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HYBRID CONTROL SYSTEM

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PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

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The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper repair, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery or batteries, and wait at least three minutes before performing any service.**

High Voltage Precautions

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DANGER:

**Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents resulting in death or severe injury, if high voltage components and vehicle are mishandled. When performing an inspection or maintenance, be sure to comply with the instructions below to perform correct work procedures.**

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulated protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**

CAUTION:

- **Be sure to install the high voltage harness clips to the original positions to prevent damage to high voltage harness. If the clips are damaged, replace them with new ones before installing the high voltage harness.**
- **To prevent damage to parts, never allow coolant to splash on the high voltage harness connector. If coolant splashes on the high voltage harness connector, immediately remove moisture from the high voltage harness connector by using an air blow gun.**
- **Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.**

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

All the high voltage harnesses and connectors are orange. The Li-ion battery and other high voltage devices include an orange high voltage label. Never touch these harnesses and high voltage parts.

HANDLING OF HIGH VOLTAGE HARNESS AND TERMINALS

Immediately insulate disconnected high voltage connectors and terminals with insulating tape.

GUIDELINES ON WORKERS WITH MEDICAL ELECTRONICS

WARNING:

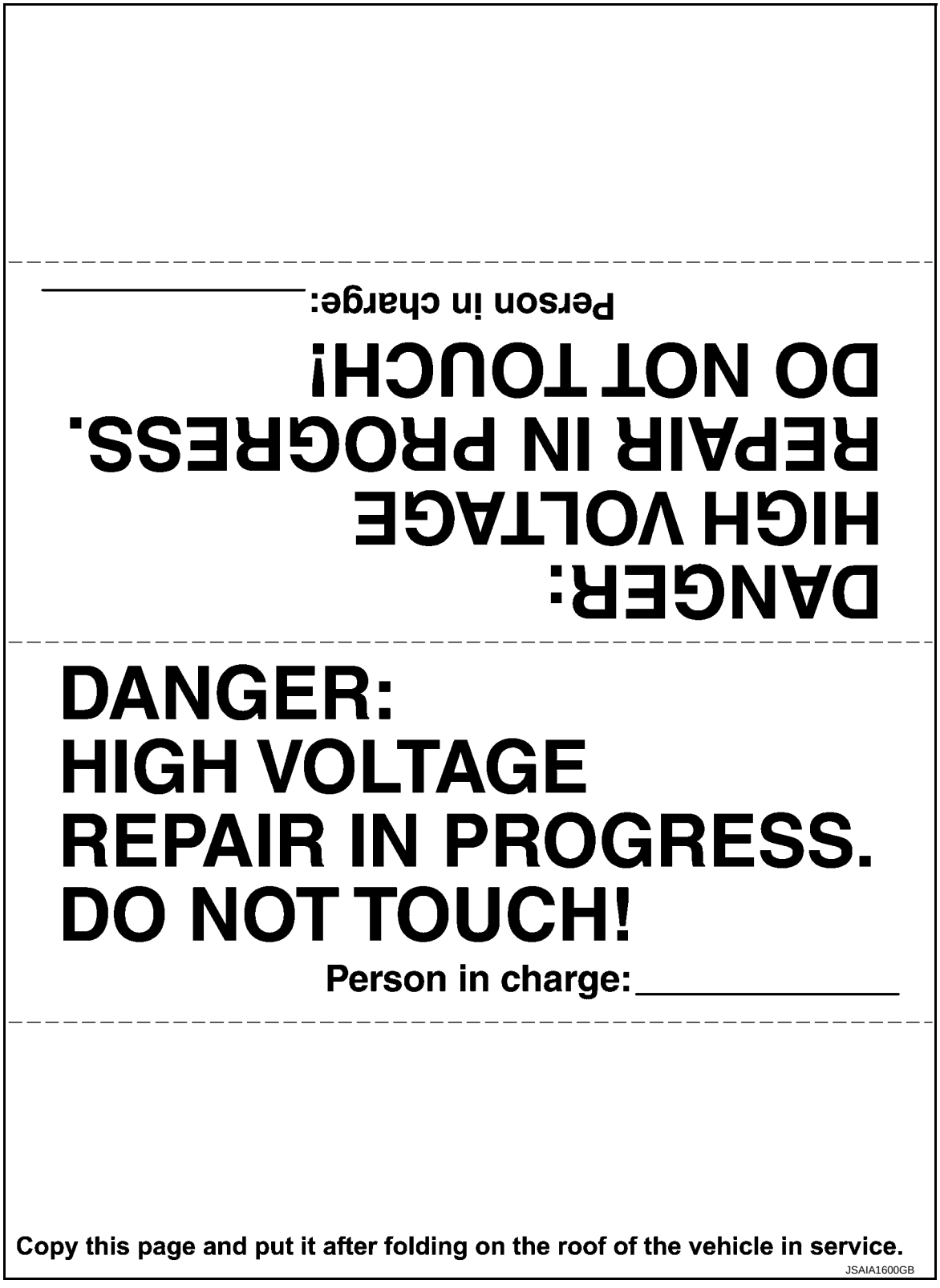
The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

PROHIBITED ITEMS TO CARRY DURING THE WORK

Hybrid vehicles and electric vehicles contain parts with high voltage and intense magnetic force. Never carry metal products and magnetic recording media (e.g. credit card, debit card) to repair/inspect high voltage parts. If this is not observed, the metal products may create a risk of short circuit and the magnetic recording media may lose their magnetic recording.

POST A SIGN OF “DANGER! HIGH VOLTAGE AREA. KEEP OUT”

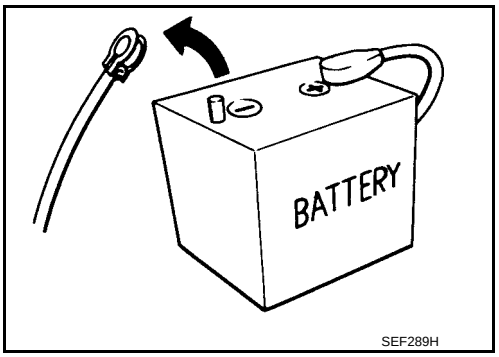
Call the attention of other workers and indicate "High voltage work in progress." Do not touch vehicles where work is being performed on high voltage systems.



Precautions for Removing Battery Terminal

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- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 5 minutes.
  NOTE:
  ECU may be active for several minutes after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- Disconnect 12V battery terminal according to the following steps.



WORK PROCEDURE

1. Turn the ignition switch OFF → ON → OFF. Get out of the vehicle. Close all doors (including trunk lid or back door).
2. Wait for 5 minutes or more.
   NOTE:
   If the battery is removed within 5 minutes after the ignition switch is turned OFF, plural DTCs may be detected.
3. Remove 12V battery terminal.

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

Precautions Concerning On-board Servicing of Hybrid Systems

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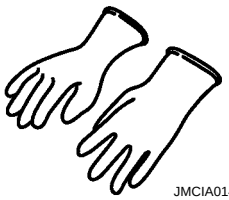
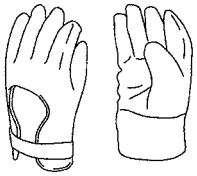
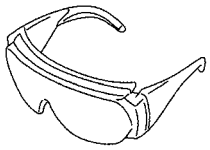
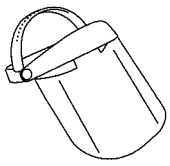
CAUTION:
Be sure to turn the ignition switch OFF before performing inspection and servicing inside the engine compartment or underneath the vehicle. If the ignition switch is ON (vehicle READY state), even if the engine is stopped, the conditions of the vehicle may cause the engine to start automatically.
If it is necessary to continually operate the engine during inspection or servicing, use the designated inspection mode. **HBC-113, "Description".**
NOTE:
The engine starts when hood is opened with the vehicle in READY state.

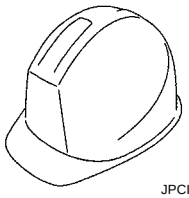
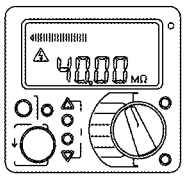
PREPARATION

PREPARATION

Commercial Service Tools

INFOID:0000000014736067

Tool name	Description
Insulated gloves  JMCIA0149ZZ	Removing and installing high voltage components [Guaranteed insulation performance for 1000V/300A]
Leather gloves  JPCIA0066ZZ	• Removing and installing high voltage components • Protect insulated gloves [Use leather gloves that can fasten the wrist tight]
Insulated safety shoes  JPCIA0011ZZ	Removing and installing high voltage components
Safety glasses  JPCIA0012ZZ	• Removing and installing high voltage components • To protect eye from the spatter on the work to electric line [ANSI Z87.1]
Face shield  JPCIA0167ZZ	• Removing and installing high voltage components • To protect face from the spatter on the work to electric line

Tool name	Description
Insulated helmet  JPCIA0013ZZ	Removing and installing high voltage components
Insulation resistance tester (Multi tester)  JPCIA0014ZZ	Measuring insulation resistance, voltage, and resistance

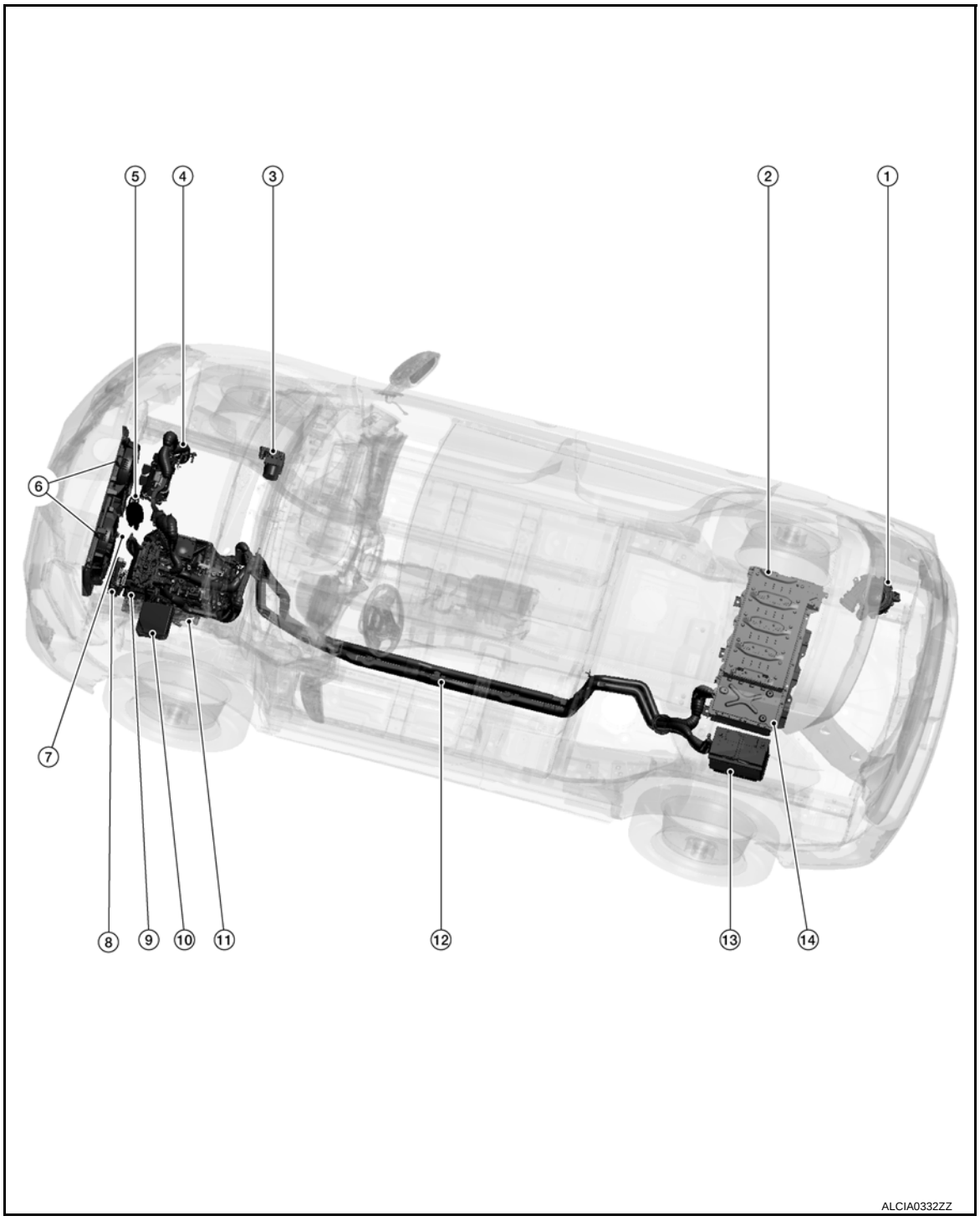
SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

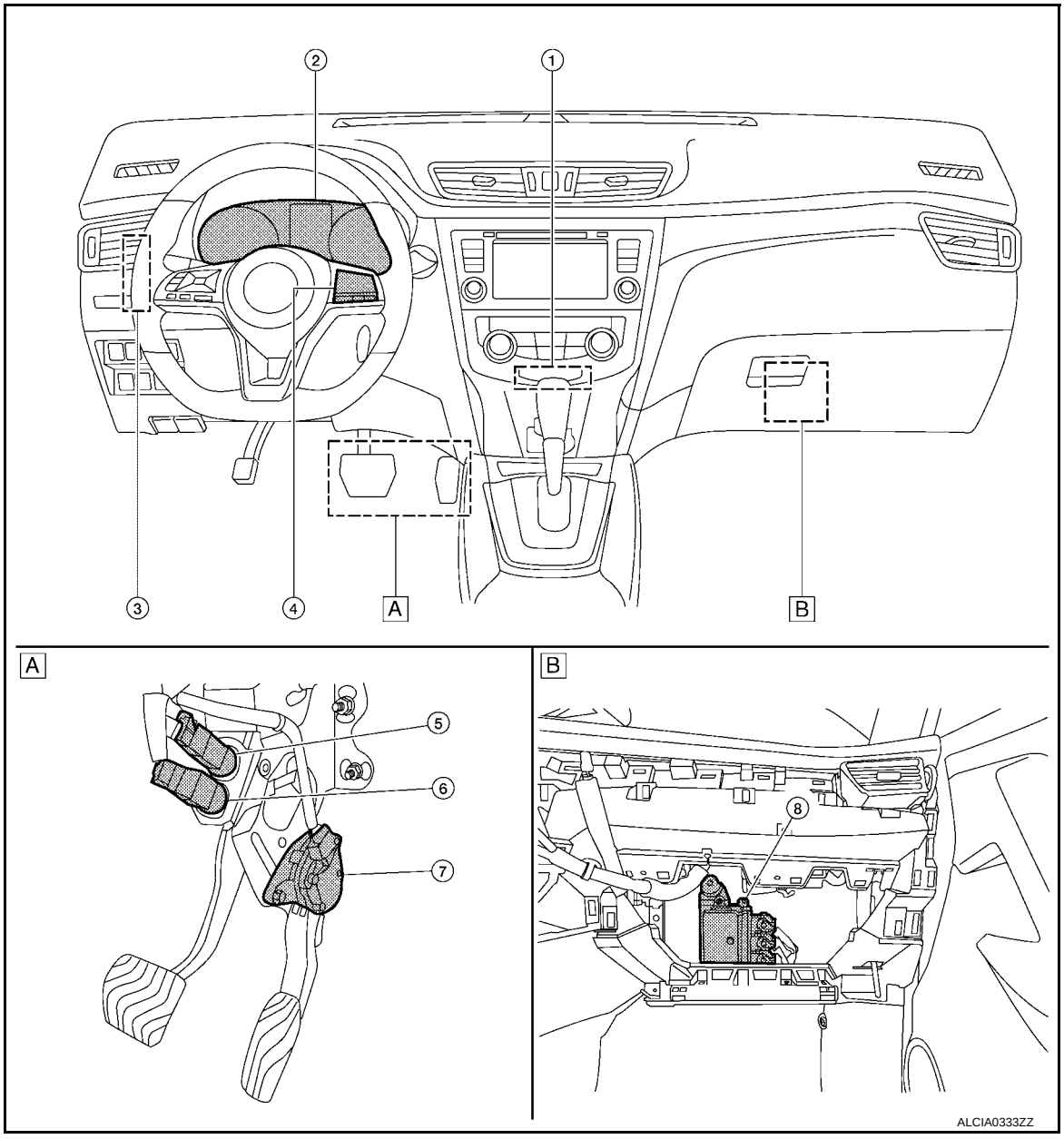
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Vehicle Compartment



No.	Component		Function
①	Battery cooling fan		HBB-15, "Battery Cooling Fan" For details of installation position, refer to HBB-13, "Component Parts Location".
②	Li-ion battery (Battery pack)	Li-ion battery	HBB-14, "Li-ion Battery" For details of installation position, refer to HBB-13, "Component Parts Location".
		Li-ion battery controller	
		Battery junction box	
		System main relay 1 (with built in battery junction box)	HBC-16, "System Main Relay"
		System main relay 2 (with built in battery junction box)	
		Pre-charge relay (with built in battery junction box)	
③	ABS actuator and electric unit (control unit)		BRC-12, "ABS Actuator and Electric Unit (Control Unit)" For details of installation position, refer to BRC-10, "Component Parts Location".
④	Electric compressor		HA-14, "REFRIGERATION SYSTEM : Electric Compressor" For details of installation position, refer to HA-13, "REFRIGERATION SYSTEM : Component Parts Location".
⑤	Electric water pump		HCO-5, "Electric water pump"
⑥	Cooling fan		EC-33, "Cooling Fan" For details of installation position, refer to EC-17, "Component Parts Location".
⑦	Hood switch		HBC-17, "Hood Switch"
⑧	ECM		EC-23, "ECM" For details of installation position, refer to EC-17, "Component Parts Location".
⑨	Traction motor inverter		TMS-11, "Traction Motor Inverter" For details of installation position, refer to TMS-11, "Component Parts Location".
⑩	IPDM E/R		For details of installation position, refer to PCS-6, "Component Parts Location".
⑪	Transaxle assembly	Traction motor	TMS-12, "Traction Motor" For details of installation position, refer to TMS-11, "Component Parts Location".
		Clutch 1	Transmits or shuts off the drive force between driving wheels and controlled by TCM according to a command from HPCM. For the structure and operation, refer to TM-46, "CLUTCH 1 CONTROL : System Description".
		Clutch 2	Transmits or shuts off the drive force between driving wheels and controlled by TCM according to a command from HPCM. For the structure and operation, refer to TM-46, "CLUTCH 2 CONTROL : System Description".
		TCM	TM-17, "CVT CONTROL SYSTEM : TCM" For details of installation position, refer to TM-15, "CVT CONTROL SYSTEM : Component Parts Location".
		Electric oil pump	TM-23, "CVT CONTROL SYSTEM : Electric Oil Pump" For details of installation position, refer to TM-15, "CVT CONTROL SYSTEM : Component Parts Location".
⑫	High-voltage harness		Harness for high voltage and high current. All high voltage harnesses and connectors are orange-colored.
⑬	12V battery		PG-133, "Battery"
⑭	DC/DC converter		HBC-18, "DC/DC Converter"

Interior Compartment



A Accelerator pedal and brake pedal upper part

B Behind of glove box (Located close to dash panel)

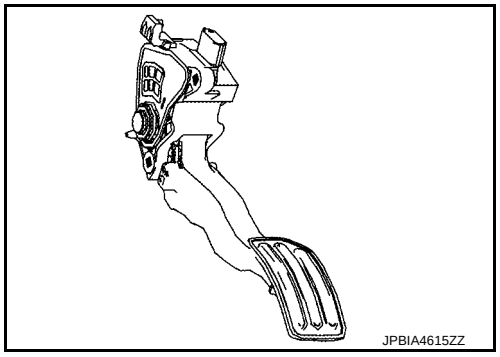
No.	Component	Function
①	A/C auto amp.	Controls the air-conditioning system (e.g. electric compressor, blower fan motor), according to a command from HPCM. For details of installation position, refer to HAC-8, "Component Part Location".
②	Combination meter	Performs the ON/OFF control of the indicator lamp, warning lamp, and the information display, according to signals received from HPCM via CAN communication. Refer to HBC-18, "Information Display" and HBC-18, "Warning Lamps and Indicator Lamps".

No.	Component	Function
③	BCM	• Sends an ignition switch status (start) to HPCM. • Sends a vehicle state (e.g. door open/close status) via CAN communication. For details of installation position, refer to BCS-5, "BODY CONTROL SYSTEM : Component Parts Location".
④	ASCD steering switch	HBC-17, "ASCD steering Switch"
	ICC steering switch	HBC-17, "ICC Steering Switch"
⑤	Brake pedal position switch	HBC-17, "Brake Pedal Position Switch"
⑥	Stop lamp switch	HBC-16, "Stop Lamp Switch"
⑦	Accelerator pedal position sensor	HBC-15, "Accelerator Pedal Position Sensor"
⑧	HPCM	HBC-18, "HPCM"

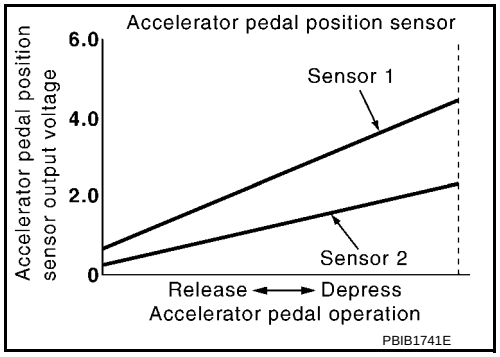
Accelerator Pedal Position Sensor

INFOID:0000000014736069

The accelerator pedal position sensor is installed on the upper section of the accelerator pedal assembly and detects the depressing amount of the accelerator pedal.



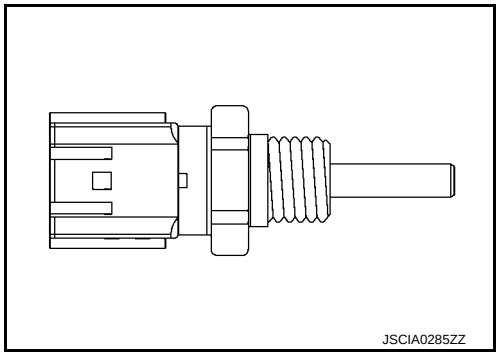
These sensors compose 2 systems. These use potentiometers to convert the amount of accelerator pedal depression to voltage signals and input the signals into HPCM.
HPCM judges the amount and speed of accelerator pedal depression from these signals, and controls the output of the engine and traction motor.



High Voltage Coolant Temperature Sensor

INFOID:0000000014736070

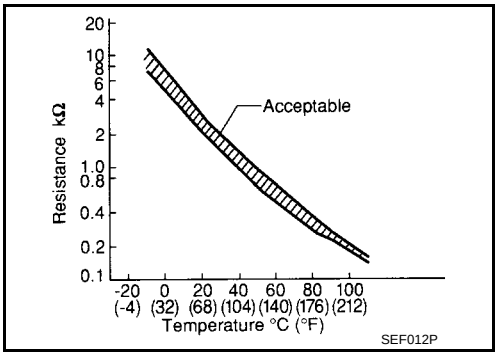
The high voltage coolant temperature sensor is detects the high voltage coolant temperature. This sensor uses a thermistor that changes its electrical resistance according to the temperature. HPCM detects a voltage change according to electrical resistance change.



<Reference data>

High voltage coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between HPCM terminals.



System Main Relay

INFOID:0000000014736071

DESCRIPTION

When high-voltage power is supplied, HPCM activates the system main relay to supply power from the Li-ion battery to the hybrid system.

SYSTEM MAIN RELAY 1

System main relay 1 is installed inside the battery junction box and is controlled by HPCM. It connects and disconnects the high-voltage circuit (+) side and the Li-ion battery.

SYSTEM MAIN RELAY 2

System main relay 2 is installed inside the battery junction box and is controlled by HPCM. It connects and disconnects the high-voltage circuit (–) side and the Li-ion battery.

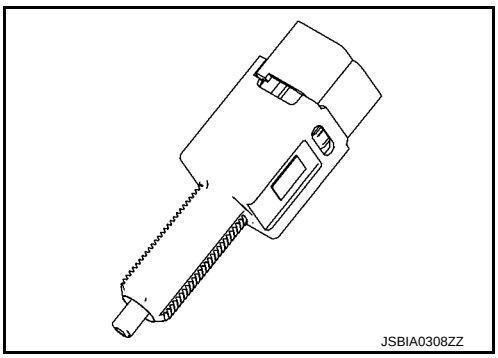
PRE-CHARGE RELAY

The pre-charge relay is contained in the battery junction box and is controlled by HPCM. When supply of high-voltage power is needed, HPCM activates the pre-charge relay and power is supplied via the charging resistor, preventing the sudden application of high-voltage.

Stop Lamp Switch

INFOID:0000000014736072

The stop lamp switch is installed to the brake pedal bracket. The switch detects the state of the brake pedal and transmits an ON/OFF signal to HPCM.
The contact of the stop lamp switch is usually open. When the brake pedal is depressed, it closes and the stop lamp switch signal is transmitted as a voltage signal.



Battery Current Sensor (With Battery Temperature Sensor)

INFOID:0000000014736073

BATTERY CURRENT SENSOR

The battery current sensor is installed to the negative cable of the battery. The battery current sensor detects the battery charge/discharge current and transmits signals to HPCM. HPCM judges the battery load based on these signals and controls the power generation by converting the target generation voltage to a power generation command signal and transmitting it to the DC/DC converter.

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power voltage variable control, and may cause the battery to discharge.

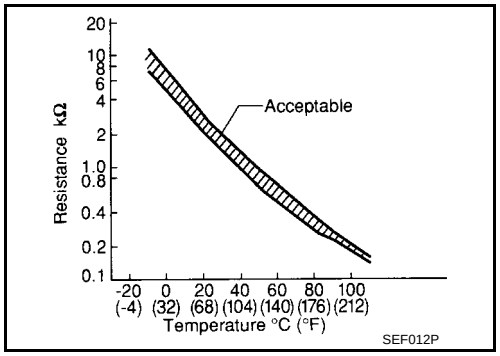
BATTERY TEMPERATURE SENSOR

Battery temperature sensor is integrated in battery current sensor.

The sensor measures temperature around the battery.
This sensor uses a thermistor and its electrical resistance varies as the temperature varies. HPCM detects a voltage change caused by the change in electrical resistance.

