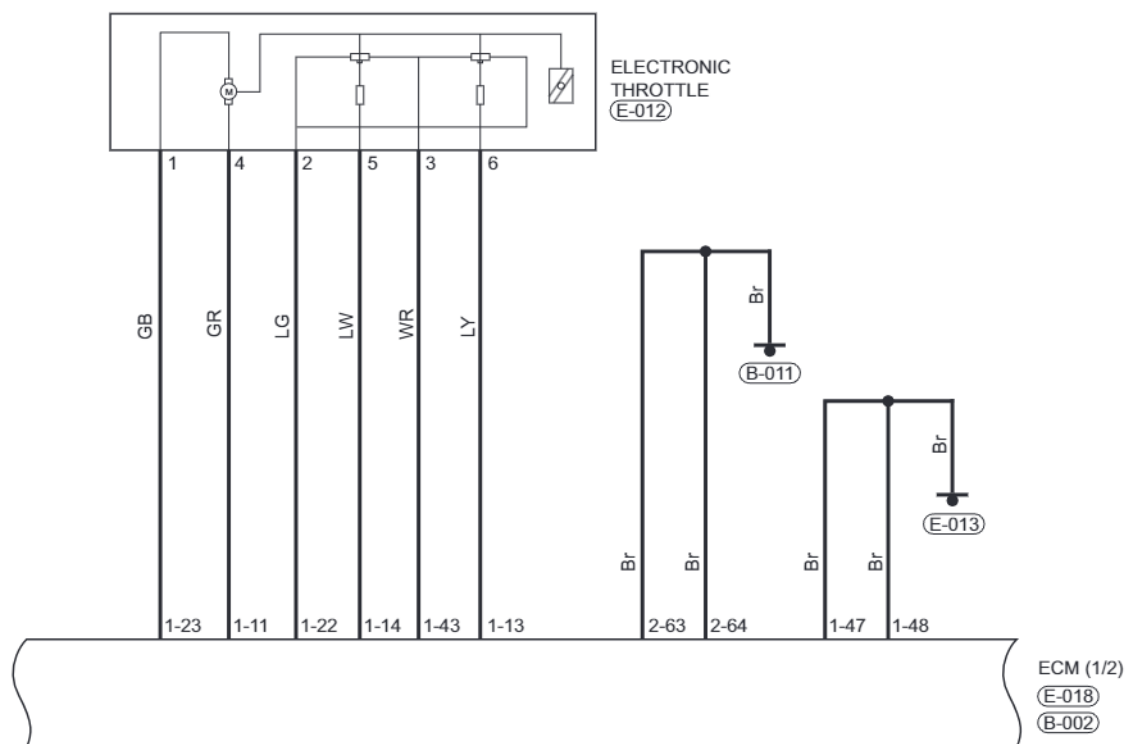
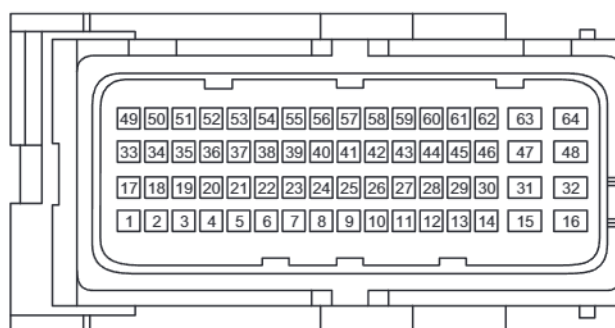
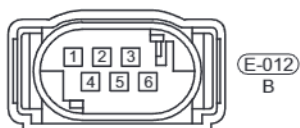
06

DTC	P0221-00	Throttle/Pedal Position Sensor/Switch B Range/Performance
-----	----------	---

DTC	P0222-00	Throttle/Pedal Position Sensor/Switch B Low Input
-----	----------	---

DTC	P0223-00	Throttle/Pedal Position Sensor/Switch B High Input
-----	----------	--

06

(E-018)
B(B-002)
B(E-012)
B

EM16063006

DTC Code	DTC Definition	DTC Detection Condition	Possible Cause
P0221-00	Throttle/Pedal Position Sensor/Switch B Range/Performance	Ignition switch ON Engine running	- Throttle position sensor 2 - Wire harness or connector - ECM
P0222-00	Throttle/Pedal Position Sensor/Switch B Low Input		
P0223-00	Throttle/Pedal Position Sensor/Switch B High Input		

DTC Confirmation Procedure

Confirm that battery voltage is over 12 V before performing following procedures.

- Turn ignition switch to LOCK.
- Connect X-431 3G diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ignition switch to ON.
- Using X-431 3G diagnostic tester, record and clear DTCs stored in ECM.
- Select Read Code.
- If DTC is detected, malfunction indicated by DTC is current. Go to diagnosis procedure - Step 1.
- If DTC is not detected, malfunction indicated by DTC is intermittent ([See page 06-20](#)).

CAUTION

- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Diagnosis Procedure

1 Check ECM ground point

- Turn ignition switch to LOCK.
- Check ECM ground points B-011 and E-013 ([See page 06-20](#)).

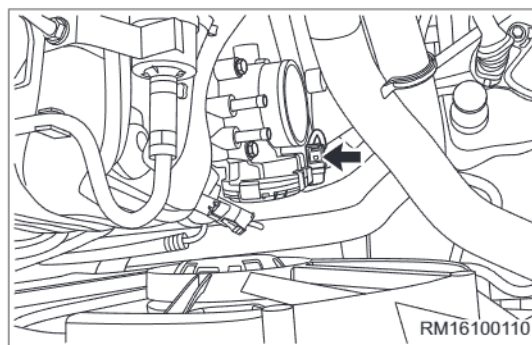
NG

Repair or replace ground wire harness or ground point

OK

2 Check electronic throttle connector

- Disconnect electronic throttle connector E-012.
- Check electronic throttle connector.

NG**Repair or replace connector****OK****06****3 Check throttle position sensor 2 signal voltage**

- Connect the electronic throttle connector E-012.
- Turn ignition switch to ON.
- Using diagnostic tester, check the throttle position sensor 2 signal voltage.

Condition	Standard Value (V)
Accelerator pedal released	4.22
Accelerator pedal depressed	0.78

 A screenshot of a diagnostic tool's datastream screen. It shows a table with columns: Datastream name, Value, and Unit. The data is as follows:

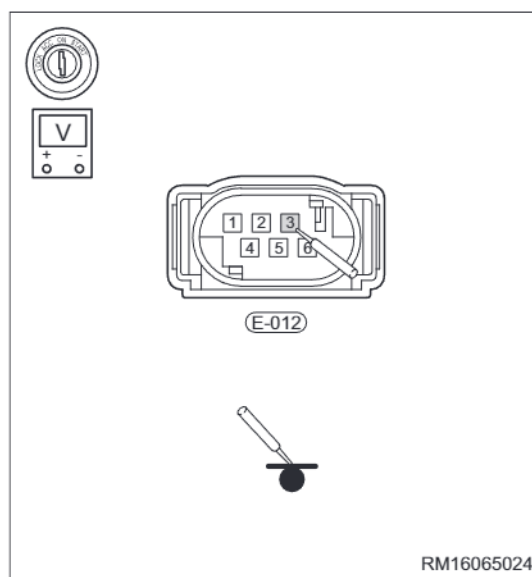
Datastream name	Value	Unit
lambda controller output	1.00	
multiplicative correction of the mixture adaptation	1.00	
sensor voltage from throttle potentiometer 1	0.78	V
sensor voltage from throttle potentiometer 2	4.22	V
additive correction of the mixture adaptation	0.00	%
Voltage PWG potentiometer 1	0.74	V
Voltage PWG potentiometer 2	0.38	V
Doubled PWG potentiometer 2 voltage	0.76	V

RM16066021

OK**Go to step 8****NG****4 Check throttle position sensor power supply voltage**

- Turn ignition switch to LOCK.
- Disconnect electronic throttle connector E-012.
- Turn ignition switch to ON and check the voltage between electronic throttle connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
E-012 (3) - Body ground	Ignition switch ON	5 V

OK**Go to step 6**

RM16065024

NG

5 Check throttle position sensor power supply circuit

- Turn ignition switch to LOCK.
- Disconnect the ECM connector E-018.
- Check the wire harness between electronic throttle connector terminal and ECM connector terminal.