<Reference data>

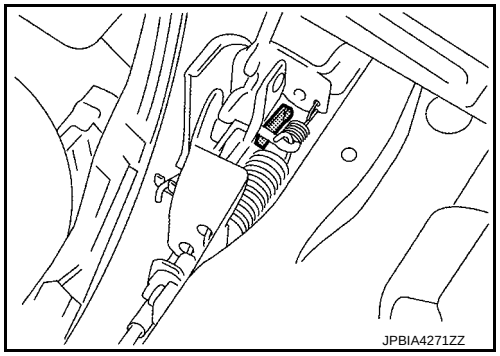
Temperature [°C (°F)]	Voltage (V)	Resistance (kΩ)
25 (77)	3.333	1.9 - 2.1
90 (194)	0.969	0.222 - 0.258



Hood Switch

INFOID:0000000014736074

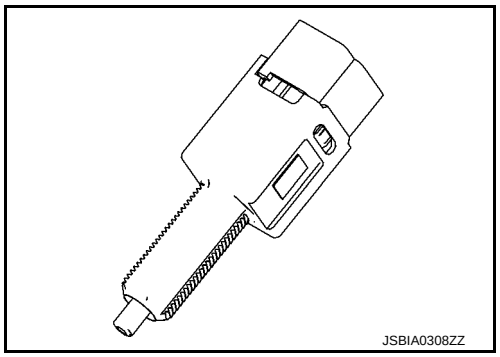
Hood switch is located in the hood lock assembly.
Hood switch detects open/close condition of hood and input the hood switch signal to IPDM E/R.



Brake Pedal Position Switch

INFOID:0000000014736075

The brake pedal position switch is installed to the brake pedal bracket. The switch detects the state of the brake pedal and transmits an ON/OFF signal to HPCM.
The contact of the brake pedal position switch is usually closed. When the brake pedal is depressed, it opens to disconnect the circuit, and shut off the output voltage. This constitutes an brake pedal position switch signal.



ASCD steering Switch

INFOID:0000000014736076

ASCD steering switch has variant values of electrical resistance for each button. HPCM reads voltage variation of switch, and determines which button is operated.
Refer to HBC-36, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description".

ICC Steering Switch

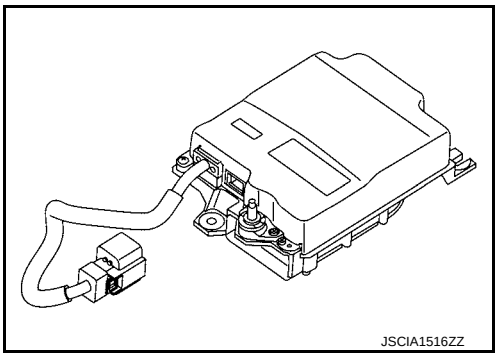
INFOID:0000000014946090

The intelligent cruise control steering switch is connected in series to different resistors in each switch circuit. HPCM reads the voltage values that are sent from each switch and split by the resistors, and detects which button is operated. For the intelligent cruise control function, refer to CCS-14, "System Description".

DC/DC Converter

INFOID:0000000014736077

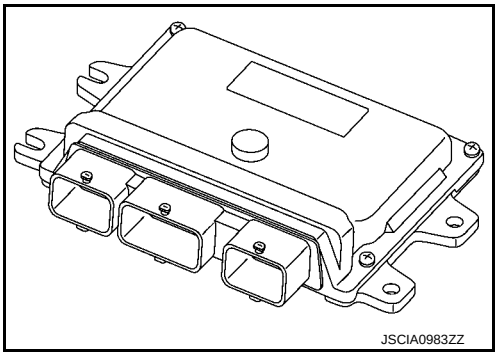
DC/DC converter reduces the high-voltage DC voltage from the Li-ion battery to DC voltage of approximately 13 V, and supplies this voltage to the on-board electrical equipment and also uses it to charge the 12V battery. In addition, it changes the output voltage according to HPCM signals so that appropriate voltage is supplied depending on the vehicle condition.



HPCM

INFOID:0000000014736078

HPCM (Hybrid Power train Control Module) consists of a microcomputer and input/output connectors for signal and power supply. It performs integrated control of the hybrid control system based on the various control modules and the signals from the sensors.
HPCM also functions as a gateway between HEV system CAN communication and CAN communication.



Information Display

INFOID:0000000014948925

Information necessary to control the information display is transmitted from each relevant control module and input into the combination meter. Based on this information, warnings or information appears on the information display.
HPCM transmits signals for the following items to the combination meter via CAN communication in order to display them.

Display item	Display content
Shift P warning	Warns the driver to shift to P position.
Low battery charge warning	Warns the driver to shift to P position when the remaining amount of Li-ion battery is low during stop in N position and indicates low battery level.
HV system over heat warning*	Warns the driver that the hybrid system temperature is too high.
ASCD indicator	Indicates the ASCD operating status.
ECO drive indicator	Indicates the ECO mode status.

CAUTION:
***: The hybrid system overheat warning indicates that the temperature of the hybrid system is too high. It may become impossible to drive the vehicle if driving is continued.**
For the information display, refer to MWI-15, "INFORMATION DISPLAY : System Description".

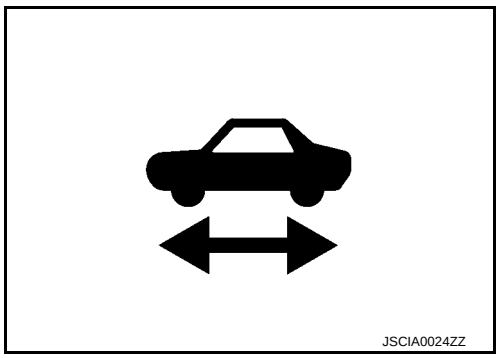
Warning Lamps and Indicator Lamps

INFOID:0000000014948926

HPCM controls the following warning lamps and indicator lamps that are located on the combination meter.

READY TO DRIVE INDICATOR LAMP

The READY to drive indicator lamp indicates that the vehicle is in a state allowing vehicle travel. HPCM transmits the READY to drive indicator lamp signal to the combination meter via CAN communication to turn ON the READY to drive indicator lamp.
The READY to drive indicator lamp operates as follows.

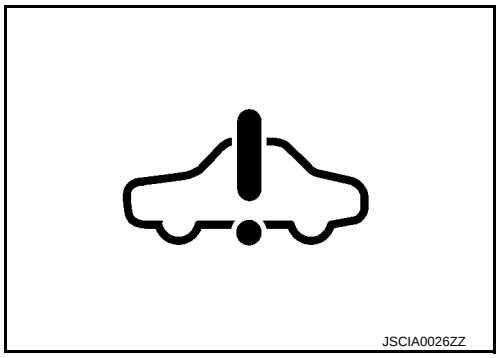

JSCIA0024ZZ

Condition	Illumination status
When ignition switch is operated from ON to READY	Blink
READY*1	ON*2
Except above	OFF

*1: The READY to drive indicator lamp blinks when charging resistor protection activates. (Turn the ignition switch OFF and wait for at least 1 minute, then turn the switch to READY again.)
*2: Lightning may take time at extremely low temperatures.

HYBRID SYSTEM WARNING LAMP

The hybrid system warning lamp turns ON when a malfunction occurs in the hybrid system.
When HPCM either detects a malfunction or receives a warning lamp activation request signal from a control module, it transmits the hybrid system warning lamp activation signal to the combination meter via CAN communication.
The hybrid system warning lamp operates as follows.

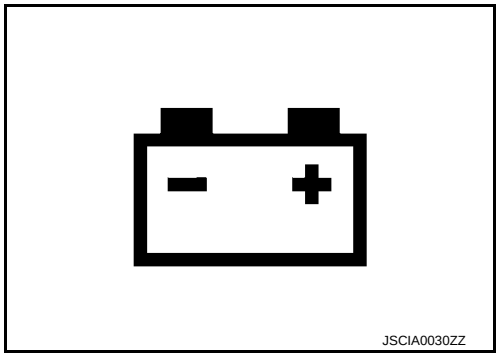

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Condition	Illumination status
When ignition switch is turned ON	ON (Bulb check)
When there is a malfunction in the hybrid system*	ON
Except above	OFF

*: When the system recovers from the malfunction and the ignition switch is turned from OFF to ON 2 times, the hybrid system warning lamp turns OFF.

12-VOLT BATTERY CHARGE WARNING LAMP

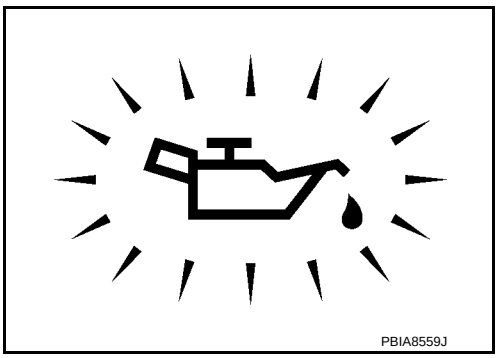
The 12-volt battery charge warning lamp turns ON when a malfunction occurs in the DC/DC converter.
When it detects a DC/DC converter malfunction, HPCM transmits the 12-volt battery charge warning lamp signal to the combination meter via CAN communication to turn the lamp ON.
The 12-volt battery charge warning lamp operates as follows.


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Condition	Illumination status
When ignition switch is turned ON	ON (Bulb check)
When a DC/DC converter malfunction occurs	ON
Except above	OFF

OIL PRESSURE WARNING LAMP

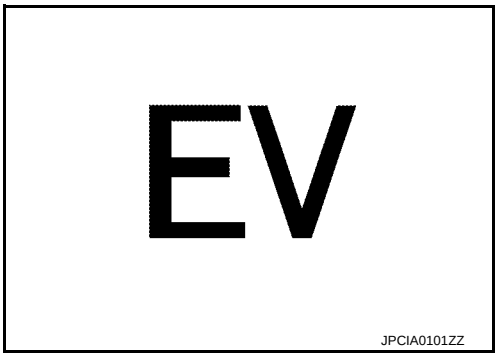
The oil pressure warning lamp turns ON when a malfunction is detected in the engine hydraulic system.
When it detects an engine hydraulic system malfunction, HPCM transmits the oil pressure warning lamp signal to the combination meter via CAN communication to turn the lamp ON.
The oil pressure warning lamp operates as follows.


PBIA8559J

Condition	Illumination status
When ignition switch is turned ON	ON (Bulb check)
When there is a malfunction in the engine hydraulic system	ON
Except above	OFF

EV INDICATOR LAMP

This lamp turns ON when the vehicle is driving using only the traction motor to inform the driving that motor driving mode is in effect.
HPCM transmits the EV indicator lamp signal to the combination meter via CAN communication.
The EV indicator lamp operates as follows.



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Condition	Illumination status
When mode is motor driving	ON
Except above	OFF

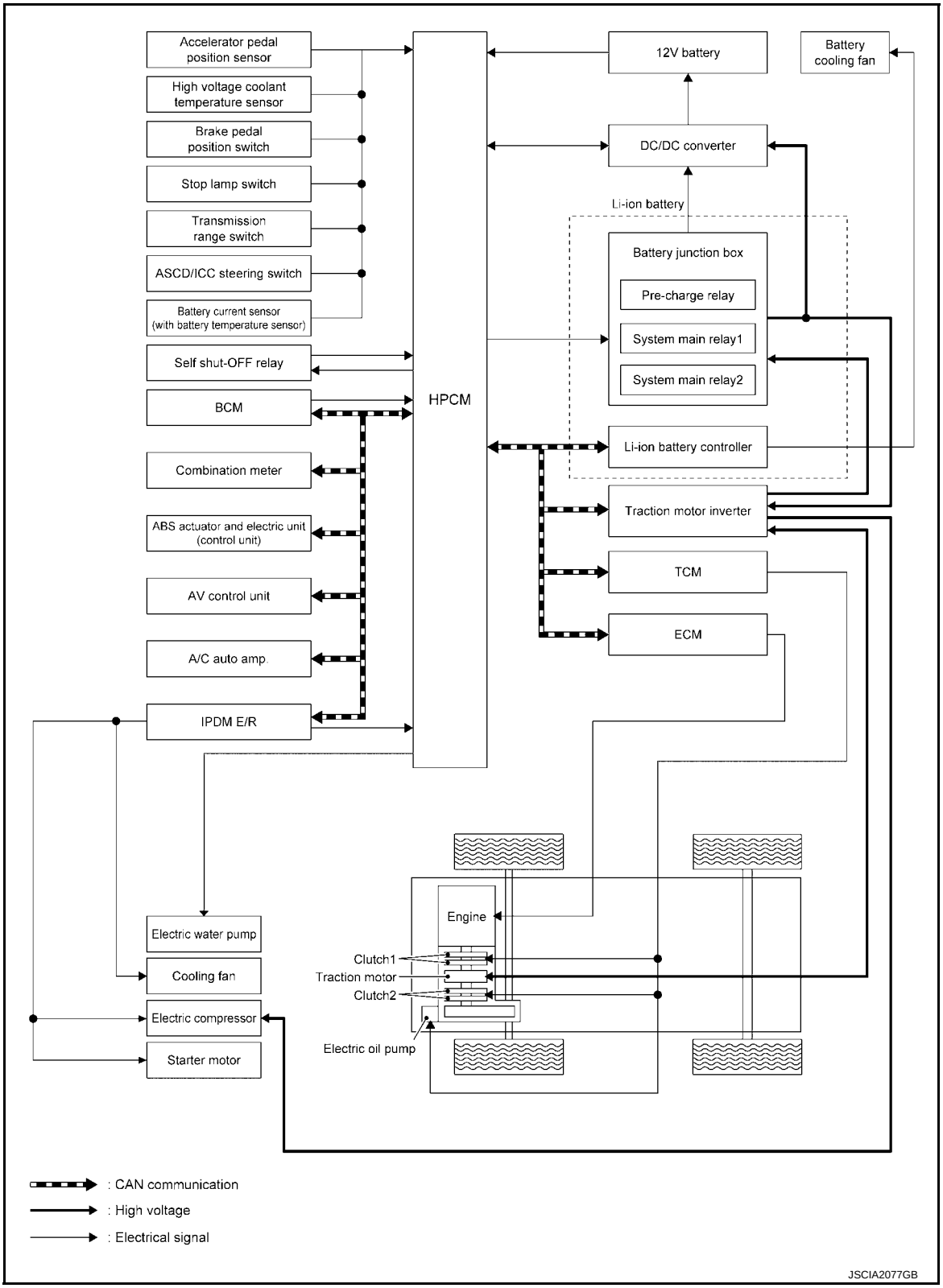
SYSTEM

HYBRID CONTROL SYSTEM

HYBRID CONTROL SYSTEM : System Description

INFOID:0000000014736079

SYSTEM DIAGRAM



HPCM INPUT/OUTPUT SIGNAL CHART

Input Signal Item

Transmitting sensor/unit	Signal name		Description
Accelerator pedal position sensor	Accelerator pedal position signal		Detects the amount that the accelerator pedal is depressed.
Battery current sensor	Battery current sensor signal		Detects the 12V battery current.
	Battery temperature sensor signal		Detects the 12V battery temperature.
Brake pedal position switch	Brake pedal position signal		Detects the brake pedal status.
Stop lamp switch			
High voltage coolant temperature sensor	High voltage coolant temperature signal		Receives high voltage coolant temperature.
12V battery	Battery voltage		Inputs the HPCM operating power.
BCM	READY signal		Detects the ignition switch condition (start).
	CAN communication	Door switch signal	Receives driver door open/close condition.
IPDM E/R	CAN communication	Hood switch signal	Receives hood open/close condition.
Combination meter	CAN communication	Vehicle speed signal	Receives the vehicle speed that is calculated by the combination meter.
ABS actuator and electric unit (control unit)	CAN communication	Decel G sensor signal	Receives the longitudinal G acting on the vehicle.
		Wheel speed signal	Receives the wheel speeds from the front, rear, left, and right wheels.
A/C auto amp.	CAN communication	Engine ON request signal	Receives engine start request.
Li-ion battery controller	CAN communication	Li-ion battery state of charge signal	Receives the Li-ion battery charge condition.
		Li-ion battery temperature signal	Receives the Li-ion battery temperature.
		Discharge control electricity signal	Receives the Li-ion battery power value which can be output.
		Charge control electricity signal	Receives the Li-ion battery power value which can be charged.
		Li-ion battery voltage signal	Receives the Li-ion battery voltage.
		Li-ion battery current signal	Receives the Li-ion battery current.
Traction motor inverter	CAN communication	Motor output torque signal	Receives traction motor torque value.
		Motor speed signal	Receives traction motor speed.
		Motor torque limit signal	Receives traction motor output torque limit value.
		Traction motor inverter voltage signal	Receives traction motor inverter high voltage value.
TCM	CAN communication	CVT ratio signal	Receives CVT ratio.
		Shift position signal	Receives shift position.
		CVT fluid temperature signal	Receives CVT fluid temperature.
		Output shaft revolution signal	Receives output shaft speed.
		Input speed signal	Receives input shaft speed.
		Clutch 2 status signal	Receives clutch 2 status.
		Clutch 2 temperature signal	Receives clutch 2 temperature.

Transmitting sensor/unit	Signal name		Description
ECM	CAN communication	Engine coolant temperature signal	Receives engine coolant temperature.
		Intake air temperature signal	Receives engine intake air temperature.
		Engine speed signal	Receives engine speed.
		Engine torque limit signal	Receives engine output torque limit value.
		Target idle speed signal	Receives the idle speed upper and lower limit values.
		Engine stop permit signal	Receives the engine stop permit signal which ECM transmits according to the status detection of the engine.
		Fuel cut-off prohibit signal	Receives the fuel cut permit/prohibit status.
		Idling stop prohibit signal	Receives the idle stop (engine stop) permit/prohibit status.

Output Signal Item

Receiving sensor/unit	Signal name		Description
Combination meter	CAN communication	READY to drive indicator lamp signal	Transmits the signal and activates the indicator lamp.
		EV indicator lamp signal	
		Assist charge signal	Transmits the signal and activates the assist charge gauge.
		Energy monitor signal	Transmits the signal and displays the status on the information display.
		Li-ion battery state of charge signal	
		ECO pedal guide signal	
ABS actuator and electric unit (control unit)	CAN communication	Target cooperative regenerative torque signal	Transmits the signal and generates the required regenerative braking torque.
NAVI control unit	CAN communication	Energy monitor signal	Transmits the signal and displays the status on the navigation display.
A/C auto amp.	CAN communication	A/C cut-off request signal	Transmits the signal and stops operation of the A/C compressor.
Traction motor inverter	CAN communication	Drive command signal	Transmits the signal and controls the traction motor output.
TCM	CAN communication	Clutch operation signal	Transmits the signal and operates clutch 1 and 2.
		CVT input torque	Transmits the integrated torque value which is sum of engine torque and traction motor torque value.
		Target CVT ratio signal	Transmits the signal and indicates optimal CVT ratio.
		Electric oil pump start up request signal	Transmits the signal and operates the electric oil pump.
ECM	CAN communication	Target engine torque signal	Transmits the signal and generates the required engine output torque.
		Engine stop notice signal	Transmits a signal to confirm if the engine can be stopped.
		Engine stop command signal	Transmits the signal and stops the engine.
		Engine idle request signal	Transmits a signal to allow the engine to go into the idle state.

SYSTEM DESCRIPTION

HPCM controls the output of the hybrid system generated by the engine and traction motor based on the signals from the sensors and control modules. In addition, it monitors and controls the conditions of the Li-ion battery and high-voltage circuit, performs cooperative regenerative braking with the brake system, and performs the complete range of various hybrid system controls.

Function	Reference
Brake system cooperation control	HBC-32, "BRAKE SYSTEM COOPERATION CONTROL : System Description"
System main relay control	HBC-33, "SYSTEM MAIN RELAY CONTROL : System Description"
Power voltage variable control system	HBC-34, "POWER VOLTAGE VARIABLE CONTROL SYSTEM : System Description"
Cooling system control	HBC-35, "COOLING SYSTEM CONTROL : System Description"
Automatic speed control device (ASCD)	HBC-36, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
ECO mode system	HBC-37, "ECO MODE SYSTEM : System Description"
CAN communication	HBC-37, "CAN COMMUNICATION : System Description"

HYBRID SYSTEM OUTPUT CONTROL

To control the drive force, HPCM detects the vehicle conditions based on information from the sensors and control modules, and controls the engine and traction motor.
HPCM judges the driving conditions based on the accelerator position, vehicle speed, selector lever position, and other signals, and calculates the target drive force for those conditions. HPCM also calculates output distribution of the engine and traction motor for required drive force, and transmits the command signal to ECM and traction motor inverter.
ECM and traction motor inverter control according to the command signal from HPCM.
NOTE:
The status of hybrid system control can be checked from “Energy monitor” on either the “Navigation display” or combination meter “Information Display”.

Functions of Primary Control Modules

Control module	Description	Reference
ECM	• Transmits engine status to HPCM via CAN communication. • Performs engine start, stop, and other engine controls based on commands from HPCM. • Outputs engine torque based on commands from HPCM.	• Engine control system EC-38 • Engine stop control EC-65
Traction motor inverter	• Transmits traction motor status to HPCM via CAN communication. • Controls traction motor power generation or output based on commands from HPCM.	• Motor power control TMS-20, • Motor regeneration control TMS-21
TCM	• Transmits transmission status to HPCM via CAN communication. • Activates clutch 1, clutch 2, and electric oil pump based on commands from HPCM. • Performs shift control according to the vehicle driving conditions.	• CVT control system TM-35 • Electric oil pump control TM-47 • Shift control TM-42
Li-ion battery controller	Transmits Li-ion battery status to HPCM via CAN communication.	• Hybrid battery system HBB-18

Control module	Description	Reference
ABS actuator and electric unit (control unit)	• Transmits brake operating status to HPCM via CAN communication. • Performs cooperative regenerative braking control together with HPCM.	• Brake control system BRC-17 • Cooperative regenerative brake function BRC-39
Combination meter	Receives request signals transmitted by CAN communication from HPCM, and activates the indicator lamps on the combination meter and displays vehicle condition in the information display.	• Meter system MWI-7 • Information display HBC-18 • Warning lamps and indicator lamps HBC-18

<EXAMPLE OF ENGINE AND TRACTION MOTOR OUTPUT CONTROL ACCORDING TO DRIVING CONDITIONS>

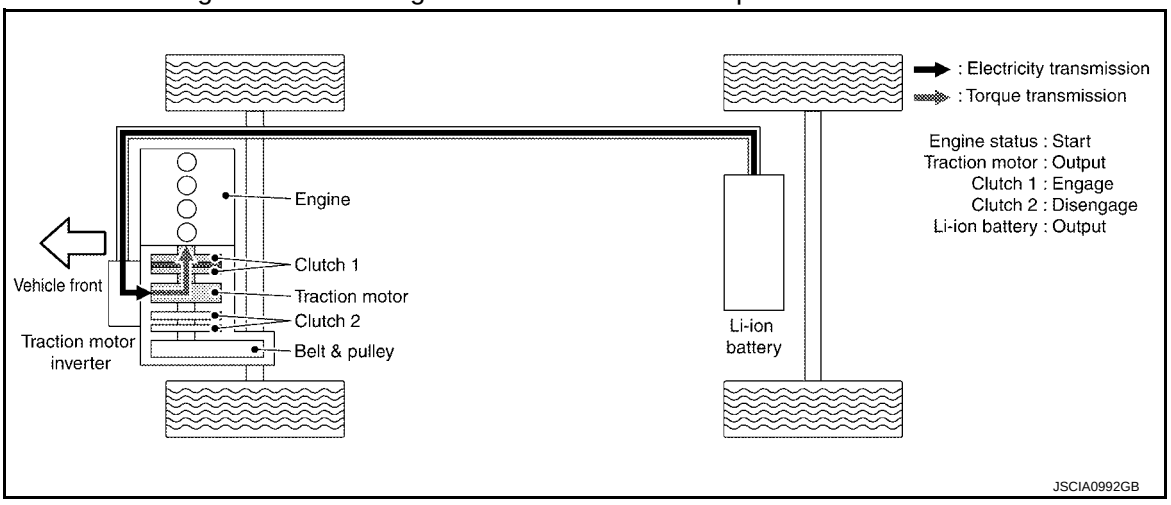
HPCM controls the driving mode according to a range of driving conditions. Examples of vehicle driving modes under different driving conditions are shown below.

Hybrid System Activation

When the ignition switch is turned ON, HPCM turns ON the self shut off relay and activates the hybrid system.

When Vehicle is READY

- When the vehicle is READY, HPCM controls the system main relay and connects the high-voltage circuit. Refer to HBC-33, "SYSTEM MAIN RELAY CONTROL : System Description".
- The combination meter activates the READY to drive indicator lamp, informing the driver that the vehicle is ready to drive.
- HPCM detects the engine and Li-ion battery status based on signals from the ECM and Li-ion battery controller.
  When engine is cold and Li-ion battery level is low, in order to warm the engine or charge the Li-ion battery, clutch 1 is engaged and the traction motor output is used to start the engine.
  NOTE:
  - Even after the engine is warm or the Li-ion battery level is sufficient, in some cases the engine still may not start due to other conditions.
  - The engine can start with the starter motor at extremely low temperatures.
  - HPCM starts the engine when the engine hood is detected as open.



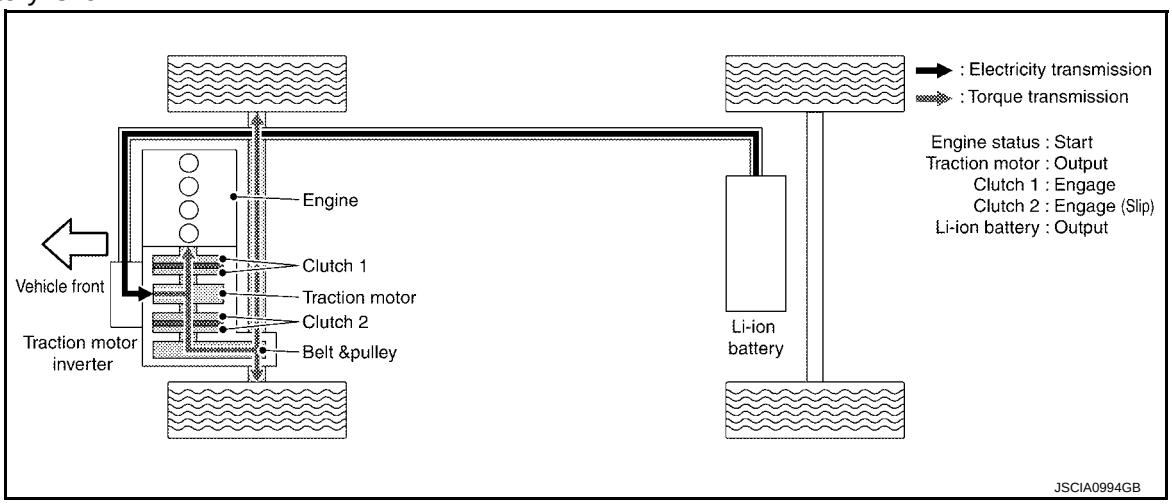
Normal Driving

When starting

- The engine starts when the brake pedal is released and the vehicle runs with output torque.
- HPCM engages clutch 1 and starts engine, then engages clutch 2 (half clutch) and transmits engine output torque to drive wheels.

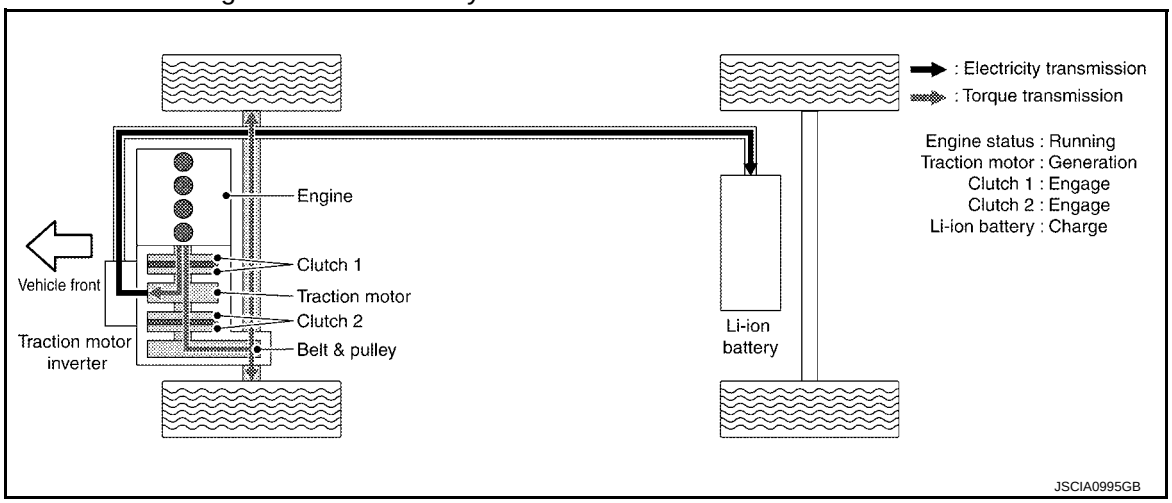
NOTE:

The engine may not stop depending on conditions such as the engine is cooled or the remaining amount of Li-ion battery is low.



When remaining Li-ion battery level is low

- When the Li-ion battery level is low, the vehicle is driven by engine output torque, and the traction motor generates power to charge the Li-ion battery.
- HPCM detects the Li-ion battery status from the Li-ion battery controller, and transmits the output torque signal to the ECM to control the engine output. The traction motor inverter controls the power generation by the traction motor and charges the Li-ion battery.

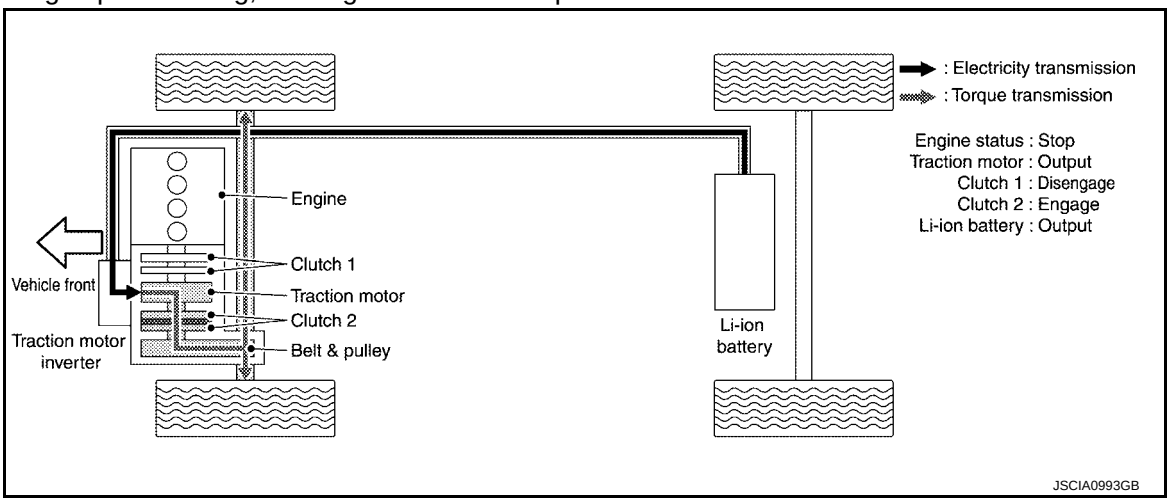


Low load driving at medium speed

- HPCM transmits the engine stop command signal to the ECM, stopping the engine and disengaging clutch 1. HPCM also transmits the drive command signal to the traction motor inverter to control the traction motor output and enables to drive on motor only.
- HPCM transmits the EV indicator lamp signal to the combination meter via CAN communication. When the combination meter receives the signal, it activates the EV indicator lamp.

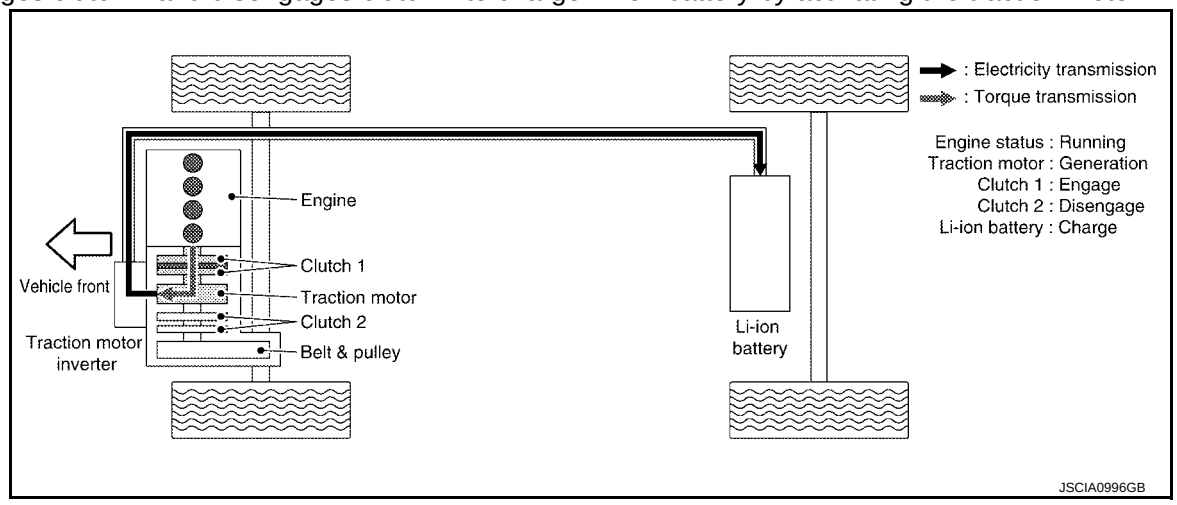
NOTE:

In low or high speed driving, the engine does not stop even with low load.



Vehicle Stopped

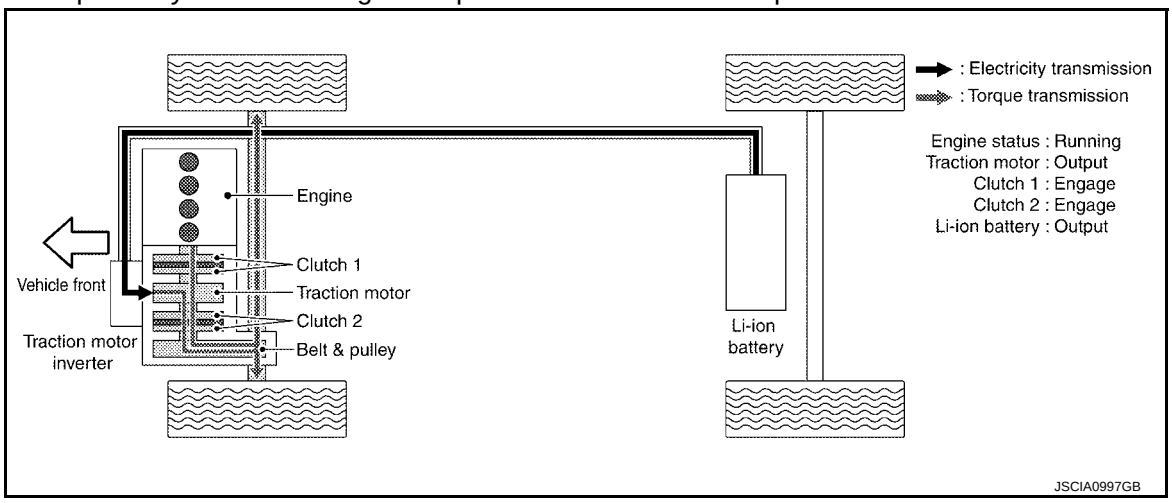
- When the Li-ion battery level is low, engine output is used to generate power from the traction motor and charge the Li-ion battery.
  NOTE:
  When the Li-ion battery level is sufficient, or due to other conditions, the engine may stop.
- When the select lever is in the P position the driver seatbelt is unbuckled, and the driver seat door is opened, the engine starts.
- HPCM receives the charging status of Li-ion battery detected by the Li-ion battery controller and controls the engine output by transmission of output torque signal to ECM when the amount of charge is low. HPCM engages clutch 1 and disengages clutch 2 to charge Li-ion battery by activating the traction motor.



Accelerating or Load is High

- When the accelerator pedal is fully depressed, the traction motor output torque assists the output torque from the engine.

- HPCM transmits the output torque signal to ECM for controlling engine output and transmits the drive command signal to traction motor inverter for controlling traction motor output. HPCM engages clutch 1 and clutch 2 respectively to transfer engine output and traction motor output to drive wheels.



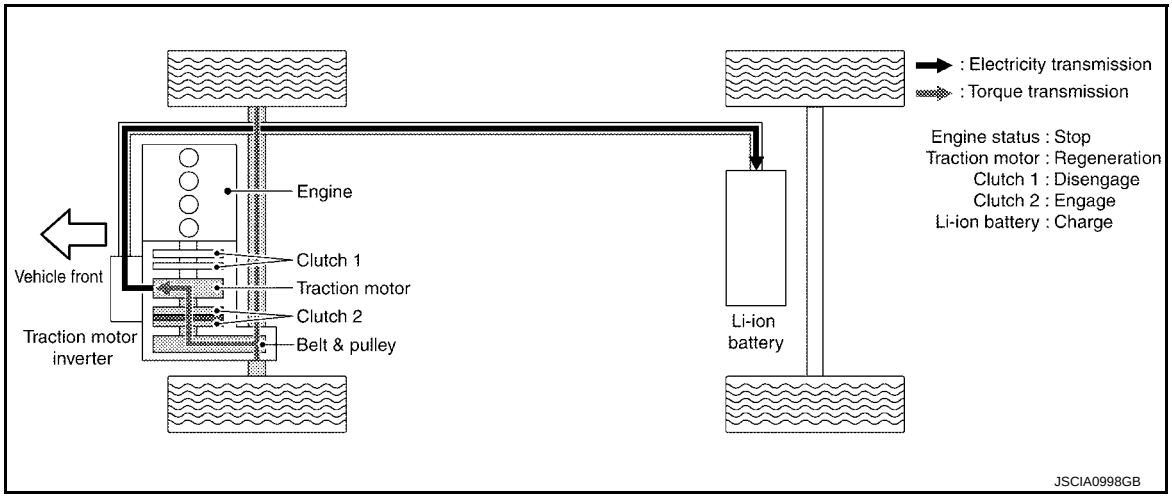
Deceleration Driving

When decelerating, regenerative braking uses the motive power of the drive wheels to generate power from the traction motor and charge the Li-ion battery.

NOTE:

The engine may not stop depending on conditions such as the engine is cooled or the remaining amount of Li-ion battery is low.

Cooperative control with the ABS actuator and electric unit (control unit) increases the amount of power generated by regenerative braking. Refer to HBC-32, "BRAKE SYSTEM COOPERATION CONTROL : System Description" for details.



Hybrid System Stop

HPCM detects the traction motor status (speed) via CAN communication from the traction motor inverter. When the ignition switch is turned OFF, then after the traction motor stops, the self shut off relay turns OFF and the hybrid system stops.

CONDITIONS FOR MOTOR DRIVING

When all of the conditions below are met, HPCM stops the engine and transitions to motor driving.

Item	Condition
Li-ion battery level	Approx. 50% or greater
Engine coolant temperature	50°C (122°F) or more
Vehicle speed	120 km/h (75 MPH) or less
Li-ion battery temperature	Not too high
Hybrid system	No malfunctions

Item	Condition
Air conditioner	ON[*1] or OFF
Selector lever position	Except manual mode[*2]
Hood	Close

*1: After driving 70 seconds at the speed of 40 km/h (25 MPH) or more while the ambient air temperature is between approximately 5°C (41°F) and 27°C (80°F).
*2: With manual mode models.

NOTE:
When the select lever is in the P position the driver seat belt is unbuckled, and the driver seat door is opened, the engine starts.

CLUTCH FUNCTION

Clutch 1 Function

- Clutch 1 is installed in the traction motor.
- Engage clutch 1 when starting the engine or transmitting engine output torque to transmission.
- During motor driving, the clutch is disengaged in order to reduce the load on the traction motor.

For the clutch structure and operation, refer to TM-46, "CLUTCH 1 CONTROL : System Description".

Clutch 2 Function

- Clutch 2 is installed between the traction motor and primary pulley.
- Engage clutch 2 when transmitting drive force to drive wheels.
- For starting from a stop, clutch 2 is allowed to slip, controlling the drive force that is transmitted to the drive wheels and providing smooth driving.

For the clutch structure and operation, refer to TM-46, "CLUTCH 2 CONTROL : System Description".

SYSTEM DISPLAY FUNCTION

HPCM controls the information display on the combination meter based on the signals from the sensors and control modules in order to inform the driver of the vehicle conditions.

Energy Monitor

- The operating status of each system can be checked by displaying the energy monitor on the navigation display and on the information display in the combination meter.
- HPCM transmits the status of each system to the NAVI control unit and combination meter via CAN communication. When the NAVI control unit and combination meter receive the signals, the energy monitor and fuel economy history are each displayed on the navigation display and information display.

Li-ion Battery State of Charge

- The level of the Li-ion battery can be checked by displaying the Li-ion battery state of charge on the information display in the combination meter.
- HPCM receives the Li-ion battery level from the Li-ion battery controller via CAN communication, and transmits the Li-ion battery state of charge signal to the combination meter via CAN communication. When the combination meter receives the signal, it displays the value indicated by the HPCM on the Li-ion battery state of charge.

Assist Charge Gauge

- The operating status of the traction motor inverter can be checked from the assist charge gauge located in the combination meter.
- HCPM transmits the assist charge signal to the combination meter via CAN communication. When the combination meter receives the signal, it activates the assist charge display and displays the traction motor status.

HYBRID CONTROL SYSTEM : Fail-safe

INFOID:0000000014736081

If a malfunction occurs in the hybrid system, HPCM performs fail-safe activation according to the detected malfunction, and activates the hybrid system warning lamp or 12-volt battery charge warning lamp.

DTC	Detection items	Hybrid system operation and vehicle behavior	
U0100 P0510 P314D P314E P314F P3151 P31A6	Engine	If engine fuel is cut off or ECM CAN communication are abnormal	The engine is stopped and the vehicle is driven by the traction motor alone.
		If ECM stopped control of the electric throttle control actuator	• The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.
		If ECM is limiting speed due to fuel cut-off	Engine stop control is prohibited and the vehicle is driven by the engine alone with a limit on the engine speed. For this reason, acceleration performance decreases.
		If ECM reduces the engine output	• HPCM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. • ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
P2857 P2859	Clutch 1	If there is a malfunction on the clutch 1 engaged side	Engine stop control is prohibited.
		If there is a malfunction on the clutch 1 disengaged side	The engine is stopped and the vehicle is driven by the traction motor alone.
U0110 P3176 P3177 P317A P317B P31A7	Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
		If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.
U0101 P0613 P3185 P3186 P31A8	Transmission	Transmission malfunction (If clutch 2 is unable to slip)	• The engine and traction motor are stopped after the vehicle is stopped. • The hybrid system can be activated, but the engine and traction motor are stopped when the selector lever is shifted to a drivable position.
		Primary speed sensor malfunction	The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed.
		Secondary speed sensor malfunction	
		Transmission range switch malfunction	
		If CAN communication with the TCM computing unit or TCM are abnormal	• The engine and traction motor are stopped. • Driving is not possible even when the accelerator pedal is depressed.
P3123 P3124 P3125 P3126 P3127 P3128	Electric water pump	Controlling the motor torque and drive with the engine power only, therefore the acceleration becomes slower, also the shift shock becomes more obvious.	

DTC	Detection items	Hybrid system operation and vehicle behavior	
U0111 P0A1F P317F P3181 P3182 P31A9	Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
		If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.
P0AA6 P3118 P3120	High-voltage system insulation resistance	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P0A95 P311D P311E	High-voltage power wiring	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0AA0 P0AA1 P0AA4	System main relay	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P0ADB P0ADC P0ADF P0AE0		• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0B37	Service plug	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A0A	Inter lock connector	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A08 P31EF P31F0 P31F1	DC/DC converter	Vehicle speed is limited according to the drop in 12V battery voltage. After vehicle speed gradually decreases and only creep drive force is output, drive force output stops.	
P0AE2 P0AE6 P0AE7	Pre-charge relay	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A1D	HPCM	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
U1000	CAN Communication	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P3157	Sensor power supply	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P1550 P1551 P1552 P1554	Battery current sensor	Variable voltage control is prohibited.	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	• Engine stop control is prohibited, and the drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.	
P310F	Engine start control	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P3117	Air conditioning system	A/C control is prohibited.	
P3135	Slight collision detection	High voltage power supply stop.	

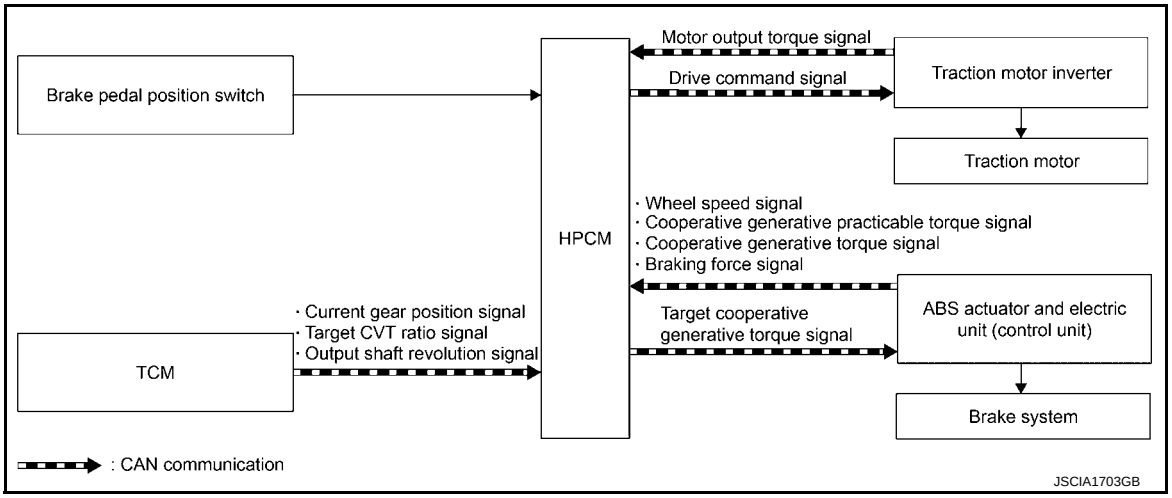
DTC	Detection items	Hybrid system operation and vehicle behavior
P3137 P3138	Car crash detection	• High voltage power supply stop. • Hybrid system start is prohibited.
P31BC	Chassis control module	The following functions are prohibited. • Active trace control • Active engine brake • Active ride control

BRAKE SYSTEM COOPERATION CONTROL

BRAKE SYSTEM COOPERATION CONTROL : System Description

INFOID:0000000014736082

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

With regenerative braking, the traction motor functions as an alternator during deceleration, and the deceleration energy that is transmitted from the vehicle wheels is converted to electrical energy and used to charge the Li-ion battery.

REGENERATIVE BRAKE CONTROL

If the brake pedal is depressed during driving, the ABS actuator and electric unit (control unit) transmits the braking force and cooperative regenerative practicable torque signal to HPCM via CAN communication. Based on these signals, HPCM calculates the regenerative braking torque, and transmits the drive command signal to the traction motor inverter. HPCM also transmits the actual regenerative braking value to the ABS actuator and electric unit (control unit) by CAN communication, allowing the ABS actuator and electric unit (control unit) to perform overall brake force control.

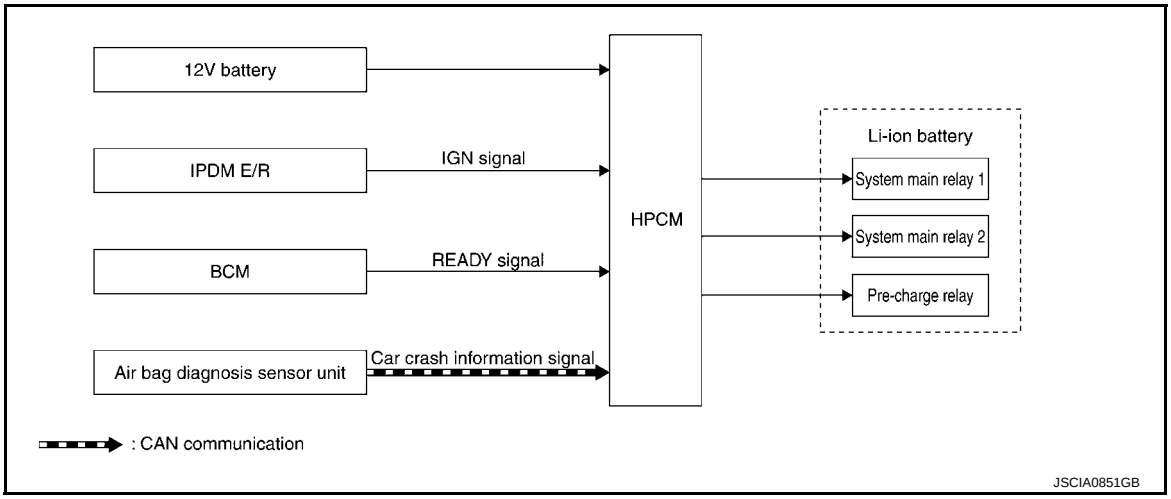
For cooperative regenerative brake function, refer to BRC-39, "COOPERATIVE REGENERATIVE BRAKE FUNCTION : System Description".

SYSTEM MAIN RELAY CONTROL

SYSTEM MAIN RELAY CONTROL : System Description

INFOID:0000000014736083

SYSTEM DIAGRAM



DESCRIPTION

HPCM controls ON/OFF of the system main relays (system main relay 1 and 2, and pre-charge relay) to connect and disconnect the hybrid system high-voltage circuit.

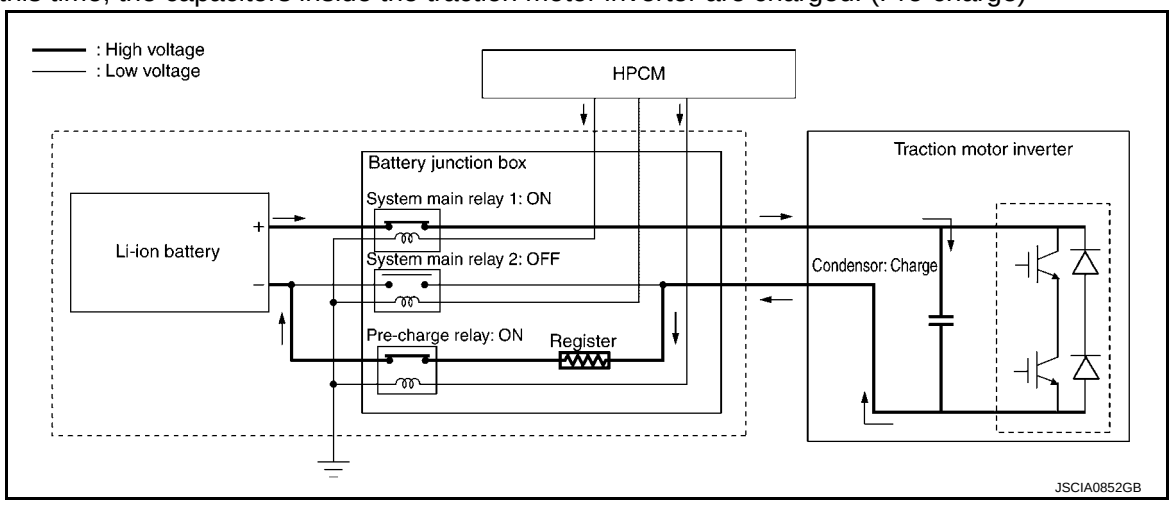
OPERATION DESCRIPTION

When High-voltage System is Connected

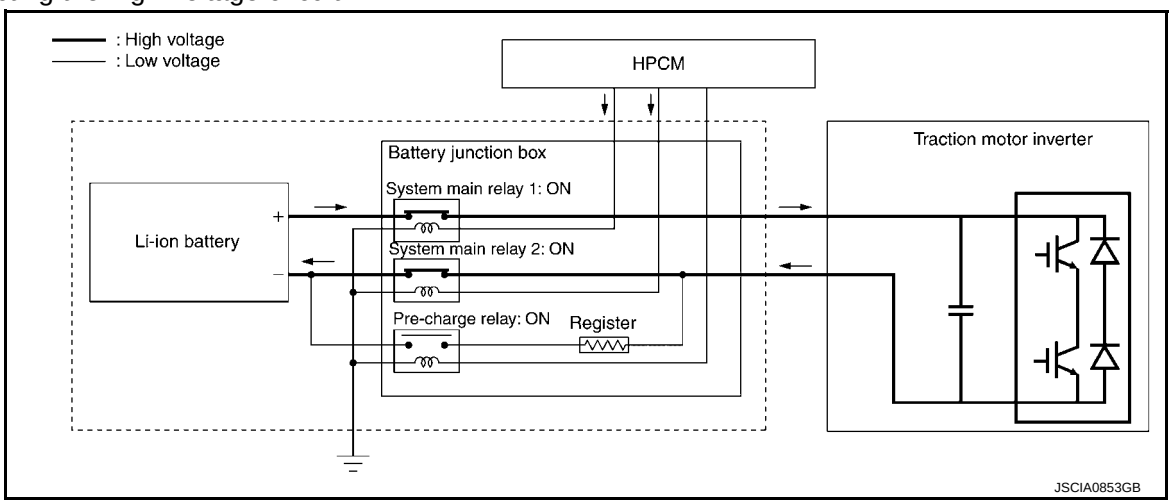
When vehicle is set to READY, HPCM controls the system main relays and first applies current via the resistor, protecting the circuit from high-voltage inrush current.