Check for Open

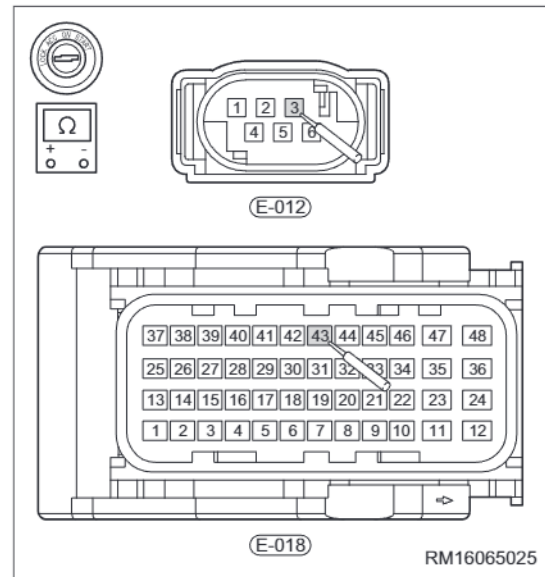
Multimeter Connection	Condition	Specified Condition
E-012 (3) - E-018 (43)	Always	Continuity

Check for Short

Multimeter Connection	Condition	Specified Condition
E-012 (3) or E-018 (43) - Body ground	Always	No continuity
E-012 (3) or E-018 (43) - Battery positive	Always	No continuity

NG

Replace wire harness or connector
(electronic throttle - ECM)



06

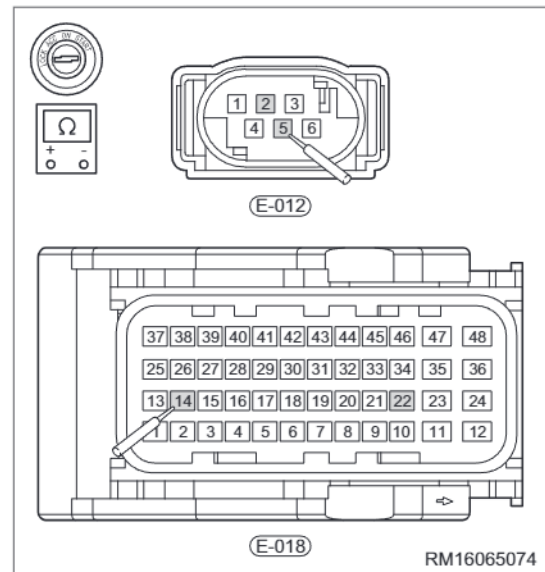
OK

6 Check throttle position sensor 2 signal circuit and ground circuit

- Check the wire harness between electronic throttle connector terminal and ECM connector terminal.

Check for Open

Multimeter Connection	Condition	Specified Condition
E-012 (5) - E-018 (14)	Always	Continuity
E-012 (2) - E-018 (22)	Always	Continuity



Check for Short

Multimeter Connection	Condition	Specified Condition
E-012 (5) or E-018 (14) - Body ground	Always	No continuity
E-012 (5) or E-018 (14) - Battery positive	Always	No continuity
E-012 (2) or E-018 (22) - Body ground	Always	No continuity
E-012 (2) or E-018 (22) - Battery positive	Always	No continuity

NG

Repair or replace wire harness or connector (electronic throttle - ECM)

OK

7

Check electronic throttle

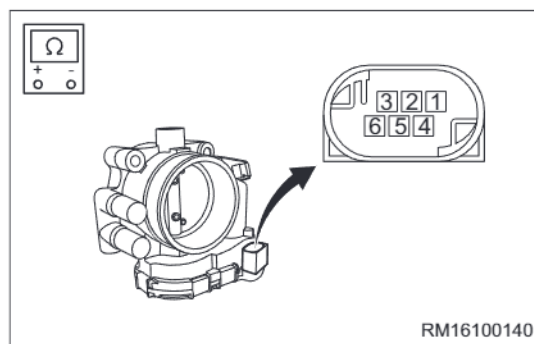
- Check electronic throttle for carbon deposits and foreign matter accumulation inside.
- Check if throttle valve body is stuck.
- Check the resistance of electronic throttle.

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 2	At normal temperature	1.067 k Ω
Terminal 5 - Terminal 2	Throttle valve is rotated	Resistance decreases as throttle valve opens
Terminal 5 - Terminal 3		Resistance increases as throttle valve opens

NG

Clean or replace electronic throttle assembly, and go to next step

OK



8 Check for DTCs

- a. Using X-431 3G diagnostic tester, read ECM DTC.
- b. Refer to "DTC confirmation procedure".
- c. Check if DTC P0221-00, P0222-00 or P0223-00 still exists.

NG**Replace ECM****OK**

**System is operating normally.
Reassemble vehicle and perform a road test to confirm that malfunction reported by customer has been repaired.**

06

Engine Problem Symptom Diagnosis

Perform primary inspection first before performing malfunction diagnosis procedures:

1. Confirm that engine malfunction indicator operates normally;
2. Using diagnostic tester, check that no error messages are recorded;
3. Confirm that malfunction complained by customer is present, and confirm the condition under which malfunction occurs.

Then, perform appearance inspection:

1. Check fuel line for leakage;
2. Check if vacuum line is broken or twisted, and if connection is correct;
3. Check intake line for blockage, air leakage, crush or damage;
4. Check if high-voltage cable of ignition system is broken or deteriorated, and if ignition sequence is correct;
5. Check if wire harness ground points are clean and secure;
6. Check each sensor or actuator connector for looseness or poor contact.

06

HINT:

If above conditions exist, repair the trouble areas first. Otherwise it will affect the repair work for following trouble diagnosis.

Diagnostic Help

1. Confirm that there are no trouble records for engine;
2. Confirm that complained trouble symptoms are present;
3. There are no abnormal conditions after performing inspection according to above procedures;
4. During servicing, do not ignore vehicle maintenance condition, cylinder pressure, mechanical ignition timing and fuel condition, etc. that can affect the system;
5. Replace ECM, and perform a test. If trouble symptom can be eliminated, trouble area is in ECM; if trouble symptom still exists, reuse the original ECM, repeat the procedures, and perform service again.

Problem Symptoms Table

Symptom	Suspected Area	See page
Engine does not crank or cranks slowly while starting	Battery Starter motor Wire harness or ignition switch Engine mechanical	06-237
Engine cranks normally but cannot start successfully while starting	No fuel in tank Fuel pump Crankshaft position sensor Ignition coil Engine mechanical	06-239
Difficult to start with hot engine	Water in fuel Fuel pump Coolant temperature sensor Fuel pressure regulator Ignition coil	06-241

Symptom	Suspected Area	See page
Difficult to start with cold engine	Water in fuel Fuel pump Coolant temperature sensor Injector Ignition coil Throttle Engine mechanical	06-243
Engine speed is normal, but it is difficult to start at anytime	Water in fuel Fuel pump Coolant temperature sensor Injector Ignition coil Throttle Intake pipe Ignition timing Spark plug Engine mechanical	06-245
Engine starts normally, but idles roughly at anytime	Water in fuel Injector Spark plug Throttle Intake pipe Ignition timing Engine mechanical	06-248
Engine starts normally, but idles roughly during warming up	Water in fuel Coolant temperature sensor Spark plug Throttle Intake pipe Engine mechanical	06-250
Engine starts normally, but idles roughly after warming up	Water in fuel Coolant temperature sensor Spark plug Throttle body Intake pipe Engine mechanical	06-252
Engine starts normally, but idles roughly or stalls with part load (for example, A/C is ON)	Air condition system Injector	06-254
Engine starts normally, but idle speed is too high	Throttle Vacuum pipe Coolant temperature sensor Ignition timing	06-256

Symptom	Suspected Area	See page
Low engine speed or stalls when accelerating	Water in fuel Air flow meter and throttle position sensor Spark plug Throttle Intake pipe Injector Ignition timing Exhaust pipe	06-258
Slow response when accelerating	Water in fuel Air flow meter and throttle position sensor Spark plug Throttle inlet pipe Injector Ignition timing Exhaust pipe	06-261
Lack of power and poor performance when accelerating	Water in fuel Air flow meter and throttle position sensor Spark plug Ignition coil Throttle Intake pipe Injector Ignition timing Exhaust pipe	06-264

Engine does not crank or cranks slowly while starting

Diagnosis Procedure

- 1 Check voltage between two battery posts when engine starts

OK: Voltage is 8 to 12 V.