System main relay operation

1. HPCM turns ON the pre-charge relay and system main relay 1, and applies current to the circuit via the resistor.
   At this time, the capacitors inside the traction motor inverter are charged. (Pre-charge)



2. When the capacitors are charged, system main relay 2 turns ON and the pre-charge relay turns OFF, connecting the high-voltage circuit.



When High-voltage System is Disconnected

When high-voltage system is disconnected, HPCM turns OFF system main relay 2 and discharges the capacitors inside the traction motor inverter (discharge). When discharge is completed, system main relay 1 turns OFF, disconnecting the high-voltage circuit.

POWER DISCONNECT CONTROL AT TIME OF VEHICLE COLLISION

Because the hybrid system uses high-voltage power, when the car crash information signal is detected at the time of a vehicle collision, HPCM turns OFF the system main relays.

CONDITIONS FOR SYSTEM MAIN RELAY OFF

HPCM turns OFF the system main relays as per the following conditions.

- When the ignition switch is turned to OFF
- When the air bag activated
- When the interlock connector turned OFF
- When a malfunction is detected in the hybrid system (fail-safe)
- When the 12V battery voltage is low

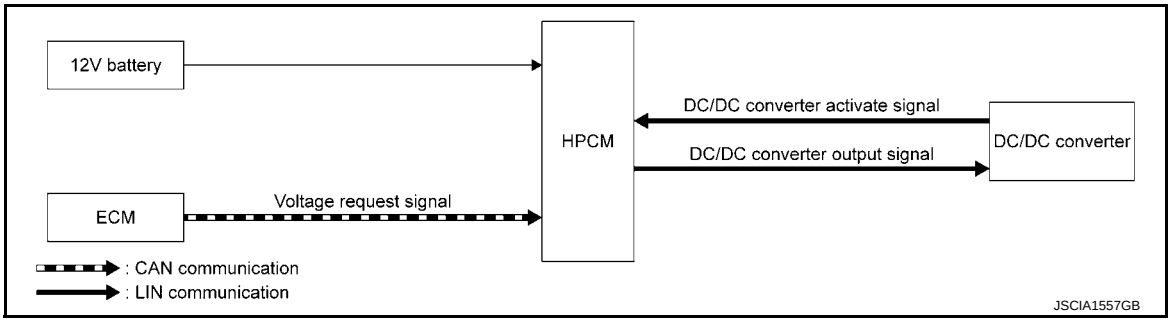
NOTE:

If the key switch is pushed quickly and continuously, the hybrid system may not be started.
In this case, wait at least 1 minute with the key switch OFF. To activate the hybrid system, push the key switch again.

POWER VOLTAGE VARIABLE CONTROL SYSTEM

POWER VOLTAGE VARIABLE CONTROL SYSTEM : System Description *INFOID:0000000014736084*

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

The power voltage variable control system reduces the electric power consumption from the Li-ion battery by varying the DC/DC converter output in a range from 13 V to 15 V according to the use status of electric equipment and the 12V battery status.

CAUTION:

When the 12V battery is deeply discharged and at similar times, the output voltage may be 13 V or less.

VARIABLE VOLTAGE CONTROL

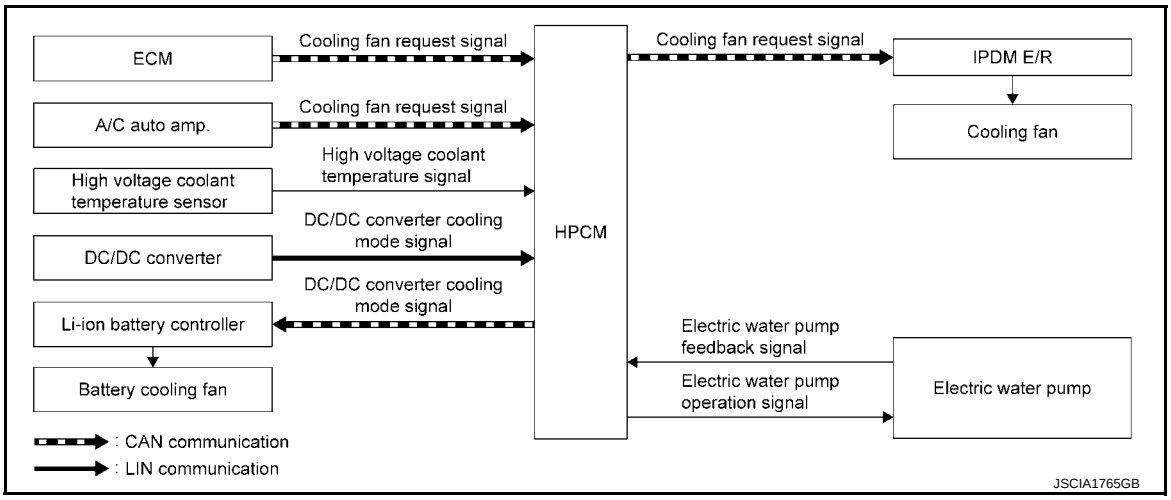
Based on the request signals from the ECM, HPCM determines the target power generation voltage value and transmits the power generation command signal to the DC/DC converter. The DC/DC converter adjusts the power generation voltage to the target power generation voltage based on the received power generation command signal.

COOLING SYSTEM CONTROL

COOLING SYSTEM CONTROL : System Description

INFOID:0000000014736085

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

Based on the request signals from the control modules, HPCM cools the engine, traction motor inverter (traction motor), and DC/DC converter.

COOLING FAN CONTROL

HPCM transmits a cooling fan speed request signal to IPDM E/R via CAN communication according to request signals from ECM, A/C auto amp. and a high voltage coolant temperature signal. Based on this signal, IPDM E/R transmits a signal to control the cooling fan motor.

Refer to EC-53, "COOLING FAN CONTROL : System Description".

DC/DC CONVERTER COOLING CONTROL

If deterioration of the DC/DC converter cooling performance causes the temperature to rise, the DC/DC converter transmits the DC/DC converter cooling mode signal to HPCM. When HPCM receives the signal, it transmits the DC/DC converter cooling mode signal to Li-ion battery controller via CAN communication. When receiving the signal, the Li-ion battery controller activates the battery cooling fan to lower the temperature of DC/DC converter.

NOTE:

To cool Li-ion battery, the Li-ion battery controller controls the drive voltage of battery cooling fan by duty control.

Refer to HBB-21, "Battery Cooling Control".

ELECTRIC WATER PUMP CONTROL

When vehicle is READY, HPCM transmits the activation signal to the electric water pump, activating the pump. It also performs duty control of the drive voltage according to the vehicle conditions, in order to control the operation of the electric water pump and reduce operating noise.

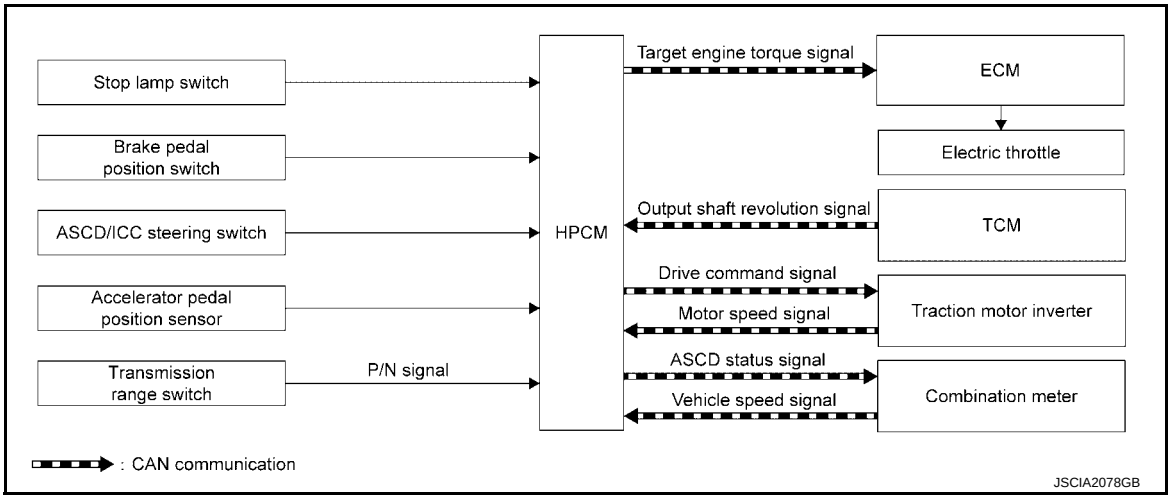
Refer to HCO-6, "High Voltage Cooling System".

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000014736086

SYSTEM DIAGRAM



ASCD BASIC SYSTEM

CAUTION:

If ASCD is used, driving safety should be given the highest priority in any event.

- ASCD (automatic speed control device) enables the driver to drive the vehicle at a constant speed with the acceleration pedal released once he a desired vehicle speed is set. *
  *: The driver can select a desired vehicle speed in a range from approximately 40 km/h (25 MPH) to 144 km/h (90 MPH).
- HPCM controls engine and traction motor output and adjusts vehicle speed to match the set speed. In addition, HPCM transmits an ASCD status signal to the combination meter and the information display displays the operation status. (Refer to HBC-38, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function".)
- If a non-standard condition is detected during ASCD control, the ASCD control is cancelled automatically.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- ASCD MAIN switch pressed (Set speed is cleared)
- More than 2 switches at ASCD/ICC steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Selector lever position is changed to N, P or R
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated
- Actual vehicle speed decreased to approximately 30km/h (18MPH) or less.

When the HPCM detects any of the following conditions, the HPCM will cancel the cruise operation and inform the driver by blinking indicator.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE indicator will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET indicator will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

SPORT MODE CONTROL

SPORT MODE CONTROL : System Description

INFOID:0000000014944422

- SPORT mode that keeps high engine revolution and provides direct feel and acceleration performance suitable for driving on winding road.
- HPCM receives an SPORT mode signal from TCM via CAN communication and improves drivability by controlling the throttle movement.

• HPCM transmits an SPORT mode indicator lamp signal to the combination meter via CAN communication.

NOTE:

For the details of the SPORT mode, refer to DMS-8, "SPORT MODE CONTROL : System Description".

ECO MODE SYSTEM

ECO MODE SYSTEM : System Description

INFOID:0000000014736087

When receiving an ECO mode signal from TCM via CAN communication, HPCM assists in fuel efficient driving by controlling the driving force of the engine and the motor less than normal force.

NOTE:

For the details of the ECO mode, refer to DMS-26, "ECO MODE CONTROL : System Description".

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000014736088

CAN (Controller Area Network) is a serial communication line for real time applications. It is an on-board multiplex communication line with high data communication speed and excellent error detection ability. A modern vehicle is equipped with many electric control units, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, 2 control units are connected with 2 communication lines (CAN H-line, CAN L-line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

This vehicle contains 2 types of CAN communication systems: CAN communications and HEV system CAN communications. HPCM includes a CAN gateway function which transmits signals between CAN communications and HEV system CAN communications.

For details about CAN communications, refer to LAN-17, "System Description".

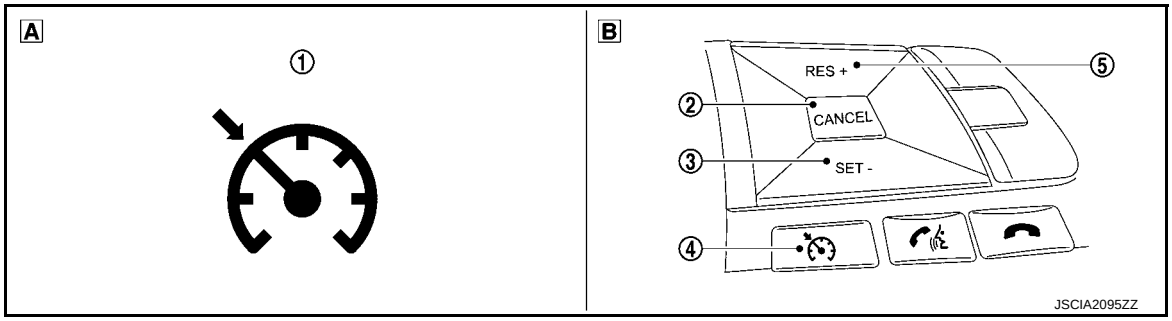
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:0000000014736096

SWITCHES AND INDICATORS



- A On the combination meter
- B On the steering wheel
- ① ASCD indicator
- ② CANCEL switch
- ③ COAST/SET switch
- ④ MAIN switch
- ⑤ ACCEL/RES switch

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
40 km/h (25 MPH)	144 km/h (90 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
ACCEL/RES switch	• Resumes the set speed. • Increases speed incrementally during cruise control driving.
COAST/SET switch	• Sets desired cruise speed. • Decreases speed incrementally during cruise control driving.
ON/OFF (MAIN) switch	Master switch to activate the ASCD system.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000014736097

This system is an on board diagnostic system that records hybrid system diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the hybrid system warning lamp, 12-volt battery charge warning lamp, and malfunction indicator lamp (MIL) and stored in control module memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

GST (Generic Scan Tool)

INFOID:0000000014736098

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control module equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to GI-62, "Description".

NOTE:
Service $0A is not applied for regions where it is not mandated.

DIAGNOSIS SYSTEM (HPCM)

DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION : 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:0000000014736099

When a malfunction is detected for the first time in two trip detection logic, 1st trip DTC and 1st trip freeze frame data are stored in the HPCM memory. The MIL does not illuminate at this stage. There are diagnoses that illuminate the hybrid system warning lamp and/or the 12-volt battery charge warning lamp, and others that do not illuminate them. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and freeze frame data are stored in the HPCM memory, and the MIL, hybrid system warning lamp and/or the 12V battery charge indicator lamp illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip>
The “trip” in the “two trip detection logic” means a driving mode in which self-diagnosis is performed during vehicle operation.
Some diagnoses of the two trip detection logic may illuminate the MIL, the hybrid system warning lamp and/or 12-volt battery charge warning lamp and others may not.
When a malfunction is detected for the first time in one trip detection logic, the DTC and Freeze Frame data are stored in the HPCM memory. There are diagnoses that illuminate the MIL, the hybrid system warning lamp and/or the 12-volt battery charge warning lamp, and others that do not illuminate them.

×: Applicable —: Not applicable

Item	1st trip DTC		DTC		MIL	
	1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying	1st trip Illuminate	2nd trip Illuminate
One trip detection diagnosis (Refer to HBC-71, "DTC Index".)	—	—	×	—	×	—
Two trip detection diagnosis (Refer to HBC-71, "DTC Index".)	×	—	—	×	—	×

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000014736100

DTC AND 1ST TRIP DTC

The following shows 2nd trip detection diagnosis that illuminates the MIL.
The 1st trip DTC number is the same as the DTC number.
If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the HPCM memory. At this time, the MIL does not illuminate. Some of the diagnoses illuminate the hybrid system warning lamp and/or the 12-volt battery charge warning lamp, and other diagnoses do not illuminate them.
If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the HPCM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the HPCM memory and the MIL, the hybrid system warning lamp, and/or the 12-volt battery charge warning lamp illuminate.
The procedure for erasing the DTC and the 1st trip DTC from HPCM memory is described in “How to Erase DTC and 1st Trip DTC” in HBC-43, "CONSULT Function".
Refer to HBC-71, "DTC Index" for the malfunctions for which the 1st trip DTC is displayed.
1st trip DTC is specified in Service $07 of SAE J1979/ISO 15031-5.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to HBC-101, "Flowchart of Trouble Diagnosis".
Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The HPCM records the driving conditions such as hybrid system condition when a malfunction is detected.
Data which are stored in the HPCM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.
HPCM can store three sets of freeze frame data (one set for MIL-illuminating DTC and two sets for non-MIL-illuminating DTC). 1st trip freeze frame data is stored in the HPCM memory along with the 1st trip DTC.
For MIL-illuminating DTC, there is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the

HPCM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the HPCM.
For non-MIL-illuminating DTC, the freeze frame data of the 1st trip DTC has no priority. Every time another 1st trip DTC is detected after two freeze frame data of the 1st trip DTC are stored, the older freeze frame data is updated. However, once freeze frame data (2nd trip detection/MIL on) is stored in the HPCM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the HPCM.
The HPCM has the following priorities to update the data.

Priority	Item
1	Freeze frame data
2	1st trip DTC freeze frame data

Both 1st trip freeze frame data and freeze frame data (along with the DTC) are cleared when the HPCM memory is erased. For the procedure for erasing the HPCM memory, refer to “How to Erase DTC and 1st Trip DTC” of HBC-43, "CONSULT Function".

DIAGNOSIS DESCRIPTION : Counter System

INFOID:0000000014736101

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the HPCM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the HPCM memory, and the MIL will come on.
- The MIL will turn OFF after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the HPCM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A). The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT will count the number of times the vehicle is driven without the malfunction of the DTC.
- The 1st trip DTC is not displayed when the self-diagnosis results is OK for the 2nd trip.

COUNTER SYSTEM CHART

Items	Driving pattern	Trip
MIL (turns OFF)	B	3
DTC, freeze frame data (no display)	A	40
1st trip DTC (clear)	B	1
1st trip freeze frame data (clear)	B	1

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000014736102

CAUTION:
Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (68°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern A.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A.

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.

- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 – 120 km/h (44 – 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 – 60 km/h (19 – 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- After experiencing the closed loop control with the hybrid system started (READY or engine started), vehicle speed of 4 km/h (2 MPH) or less and the status without stepping on the accelerator pedal are maintained for 12 seconds or more.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- The status with the hybrid system started (READY or engine started) is maintained for 22 minutes or more.

NOTE:
- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern B.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature condition:
- When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE:
- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.
- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

INFOID:0000000014944564

Permanent DTC is defined in SAE J1979/ISO 15031-5 Service $0A.
Control module stores a DTC issuing a command of turning on MIL as a permanent DTC and keeps storing the DTC as a permanent DTC until control module judges that there is no presence of malfunction.
Permanent DTCs cannot be erased by using the erase function of CONSULT or Generic Scan Tool (GST) and by disconnecting the 12V battery to shut off power to control module. This prevents a vehicle from passing the use inspection without repairing a malfunctioning part.
When not passing the use inspection due to more than one permanent DTC, permanent DTCs should be erased, referring to this manual.

NOTE:
- The important items in state emission inspection are that MIL is not ON, SRT test items are set, and permanent DTCs are not included.
- Permanent DTCs do not apply for regions that permanent DTCs are not regulated by law.

PERMANENT DTC SET TIMING

The setting timing of permanent DTC is stored in control module with the lighting of MIL when a DTC is confirmed.

On Board Function

INFOID:0000000014736103

INSPECTION MODE

Description

- When the engine is warm and the Li-ion battery is sufficiently charged, the engine automatically stops when the vehicle is stopped. For this reason, when continuous engine operation is required, it is necessary to use inspection mode.
- When turning the vehicle wheels on a chassis dynamometer or similar equipment, it is necessary to use inspection mode to change the vehicle to suitable conditions.

Inspection mode*1	Primary purpose	Control	Combination meter	
			Hybrid system warning lamp	12-volt battery charge warning lamp
Inspection mode 1*2, *3	Example: inspections that are performed with no load on the engine	• Disengage clutch 1 to eliminate any load on the engine. (P position only) • Operate the engine continuously.	Blink	—
Inspection mode 2	Example: driving on a 2-wheel chassis dynamometer	Change the balance of the regenerative brake at the front and rear wheels.	—	Blink
Inspection mode 3	Example: driving on a 4-wheel chassis dynamometer	Prohibit slope estimation.	Blink	Blink
Inspection mode 5*3	Example: driving using the engine and traction motor	Operate the engine continuously.	Blink	—
Inspection mode 7	Example: measurement of engine compression pressure or scavenging combustion chamber when eliminating moisture from fuel on the spark plugs	Run the engine with cutoff of fuel.	—	—

CAUTION:

- ***1: Inspection mode is canceled when the ignition switch is turned OFF. It is not canceled when the mode changed from CONSULT "EV/HEV", "ACTIVE TEST" mode to another mode. However inspection mode 1 is canceled if the select lever is shifted from P position to D position.**
- ***2: Check the conditions listed below before using inspection mode 1.**
- **If inspection mode 1 is engaged when the Li-ion battery level is low, then in order to engage clutch 1 and charge the battery from the engine, use CONSULT "EV/HEV" "DATA MONITOR" mode and check that the "HV BATTERY LEVEL" reading is 50% or more, or else use the "Li-ion battery state of charge" in the information display on the combination meter and check that the battery level is 50% or more.**
- **Check that the engine coolant temperature is 80 °C (176 °F) or more.**
- ***3: When the select lever is in the P or N position, adjustments to the throttle position prevent the engine speed from exceeding 3,000 rpm.**

Operation Procedure

- Inspection mode 1: Refer to HBC-113, "Work Procedure (Inspection Mode 1)".
- Inspection mode 2: Refer to HBC-114, "Work Procedure (Inspection Mode 2)".
- Inspection mode 3: Refer to HBC-114, "Work Procedure (Inspection Mode 3)".
- Inspection mode 5: Refer to HBC-115, "Work Procedure (Inspection Mode 5)".
- Inspection mode 7: Refer to HBC-115, "Work Procedure (Inspection Mode 7)".

CONSULT Function

INFOID:0000000014736104

FUNCTION

Diagnosis test mode	Function
Self-diagnosis results	Can quickly read and erase the 1st trip DTC, DTC, 1st trip DTC freeze frame data, or freeze frame data or other self diagnosis results.*
Data monitor	HPCM input or output data can be read.
Work support	Quick and precise adjustment for components and systems can be performed according to CONSULT display.
Active test	CONSULT activates actuator via HPCM, or can perform operation within the specified area that is indicated by partial command value.
ECU identification information	HPCM part number can be read.

*: When HPCM memory is erased, the following diagnosis information is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip DTC freeze frame data
- Restart-prohibit fail-safe mode

CAUTION:

If restart-prohibit fail-safe mode is repeatedly canceled by CONSULT “ERASE DTC” and then restarted, the Li-ion battery level declines to zero and start becomes impossible. If the Li-ion battery level declines to zero, it is necessary to charge or replace all of the Li-ion batteries.

SELF-DIAGNOSTIC RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to HBC-71, "DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in “Self-diag results”.

- When HPCM detects a 1st trip DTC, “1t” is displayed for “TIME”.
- When HPCM has detected a current DTC, “0” is displayed for “TIME”.
- If “TIME” is neither “0” nor “1t”, the DTC occurred in the past and HPCM shows the number of times the vehicle has been driven since the last detection of the DTC.

How to Erase DTC and 1st Trip DTC

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

Freeze Frame Data and 1st Trip DTC Freeze Frame Data

Freeze frame Data item*1	Unit	Description
DIAG TROUBLE CODE	—	When there is a malfunction in the hybrid system, the malfunction code is displayed. (Refer to HBC-71, "DTC Index".)
ENG CAL/LD VALUE	%	Indicates the calculated engine load value.
COOLANT TEMP	°C	Indicates the engine coolant temperature.
ENGINE SPEED	rpm	Indicates the engine speed.
VEHICLE SPEED	km/h	Indicates the vehicle speed.
INTAKE AIR TEMP	°C	Indicates the intake air temperature.
THRTL OPEN ANGLE	%	Indicates the throttle position.
ENGINE RUN TIME	sec	Indicates the engine running time.
12V BATTERY VOLTAGE	V	Indicates the HPCM power voltage.
THRTL OPEN ANGLE 2	%	Indicates the throttle position.
ACCEL SENSOR 1	deg	Indicates the accelerator pedal position sensor 1 position.

Freeze frame Data item*1	Unit	Description
ACCEL SENSOR 2	deg	Indicates the accelerator pedal position sensor 2 position.
HV BATT LEVEL	—	Indicates the high-voltage battery level.
FUEL TYPE	—	Indicates the fuel type.
ACCEL OPEN ANGLE	—	Indicates the accelerator position.
VEHICLE SPEED	km/h	Indicates the vehicle speed.
TARGET ENGINE TORQUE	Nm	Indicates the target engine torque.
ENGINE SPEED	rpm	Indicates the engine speed.
ENGINE TORQUE	Nm	Indicates the engine torque.
MOTOR TORQUE	Nm	Indicates the motor torque.
MOTOR SPEED	rpm	Indicates the motor speed.
CMD MOTOR TORQ	Nm	Indicates the motor torque command value.
TRG MOTOR SPEED	rpm	Indicates the target motor speed.
GEAR POSITION	—	Indicates the actual gear position.
NEXT GEAR	—	Indicates the next gear.
TM OUTPUT REV	rpm	Indicates the output shaft speed.
CLUTCH 2 CONNECTION STATUS	Nm	Indicates the clutch 2 connection status.
BRAKING FORCE	N	Indicates the brake braking force.
ENG TRQ LIMIT MAX	Nm	Indicates the engine torque upper-limit value.
ENG TRQ LIMIT MIN	Nm	Indicates the engine torque lower-limit value.
HV DISCHARGE POWER	kW	Indicates the high-voltage discharge power.
HV CHARGE POWER	kW	Indicates the high-voltage charge power.
MOTOR TORQ LIMIT (OUT)	Nm	Indicates the motor output torque limit value.
MOTOR TORQ LIMIT (REGE)	Nm	Indicates the motor regeneration torque limit value.
HPCM ACTIVATION	—	Indicates the HPCM activation status.
HYBRID SYSTEM CONTROL STATUS	—	Indicates the hybrid system control status.
DIAGNOSTIC TROUBLE CODE	—	When there is a malfunction in the hybrid system, the malfunction code is displayed. (Refer to HBC-71, "DTC Index".)
ENGINE COOLANT TEMP	°C	Indicates the engine coolant temperature.
ATF TEMP	°C	Indicates the ATF temperature.
CLUTCH 2 TEMP	°C	Indicates the clutch 2 temperature.
HV BATTERY TEMP	°C	Indicates the Li-ion battery temperature.
HV BATTERY VOLT	V	Indicates the Li-ion battery voltage.
HV BATTERY CURRENT	A	Indicates the Li-ion battery current.
INVERTER VOLTAGE	V	Indicates the traction motor inverter voltage.
BRAKE BOOSTER PRES SEN	kPa	Indicates the brake booster pressure.
TM INPUT REV	rpm	Indicates the input shaft speed.
ENGINE TORQUE LIMIT (TRANSMISSION)	—	Indicates the engine torque limit value.

Freeze frame Data item*1	Unit	Description
CLUTCH 1 TRG OIL PRESS	kPa	Indicates the clutch 1 target oil pressure.
ISOLAT SENS WAVE AMP	V	Indicates the insulation detection voltage width.
GRADIENT RATIO	%	Indicates the slope ratio.
G SENSOR	G	Indicates the gradient status.
FUEL LEVEL SENSOR	—	Indicates the fuel level sensor signal voltage.
HI VOLTAGE COOLANT TEMP	°C	Indicates the high voltage coolant temperature.
BATTERY JUNCTION BOX STATUS	—	Indicates the system main relays activation request status.
CLUTCH 1 TEMPERATURE	°C	Indicates the clutch 1 temperature.
CLUTCH 1 LEARNING (CURRENT)	kPa	Indicates the clutch 1 learning value.
CLUTCH 1 LEARNING VALUE (INITIAL)	kPa	Indicates the clutch 1 initial learning value.
NEXT GEAR RATIO	—	Indicates the next gear ratio.
CURRENT GEAR RATIO	—	Indicates the current gear ratio.
INVERTER W/P MONITOR	%	Indicates the electric water pump control status.
INVERTER W/P DUTY	%	Indicates the electric water pump operating status.
SHIFT POSITION (METER)	—	Indicates the shift position displayed on the combination meter.
G SENSOR LEANING VALUE	G	Indicates the G sensor leaning value.
PRE-CHARGE RESISTOR OVERHEAT JUDGMENT	—	Indicates the pre-charge resistor overheat judgment.
READY ACTIVATION MODE	—	Indicates the ready activation mode.
ASCD CONTROL 1	—	Indicates the ASCD control information.
ASCD CONTROL 2	—	Indicates the ASCD control information.
TARGET TORQUE DIFFERENCE MONITOR	Nm	Indicates the difference between the target output torque requested by the driver and the actual output torque which is sum of torque value from the engine and the traction motor.
OUTPUT TORQUE LIMIT (HYBRID)	Nm	Indicates the total output torque limit value.
OUTPUT TORQUE LIMIT (MOTOR)	Nm	Indicates the total output torque limit value.
TRACTION MOTOR TORQUE SUBTRACTION	Nm	Indicates subtracted torque value of the traction motor.
ENGINE TORQUE SUBTRACTION	Nm	Indicates subtracted torque value of the engine.
OUTPUT TORQUE LIMIT TIME (HYBRID)	sec	Indicates the total output torque limit time.
OUTPUT TORQUE LIMIT TIME (MOTOR)	sec	Indicates the total output torque limit time.
TRANSMISSION TORQUE LIMIT	Nm	Indicates limited torque value input to the transmission.

Freeze frame Data item*1	Unit	Description
TRACTION MOTOR INVERTER TEMPERATURE	°C	Indicates the traction motor Inverter temperature.
ENGINE STOP REQUEST	On/Off	Indicates the engine stop request status.
P/N POS SIGNAL	On/Off	Indicates the park/neutral position.
ENGINE START REQ	On/Off	Indicates the engine start request status.
IDLE REQUEST	On/Off	Indicates the idle request status.
EV INDICATOR LAMP SIGNAL	On/Off	Indicates the idle stop inhibit status.
FUEL CUT INHIBIT	On/Off	Indicates the fuel cut inhibit status.
ENGINE POWER LOW	On/Off	Indicates the engine output drop.
ENGINE START SIGNAL	On/Off	Indicates the engine start request status.
CLUTCH 1 LOCK-UP STATUS	On/Off	Indicates the clutch 1 lock-up status.
HYBRID SYSTEM TORQUE LIMIT MODE	On/Off	Indicates the hybrid system torque limit mode status.
TRACTION MOTOR TORQUE LIMIT	On/Off	Indicates the traction motor torque limit status.
TRANSMISSION INPUT TORQUE LIMIT MODE	On/Off	Indicates the status of that the input torque value to the transmission is limited.

*1: Item is the same as the 1st trip DTC freeze frame data item.

DATA MONITOR MODE

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

For reference values of the following items, refer to HBC-58, "Reference Value".

Monitored Items

MONITOR ITEM SELECTION PATTERN

- Pattern A: MAIN SIGNALS
- Pattern B: EV/HEV
- Pattern C: ENGINE
- Pattern D: TRANSMISSION
- Pattern E: HV BATTERY
- Pattern F: MOTOR CONTROL
- Pattern G: DC/DC
- Pattern H: OTHER

×: Applicable

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
ESTIMAT VEHICLE SPEED	km/h	×	×	×	×	×	×	×	×	Indicates the estimated vehicle speed that is calculated by HPCM.	
ACCEL OPEN ANGLE	—	×	×	×	×	×	×	×	×	Indicates the accelerator pedal position that is calculated by HPCM.	

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
SHIFT POSITION (METER)	OFF/P/R/N/D/M1/M2/M3/M4/M5/M6/M7	×	×	×	×	×	×	×	×	Displays the selector lever position received from TCM via CAN communication. • OFF: — • P: Selector lever P position • R: Selector lever R position • N: Selector lever N position • D: Selector lever D position • M1 - M7: Selector lever position manual mode	
TARGET ENGINE TORQUE	Nm	×	×	×	×	×	×	×	×	Indicates the engine torque command value that is transmitted by HPCM to ECM via CAN communication.	
ENGINE SPEED	rpm	×	×	×	×	×	×	×	×	Displays the engine speed received from ECM via CAN communication.	
ENGINE TORQUE	Nm	×	×	×	×	×	×	×	×	Displays the engine speed torque from ECM via CAN communication.	
COMMAND MOTOR TORQUE	Nm	×	×	×	×	×	×	×	×	Indicates the motor torque command value that is transmitted from HPCM to the traction motor inverter via CAN communication.	
MOTOR TORQUE	Nm	×	×	×	×	×	×	×	×	Indicates the traction motor torque value that is received from the traction motor inverter via CAN communication.	
MOTOR SPEED	rpm	×	×	×	×	×	×	×	×	Indicates the traction motor speed that is received from the traction motor inverter via CAN communication.	
COMMAND MOTOR SPEED	rpm	×	×	×	×	×	×	×	×	Indicates the traction motor speed command value that is transmitted from HPCM to the traction motor inverter via CAN communication.	
GEAR POSITION	—	×	×	×	×	×	×	×	×	Indicates the gear position received from TCM via CAN communication.	
NEXT GEAR POSITION	—	×	×	×	×	×	×	×	×	Indicates the gear to shift to next that is received from TCM via CAN communication.	
TM OUTPUT REV	rpm	×	×	×	×	×	×	×	×		
REGENERATION TORQUE	Nm	×	×	×	×	×	×	×	×		
CMD REGENERATION TORQ	Nm	×	×	×	×	×	×	×	×		
BRAKING FORCE	Nm	×	×	×	×	×	×	×	×		
SUB OIL PUMP ACTIV TORQ	Nm		×		×					Indicates the load torque value of the mechanical oil pump equipped with CVT via TCM.	
ELECT CMP ACTIV TORQ	Nm		×	×					×	Indicates the load torque value of the A/C compression calculated by HPCM.	
12V BATTERY TEMP	°C		×						×	The 12V battery temperature (determined by the signal voltage of the battery temperature sensor) is displayed.	
12V BATTERY CURRENT SEN	A		×					×	×	The signal voltage of 12V battery current sensor is displayed.	

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
ASCD VEHICLE SPEED	km/h								×	Indicates the set vehicle speed.	
ASCD CMD VEHICLE SPEED	km/h								×	Indicates the vehicle speed command value.	
SL TARGET VEHICLE SPEED	km/h								×	Indicates the preset vehicle speed of speed limiter.	
TARGET IDLE SPEED MAX	rpm			×						Indicates the upper-limit value of the target idle speed that is transmitted from HPCM to ECM via CAN communication.	
TARGET IDLE SPEED MIN	rpm			×						Indicates the lower-limit value of the target idle speed that is transmitted from HPCM to ECM via CAN communication.	
HV DISCHARGE POWER	kW	×	×	×	×	×	×	×	×	Indicates the discharge control power received from the Li-ion battery controller via CAN communication.	
HV CHARGE POWER	kW	×	×	×	×	×	×	×	×	Indicates the charge control power received from the Li-ion battery controller via CAN communication.	
MOTOR TORQ LIMIT (OUT)	Nm	×	×	×	×	×	×	×	×	Indicates the traction motor output limit value that HPCM transmitted to the traction motor inverter via CAN communication.	
MOTOR TORQ LIMIT (REGE)	Nm	×	×	×	×	×	×	×	×	Indicates the traction motor regenerative limit value that HPCM transmitted to the traction motor inverter via CAN communication.	
MOT TORQUE LIMIT (INV)	%	×	×	×	×	×	×	×	×	Indicates the traction motor output limit value that is received from the traction motor inverter via CAN communication.	
HV BATTERY LEVEL	%	×	×	×	×	×	×	×	×	Indicates the Li-ion battery level received from the Li-ion battery controller via CAN communication.	
HV BATTERY VOLTAGE	V	×	×	×	×	×	×	×	×	Indicates the Li-ion battery voltage value received from the Li-ion battery controller via CAN communication.	
HV BATTERY CURRENT	A	×	×	×	×	×	×	×	×	Indicates the Li-ion battery current value received from the Li-ion battery controller via CAN communication.	
HV BATTERY TEMP	°C	×	×	×	×	×	×	×	×	Indicates the Li-ion battery temperature received from the Li-ion battery controller via CAN communication.	
BATT FAN ACTIV REQ (LBC)	—					×				Indicates the Li-ion battery cooling mode signal status received from Li-ion battery via CAN communication.	
BATT FAN ACTIV REQ (HPCM)	—					×		×		Indicates the cooling mode signal status that is confirmed by HPCM.	
READY SHUT DOWN COUNT	count		×			×				Indicates the number of shutting down after READY status by decrease in the remaining Li-ion battery level.	
R/OFF COUNT (PWR LMT)	—		×			×				Indicates READY OFF count by engine start limit from HPCM.	

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
12V BATTERY VOLTAGE	V	×	×	×	×	×	×	×	×	Indicates the power voltage input into HPCM.	
APP SENSOR 1	%		×							Indicates the value calculated from the accelerator pedal position sensor 1 signal voltage.	
APP SENSOR 2	%		×							Indicates the value calculated from the accelerator pedal position sensor 2 signal voltage.	
ENGINE COOLANT TEMP	°C	×	×	×	×	×	×	×	×	Displays the engine coolant temperature received from ECM via CAN communication.	
INTAKE AIR TEMP SEN	°C			×						Receives the intake temperature received from ECM via CAN communication.	
INVERTER VOLTAGE	V	×	×	×	×	×	×	×	×	Indicates the traction motor inverter voltage value that is received from the traction motor inverter via CAN communication.	
TRACTION MOT INV TEMP	°C		×							Displays the traction motor inverter temperature received from traction motor inverter via CAN communication.	
TM INPUT REV	rpm	×	×	×	×	×	×	×	×	Indicates the input shaft speed received from TCM via CAN communication.	
TRANSMISSION FLUID TEMP	°C	×	×	×	×	×	×	×	×	Indicates the CVT fluid temperature received from TCM via CAN communication.	
CLUTCH 2 TEMPERATURE	°C	×	×	×	×	×	×	×	×	Indicates the clutch 2 temperature received from TCM via CAN communication.	
TM INPUT TORQUE	Nm		×							Indicates input traction motor torque value of the transmission input shaft.	
GRADIENT RATIO	%	×	×	×	×	×	×	×	×	Displays the inclination angle calculated from the G sensor signal.	
G SENSOR	G	×	×	×	×	×	×	×	×	Indicates the G sensor signal value received from ABS actuator and electric unit (control unit) via CAN communication.	
ISOLAT SENS WAVE AMP	mV					×	×	×		Indicates the insulation detection voltage width received from the Li-ion battery controller via CAN communication.	
CLUTCH 1 TEMPERATURE 1	°C				×					Displays clutch 1 temperature estimated with HPCM.	To judge protection control condition of clutch 1.
CLUTCH 1 TEMPERATURE 2	°C		×		×					Displays clutch 1 temperature estimated with HPCM.	To judge authorization condition of engine stop control.
STARTER RELAY STATUS	—		×							Indicates the starter relay status received from IPDM E/R via CAN communication.	
INVERTER W/P MONITOR	%		×							Indicates the electric water pump control status.	

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
INVERTER W/P DUTY	%		×							Indicates the electric water pump operating status.	
COOL FAN ACT REQ (MOTOR)	—		×				×			Indicates the status of the cooling fan activation request signal that is received from the traction motor inverter via CAN communication.	
RAD FAN DUTY	%		×	×						Indicates the cooling fan control status that is confirmed by HPCM.	
RAD FAN ACTIV REQ (ECM)	%		×	×			×		×	Indicates the status of the cooling fan activation request signal that is received from the ECM via CAN communication.	
RAD FAN ACTIV REQ (A/C)	%		×	×			×		×	Indicates the status of the cooling fan activation request signal that is received from the A/C auto amp. via CAN communication.	
RAD FAN ACTIV REQ (HPCM)	%		×	×			×		×	Displays the cooling fan activation request transmitted IPDM E/R via CAN communication.	
DOOR SW-DR	—		×							Indicates the door switch status received from BCM via CAN communication.	
ACCEL SENSOR 1 VOLTAGE	mV		×							Indicates the signal voltage that is input from accelerator pedal position sensor 1.	
ACCEL SENSOR 2 VOLTAGE	mV		×							Indicates the signal voltage that is input from accelerator pedal position sensor 2.	
VACUUM SENSOR	kPa		×						×	Indicates the brake booster pressure.	
HI VOLTAGE COOLANT TEMP	°C		×							The high voltage coolant temperature (determined by the signal voltage of the high voltage coolant temperature sensor) is displayed.	
SENSOR POWER SUPPLY 1	mV		×							Indicates the sensor power 1 voltage.	
SENSOR POWER SUPPLY 2	mV		×							Indicates the sensor power 2 voltage.	
FUEL LEVEL SENSOR	—		×							Indicates the fuel level sensor voltage.	
WHEEL SENSOR (FR-RH)	rpm		×							Indicates the front right wheel speed received from ABS actuator and electric unit (control unit) via CAN communication.	
WHEEL SENSOR (FR-LH)	rpm		×							Indicates the front left wheel speed received from ABS actuator and electric unit (control unit) via CAN communication.	
TARGET IDLE SPEED	rpm		×							Indicates the target idle speed that is transmitted from HPCM to ECM via CAN communication.	
BCM STATUS	—		×							Indicates the ignition switch position received from BCM via CAN communication.	

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
BAROMETRIC PRESS SEN	kPa		×	×						Indicates the barometric pressure received from the ECM via CAN communication.	
READY LAMP SIGNAL	Off/ BLINK/ On		×						×	Indicates the READY to drive indicator lamp status [Off/BLINK/On].	
HYBRID SYSTEM W/L SIGNAL	Off/ BLINK/ On		×						×	Indicates the hybrid system warning lamp status [Off/BLINK/On].	
CHARGE LAMP SIGNAL	Off/ BLINK/ On		×						×	Indicates the 12-volt battery charge warning lamp status [Off/BLINK/On].	
A/F CORRECTN (BARO PRES)	—		×	×						Indicates the value of reduced engine torque received from ECM via CAN communication.	The engine torque reduces as the altitude increases.
ENGINE STOP REQUEST	On/Off	×	×	×	×	×	×	×	×	Displays the engine stop request transmitted ECM via CAN communication.	
F/C CYLINDER QUANTITY	—		×	×						Indicates the fuel cut-off status received from ECM via CAN communication.	
ENGINE START REQUEST	On/Off	×	×	×	×	×	×	×	×	Indicates the engine start request transmitted to ECM via CAN communication.	
IDLE REQUEST	On/Off	×	×	×	×	×	×	×	×	Displays the idle request (engine independence request) transmitted ECM via CAN communication.	
ENGINE STOP PERMIT	On/Off			×						Indicates the HPCM engine forced stop permit.	
ENGINE START REQ (A/C)	On/Off			×						Displays the engine start request received from the A/C auto amp. via CAN communication.	
EV INDICATOR LAMP SIGNAL	On/Off			×						Indicates the EV indicator lamp signal status transmitted to combination meter via CAN communication.	
FUEL CUT INHIBIT	On/Off			×						Indicates the fuel cut-off prohibit signal received from ECM via CAN communication.	
PRE-CHARGE RELAY ACTIVATION	On/Off		×							Indicates the operation status of precharge relay.	
ENGINE STOP JUDGE	On/Off			×						Indicates the HPCM engine stop permit signal.	
NEUTRAL RELAY ACTIVATION	—		×							**NOTE:** The item is indicated, but not used.	
ENGINE START SIGNAL	On/Off		×							Indicates the engine start signal received from BCM via CAN communication.	
CLUTCH 1 STATUS	On/Off		×		×					Indicates the clutch 1 status.	
HV N MAIN RLY ACTIV	On/Off		×							Indicates the output status of system main relay 2 operation voltage.	
HV P MAIN RLY ACTIV	On/Off		×							Indicates the output status of system main relay 1 operation voltage.	
HV PRE CHG RLY ACTIV	On/Off		×							Indicates the output status of precharge relay operation voltage.	

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
HV N MAIN RLY ACTIV MONI	On/Off		×							Indicates system main relay 2 [On/Off] status.	
HV P MAIN RLY ACTIV MONI	On/Off		×							Indicates system main relay 1 [On/Off] status.	
START SIGNAL	On/Off	×	×	×	×	×	×	×	×	Indicates status of the start signal (READY signal) that is input from BCM.	
IGN SW SIGNAL	On/Off	×	×	×	×	×	×	×	×	Indicates status of ignition switch signal that is input from IPDM E/R.	
CLUTCH 2 PROTECT	On/Off		×						×	Indicates activation status of clutch 2 overheat protection control	
SHIFT POSITION WARNING	On/Off		×						×	Indicates activation status of Shift P warning.	
ENGINE OIL PRESS WARNING	On/Off		×						×	Indicates activation status of engine oil pressure warning lamp.	
EV INDICATOR LAMP SIGNAL 2	On/Off		×						×	Indicates activation status of EV indicator lamp.	
P/N POS SIGNAL	On/Off		×							Indicates park/neutral position signal [On/Off] status.	
ASCD BRAKE SW	On/Off		×							Indicates brake pedal position switch [On/Off] status.	
STOP LAMP SWITCH STATUS	On/Off		×							Indicates stop lamp switch [On/Off] status.	
INV COVER INTERLOCK SIG	On/Off		×							Indicates interlock switch [On/Off] status.	
SERVICE PLUG	On/Off		×							Indicates service plug [On/Off] status.	
SS OFF RELAY	On/Off		×							Indicates self shut-off relay [On/Off] status.	
IDLE AIR VOLUME LEARN PERMIT	On/Off								×	Indicates intake air amount learning permit status.	
A/C CUT REQ	On/Off								×	Indicates A/C cut-off request status.	
SUB OIL PUMP ACTIV REQ	On/Off								×	Indicates electric oil pump activation request status.	
DC/DC CONV ACTIV REQ	On/Off							×		Indicates the DC/DC converter activation request status.	
DC/DC CONVERTER STATUS	On/Off							×		Indicates the DC/DC converter status.	
DC/DC CONV INDICATE VOLT	V		×					×		Indicates the DC/DC converter control voltage.	
BATT FAN ACTIV REQ (DC/DC)	—		×					×		Indicates the DC/DC converter cooling mode signal status received from DC/DC converter by communication.	
EPS ACTIV REQ	—								×	Indicates the EPS activation request status.	
REV SYNC GEAR SHIFT REQ	On/Off								×	Indicates the status of speed-synchronized shift prohibit request that HPCM transmitted to TCM via CAN communication.	
READY INHIBIT (FAILSAFE)	On/Off								×	Indicates engine restart prohibit status.	

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
ENGINE STOP INHIBIT (TM)	On/Off		×		×					Indicates the engine stop inhibit signal received from TCM via CAN communication.	
DISTANCE SW	On/Off								×	Indicates distance switch [On/Off] status.	
STOP LAMP SW SIGNAL	On/Off								×	Indicates stop lamp switch [On/Off] status.	
ASCD SET SW	On/Off								×	Indicates SET/COAST switch [On/Off] status.	
ASCD RESUME/ACC SW	On/Off								×	Indicates RESUME/ACCELERATE switch [On/Off] status.	
ASCD CANCEL SW	On/Off								×	Indicates ASCD CANCEL switch [On/Off] status.	
ASCD MAIN SW	On/Off								×	Indicates ASCD MAIN switch [On/Off] status.	
ASCD SET LAMP	On/Off								×	Indicates activation status of ASCD SET indicator lamp.	
O/D CANCEL JUDGMENT	On/Off								×	Indicates OD cancel signal [On/Off] status.	
O/D ON JUDGMENT	On/Off								×	Indicates the OD [On/Off] status received from TCM via CAN communication.	
ASCD CRUISE LAMP	On/Off								×	Indicates activation status of ASCD CRUISE lamp.	
ASCD CANCEL (LOW SPEED)	On/Off								×	Indicates the vehicle cruise control status. • Off: Set speed is retained. • On: Cruise control is canceled when the vehicle decelerates below the minimum speed that allows cruise control to be set.	
ASCD CANCEL (SPEED DIFF)	On/Off								×	Indicates the vehicle cruise control status. • Off: Set speed is retained. • On: Cruise control is canceled when the vehicle decelerates excessively below the set speed.	
WHEEL SPIN JUDGMENT	On/Off		×		×					Indicates the wheel spin judgment value received from TCM via CAN communication.	
G SEN CORRECT ERROR	On/Off								×	Indicates the status of G sensor calibration.	
DTC 1	—		×							Indicates DTC in the hybrid system.	Indicates first-detected DTC.
DTC 2	—		×							Indicates DTC in the hybrid system.	Indicates second-detected DTC.
DTC 3	—		×							Indicates DTC in the hybrid system.	Indicates third-detected DTC.
INSPECTION MODE 2	—								×	Indicates the inspection mode status. • 0: Normal • 1–7: Indicates the operation of Inspection mode.	

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
DRIVE MODE	ECO/ SPORT/ SNOW/ AUTO								×	Indicates the characteristic of drive mode.	
BRAKE OVERRIDE OPERAT	On/Off		×							Indicates the brake override operating status.	
ECO PEDAL STATUS	—								×	Indicates the ECO pedal status that is set on the navigation display. • 0: No control • 1: OFF • 2: Soft • 3: Standard	
ECO PEDAL REACTN FORCE	N								×	Indicates the ECO pedal reaction force value.	
HV BATTERY LEVEL (METER)	%		×						×	Indicates the indicated battery level gauge value that is transmitted to the combination meter.	
ASSIST CHARGE (METER)	%		×						×	Indicates the indicated assist charge gauge position value that is transmitted to the combination meter.	
DRIVE CONDITION 1	—		×						×	Indicates the displayed energy monitor signal that is displayed on the navigation display. • 0: No flow • 1: Motor assist driving • 2: Engine driving, power generation • 3: EV driving (Motor driving) • 4: Regenerative braking • 5: Power generation • 6: Engine driving • 7: Power regeneration	Display 1 indicates the status between engine and tires.
DRIVE CONDITION 2	—		×						×		Display 2 indicates the status between engine and traction motor.
DRIVE CONDITION 3	—		×						×		Display 3 indicates the status between traction motor and Li-ion battery.
DRIVE CONDITION 4	—		×						×		Display 4 indicates the status between traction motor and tires.
TIRE ROTATION DIRECTION	—		×						×	Indicates the tire rotation direction for the energy monitor that is displayed on the navigation display.	
AMOUNT OF REGENERATION	kW		×						×	Indicates the amount of regenerative braking that is transmitted from HPCM to NAVI control unit via CAN communication.	

Monitor item	Unit	Monitor item selection								Description	Note
		A	B	C	D	E	F	G	H		
ENG WATER TEMP DIFFERNC	°C		×							Indicates the difference between engine coolant temperature and high voltage coolant temperature.	Indicates when the engine coolant temperature is higher than the high voltage coolant temperature.
INV WATER TEMP DIFFERNC	°C		×							Indicates the difference between engine coolant temperature and high voltage coolant temperature.	Indicates when the high voltage coolant temperature is higher than the engine coolant temperature.

NOTE:

Monitoring is not performed of monitor items for systems not present in the vehicle.

WORK SUPPORT MODE

Work Item

Work item	Condition	Usage
CLUTCH 1 ZERO POSITION LEARNING*	Make clutch 1 initial position (disengaged position) learning when replacing HPCM or transmission assembly.	When the clutch 1 position learning is performed.
G SENSOR CALIBRATION	Performs the learning of G sensor initial inclination angle (zero inclination point) after G sensor is installed or HPCM/G sensor is replaced.	When correcting G sensor neutral position.

*: For CLUTCH 1 ZERO POSITION LEARNING, refer to the following information.

- Hybrid system warning lamp and 12 V battery charge warning lamp blink during operation.
- When the learning is completed, 12 V battery charge warning lamp turns OFF.
- If the learning is not completed normally, 12 V battery charge warning lamp continues blinking.
- Hybrid system warning lamp turns OFF when the key switch is turned OFF.