NG

Replace battery

OK

- 2 Check voltage of starter motor positive post

a. Ignition switch remains in START position and check the voltage of starter motor positive post.

OK: Voltage is 8 to 12 V.

NG

Repair or replace wire harness

OK

- 3 Check operation of starter motor

a. Remove the starter motor.

b. Check if there is an open circuit or if it is stuck due to poor lubrication.

NG

Repair or replace starter

OK

- 4 Check engine lubricant and gear oil

a. If malfunction only occurs in winter, check if starter motor resistance is too strong because of improper engine lubricant and gear oil selection.

NG

Replace lubricant with appropriate number

OK

- 5 Check engine internal mechanical resistance

a. Check if engine internal mechanical resistance is too strong, causing starter motor not to run or run slowly.

NG

Check and repair engine internal resistance malfunction



OK

Go to Diagnostic Help

Engine cranks normally but cannot start successfully while starting

Diagnosis Procedure

1 Check fuel pressure

- a. Using a fuel pressure gauge, check the fuel pressure ([See page 08-11](#)).

Standard Fuel Pressure

Condition	Fuel System Pressure (kPa)
Key ON	400
Engine Idling	400
Key LOCK	400

06

NG

Repair or replace fuel system

OK

2 Using diagnostic tester, observe if any speed signal is output

- a. Connect diagnostic tester, start engine and select Read Datastream.
b. Observe if any speed signal is output.

NG

Check and repair crankshaft position sensor wire harness

OK

3 Check spark

- a. Remove ignition coil and spark plug of one cylinder, and ground spark plug housing. Start engine, and check if spark is generated.

OK: Spark is generated.

NG

Check and repair ignition system

OK

4 Check pressure of cylinder

- a. Measure compression of misfiring cylinder ([See page 07-18](#)).

NG

Check engine to confirm cause of low compression

OK



5

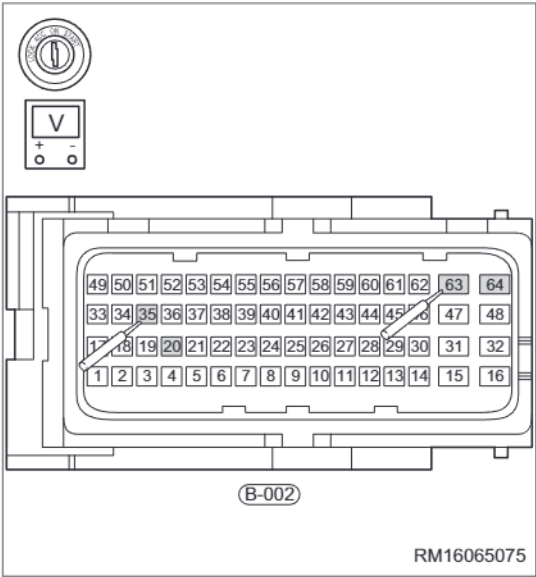
Check ECM power supply and ground

- a. Disconnect the ECM connector B-002.
- b. Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG

Repair or replace related wire harness



OK

Go to Diagnostic Help

Difficult to start with hot engine

Diagnosis Procedure

1 Check fuel pressure

- a. Using a fuel pressure gauge, check the fuel pressure ([See page 08-11](#)).

Standard Fuel Pressure

Condition	Fuel System Pressure (kPa)
Key ON	400
Engine Idling	400
Key LOCK	400

06

NG

Repair or replace fuel system

OK

2 Check spark

- a. Remove ignition coil and spark plug of one cylinder, and ground spark plug housing. Start engine, and check if spark is generated.

OK: Spark is generated.

NG

Check and repair ignition system

OK

3 Disconnect coolant temperature sensor connector, start engine and observe if engine starts successfully at this time

OK

Check and repair wire harness or replace sensor

NG

4 Check fuel pressure regulator

NG

Replace fuel pressure regulator

OK



5 Check fuel condition

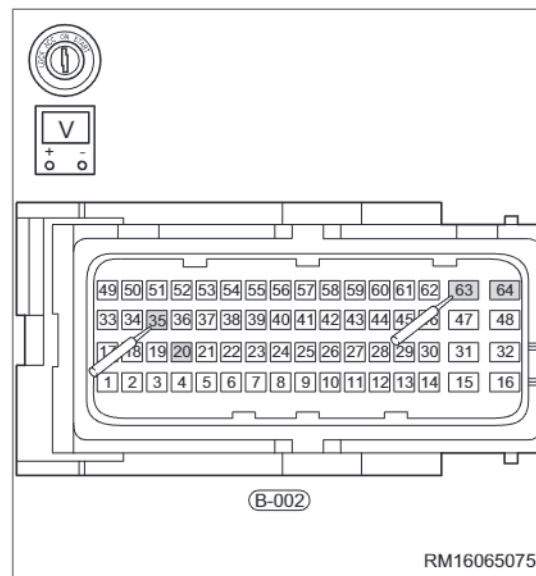
- a. Observe if trouble occurs just after fuel is filled.

NG**Replace fuel****OK****6 Check ECM power supply and ground**

- a. Disconnect the ECM connector B-002.
b. Turn ignition switch to ON and check ECM connector terminals.

06

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG**Repair or replace related wire harness****OK****Go to Diagnostic Help**

Difficult to start with cold engine

Diagnosis Procedure

1 Check fuel pressure

- a. Using a fuel pressure gauge, check the fuel pressure ([See page 08-11](#)).

Standard Fuel Pressure

Condition	Fuel System Pressure (kPa)
Key ON	400
Engine Idling	400
Key LOCK	400

06

NG

Repair or replace fuel system

OK

2 Check spark

- a. Remove ignition coil and spark plug of one cylinder, and ground spark plug housing. Start engine, and check if spark is generated.

OK: Spark is generated.

NG

Check and repair ignition system

OK

3 Disconnect coolant temperature sensor connector, start engine and observe if engine starts successfully at this time

OK

Check and repair wire harness or replace sensor

NG

4 Depress accelerator pedal slightly, and observe if it is easy to start

OK

Clean throttle

NG



5 Check injector for leakage or blockage

NG → Clean or replace injector

OK

6 Check fuel condition

a. Observe if trouble occurs just after fuel is filled.

NG → Replace fuel

OK

06

7 Check pressure of cylinder

a. Measure compression of misfiring cylinder ([See page 07-18](#)).

NG → Check engine to confirm cause of low compression

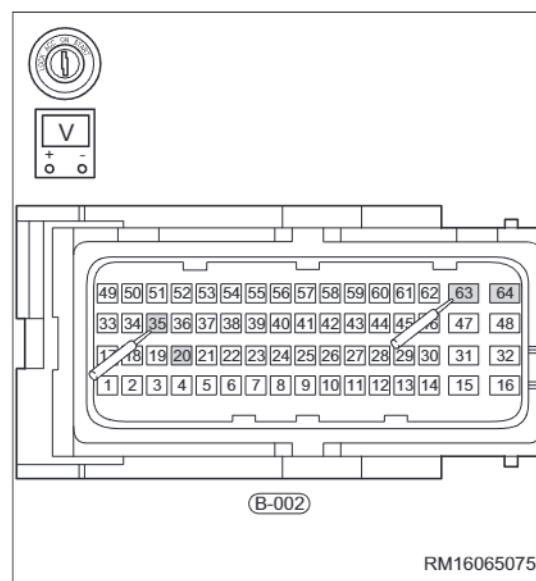
OK

8 Check ECM power supply and ground

- a. Disconnect the ECM connector B-002.
b. Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG → Repair or replace related wire harness



OK

Go to Diagnostic Help

Engine speed is normal, but it is difficult to start at anytime

Diagnosis Procedure

- 1** Check air filter for blockage, and intake pipe for air leakage

NG Check and repair intake system

OK

- 2** Check fuel pressure

- a. Using a fuel pressure gauge, check the fuel pressure ([See page 08-11](#)).

Standard Fuel Pressure

Condition	Fuel System Pressure (kPa)
Key ON	400
Engine Idling	400
Key LOCK	400

NG Repair or replace fuel system

OK

- 3** Check spark plug

- a. Check the spark plug of each cylinder, and observe if the type and gap are as specified.

NG Replace spark plug

OK

- 4** Check spark

- a. Remove ignition coil and spark plug of one cylinder, and ground spark plug housing. Start engine, and check if spark is generated.

OK: Spark is generated.

NG Check and repair ignition system

OK

5

Disconnect coolant temperature sensor connector, start engine and observe if engine starts successfully at this time

OK

Check and repair wire harness or replace sensor

NG

6

Depress accelerator pedal slightly, and observe if it is easy to start

OK

Clean throttle

NG

06

7

Check injector for leakage or blockage

NG

Clean or replace injector

OK

8

Check fuel condition

a. Observe if trouble occurs just after fuel is filled.

NG

Replace fuel

OK

9

Check pressure of cylinder

a. Measure compression of misfiring cylinder ([See page 07-18](#)).

NG

Check engine to confirm cause of low compression

OK

10

Check engine ignition sequence and ignition timing

a. Check if engine ignition sequence and ignition timing are as specified.

NG

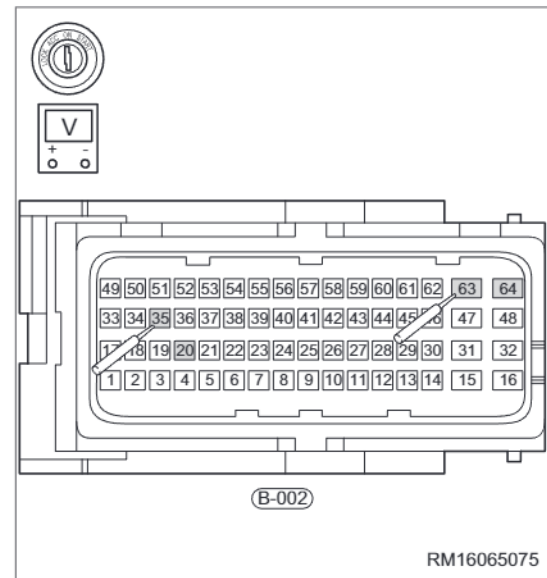
Check and repair ignition timing

OK

11 Check ECM power supply and ground

- Disconnect the ECM connector B-002.
- Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG**Repair or replace related wire harness****OK****06****Go to Diagnostic Help**

Engine starts normally, but idles roughly at anytime

Diagnosis Procedure

1 Check air filter for blockage, and intake pipe for air leakage

NG → Check and repair intake system

OK

2 Check if throttle is sticking

NG → Repair or replace throttle

OK

3 Check spark plug

a. Check the spark plug of each cylinder, and observe if the type and gap are as specified.

NG → Replace spark plug

OK

4 Check throttle for carbon deposits

NG → Clean throttle

OK

5 Check injector for leakage or blockage

NG → Clean or replace injector

OK

6 Check fuel condition

a. Observe if trouble occurs just after fuel is filled.

NG → Replace fuel

OK

7 Check pressure of cylinder

- a. Measure compression of misfiring cylinder (See page 07-18).

NG

Check engine to confirm cause of low compression

OK**8 Check engine ignition sequence and ignition timing**

- a. Check if engine ignition sequence and ignition timing are as specified.

NG

Check and repair ignition timing

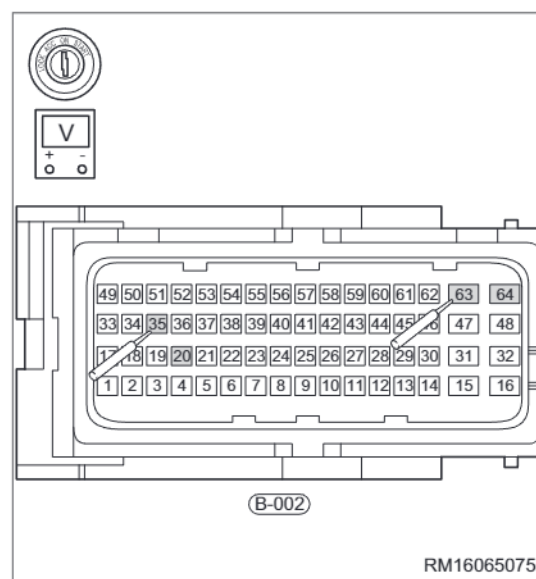
OK**06****9 Check ECM power supply and ground**

- a. Disconnect the ECM connector B-002.
b. Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG

Repair or replace related wire harness

**OK**

Go to Diagnostic Help

Engine starts normally, but idles roughly during warming up

Diagnosis Procedure

1 Check air filter for blockage, and intake pipe for air leakage

NG

Check and repair intake system

OK

2 Check spark plug

a. Check the spark plug of each cylinder, and observe if the type and gap are as specified.

NG

Replace spark plug

OK

3 Check throttle for carbon deposits

NG

Clean throttle

OK

4 Unplug coolant temperature sensor connector, start engine and observe if engine idles normally during warming up

OK

Check and repair wire harness or replace sensor

NG

5 Check injector for leakage or blockage

NG

Clean or replace injector

OK

6 Check fuel condition

a. Observe if trouble occurs just after fuel is filled.

NG

Replace fuel

OK

7 Check pressure of cylinder

- a. Measure compression of misfiring cylinder (See page 07-18).

NG

Check engine to confirm cause of low compression

OK

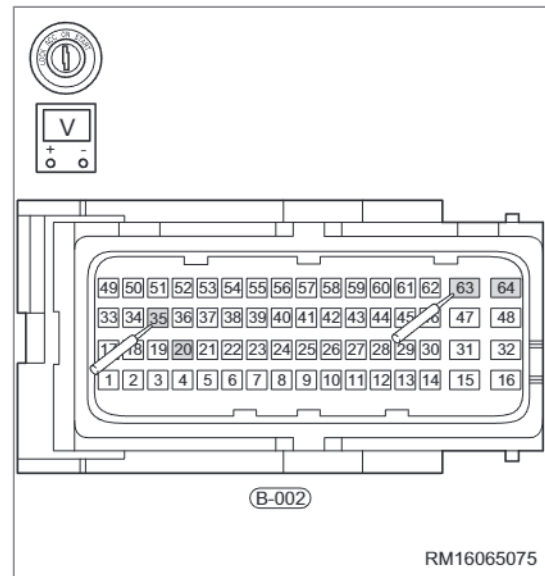
8 Check ECM power supply and ground

- a. Disconnect the ECM connector B-002.
b. Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG

Repair or replace related wire harness



OK

06

Go to Diagnostic Help

Engine starts normally, but idles roughly after warming up

Diagnosis Procedure

1 Check air filter for blockage, and intake pipe for air leakage

NG

Check and repair intake system

OK

2 Check spark plug

a. Check the spark plug of each cylinder, and observe if the type and gap are as specified.