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgement	Check item (Remedy)
INSPECTION MODE 1*1, *2	Prohibits engine idle stop under engine no-load conditions. Clutch 1: Disengaged Traction motor: Not operating	• Hybrid system warning lamp blinks. • For details, refer to HBC-113.	Example: inspections that are performed with no load on the engine
INSPECTION MODE 2	Changes the regenerative braking balance of the front and rear wheels when driving on a 2-wheel chassis dynamometer.	• 12-volt battery charge warning lamp blinks. • For details, refer to HBC-114.	Example: driving on a 2-axle chassis dynamometer
INSPECTION MODE 3	Prohibits gradient estimation when driving on a 4-wheel chassis dynamometer.	• Hybrid system warning lamp and 12-volt battery charge warning lamp blinks. • For details, refer to HBC-114.	Example: driving on a 4-axle chassis dynamometer
INSPECTION MODE 5*2	Prohibits engine idle stop in order to perform emissions measurement.	• Engine operates continuously. • Hybrid system warning lamp blinks. • For details, refer to HBC-115.	Example: driving using the engine only
ENGINE CRANKING	This vehicle inspection mode stops fuel injection control and ignition timing control and performs cranking.	• Runs the engine with cutoff of fuel. • For details, refer to HBC-115.	Inspection of engine compression pressure and other items

Test item	Condition	Judgement	Check item (Remedy)
WATER PUMP	Forcibly drives the electric water pump to check pump operation and when adding coolant.	Electric water pump operates when ignition switch is ON.	• Harness and connector • Electric water pump • Adding coolant
VOLTAGE CONTROL	Changes the voltage command value periodically in order to check operation of the DC/DC converter.	Changes the DC/DC converter drive voltage between 13V and 15V (20 second cycle).	• Harness and connector • DC/DC converter

CAUTION:

- ***1: Inspection mode is canceled when the ignition switch turns OFF. It is not canceled when a mode other than "ACTIVE TEST" is selected. However inspection mode 1 is canceled if the select lever is shifted from P position to D position.**
  Check the conditions listed below before using inspection mode 1.
  - **If inspection mode 1 is engaged when the Li-ion battery level is low, then in order to engage clutch 1 and charge the battery from the engine, use CONSULT "EV/HEV" "DATA MONITOR" mode and check that the "HV BATTERY LEVEL" reading is 50% or more, or else use the "Li-ion battery state of charge" in the information display on the combination meter and check that the battery level is 50% or more.**
  - **Check that the engine coolant temperature is 80 °C (176 °F) or more.**
- ***2: When the select lever is in the P or N position, adjustments to the throttle position prevent the engine speed from exceeding 3,000 rpm.**

ECU DIAGNOSIS INFORMATION

HPCM

Reference Value

INFOID:0000000014736105

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- Specification data are reference values.
- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For outlines of following items, refer to HBC-43, "CONSULT Function".

CONSULT MONITOR ITEM

Monitor Item	Condition		Values/Status
ESTIMAT VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication.
ACCEL OPEN ANGLE	Ignition switch: ON		0 - 100
SHIFT POSITION (METER)	Ignition switch: ON		Indicates selector lever position
TARGET ENGINE TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.
ENGINE SPEED	Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
ENGINE TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.
COMMAND MOTOR TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.
MOTOR TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.
MOTOR SPEED	READY	During driving	Changes the value according to the acceleration or deceleration.
COMMAND MOTOR SPEED	READY	During driving	Changes the value according to the acceleration or deceleration.
GEAR POSITION	During driving		0 - 15
NEXT GEAR POSITION	During driving		0 - 15
TM OUTPUT REV	READY	During driving	Changes the value according to the acceleration or deceleration.
REGENERATION TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.
CMD REGENERATION TORQ	READY	During driving	Changes the value according to the acceleration or deceleration.
BRAKING FORCE	READY	During driving	Changes the value according to the acceleration or deceleration.
SUB OIL PUMP ACTIV TORQ	READY		0 - 63.5 Nm
ELECT CMP ACTIV TORQ	READY		0 - 102 Nm
12V BATTERY TEMP	Ignition switch: ON		(-50) - (+205)°C
12V BATTERY CURRENT SEN	Ignition switch: ON		(-320) - (+320) A
ASCD VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication.
ASCD CMD VEHICLE SPEED	—		Almost the same speed as the set speed.

Monitor Item	Condition		Values/Status
SL TARGET VEHICLE SPEED	**NOTE:** The item is indicated, but not used.		—
TARGET IDLE SPEED MAX	READY	During driving	Changes the value according to the acceleration or deceleration.
TARGET IDLE SPEED MIN	READY	During driving	Changes the value according to the acceleration or deceleration.
HV DISCHARGE POWER	Ignition switch: ON		0 - 65 kW
HV CHARGE POWER	Ignition switch: ON		0 - 30 kW
MOTOR TORQ LIMIT (OUT)	READY	During driving	Changes the value according to the acceleration or deceleration.
MOTOR TORQ LIMIT (REGE)	READY	During driving	Changes the value according to the acceleration or deceleration.
MOT TORQUE LIMIT (INV)	READY	During driving	0 - 100%
HV BATTERY LEVEL	Ignition switch: ON		15 - 85%
HV BATTERY VOLTAGE	Ignition switch: ON		150 - 415 V
HV BATTERY CURRENT	Ignition switch: ON		(-10) - (+10) A
HV BATTERY TEMP	Ignition switch: ON		(-40) - (+65)°C
BATT FAN ACTIV REQ (LBC)	READY		0 - 7
BATT FAN ACTIV REQ (HPCM)	READY		0 - 7
READY SHUT DOWN COUNT	Ignition switch: ON		0 - 255
R/OFF COUNT (PWR LMT)	Ignition switch: ON		0
12V BATTERY VOLTAGE	Ignition switch: ON		5 - 13 V
	READY		9.5 - 15.5 V
APP SENSOR 1	Ignition switch: ON	Accelerator pedal open angle	0 - 100 deg
APP SENSOR 2	Ignition switch: ON	Accelerator pedal open angle	0 - 100 deg
ENGINE COOLANT TEMP	Engine: After warming up		More than 70°C
INTAKE AIR TEMP SEN	Engine: After warming up		Indicates intake air temperature
INVERTER VOLTAGE	Ignition switch: ON		0 - 15 V
TRACTION MOT INV TEMP	READY		(-40) - (+215)°C
TM INPUT REV	READY	During driving	0 - 7,300 rpm
TRANSMISSION FLUID TEMP	Ignition switch: ON		(-50) - (+200)°C
CLUTCH 2 TEMPERATURE	READY		40 - 550°C
TM INPUT TORQUE	READY		(-200) - (+435) Nm
GRADIENT RATIO	Ignition switch: ON (Level road)		(-32) - (+32.5)%
G SENSOR	Ignition switch: ON (Level road)		(-2) - (+2) G
ISOLAT SENS WAVE AMP	READY	During driving (A/C: MAX)	More than 3,150 mV
CLUTCH 1 TEMPERATURE 1	READY		0 - 510°C

Monitor Item	Condition		Values/Status
CLUTCH 1 TEMPERATURE 2	Ignition switch: ON		(-50) - (+205)°C
STARTER RELAY STATUS	Ignition switch: ON	Starter motor: Operating	On
	Except above		Off
INVERTER W/P MONITOR	READY		0 - 100%
INVERTER W/P DUTY	READY		0 - 100%
COOL FAN ACT REQ (MOTOR)	READY		0 - 3
RAD FAN DUTY	READY		0 - 100%
RAD FAN ACTIV REQ (ECM)	READY		0 - 100%
RAD FAN ACTIV REQ (A/C)	READY		0 - 100%
RAD FAN ACTIV REQ (HPCM)	READY		0 - 100%
DOOR SW-DR	Door (driver side)	Close	0
		Open	1
ACCEL SENSOR 1 VOLTAGE	Ignition switch: ON	Accelerator pedal: Fully released	450 - 1,000 mV
		Accelerator pedal: Sightly depressed	4,400 - 4,800 mV
ACCEL SENSOR 2 VOLTAGE	Ignition switch: ON	Accelerator pedal: Fully released	450 - 1,000 mV
		Accelerator pedal: Sightly depressed	4,400 - 4,800 mV
VACUUM SENSOR	Brake pedal: ON ⇔ OFF		The negative pressure value varies.
HI VOLTAGE COOLANT TEMP	Ignition switch: ON		(-50) - (+205)°C
SENSOR POWER SUPPLY 1	Ignition switch: ON		5,000 mV
SENSOR POWER SUPPLY 2	Ignition switch: ON		5,000 mV
FUEL LEVEL SENSOR	Ignition switch: ON		0 - 1,023
WHEEL SENSOR (FR-RH)	Turn drive wheels		0 - 2731 rpm
WHEEL SENSOR (FR-LH)	Turn drive wheels		0 - 2731 rpm
TARGET IDLE SPEED	READY	During driving	Changes the value according to the acceleration or deceleration.
BCM STATUS	Ignition switch: ON		1 - 3
BAROMETRIC PRESS SEN	Ignition switch: ON		0 - 102.3 kPa
READY LAMP SIGNAL	Ignition switch: OFF		Off
	Ignition switch: ON → START		BLINK
	READY		On
HYBRID SYSTEM W/L SIGNAL	Ignition switch: ON	System normal	Off
		Inspection mode	BLINK
		System abnormality	On

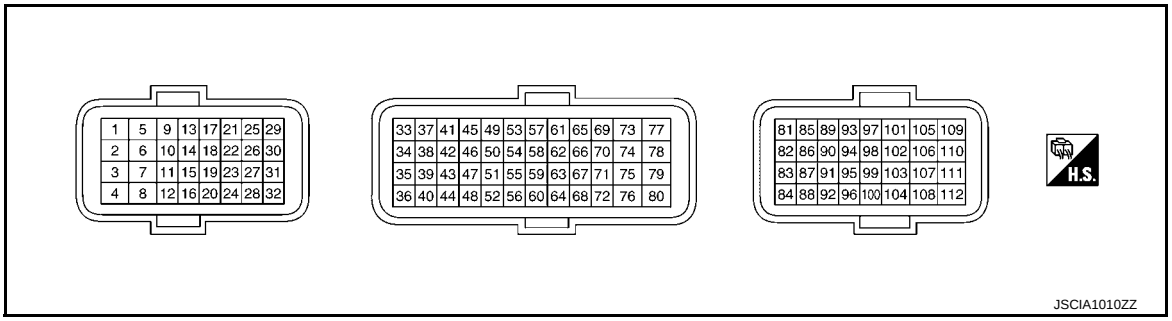
Monitor Item	Condition		Values/Status
CHARGE LAMP SIGNAL	Ignition switch: ON	System normal	Off
		Inspection mode	BLINK
		DC/DC converter abnormality	On
A/F CORRECTN (BARO PRES)	Ignition switch: ON		0 - 2
ENGINE STOP REQUEST	READY	During engine stopped	On
	Except above		Off
F/C CYLINDER QUANTITY	READY	During engine stopped	4
	Except above		0
ENGINE START REQUEST	READY	During engine running	On
		During engine stopped	Off
IDLE REQUEST	READY	Engine independence request	On
	Except above		Off
ENGINE STOP PERMIT	READY	Engine stop judgment	On
	Except above		Off
ENGINE START REQ (A/C)	READY	Receives a engine ON request signal from A/C auto amp.	On
	Except above		Off
EV INDICATOR LAMP SIGNAL	READY	During motor driving	On
		Except motor driving	Off
FUEL CUT INHIBIT	READY	Receives a fuel cut signal from ECM	On
	Except above		Off
PRE-CHARGE RELAY ACTIVATION	Ignition switch: ON		Off
	Ignition switch ON → READY		On
	READY		Off
ENGINE STOP JUDGE	READY	Engine stop judgment	On
	Except above		Off
NEUTRAL RELAY ACTIVATION	**NOTE:** The item is indicated, but not used		—
ENGINE START SIGNAL	READY	Starter motor: Operating	On
	Except above		Off
CLUTCH 1 STATUS	READY	Clutch 1: Engage	On
		Except above	Off
HV N MAIN RLY ACTIV	Ignition switch: ON		Off
	READY		On
HV P MAIN RLY ACTIV	Ignition switch: ON		Off
	READY		On
HV PRE CHG RLY ACTIV	Ignition switch: ON		Off
	Ignition switch ON → READY		On
	READY		Off
HV N MAIN RLY ACTIV MONI	Ignition switch: ON		Off
	READY		On
HV P MAIN RLY ACTIV MONI	Ignition switch: ON		Off
	READY		On

Monitor Item	Condition		Values/Status
START SIGNAL	READY		On
	Ignition switch: ON		Off
IGN SW SIGNAL	Ignition switch: ON → OFF → ON		On → Off → On
CLUTCH 2 PROTECT	READY	Normal	On
		Clutch 2 overheat judgment	Off
SHIFT POSITION WARNING	Shift P warning (Information display)	Indicated	On
		Not indicated	Off
ENGINE OIL PRESS WARNING	Ignition switch: ON		On
	READY	Normal	Off
EV INDICATOR LAMP SIGNAL 2	READY	During motor driving	On
		Except motor driving	Off
P/N POS SIGNAL	Ignition switch: ON	Selector lever: P or N	On
		Selector lever: Except above	Off
ASCD BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	On
		Brake pedal: Slightly depressed	Off
STOP LAMP SWITCH STATUS	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
INV COVER INTER-LOCK SIG	Ignition switch: ON	Inverter cover: Install	On
		Inverter cover: Remove	Off
SERVICE PLUG	Ignition switch: ON	Service Plug: Install	On
		Service Plug: Remove	Off
SS OFF RELAY	Ignition switch: ON		On
IDLE AIR VOL LEARN PERMIT	Perform intake air volume learning		On
	Except above		Off
A/C CUT REQ	READY	A/C cut request	On
	Except above		Off
SUB OIL PUMP ACTIV REQ	READY	Electric oil pump activation request	On
	Except above		Off
DC/DC CONV ACTIV REQ	READY		On
	Ignition switch: ON		Off
DC/DC CONVERTER STATUS	READY	Not activation	On
		Activation	Off
DC/DC CONV INDICATE VOLT	Ignition switch: ON		14 V
	READY		13 - 15 V
BATT FAN ACTIV REQ (DC/DC)	READY		0 - 3
EPS ACTIV REQ	READY		On
	Ignition switch: ON		Off
REV SYNC GEAR SHIFT REQ	READY	Prohibition	On
		Normal	Off
READY INHIBIT (FAIL-SAFE)	Ignition switch: ON	Abnormality	On
		Normal	Off
ENGINE STOP INHIBIT (TM)	READY	Prohibition	On
		Normal	Off

Monitor Item	Condition		Values/Status
DISTANCE SW	Ignition switch: ON	DISTANCE switch: Pressed	On
		DISTANCE switch: Released	Off
STOP LAMP SW SIGNAL	Ignition switch: ON	Brake pedal: Fully released	Off
		Brake pedal: Slightly depressed	On
ASCD SET SW	Ignition switch: ON	SET/COAST switch: ON	On
		SET/COAST switch: OFF	Off
ASCD RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: ON	On
		RESUME/ACCELERATE switch: OFF	Off
ASCD CANCEL SW	Ignition switch: ON	CANCEL switch: ON	On
		CANCEL switch: OFF	Off
ASCD MAIN SW	Ignition switch: ON	MAIN switch: ON	On
		MAIN switch: OFF	Off
ASCD SET LAMP	• Main switch: ON • Vehicle speed: 40 km/h (25 MPH) - 144 km/h (90MPH)	ASCD: Operation	On
		ASCD: Not operation	Off
O/D CANCEL JUDGMENT	Ignition switch: ON		Off
O/D ON JUDGMENT	Ignition switch: ON		Off
ASCD CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	On → Off
ASCD CANCEL (LOW SPEED)	Ignition switch: ON		Off
ASCD CANCEL (SPEED DIFF)	Ignition switch: ON		Off
WHEEL SPIN JUDGMENT	READY	Wheel spin judgment	On
		Except above	Off
G SEN CORRECT ERROR	Ignition switch: ON	Abnormality	On
		Normal	Off
DTC 1	Ignition switch: ON		Indicates detected DTC.
DTC 2	Ignition switch: ON		Indicates detected DTC.
DTC 3	Ignition switch: ON		Indicates detected DTC.
INSPECTION MODE 2	Ignition switch: ON	Perform inspection mode	1 - 7
DRIVE MODE	Ignition switch: ON	Drive mode select switch: ECO	ECO
		Drive mode select switch: SPORT	SPORT
		Drive mode select switch: SNOW	SNOW
		Other	AUTO
BRAKE OVERRIDE OPERAT	• READY • Selector lever: D • Brake pedal: Depressed • Accelerator pedal: Depressed gradually **CAUTION:** **Always perform in a safe place with the drive wheels lifted in the shop or with wheel chock.**		On
	Except above		Off

Monitor Item	Condition		Values/Status
ECO PEDAL STATUS	Changes the ECO pedal status	No control	0
		OFF	1
		Soft	2
		Standard	3
ECO PEDAL REACTN FORCE	—		N
HV BATTERY LEVEL (METER)	Ignition switch: ON		0 - 100%
ASSIST CHARGE (METER)	READY		(-100) - (+100)%
DRIVE CONDITION 1	READY	During driving	0 - 7
DRIVE CONDITION 2	READY	During driving	0 - 7
DRIVE CONDITION 3	READY	During driving	0 - 7
DRIVE CONDITION 4	READY	During driving	0 - 7
TIRE ROTATION DIRECTION	READY	During driving	0 - 3
AMOUNT OF REGENERATION	READY	During driving (Braking)	0 - 63.5 kW
ENG WATER TEMP DIFFERNC	Ignition switch: ON	The engine coolant temperature is higher than the high voltage coolant temperature.	0 - 255°C
INV WATER TEMP DIFFERNC	Ignition switch: ON	The high voltage coolant temperature is higher than the engine coolant temperature.	0 - 255°C

TERMINAL LAYOUT

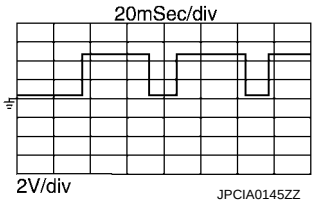
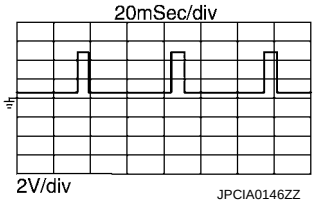


PHYSICAL VALUES

NOTE:

- Specification data are output/input values which are detected or supplied by the HPCM at the connector.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (GR)	112 (GR)	System main relay 2	Output	[Ignition switch: ON]	Less than 2.0 V
				[READY]	More than battery voltage – 2.0 V
2 (SB)	112 (GR)	Pre-charge signal	Output	[Ignition switch: ON]	Less than 2.0 V
				[Ignition switch: ON → READY]	More than battery voltage – 2.0 V
				[READY]	Less than 2.0 V
4 (BG)	112 (GR)	System main relay 1	Output	[Ignition switch: ON]	Less than 2.0 V
				[READY]	More than battery voltage – 2.0 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
5 (V)	112 (GR)	Self shut off relay	Output	[Ignition switch: OFF] A few seconds after turning ignition switch OFF	Less than 2.0 V
				[Ignition switch: ON]	More than battery voltage – 2.0 V
18 (W)	112 (GR)	Electric water pump	Output	[Ignition switch: OFF]	0 V
				[READY]	★ More than 1.0 - 4.0 V 
21 (B)	112 (GR)	Electric water pump (Feed back)	Input	[Ignition switch: OFF]	0 V
				[READY]	★ More than 1.0 - 4.0 V 
24 (R)	25 (LG)	High voltage coolant temperature sensor	Input	[Ignition switch: ON]	0 - 4.8 V Output voltage varies with high voltage coolant temperature.
25 (LG)	—	Sensor ground (High voltage coolant temperature sensor)	—	—	—
30 (W)	112 (GR)	Connection detecting circuit	Input	Inter lock connector: OFF	Less than 1.0 V
				Inter lock connector: ON	More than 9.0 V
32 (Y)	112 (GR)	Service plug	Input	Service plug: OFF	Less than 1.0 V
				Service plug: ON	More than 9.0 V
36 (L)	112 (GR)	P/N signal	Input	[Ignition switch: ON] Selector lever: P or N	More than 9.0 V
				[Ignition switch: ON] Selector lever: Except above	Less than 1.0 V
50 (B)	—	HPCM ground	—	—	—
51 (—)	—	Shield	—	—	—
54 (B)	—	HPCM ground	—	—	—
57 (B)	—	HPCM ground	—	—	—
63 (LG)	70 (W)	12V battery temperature sensor	Input	[Ignition switch: ON]	0 - 4.8 V Output voltage varies with 12V battery temperature.
69 (B)	70 (W)	12V battery current sensor	Input	[Ignition switch: ON]	0 - 4.8 V Output voltage varies with 12V battery current.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/ Output		
70 (W)	—	Sensor ground (12V battery temperature sensor, 12V battery current sensor)	—	—	—
72 (BR)	70 (W)	Sensor power supply (12V battery temperature sensor, 12V battery current sensor)	Output	[Ignition switch: ON]	5 V
77 (L)	112 (GR)	Power supply for HPCM	Input	[Ignition switch: ON]	More than 9.5 V
81 (R)	112 (GR)	12V battery voltage	—	[Ignition switch: OFF]	More than 9.5 V
83 (P)	—	CAN-L	Input/ Output	—	—
84 (L)	—	CAN-H	Input/ Output	—	—
88 (B)	112 (GR)	DC/DC converter voltage stabilizer signal	Input/ Output	—	—
93 (Y)	112 (GR)	IGN signal	Input	[Ignition switch: OFF]	Less than 1.0 V
				[Ignition switch: ON]	More than 9.0 V
94 (G)	95 (V)	ASCD steering switch*1	Input	[Ignition switch: ON] ASCD steering switch: OFF	4.0 V
				[Ignition switch: ON] MAIN switch: Pressed	0 V
				[Ignition switch: ON] CANCEL switch: Pressed	1.0 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	3.0 V
				[Ignition switch: ON] SET/COAST switch: Pressed	2.0 V
94 (G)	95 (V)	ICC steering switch*2	Input	[Ignition switch: ON] MAIN switch: Pressed	0 V
				[Ignition switch: ON] CANCEL switch: Pressed	1.18 V
				[Ignition switch: ON] DISTANCE switch: Pressed	1.51 V
				[Ignition switch: ON] SET/COAST switch: Pressed	2.00 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	2.71 V
95 (V)	—	Sensor ground (ASCD/ICC steering switch)	—	—	—
97 (L)	—	HEV system CAN-H	Input/ Output	—	—
98 (G)	—	HEV system CAN-L	Input/ Output	—	—
99 (R)	112 (GR)	Stop lamp switch	Input	Brake pedal: Slightly depressed	More than 9.0 V
				Brake pedal: Fully released	Less than 1.0 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
100 (W)	112 (GR)	Brake pedal position switch	Input	[Ignition switch: ON] Brake pedal: Slightly depressed	Less than 1.0 V
				[Ignition switch: ON] Brake pedal: Fully released	More than 9.0 V
102 (SB)	104 (LG)	Sensor power supply (Accelerator pedal position sensor 2)	Output	[Ignition switch: ON]	4.5 - 5.5 V
103 (BR)	104 (LG)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] Accelerator pedal: Fully depressed	More than 2.0 V
				[Ignition switch: ON] Accelerator pedal: Fully released	Less than 0.5 V
104 (LG)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
105 (BR)	112 (GR)	Power supply for HPCM	Input	[Ignition switch: ON]	More than 9.5 V
106 (V)	111 (R)	Sensor power supply (Accelerator pedal position sensor 1)	Output	[Ignition switch: ON]	4.5 - 5.5 V
108 (B)	—	HPCM ground	—	—	—
110 (GR)	111 (R)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] Accelerator pedal: Fully depressed	More than 4.0 V
				[Ignition switch: ON] Accelerator pedal: Fully released	Less than 1.0 V
111 (R)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
112 (GR)	—	HPCM ground	—	—	—

*1: Without ICC models
*2: With ICC models
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Fail-safe

INFOID:0000000014736106

If a malfunction occurs in the hybrid system, HPCM performs fail-safe activation according to the detected malfunction, and activates the hybrid system warning lamp or 12-volt battery charge warning lamp.

DTC	Detection items	Hybrid system operation and vehicle behavior	
U0100 P0510 P314D P314E P314F P3151 P31A6	Engine	If engine fuel is cut off or ECM CAN communication are abnormal	The engine is stopped and the vehicle is driven by the traction motor alone.
		If ECM stopped control of the electric throttle control actuator	• The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.
		If ECM is limiting speed due to fuel cut-off	Engine stop control is prohibited and the vehicle is driven by the engine alone with a limit on the engine speed. For this reason, acceleration performance decreases.
		If ECM reduces the engine output	• HPCM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. • ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.
P2857 P2859	Clutch 1	If there is a malfunction on the clutch 1 engaged side	Engine stop control is prohibited.
		If there is a malfunction on the clutch 1 disengaged side	The engine is stopped and the vehicle is driven by the traction motor alone.
U0110 P3176 P3177 P317A P317B P31A7	Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
		If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.
U0101 P0613 P3185 P3186 P31A8	Transmission	Transmission malfunction (If clutch 2 is unable to slip)	• The engine and traction motor are stopped after the vehicle is stopped. • The hybrid system can be activated, but the engine and traction motor are stopped when the selector lever is shifted to a drivable position.
		Primary speed sensor malfunction	The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed.
		Secondary speed sensor malfunction	
		Transmission range switch malfunction	
		If CAN communication with the TCM computing unit or TCM are abnormal	• The engine and traction motor are stopped. • Driving is not possible even when the accelerator pedal is depressed.
P3123 P3124 P3125 P3126 P3127 P3128	Electric water pump	Controlling the motor torque and drive with the engine power only, therefore the acceleration becomes slower, also the shift shock becomes more obvious.	

DTC	Detection items	Hybrid system operation and vehicle behavior	
U0111 P0A1F P317F P3181 P3182 P31A9	Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
		If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.
P0AA6 P3118 P3120	High-voltage system insulation resistance	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P0A95 P311D P311E	High-voltage power wiring	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0AA0 P0AA1 P0AA4	System main relay	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P0ADB P0ADC P0ADF P0AE0		• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0B37	Service plug	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A0A	Inter lock connector	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A08 P31EF P31F0 P31F1	DC/DC converter	Vehicle speed is limited according to the drop in 12V battery voltage. After vehicle speed gradually decreases and only creep drive force is output, drive force output stops.	
P0AE2 P0AE6 P0AE7	Pre-charge relay	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A1D	HPCM	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
U1000	CAN Communication	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P3157	Sensor power supply	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P1550 P1551 P1552 P1554	Battery current sensor	Variable voltage control is prohibited.	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	• Engine stop control is prohibited, and the drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.	
P310F	Engine start control	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P3117	Air conditioning system	A/C control is prohibited.	
P3135	Slight collision detection	High voltage power supply stop.	

DTC	Detection items	Hybrid system operation and vehicle behavior
P3137 P3138	Car crash detection	• High voltage power supply stop. • Hybrid system start is prohibited.
P31BC	Chassis control module	The following functions are prohibited. • Active trace control • Active engine brake • Active ride control

DTC Inspection Priority Chart

INFOID:0000000014736107

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority-chart.