NG

Replace spark plug

OK

3 Check throttle for carbon deposits

NG

Clean throttle

OK

4 Unplug coolant temperature sensor connector, start engine and observe if engine idles normally during warming up

OK

Check and repair wire harness or replace sensor

NG

5 Check injector for leakage or blockage

NG

Clean or replace injector

OK

6 Check fuel condition

a. Observe if trouble occurs just after fuel is filled.

NG

Replace fuel

OK

7 Check pressure of cylinder

- a. Measure compression of misfiring cylinder (See page 07-18).

NG

Check engine to confirm cause of low compression

OK

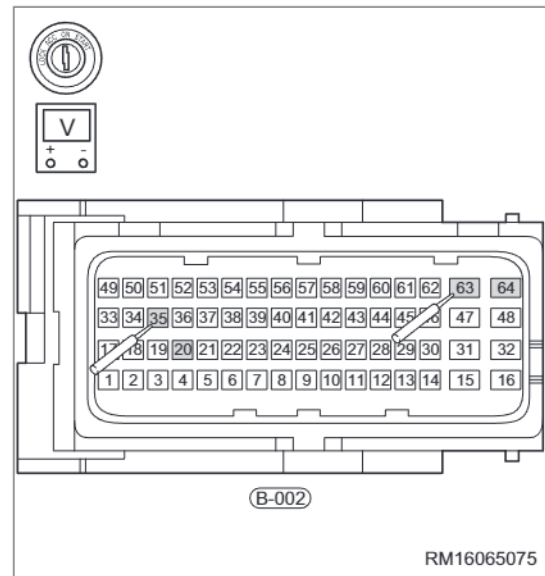
8 Check ECM power supply and ground

- a. Disconnect the ECM connector B-002.
b. Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG

Repair or replace related wire harness



OK

06

Go to Diagnostic Help

Engine starts normally, but idles roughly or stalls with part load (for example, A/C is ON)

Diagnosis Procedure

1 Check throttle for carbon deposits

NG → Clean throttle

OK

06

2 Observe if engine output increases when A/C is turned on. In other words, observe changes of ignition advance angle, injection pulse width and intake air volume using diagnostic tester

OK → Go to step 4

NG

3 Connect ECM adapter, and disconnect cable of ECM corresponding terminal. Check if wire harness side is HIGH-level signal with A/C ON

NG → Check and repair A/C system

OK

4 Check if A/C system pressure, compressor magnetic clutch and A/C compressor pump are normal

NG → Check and repair A/C system

OK

5 Check injector for leakage or blockage

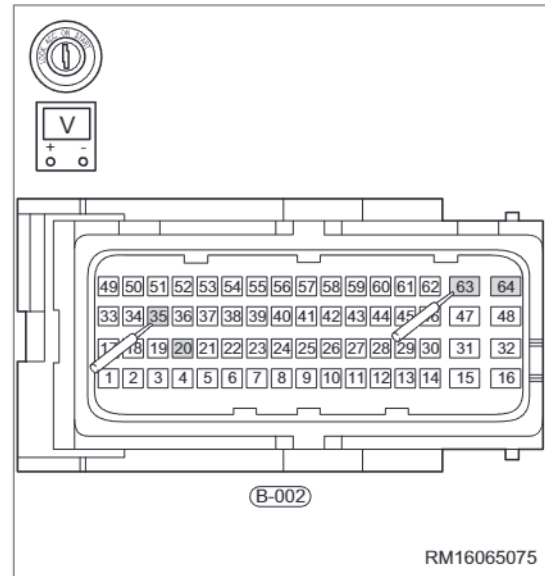
NG → Clean or replace injector

OK

6 Check ECM power supply and ground

- Disconnect the ECM connector B-002.
- Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG**Repair or replace related wire harness****OK****06****Go to Diagnostic Help**

Engine starts normally, but idle speed is too high

Diagnosis Procedure

1 Check if accelerator pedal is stuck

NG

Adjust or replace accelerator pedal

OK

2 Check intake system and connected vacuum pipe for air leakage

NG

Check and repair intake system

OK

3 Check throttle for carbon deposits

NG

Clean throttle

OK

4 Disconnect coolant temperature sensor connector, start engine and observe if engine idle is normal at this time

OK

Check and repair wire harness or replace sensor

NG

5 Check engine ignition timing

a. Check if engine ignition timing is as specified.

NG

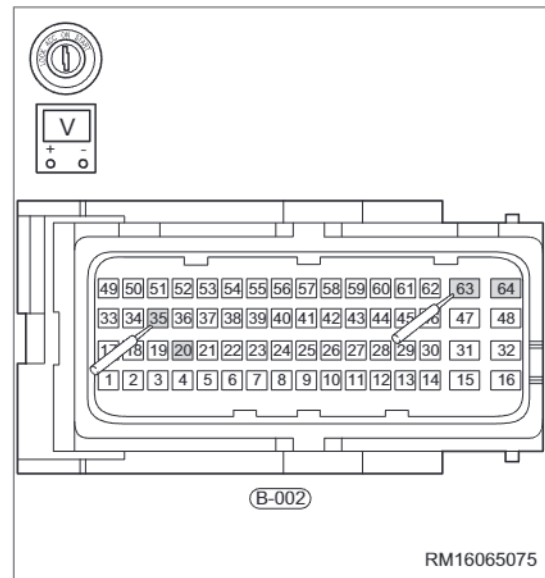
Check and repair ignition timing

OK

6 Check ECM power supply and ground

- Disconnect the ECM connector B-002.
- Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG**Repair or replace related wire harness****OK****06****Go to Diagnostic Help**

Low engine speed or stalls when accelerating

Diagnosis Procedure

- 1 Check air filter for blockage, and intake pipe for air leakage

NG Check and repair intake system

OK

- 2 Check fuel pressure

- a. Using a fuel pressure gauge, check the fuel pressure ([See page 08-11](#)).

Standard Fuel Pressure

Condition	Fuel System Pressure (kPa)
Key ON	400
Engine Idling	400
Key LOCK	400

NG Repair or replace fuel system

OK

- 3 Check spark plug

- a. Check the spark plug of each cylinder, and observe if the type and gap are as specified.

NG Replace spark plug

OK

- 4 Check throttle for carbon deposits

NG Clean throttle

OK

- 5 Check air flow meter, throttle position sensor and wire harness

NG Check and repair wire harness or replace sensor

OK

6 Check injector for leakage or blockage

NG

Clean or replace injector

OK

7 Check fuel condition

a. Observe if trouble occurs just after fuel is filled.

NG

Replace fuel

OK

8 Check engine ignition sequence and ignition timing

a. Check if engine ignition sequence and ignition timing are as specified.

NG

Check and repair ignition timing

OK

9 Check exhaust system

a. Check exhaust system for leakage or blockage.

NG

Repair or replace related exhaust system components

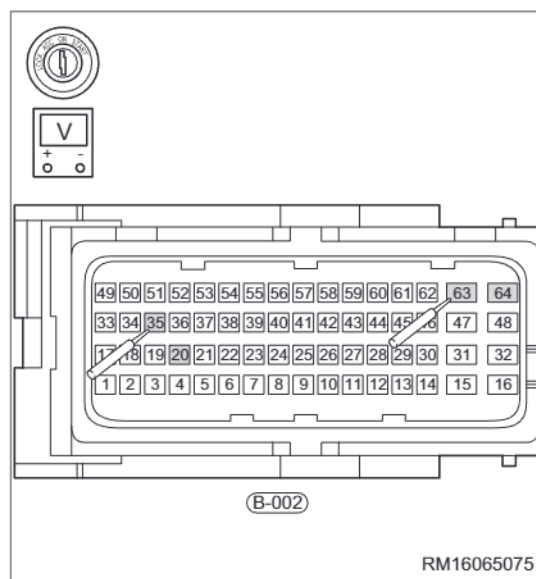
OK

06

10 Check ECM power supply and ground

- Disconnect the ECM connector B-002.
- Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG**Repair or replace related wire harness****06****OK****Go to Diagnostic Help**

Slow response when accelerating

Diagnosis Procedure

- 1** Check air filter for blockage, and intake pipe for air leakage

NG → Check and repair intake system

OK

- 2** Check fuel pressure

- a. Using a fuel pressure gauge, check the fuel pressure ([See page 08-11](#)).

Standard Fuel Pressure

Condition	Fuel System Pressure (kPa)
Key ON	400
Engine Idling	400
Key LOCK	400

NG → Repair or replace fuel system

OK

- 3** Check spark fuel

- a. Check the spark plug of each cylinder, and observe if the type and gap are as specified.

NG → Replace spark plug

OK

- 4** Check throttle for carbon deposits

NG → Clean throttle

OK

- 5** Check air flow meter, throttle position sensor and wire harness

NG → Check and repair wire harness or replace sensor

06



OK

6 Check injector for leakage or blockage

NG

Clean or replace injector

OK

7 Check fuel condition

a. Observe if trouble occurs just after fuel is filled.

06

NG

Replace fuel

OK

8 Check engine ignition sequence and ignition timing

a. Check if engine ignition sequence and ignition timing are as specified.

NG

Check and repair ignition timing

OK

9 Check exhaust system

a. Check exhaust system for leakage or blockage.

NG

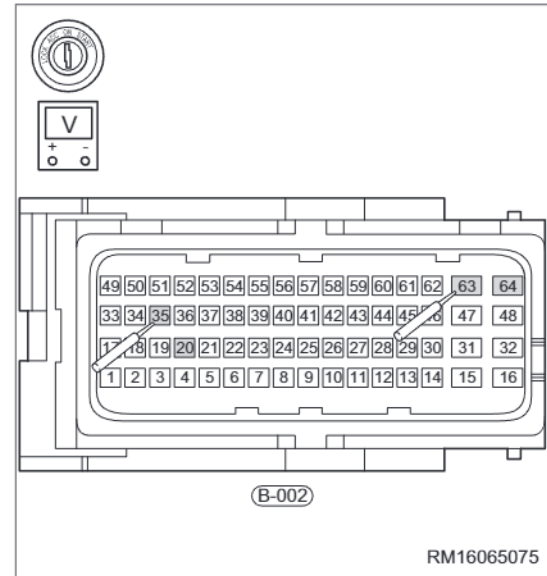
Repair or replace related exhaust system components

OK

10 Check ECM power supply and ground

- Disconnect the ECM connector B-002.
- Turn ignition switch to ON and check ECM connector terminals.

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG**Repair or replace related wire harness****OK****06****Go to Diagnostic Help**

Lack of power and poor performance when accelerating

Diagnosis Procedure

1

Check if malfunctions that clutch slipping, low tire inflation pressure, brake dragging, incorrect tire size, and incorrect four-wheel alignment are present

NG

Check and repair malfunctioning component

OK

06

2

Check air filter for blockage, and intake pipe for air leakage

NG

Check and repair intake system

OK

3

Check fuel pressure

- a. Using a fuel pressure gauge, check the fuel pressure ([See page 08-11](#)).

Standard Fuel Pressure

Condition	Fuel System Pressure (kPa)
Key ON	400
Engine Idling	400
Key LOCK	400

NG

Repair or replace fuel system

OK

4

Check spark plug

- a. Check the spark plug of each cylinder, and observe if the type and gap are as specified.

NG

Replace spark plug

OK

5

Check spark

- a. Remove ignition coil and spark plug of one cylinder, and ground spark plug housing. Start engine, and check if spark is generated.

OK: Spark is generated.

NG

Check and repair ignition system

OK

6

Check throttle for carbon deposits

NG

Clean throttle

OK

7

Check air flow meter, throttle position sensor and wire harness

NG

Check and repair wire harness or replace sensor

OK

8

Check injector for leakage or blockage

NG

Clean or replace injector

OK

9

Check fuel condition

a. Observe if trouble occurs just after fuel is filled.

NG

Replace fuel

OK

10

Check engine ignition sequence and ignition timing

a. Check if engine ignition sequence and ignition timing are as specified.

NG

Check and repair ignition timing

OK

11

Check exhaust system

a. Check exhaust system for leakage or blockage.



NG

Repair or replace related exhaust system components

OK

12 Check ECM power supply and ground

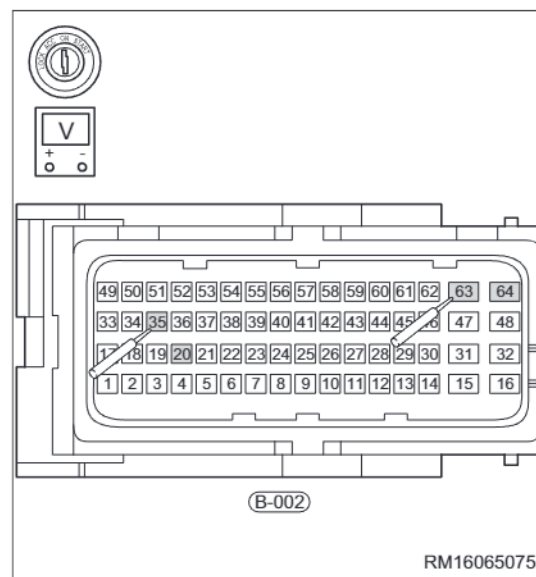
- Disconnect the ECM connector B-002.
- Turn ignition switch to ON and check ECM connector terminals.

06

Multimeter Connection	Condition	Specified Condition
B-002 (35, 20) - B-002 (63 or 64)	Ignition switch ON	11 to 14 V

NG

Repair or replace related wire harness



OK

Go to Diagnostic Help

ON-VEHICLE SERVICE

Intake/Exhaust VVT Control Valve

Description

There are two VVT control valves, which are located on intake side and exhaust side respectively.

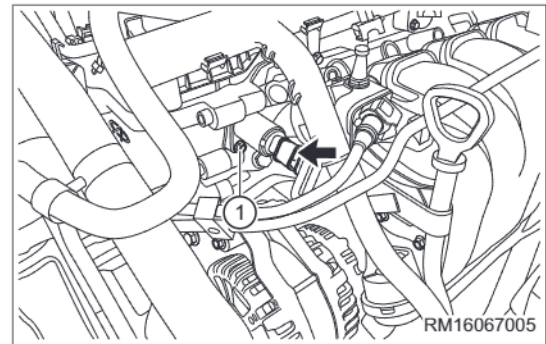
Operation

ECM controls VVT control valves depending on engine conditions, changes the flowing direction of oil in phasers to advance or retard intake/exhaust camshaft, thus changing the timing of intake valve and exhaust valve.

Removal

Use same procedures for removal of exhaust VVT control valve and intake VVT control valve. Procedures listed below are for intake VVT control valve.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the intake VVT control valve.
 - a. Disconnect the intake VVT control valve connector (arrow), and then remove the intake VVT control valve fixing bolt (1).
(Tightening torque: $8 \pm 2 \text{ N}\cdot\text{m}$)



Installation

Installation is in the reverse order of removal.

Coolant Temperature Sensor

Description

Coolant temperature sensor is a negative temperature coefficient sensor, which is installed into the mounting hole in thermostat holder.

Operation

Coolant temperature sensor provides an input signal for Engine Control Module (ECM). As temperature increases, the resistance of sensor decreases. As coolant temperature changes, the resistance of coolant temperature sensor varies accordingly, resulting in a change in voltage of coolant temperature sensor signal circuit. ECM uses this input signal to control air-fuel mixture, ignition timing, A/C compressor and radiator fan on/off timing.