Priority	DTC	Detected items
1	U0100, U0101, U0107, U0110, U0111, U1000	CAN communication
	P0510	Throttle position sensor
	P0A1D, P310A	HPCM
	P0851, P0852	Transmission range switch
	P0A00, P0A02, P0A03, P0A93	High voltage coolant temperature sensor
	P0A0A, P0A0C	Inter lock connector
	P0AA6, P3117, P3118, P3120	Insulation resistance drop
	P0AA7	Insulation resistance sensor
	P0B35, P0B37	Service plug
	P1550, P1551, P1552, P1554	12V battery current sensor
	P1556, P1557	12V battery temperature sensor
	P161D, P161E, P161F	Immobilizer
	P2122, P2123, P2127, P2128, P2138	Accelerator pedal position sensor
	P3109	12V battery supply
	P311D, P311E	High voltage system
	P3157	Sensor power supply
	P1212, P3194, P31A6, P31A7, P31A8, P31A9, P31B1, P31BC	Communication circuit
2	P0613, P0701, P3185, P3186	TCM
	P0930	Shift lock system
	P0A06, P0A07, P3123, P3124	Electric water pump
	P0A08, P31EF, P31F0, P31F1	DC/DC converter
	P0A1F, P317F, P3180, P3181, P3182, P3184	Li-ion battery controller
	P0A95, P0AA0, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0	System main relay
	P0AE2, P0AE6, P0AE7	Pre-charge relay
	P1572, P3114	Brake pedal position switch
	P1805, P3112	Stop lamp switch
	P2857, P2859	Clutch 1
	P3110	IGN relay
	P314D, P314E, P314F, P3151	ECM
	P3176, P3177, P3178, P3179, P317A, P317B	Traction motor inverter

Priority	DTC	Detected items
3	P310F	Hybrid system
	P3125, P3126, P3127, P3128	Electric water pump system
	P3135	Slight collision detection
	P3137, P3138	Car crash
	P3139	Air bag system
	P1564, P31FB, P31FD, P31FE	ASCD system
	P31FF	ASCD vehicle speed sensor

DTC Index

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×: Applicable —: Not applicable

DTC[*1]	Items (CONSULT screen terms)	Trip	Warning lamp[*3]				Reference
CONSULT[*2]			HEV	CHG	MIL	Permanent DTC group[*4]	
U0100[*5]	ECM/PCM A	1	×	—	×	B	HBC-123
U0101[*5]	TCM	1	×	—	×	B	HBC-126
U0107[*5]	TAC MODULE	1	—	—	—	—	HBC-128
U0110[*5]	DRIVE MOTOR CONTROL MODULE A	1	×	—	×	B	HBC-129
U0111[*5]	BATTERY ENERGY CONTROL MODULE A	1	×	—	×	B	HBC-131
U1000[*5]	CAN COMM CIRCUIT	1	×	—	—	—	HBC-133
P0510	CLOSED THROTTLE POSITION SWITCH	1	×	—	—	—	HBC-134
P0613	TCM	1	×	—	×	—	HBC-135
P0701	T/M CONTROL SYSTEM	1	×	—	—	—	HBC-137
P0851	PARK/NEUTRAL SWITCH	1	×	—	—	—	HBC-138
P0852	PARK/NEUTRAL SWITCH	1	—	—	—	—	HBC-138
P0930	GEAR SHIFT LOCK SOL/ACT A	1	×	—	—	—	HBC-140
P0A00	MOTOR ELECT COOLANT TEMP SEN	2	×	—	×	—	HBC-141
P0A02	MOTOR COOLANT TEMP SENSOR	1	×	—	×	—	HBC-145
P0A03	MOTOR COOLANT TEMP SENSOR	1	×	—	×	—	HBC-145
P0A06	COOLANT PUMP A	1	×	—	×	—	HBC-148
P0A07	COOLANT PUMP A	1	×	—	×	—	HBC-148
P0A08	DC/DC CONVERTER	1	—	×	—	—	HBC-151
P0A0A	HV SYSTEM INTERLOCK ERROR	1	×	—	—	—	HBC-154
P0A0C	HV SYSTEM INTERLOCK ERROR	1	×	—	—	—	HBC-154
P0A1D	HPCM	1	×	—	×	B	HBC-158
P0A1F	BATTERY ENERGY CONTROL MODULE	1	×	—	×	B	HBC-160
P0A93	MOTOR ELECT COOLANT TEMP SEN	1	×	—	×	—	HBC-162
P0A95	HIGH VOLTAGE FUSE	1	×	—	×	—	HBC-165
P0AA0	HYBRID BATT POSITIVE CONTACTOR	1	×	—	×	—	HBC-173
P0AA1	HYBRID BATT POSITIVE CONTACTOR	1	×	—	×	—	HBC-177
P0AA4	HYBRID BATT NEGATIVE CONTACTOR	1	×	—	×	—	HBC-180

DTC[*1]	Items (CONSULT screen terms)	Trip	Warning lamp[*3]				Reference
CONSULT[*2]			HEV	CHG	MIL	Permanent DTC group[*4]	
P0AA6	HYBRID BATT VOLT SYS ISOLATION	1	×	—	—	—	HBC-184
P0AA7	HYBRID BATT VOLT ISOLATION SENSOR	1	×	—	—	—	HBC-188
P0ADB	HYBRID BATT POSITIVE CONTACTOR	1	×	—	×	—	HBC-189
P0ADC	HYBRID BATT POSITIVE CONTACTOR	1	×	—	×	—	HBC-189
P0ADF	HYBRID BATT NEGATIVE CONTACTOR	1	×	—	×	—	HBC-192
P0AE0	HYBRID BATT NEGATIVE CONTACTOR	1	×	—	×	—	HBC-192
P0AE2	HYBRID BATT PRECHARGE CONTACTOR	1	×	—	×	—	HBC-195
P0AE6	HYBRID BATT PRECHARGE CONTACTOR	1	×	—	×	—	HBC-199
P0AE7	HYBRID BATT PRECHARGE CONTACTOR	1	×	—	×	—	HBC-199
P0B35	HIGH VOLTAGE SERVICE DISCONNECT	1	×	—	—	—	HBC-202
P0B37	HIGH VOLTAGE SERVICE DISCONNECT	1	×	—	—	—	HBC-202
P1212	TCS/CIRC	1	×	—	—	—	HBC-206
P1550	BAT CURRENT SENSOR	1	—	—	—	—	HBC-208
P1551	BAT CURRENT SENSOR	1	—	—	—	—	HBC-211
P1552	BAT CURRENT SENSOR	1	—	—	—	—	HBC-211
P1554	BAT CURRENT SENSOR	1	—	—	—	—	HBC-214
P1556	BATTMPSEN/CIRC	1	—	—	—	—	HBC-217
P1557	BATTMPSEN/CIRC	1	—	—	—	—	HBC-217
P1564	ASCD SW	1	—	—	—	—	HBC-220 (Without ICC) HBC-223 (With ICC)
P1572	ASCD BRAKE SWITCH	1	—	—	—	—	HBC-226
P161D[*6]	IMMOBILIZER	1	—	—	—	—	SEC-65
P161E[*6]	IMMOBILIZER	1	—	—	—	—	SEC-66
P161F[*6]	IMMOBILIZER	1	—	—	—	—	SEC-67
P1805	BRAKE SWITCH	1	—	—	—	—	HBC-230
P2122	APP SENSOR D	1	×	—	×	B	HBC-233
P2123	APP SENSOR D	1	×	—	×	B	HBC-233
P2127	APP SENSOR E	1	×	—	×	B	HBC-237
P2128	APP SENSOR E	1	×	—	×	B	HBC-237
P2138	APP SENSOR	1	×	—	×	B	HBC-241
P2857	CLUTCH A	1	×	—	×	B	HBC-245
P2859	CLUTCH A	1	×	—	×	B	HBC-245
P3109	12V POWER SUPPLY	1	—	—	—	—	HBC-247
P310A	HPCM	1	×	—	×	—	HBC-248
P310F	HYBRID SYS ACTIVATION ERROR	2	×	—	×	—	HBC-249

DTC[*1]	Items (CONSULT screen terms)	Trip	Warning lamp[*3]				Reference
CONSULT[*2]			HEV	CHG	MIL	Permanent DTC group[*4]	
P3110	IGN RELAY	1	×	—	—	—	HBC-251
P3112	STOP LAMP SWITCH	1	—	—	—	—	HBC-253
P3114	BRAKE SWITCH	1	—	—	—	—	HBC-256
P3117	A/C SYSTEM	1	×	—	—	—	HBC-259
P3118	HYBRID BATTERY ISOLATION	1	×	—	—	—	HBC-260
P311D	HIGH VOLTAGE SYSTEM	1	×	—	×	—	HBC-261
P311E	HIGH VOLTAGE SYSTEM	1	×	—	×	—	HBC-261
P3120	HV SYSTEM ISOLATION	1	×	—	—	—	HBC-269
P3123	HV SYSTEM COOLING PUMP	1	×	—	×	—	HBC-272
P3124	HV SYSTEM COOLING PUMP	1	×	—	×	—	HBC-272
P3125	ELECTRIC WATER PUMP SYSTEM	1	×	—	×	—	HBC-275
P3126	ELECTRIC WATER PUMP SYSTEM	1	×	—	×	—	HBC-275
P3127	ELECTRIC WATER PUMP SYSTEM	1	×	—	×	—	HBC-275
P3128	ELECTRIC WATER PUMP SYSTEM	1	×	—	×	—	HBC-278
P3135	SLIGHT COLLISION DETECTION	1	×	—	—	—	HBC-280
P3137	CAR CRASH	1	×	—	—	—	HBC-281
P3138	CAR CRASH	1	×	—	—	—	HBC-281
P3139	AIR BAG SYSTEM	1	×	—	—	—	HBC-282
P314D	ENGINE SYSTEM	1	×	—	—	—	HBC-283
P314E	ENGINE SYSTEM	1	×	—	—	—	HBC-283
P314F	ENGINE SYSTEM	1	×	—	—	—	HBC-283
P3151	ENGINE SYSTEM	1	×	—	—	—	HBC-283
P3157	SENSOR POWER SUPPLY	1	×	—	×	B	HBC-284
P3176	MOTOR SYSTEM	1	×	—	—	—	HBC-287
P3177	MOTOR SYSTEM	1	×	—	—	—	HBC-288
P3178	MOTOR SYSTEM	1	×	—	—	—	HBC-289
P3179	MOTOR SYSTEM	1	×	—	—	—	HBC-290
P317A	MOTOR SYSTEM	1	×	—	—	—	HBC-291
P317B	MOTOR SYSTEM	1	×	—	—	—	HBC-292
P317F	HV BATTERY SYSTEM	1	×	—	—	—	HBC-293
P3180	HV BATTERY SYSTEM	1	×	—	—	—	HBC-294
P3181	HV BATTERY SYSTEM	1	×	—	—	—	HBC-295
P3182	HV BATTERY SYSTEM	1	×	—	—	—	HBC-296
P3184	HV BATTERY SYSTEM	1	×	—	—	—	HBC-297
P3185	TRANSMISSION SYSTEM	1	×	—	—	—	HBC-298
P3186	TRANSMISSION SYSTEM	1	×	—	—	—	HBC-299
P3194	COMMUNICATION ERROR	1	×	—	—	—	HBC-300
P31A6	COMMUNICATION ERROR	1	×	—	×	B	HBC-301
P31A7	COMMUNICATION ERROR	1	×	—	×	B	HBC-303
P31A8	COMMUNICATION ERROR	1	×	—	×	B	HBC-305
P31A9	COMMUNICATION ERROR	1	×	—	×	B	HBC-307

DTC[*1]	Items (CONSULT screen terms)	Trip	Warning lamp[*3]				Reference
CONSULT[*2]			HEV	CHG	MIL	Permanent DTC group[*4]	
P31B1	COMMUNICATION ERROR	1	—	—	—	—	HBC-309
P31BC	COMMUNICATION ERROR	1	—	—	—	—	HBC-311
P31EF	DC/DC CONVERTER	1	—	×	—	—	HBC-313
P31F0	COMMUNICATION ERROR	1	—	×	—	—	HBC-315
P31F1	COMMUNICATION ERROR	1	—	×	—	—	HBC-317
P31FB	ASCD SYSTEM	1	—	—	—	—	HBC-319
P31FD	ASCD SYSTEM	1	—	—	—	—	HBC-319
P31FE	ASCD SYSTEM	1	—	—	—	—	HBC-321
P31FF	ASCD VEHICLE SPEED SENSOR	1	—	—	—	—	HBC-323

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012/ISO 15031-6.
*3: When HPCM detects a malfunction in the hybrid systems, warning lamp is turned ON.
- HEV: Hybrid system warning lamp
- CHG: 12-volt battery charge warning lamp
- MIL: Malfunction indicator lamp

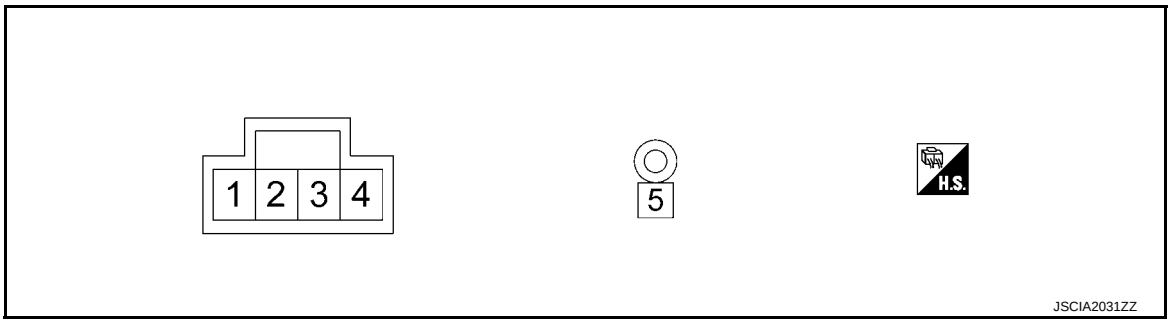
*4: Refer to HBC-107, "Description".
*5: The trouble diagnosis for this DTC needs CONSULT.
*6: This DTC is related with immobilizer.

DC/DC CONVERTER

Reference Value

INFOID:0000000014736109

TERMINAL LAYOUT



PHYSICAL VALUES

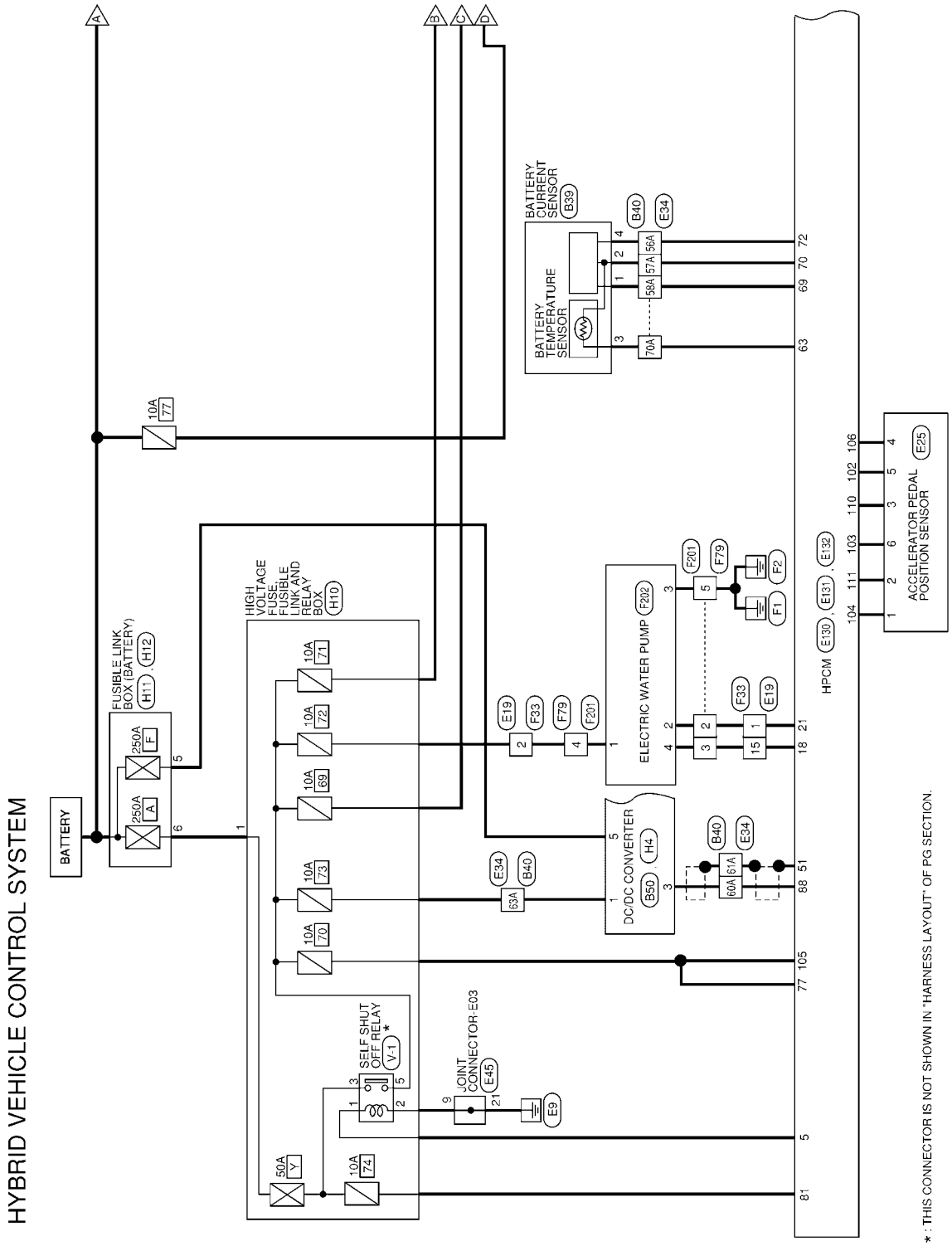
Terminal No. (Wire color)	Description		Condition	Value (Approx.)
	Signal name	Input/ Output		
1 (LG)	Power supply for DC/DC converter	Input	[Ignition switch: ON]	More than 9.5 V
3 (B)	LIN communication signal	Input/ Output	—	—
5 (B/Y)	12V battery voltage	Output	[Ignition switch: OFF]	More than 9.5 V