Removal

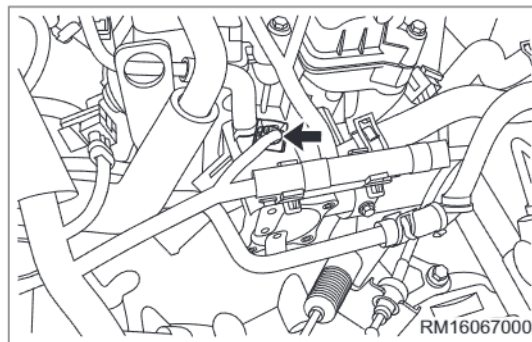
06

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.

⚠ WARNING

- Always make sure engine is in low temperature before operating cooling system. Never open the expansion tank cap or remove the drain cock plug when engine is operating or cooling system overheats. High-pressurized hot engine coolant and steam may flow out and cause serious injury.

3. Remove the engine trim cover.
4. Disconnect the coolant temperature sensor connector and remove the coolant temperature sensor.
(Tightening torque: $14 \pm 1 \text{ N}\cdot\text{m}$)



Installation

Installation is in the reverse order of removal.

👁 CAUTION

- Perform sealing with anaerobic seal gum.
- Confirm that sensor is tightened fully during installation.
- After installing engine coolant temperature sensor, check coolant level.

Knock Sensor

Description

Knock sensor is installed on cylinder block, and used to detect engine vibration caused by detonation.

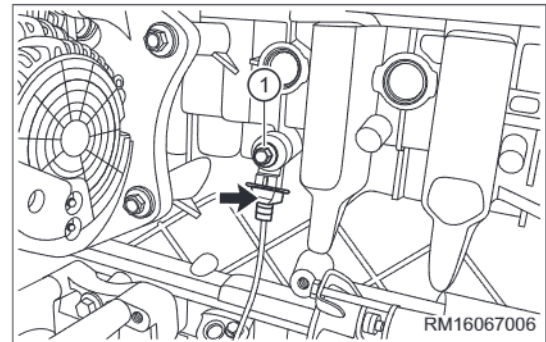
Operation

The sensitive element of knock sensor is a piezoelectric ceramic. Vibration of engine cylinder block is transferred to the piezoelectric ceramic through a mass block in the sensor. Due to the pressure generated by vibration of mass block, the piezoelectric ceramic generates a voltage at both electrode faces, and converts the vibration signal to an AC voltage signal to output it. As intensity of vibration increases, knock sensor output voltage increases accordingly.

Because frequency of vibration signal caused by engine knocking is far more than that of normal engine vibration signal, Engine Control Module (ECM) can distinguish between knock or non-knock signals by processing these signals from knock sensor.

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Disconnect the knock sensor connector (arrow), and remove the knock sensor fixing bolt (1).
(Tightening torque: $20 \pm 5 \text{ N}\cdot\text{m}$)



Installation

Installation is in the reverse order of removal.

CAUTION

- Never allow any kinds of gasket and washer between sensor and engine block. Only the metal part of sensor can contact with engine block directly.
- DO NOT apply lubricant, grease or seal gum when installing knock sensor. Keep engine block clean and dry, and never allow any foreign matter (such as oil) on the installation area of knock sensor.
- Never tap knock sensor when installing it.

Oxygen Sensor

Description

This vehicle is equipped with two oxygen sensors (upstream oxygen sensor and downstream oxygen sensor). Oxygen sensors continually monitor the oxygen concentration in exhaust gas.

Operation

Oxygen sensor generates voltage depending on the oxygen content in exhaust gas. The sensor generates low voltage when oxygen content is high, and high voltage when oxygen content is low. Therefore, the sensor acts as a rich-lean switch.

Oxygen sensor is equipped with a heating element that keeps sensor at proper operating temperature under all operating conditions.

Upstream Oxygen Sensor

06

Input signal from upstream heated oxygen sensor informs Engine Control Module (ECM) of the oxygen content in exhaust gas. Based on this input signal, Engine Control Module (ECM) adjusts air-fuel ratio finely by adjusting injector pulse width.

Downstream Oxygen Sensor

Downstream heated oxygen sensor signal is used to detect the catalytic converter deterioration. As converter deteriorates, the signal from downstream sensor begins to match upstream sensor signal except for a slight time delay. By comparing the signal from upstream heated oxygen sensor to the signal from downstream sensor, Engine Control Module (ECM) calculates the efficiency of catalytic converter.

Removal & Installation - Upstream Oxygen Sensor

(See page 09-12)

Removal & Installation - Downstream Oxygen Sensor

(See page 09-14)

Camshaft Position Sensor

Description

This vehicle is equipped with an intake camshaft position sensor and an exhaust camshaft position sensor, which are installed on cylinder head cover.

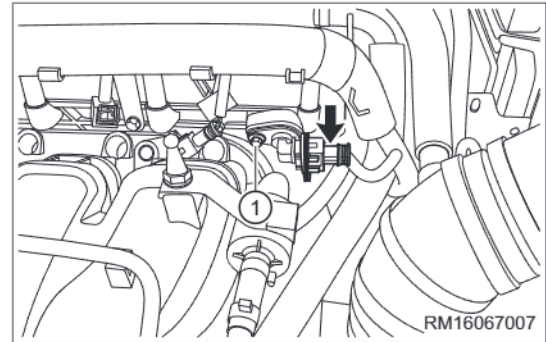
Operation

Camshaft position sensor is a Hall type sensor and a phaser is installed on camshaft. When phaser is in high teeth, the applicable circuit output is low level; when phaser is in missing teeth, the applicable circuit output is high level. As a result, the crankshaft phase information is provided to Engine Control Module (ECM), so that the compression top dead center and exhaust top dead center of crankshaft can be distinguished.

Removal

Use same procedures for removal of exhaust camshaft position sensor and intake camshaft position sensor. Procedures listed below are for intake camshaft position sensor.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the camshaft position sensor.
 - a. Disconnect intake camshaft position sensor connector (arrow) and remove the intake camshaft position sensor fixing bolt (1).
(Tightening torque: $8 \pm 1 \text{ N}\cdot\text{m}$)



Installation

Installation is in the reverse order of removal.

CAUTION

- Sensor should be pressed into mounting hole. Never use tools (such as a hammer) to strike sensor into mounting hole forcibly.

Crankshaft Position Sensor

Description

Crankshaft position sensor is installed on clutch case, against flywheel teeth. It is used to detect the speed and position of crankshaft.

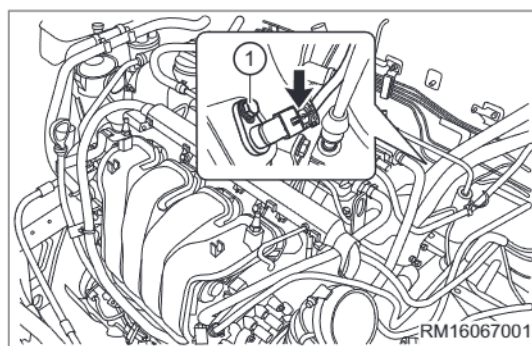
Operation

Crankshaft position sensor operates by using magnetoelectric effect. When crankshaft rotates, it drives flywheel to rotate. The flywheel teeth will cut the magnetic line of sensor, and change of magnetic flux causes both ends of sensor coil to generate output voltage with a certain frequency which is sent to Engine Control Module (ECM). And the output signal can indicate the speed and position of crankshaft.

Removal

06

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the crankshaft position sensor.
 - a. Disconnect the crankshaft position sensor connector (arrow), and remove the crankshaft position sensor fixing bolt (1).
(Tightening torque: 8 ± 2 N·m)



Installation

Installation is in the reverse order of removal.

CAUTION

- Press in crankshaft position sensor rather than tap when installing it.

Intake Pressure/Temperature Sensor

Description

Intake pressure/temperature sensor integrates with intake manifold absolute pressure sensor and intake temperature sensor, which is installed on the intake manifold upper body assembly.

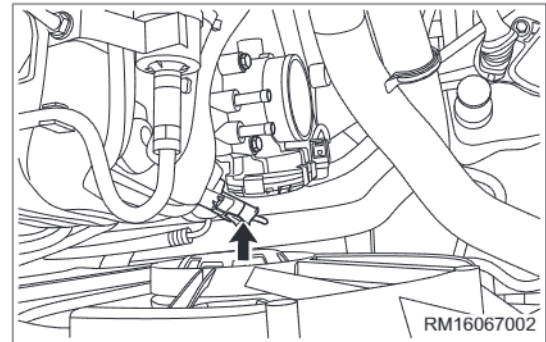
Operation

Intake manifold absolute pressure sensing element consists of a piece of silicon chip, which will deform mechanically as intake manifold absolute pressure changes. Piezoresistor in sensor will also deform, thus changing the resistance. Voltage signal linearly related to the pressure is generated, after processing by signal circuit of silicon chip.

Intake temperature sensor is a negative temperature coefficient thermistor, whose resistance changes with intake temperature. This sensor converts temperature signal into voltage value and sends it to Engine Control Module (ECM), thus monitoring the change of intake temperature.

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Disconnect the intake pressure/temperature sensor connector.



5. Remove the intake pressure/temperature sensor fixing bolt.
(Tightening torque: $6 \pm 1 \text{ N}\cdot\text{m}$)

Installation

Installation is in the reverse order of removal.

CAUTION

- Remove foreign matter on sensor before installation.
- Apply grease to O-ring before installation, to prevent it from being damaged during installation.

Ignition Coil

Description

Ignition coil converts low voltage of primary winding into high voltage of secondary winding, and discharges spark plug electrode to produce sparks which will ignite the combustible air-fuel mixture in cylinder.

Operation

An ignition coil consists of primary winding, secondary winding, iron core and housing etc. The primary and secondary windings form an induced circuit. An instant induced voltage generated by turning primary circuit switch on and off, and an instant high voltage generated by secondary circuit will cause spark plugs to discharge, thus igniting the combustible air-fuel mixture. The primary winding will recharge when its ground passage is on through an Engine Control Module (ECM) signal. If Engine Control Module (ECM) cuts off the control signal to primary winding circuit, it will stop charging and a high voltage will be induced in the secondary winding.

06

Removal & Installation

([See page 14-8](#)).

Variable Intake Solenoid Valve

Description

Variable intake solenoid valve is a vacuum switch valve, which is located on the intake manifold.

Operation

Depending on engine speed, ECM controls the vacuum from intake manifold by variable intake solenoid valve, drives the variable intake manifold actuator and rotates tumble valve, thus changing the length of intake manifold.

Removal & Installation

([See page 10-18](#))

Electronic Accelerator Pedal Sensor

Description

Accelerator pedal is installed to the cowl of body, and accelerator pedal sensor is located inside the accelerator pedal.

Operation

Accelerator pedal sensor outputs electrical signal which varies linearly depending on the pedal travel to ECM, in order to detect the position of accelerator pedal.

ECM adjusts the opening angle of electronic throttle according to this signal and other information, to meet intake requirements under different operating conditions.

Removal & Installation

(See page 10-24)

Electric Fuel Pump

Description

Electric fuel pump consists of DC motor, vane pump and end cover (integrated with check valve, pressure regulator and anti-electromagnetic interference element) etc. Pump and motor are installed coaxially, and sealed in the same housing. Fuel is filled around the pump and motor in the housing and used for heat dissipation and lubrication.

Operation

Battery supplies power to electric fuel pump via electric fuel pump relay, which can turn on electric fuel pump circuit only when starting and engine running. When engine stops running because of an accident, fuel pump stops running automatically. The maximum pressure at electric fuel pump outlet is adjusted by pressure regulator to keep the whole fuel system pressure at 400 kPa.

Removal & Installation

(See page 08-15)

06

Fuel Injector

Description

Fuel injector is located on the cylinder head near to intake valve, and nozzle end is located directly above the intake port.

Operation

Engine Control Module (ECM) sends electric pulse to injector coil, forming magnetic field force. When magnetic field force increases enough to overcome the resultant force from return spring pressure, needle gravity and friction force, needle begins to rise up and injector starts to inject fuel. Pressure of return spring forces the needle to close again when injection pulse stops.

Removal & Installation

(See page 08-26)

Electric Throttle Assembly

Description

Electric throttle assembly is located on the intake manifold assembly.

Operation

Electric throttle assembly is a critical part for engine intake system. Its main function is to adjust intake passage area according to driver's driving intention, and control intake air volume to meet intake requirement for engine in different operating conditions, and send back position signals of throttle valve plate to control unit to achieve accurate control. When malfunction occurs, throttle valve plate will stop at the limp home position determined in a mechanical way.

Electric throttle assembly consists of four parts: drive module, train module, executive module and feedback module, and all components are integrated into the same throttle valve housing.

Removal & Installation

([See page 10-14](#))

06

Canister Solenoid Valve

Description

Canister solenoid valve opens when power is on, and closes when power is off.

Operation

Canister solenoid valve consists of solenoid coil, magnet armature, valve, etc. Air volume through canister solenoid valve is related to electric pulse duty ratio output from Engine Control Module (ECM) and pressure difference between canister inlet and outlet. When there is no electric pulse, the canister solenoid valve closes.

Removal & Installation

(See page 09-7)

Engine Control Module (ECM)

Description

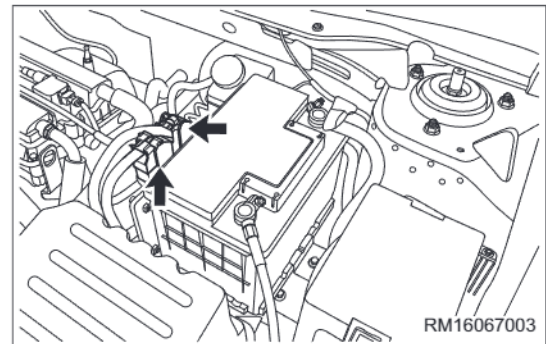
Engine Control Module (ECM), mounted on the battery bracket in engine compartment, can be removed only as a unit for replacement.

Operation

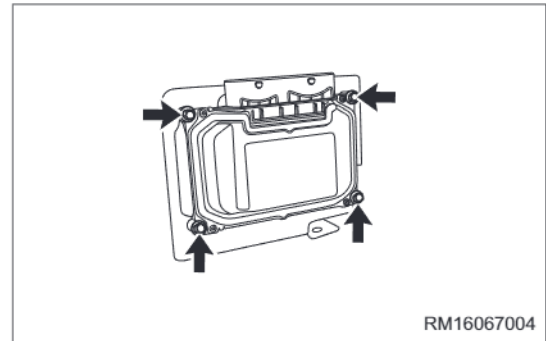
Engine Control Module (ECM) is a pre-programmed microprocessor digital computer, which is used to adjust ignition timing, air-fuel ratio, emission control, speed control, A/C compressor and idle speed etc. Engine Control Module (ECM) enables the program to suit ever-changing operation conditions.

Removal

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the Engine Control Module (ECM).
 - a. Disconnect the ECM connectors.



- b. Remove the ECM fixing bolt, and take off the ECM.
(Tightening torque: $7 \pm 1 \text{ N}\cdot\text{m}$)



Installation

Installation is in the reverse order of removal.

CAUTION

- Pay attention to static electricity protection when installing.
- Take care to protect connector terminals.
- To prevent water droplets from accumulating on connector joint, face it down.