WIRING DIAGRAM

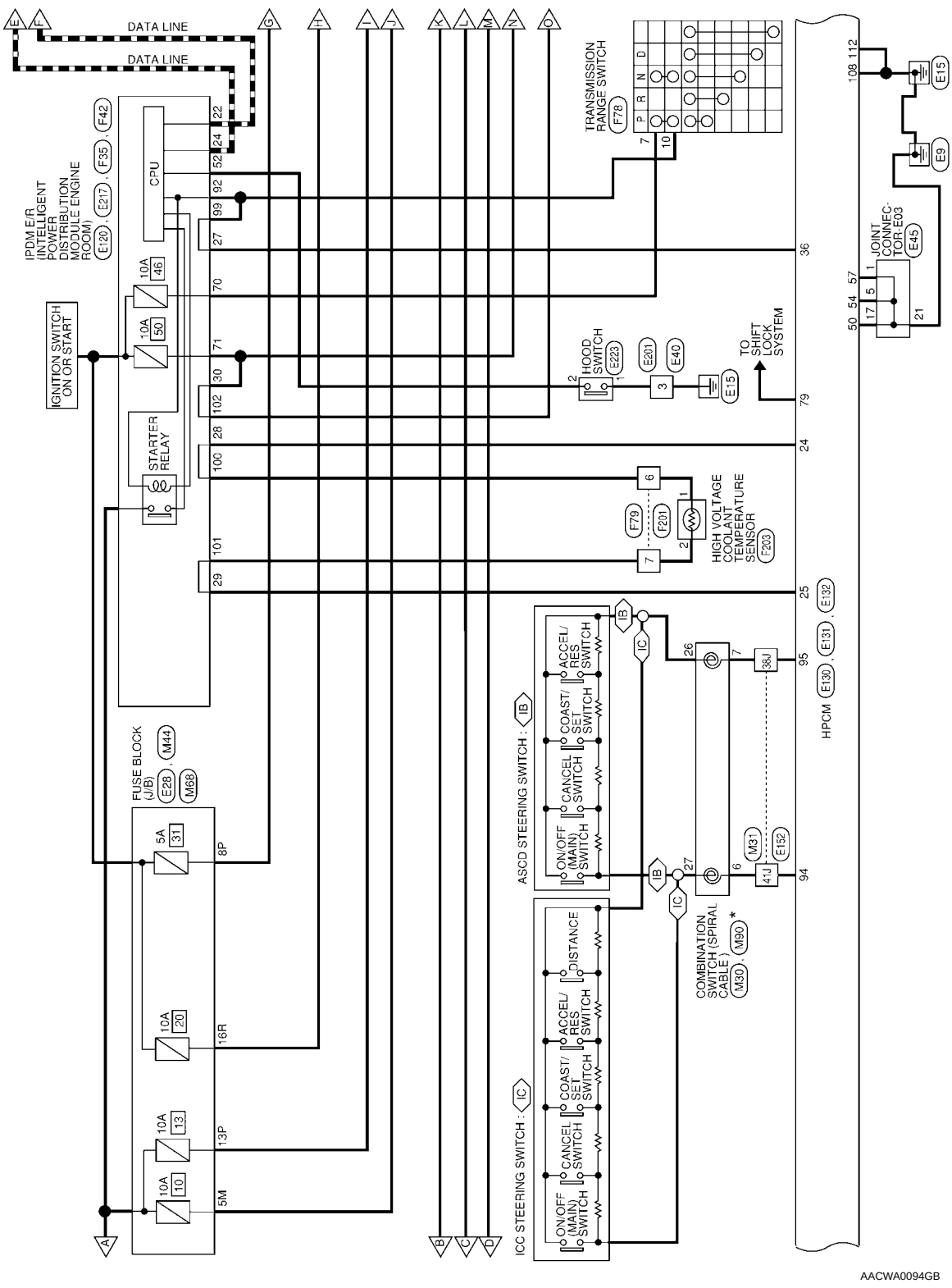
HYBRID CONTROL SYSTEM

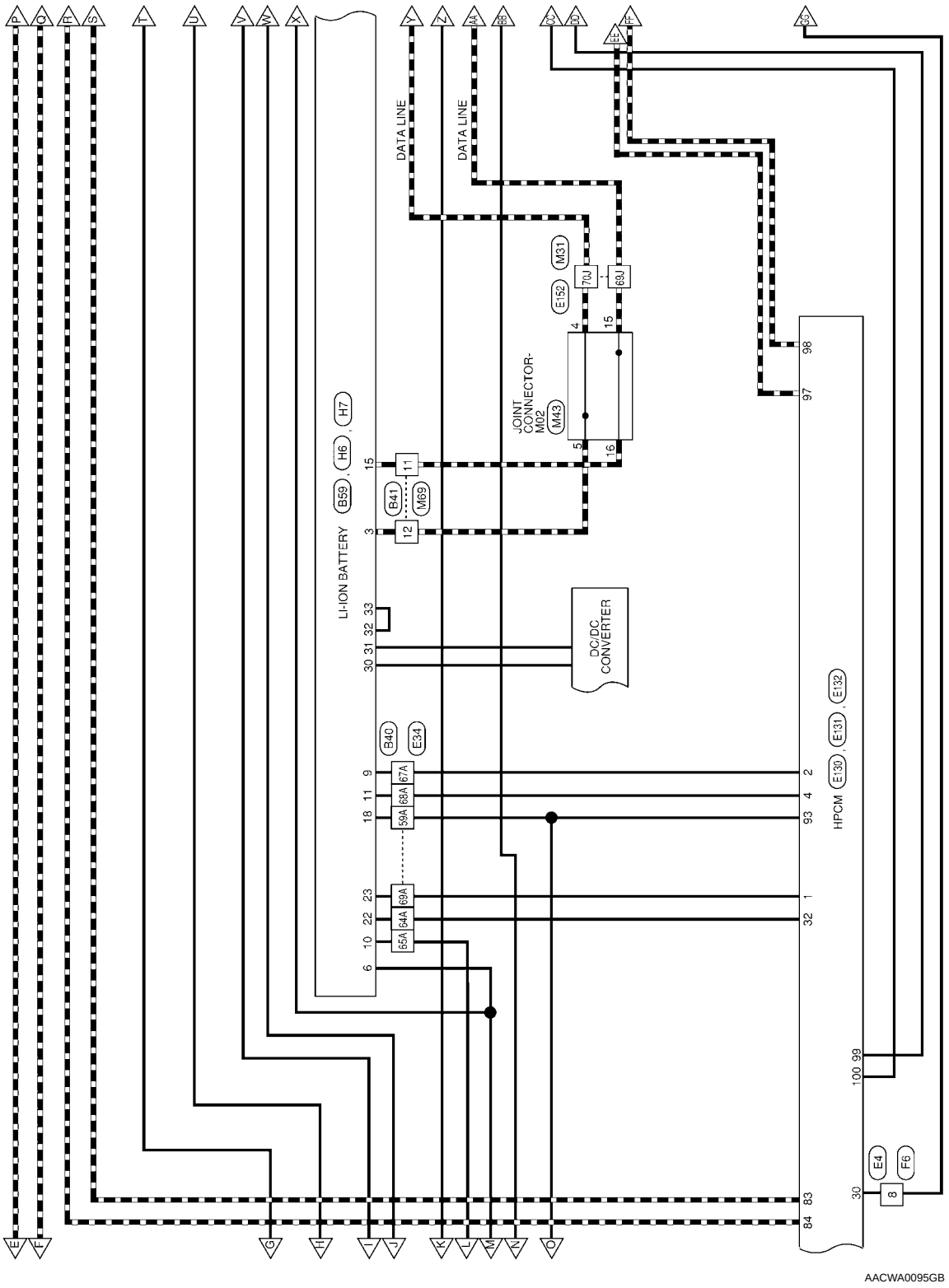
Wiring Diagram

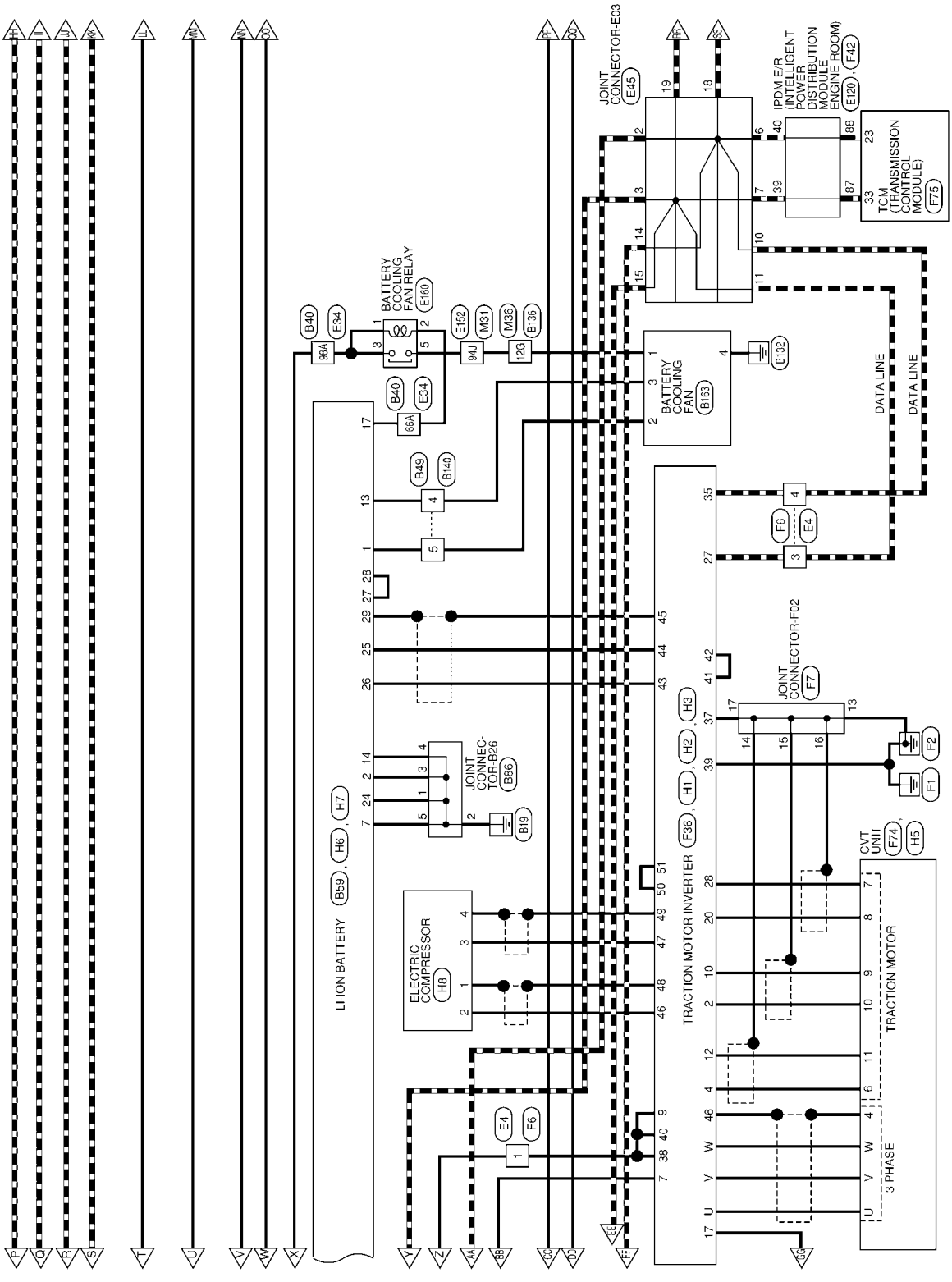
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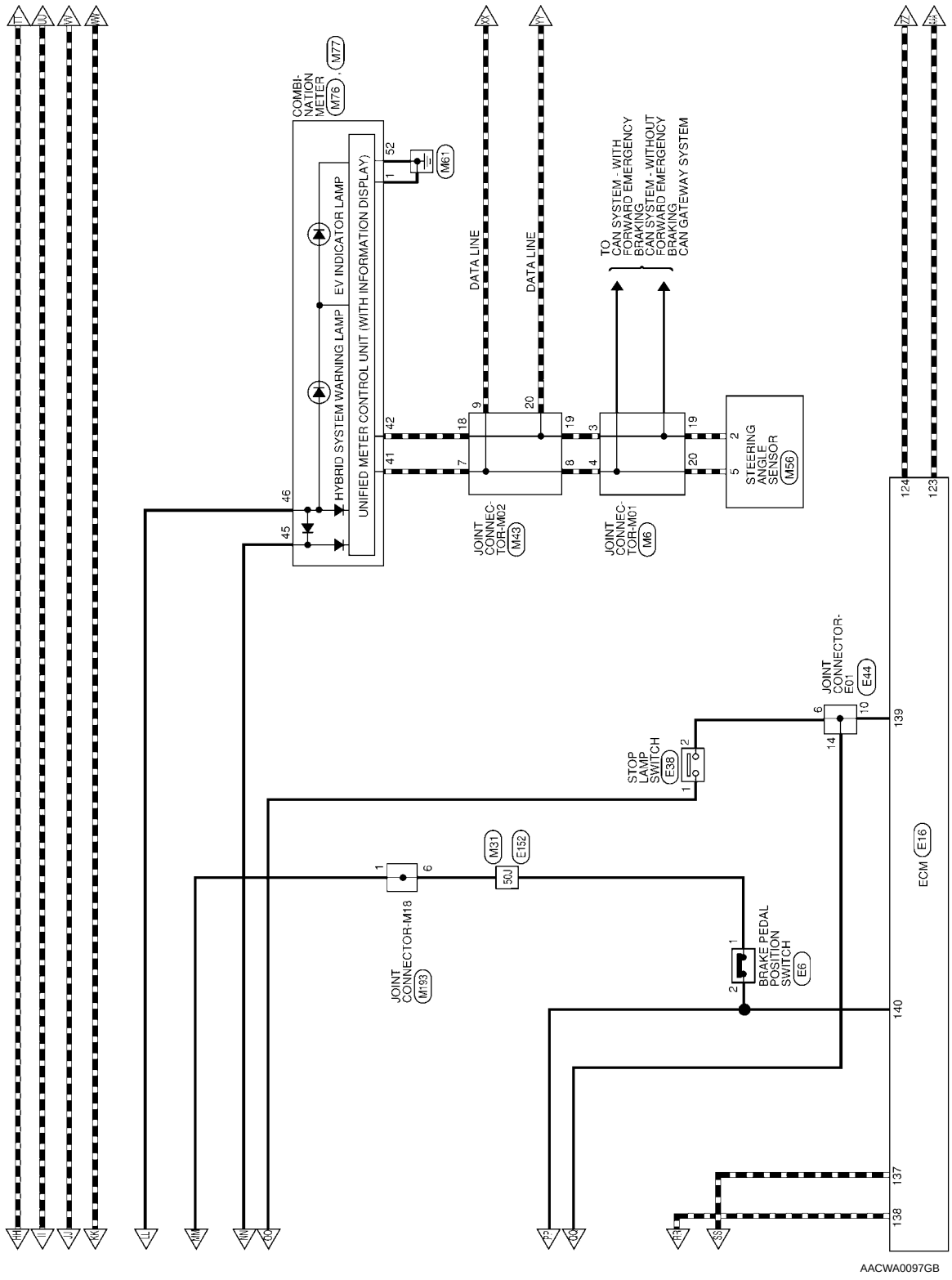


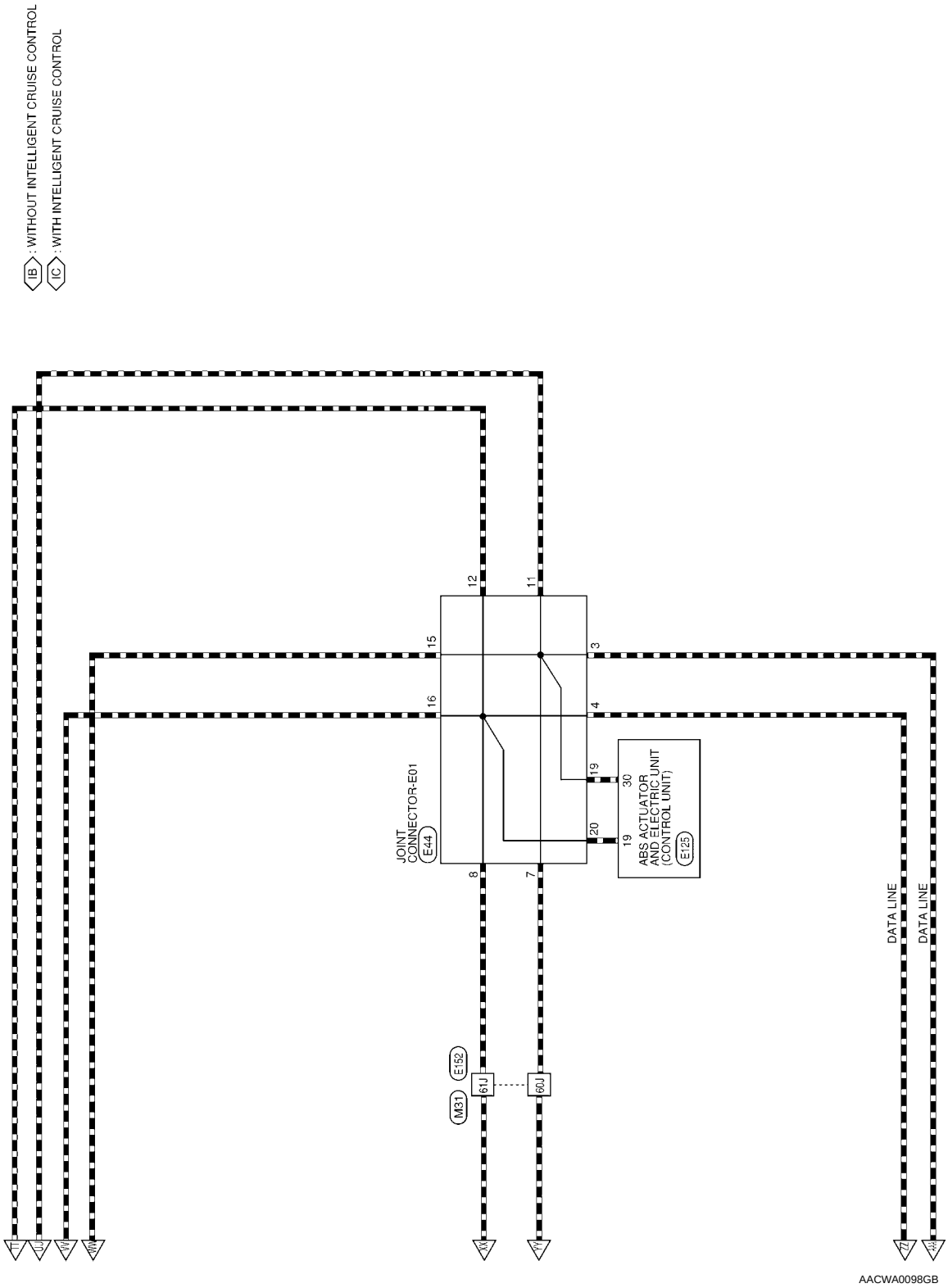
AACWA0093GB


DATA LINE
DATA LINE
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
CPU
IGNITION SWITCH ON OR START
STARTER RELAY
FUSE BLOCK (J/B)
TRANSMISSION RANGE SWITCH
HOOD SWITCH
TO SHIFT LOCK SYSTEM
HIGH VOLTAGE COOLANT TEMPERATURE SENSOR
ASCD STEERING SWITCH
ICC STEERING SWITCH
ON/OFF (MAIN) SWITCH
CANCEL SWITCH
COAST/ SET SWITCH
ACCEL/ RES SWITCH
DISTANCE
COMBINATION SWITCH (SPIRAL CABLE)
HPCM
JOINT CONNECTOR-E03
AACWA0094GB


DATA LINE
DATA LINE
LI-ION BATTERY
JOINT CONNECTOR-M02
DC/DC CONVERTER
HPCM
AACWA0095GB


JOINT CONNECTOR-E03 E45
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E120, F42
TCM (TRANSMISSION CONTROL MODULE) F75
BATTERY COOLING FAN RELAY E160
BATTERY COOLING FAN B163
DATA LINE
DATA LINE
JOINT CONNECTOR-F02 F7
JOINT CONNEC-TOR-B26 B66
LI-ION BATTERY B59, H6, H7
ELECTRIC COMPRESSOR H8
TRACTION MOTOR INVERTER F36, H1, H2, H3
CVT UNIT F74, H5
TRACTION MOTOR
3 PHASE
AACWA0096GB


COMBI-NATION METER
M76
M77
UNIFIED METER CONTROL UNIT (WITH INFORMATION DISPLAY)
HYBRID SYSTEM WARNING LAMP
EV INDICATOR LAMP
DATA LINE
DATA LINE
TO
CAN SYSTEM - WITH FORWARD EMERGENCY BRAKING
CAN SYSTEM - WITHOUT FORWARD EMERGENCY BRAKING
CAN GATEWAY SYSTEM
JOINT CONNEC-TOR-M02
M43
JOINT CONNEC-TOR-M01
M6
STEERING ANGLE SENSOR
M56
JOINT CONNECTOR-E01
E44
STOP LAMP SWITCH
E38
JOINT CONNECTOR-M18
M193
M31
E152
50J
BRAKE PEDAL POSITION SWITCH
E6
ECM
E16
AACWA0097GB


1B : WITHOUT INTELLIGENT CRUISE CONTROL
1C : WITH INTELLIGENT CRUISE CONTROL
JOINT CONNECTOR-E01
E44
12
11
15
3
16
4
19
20
8
7
ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
E125
30
19
DATA LINE
DATA LINE
E152
M31
61J
60J
AACWA0098GB

HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

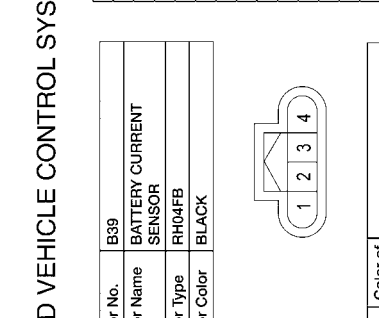
Connector No.	B39
Connector Name	BATTERY CURRENT SENSOR
Connector Type	RH04FB
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	CURSEN
2	W	CURSENG
3	G	TBATT
4	BR	CURSENA

Connector No.	B40
Connector Name	WIRE TO WIRE
Connector Type	TH80MDGY-CS16-TM4
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
1A	–	TO ENGINE ROOM HARNESS
2A	–	TO ENGINE ROOM HARNESS
3A	–	TO ENGINE ROOM HARNESS
4A	–	TO ENGINE ROOM HARNESS
5A	–	TO ENGINE ROOM HARNESS
6A	LG	TO ENGINE ROOM HARNESS

7A	Y	TO ENGINE ROOM HARNESS
8A	GR	TO ENGINE ROOM HARNESS
9A	BR	TO ENGINE ROOM HARNESS
10A	–	TO ENGINE ROOM HARNESS
11A	–	TO ENGINE ROOM HARNESS
12A	–	TO ENGINE ROOM HARNESS
13A	–	TO ENGINE ROOM HARNESS
14A	–	TO ENGINE ROOM HARNESS
15A	–	TO ENGINE ROOM HARNESS
16A	–	TO ENGINE ROOM HARNESS
17A	–	TO ENGINE ROOM HARNESS
18A	–	TO ENGINE ROOM HARNESS
19A	–	TO ENGINE ROOM HARNESS
20A	–	TO ENGINE ROOM HARNESS
21A	–	TO ENGINE ROOM HARNESS
22A	–	TO ENGINE ROOM HARNESS
23A	–	TO ENGINE ROOM HARNESS
24A	–	TO ENGINE ROOM HARNESS
25A	–	TO ENGINE ROOM HARNESS
26A	–	TO ENGINE ROOM HARNESS
27A	–	TO ENGINE ROOM HARNESS
28A	–	TO ENGINE ROOM HARNESS
29A	–	TO ENGINE ROOM HARNESS
30A	–	TO ENGINE ROOM HARNESS
31A	–	TO ENGINE ROOM HARNESS
32A	–	TO ENGINE ROOM HARNESS
33A	–	TO ENGINE ROOM HARNESS
34A	–	TO ENGINE ROOM HARNESS
35A	–	TO ENGINE ROOM HARNESS
36A	–	TO ENGINE ROOM HARNESS
37A	–	TO ENGINE ROOM HARNESS
38A	–	TO ENGINE ROOM HARNESS
39A	–	TO ENGINE ROOM HARNESS
40A	–	TO ENGINE ROOM HARNESS
41A	–	TO ENGINE ROOM HARNESS
42A	–	TO ENGINE ROOM HARNESS
43A	–	TO ENGINE ROOM HARNESS
44A	–	TO ENGINE ROOM HARNESS
45A	–	TO ENGINE ROOM HARNESS
46A	–	TO ENGINE ROOM HARNESS
47A	–	TO ENGINE ROOM HARNESS
48A	–	TO ENGINE ROOM HARNESS
49A	–	TO ENGINE ROOM HARNESS
50A	–	TO ENGINE ROOM HARNESS
51A	–	TO ENGINE ROOM HARNESS
52A	–	TO ENGINE ROOM HARNESS
53A	–	TO ENGINE ROOM HARNESS
54A	R	TO ENGINE ROOM HARNESS
55A	L	TO ENGINE ROOM HARNESS
56A	BR	TO ENGINE ROOM HARNESS
57A	W	TO ENGINE ROOM HARNESS
58A	B	TO ENGINE ROOM HARNESS
59A	LG	TO ENGINE ROOM HARNESS

60A	B	TO ENGINE ROOM HARNESS
61A	SHIELD	TO ENGINE ROOM HARNESS
62A	–	TO ENGINE ROOM HARNESS
63A	LG	TO ENGINE ROOM HARNESS
64A	Y	TO ENGINE ROOM HARNESS
65A	P	TO ENGINE ROOM HARNESS
66A	R	TO ENGINE ROOM HARNESS
67A	SB	TO ENGINE ROOM HARNESS
68A	BG	TO ENGINE ROOM HARNESS
69A	GR	TO ENGINE ROOM HARNESS
70A	G	TO ENGINE ROOM HARNESS
71A	–	TO ENGINE ROOM HARNESS
72A	–	TO ENGINE ROOM HARNESS
73A	–	TO ENGINE ROOM HARNESS
74A	–	TO ENGINE ROOM HARNESS
75A	B	TO ENGINE ROOM HARNESS
76A	G	TO ENGINE ROOM HARNESS
77A	SB	TO ENGINE ROOM HARNESS
78A	BG	TO ENGINE ROOM HARNESS
79A	Y	TO ENGINE ROOM HARNESS
80A	BR	TO ENGINE ROOM HARNESS
81A	R	TO ENGINE ROOM HARNESS
82A	–	TO ENGINE ROOM HARNESS
83A	–	TO ENGINE ROOM HARNESS
84A	–	TO ENGINE ROOM HARNESS
85A	–	TO ENGINE ROOM HARNESS
86A	–	TO ENGINE ROOM HARNESS
87A	–	TO ENGINE ROOM HARNESS
88A	–	TO ENGINE ROOM HARNESS
89A	–	TO ENGINE ROOM HARNESS
90A	–	TO ENGINE ROOM HARNESS
91A	–	TO ENGINE ROOM HARNESS
92A	–	TO ENGINE ROOM HARNESS
93A	–	TO ENGINE ROOM HARNESS
94A	–	TO ENGINE ROOM HARNESS
95A	–	TO ENGINE ROOM HARNESS
96A	BG	TO ENGINE ROOM HARNESS
97A	–	TO ENGINE ROOM HARNESS
98A	GR	TO ENGINE ROOM HARNESS
99A	LA/BR	TO ENGINE ROOM HARNESS
100A	G	TO ENGINE ROOM HARNESS

Connector No.	B41
Connector Name	WIRE TO WIRE
Connector Type	TH32MW-NH
Connector Color	WHITE

H.S.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Terminal No.	Color of Wire	Signal Name
1	SB	TO MAIN HARNESS
2	SB	TO MAIN HARNESS
3	L	TO MAIN HARNESS
4	L	TO MAIN HARNESS
5	W	TO MAIN HARNESS
6	Y	TO MAIN HARNESS
7	LG	TO MAIN HARNESS
8	BG	TO MAIN HARNESS
9	BR	TO MAIN HARNESS
10	Y	TO MAIN HARNESS
11	G	TO MAIN HARNESS
12	L	TO MAIN HARNESS
13	W	TO MAIN HARNESS
14	GR	TO MAIN HARNESS
15	Y	TO MAIN HARNESS
16	P	TO MAIN HARNESS
17	R	TO MAIN HARNESS
18	W	TO MAIN HARNESS
19	R	TO MAIN HARNESS
20	–	TO MAIN HARNESS
21	–	TO MAIN HARNESS
22	–	TO MAIN HARNESS
23	–	TO MAIN HARNESS
24	P	TO MAIN HARNESS
25	L	TO MAIN HARNESS
26	G	TO MAIN HARNESS
27	R	TO MAIN HARNESS
28	L	TO MAIN HARNESS
29	SHIELD	TO MAIN HARNESS
30	W	TO MAIN HARNESS
31	B	TO MAIN HARNESS
32	R	TO MAIN HARNESS

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	B49
Connector Name	WIRE TO WIRE
Connector Type	NS16MW-CS
Connector Color	WHITE

H.S.

1	2	3		4	5	6	7
8	9	10	11	12	13	14	15	16

Terminal No.	Color of Wire	Signal Name
1	SB	TO BODY NO. 2 HARNESS
2	W	TO BODY NO. 2 HARNESS
3	LA/W	TO BODY NO. 2 HARNESS
4	V	TO BODY NO. 2 HARNESS
5	SB	TO BODY NO. 2 HARNESS
6	LA/BR	TO BODY NO. 2 HARNESS
7	P	TO BODY NO. 2 HARNESS
8	LA/W	TO BODY NO. 2 HARNESS
9	LA/BR	TO BODY NO. 2 HARNESS
10	R	TO BODY NO. 2 HARNESS
11	LA/G	TO BODY NO. 2 HARNESS
12	LA/P	TO BODY NO. 2 HARNESS
13	–	TO BODY NO. 2 HARNESS
14	–	TO BODY NO. 2 HARNESS
15	G	TO BODY NO. 2 HARNESS
16	V	TO BODY NO. 2 HARNESS

Connector No.	B59
Connector Name	LI-ION BATTERY
Connector Type	TH24FW-NH
Connector Color	WHITE

H.S.

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24

Terminal No.	Color of Wire	Signal Name
1	SB	SIO
2	B	GND1
3	L	CAN-H
4	–	–
5	–	–
6	P	BAT
7	B	RLY2 GND
8	–	–
9	SB	PRE CHG RLY V
10	P	SDSW (+)
11	BG	RLY1 V
12	–	–
13	V	VM0
14	B	GND2
15	G	CAN-L
16	–	–
17	R	FCTL
18	LG	VIGN
19	–	–
20	–	–
21	–	–
22	Y	SDSW (–)
23	GR	RLY2 V
24	B	RLY1 GND

Connector No.	B86
Connector Name	JOINT CONNECTOR-B26
Connector Type	SAC08JW
Connector Color	WHITE

H.S.

8	7	6	5	4	3	2	1

Terminal No.	Color of Wire	Signal Name
1	B	GROUND
2	B	GROUND
3	B	GROUND
4	B	GROUND
5	B	GROUND
6	–	–
7	–	–
8	–	–

Connector No.	B50
Connector Name	DC/DC CONVERTER
Connector Type	JAB04FB
Connector Color	BLACK

H.S.

1	2	3	4

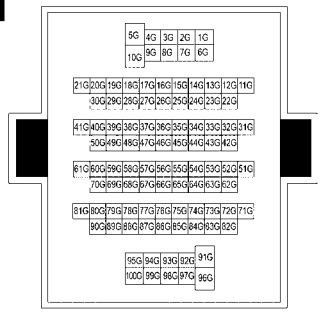
Terminal No.	Color of Wire	Signal Name
1	LG	POWER SUPPLY FOR DC/DC CONVERTER
2	–	–
3	B	LIN COMMUNICATION SIGNAL
4	–	–

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	B136
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4
Connector Color	WHITE

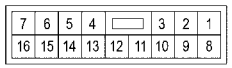
H.S.



Terminal No.	Color of Wire	Signal Name
1G	LA/GR	TO MAIN HARNESS
2G	LA/P	TO MAIN HARNESS
3G	Y	TO MAIN HARNESS
4G	L	TO MAIN HARNESS
5G	G	TO MAIN HARNESS
6G	LA/BR	TO MAIN HARNESS
7G	BR	TO MAIN HARNESS
8G	LA/L	TO MAIN HARNESS
9G	LA/R	TO MAIN HARNESS
10G	R	TO MAIN HARNESS
11G	G	TO MAIN HARNESS
12G	Y	TO MAIN HARNESS
13G	BR	TO MAIN HARNESS
14G	–	TO MAIN HARNESS
15G	Y	TO MAIN HARNESS
16G	–	TO MAIN HARNESS
17G	–	TO MAIN HARNESS
18G	R	TO MAIN HARNESS
19G	R	TO MAIN HARNESS
20G	W	TO MAIN HARNESS
21G	P	TO MAIN HARNESS
22G	P	TO MAIN HARNESS
23G	L	TO MAIN HARNESS
24G	W	TO MAIN HARNESS
25G	L	TO MAIN HARNESS
26G	–	TO MAIN HARNESS
27G	–	TO MAIN HARNESS
28G	–	TO MAIN HARNESS
29G	SB	TO MAIN HARNESS
30G	–	TO MAIN HARNESS
31G	–	TO MAIN HARNESS
32G	–	TO MAIN HARNESS
33G	–	TO MAIN HARNESS
34G	V	TO MAIN HARNESS
35G	BR	TO MAIN HARNESS
36G	SHIELD	TO MAIN HARNESS
37G	LG	TO MAIN HARNESS
38G	V	TO MAIN HARNESS
39G	SHIELD	TO MAIN HARNESS
40G	G	TO MAIN HARNESS
41G	R	TO MAIN HARNESS
42G	–	TO MAIN HARNESS
43G	–	TO MAIN HARNESS
44G	BG	TO MAIN HARNESS
45G	SHIELD	TO MAIN HARNESS
46G	W	TO MAIN HARNESS
47G	R	TO MAIN HARNESS
48G	SHIELD	TO MAIN HARNESS
49G	L	TO MAIN HARNESS
50G	Y	TO MAIN HARNESS
51G	–	TO MAIN HARNESS
52G	–	TO MAIN HARNESS
53G	–	TO MAIN HARNESS
54G	–	TO MAIN HARNESS
55G	–	TO MAIN HARNESS
56G	–	TO MAIN HARNESS
57G	–	TO MAIN HARNESS
58G	–	TO MAIN HARNESS
59G	–	TO MAIN HARNESS
60G	GR	TO MAIN HARNESS
61G	V	TO MAIN HARNESS
62G	–	TO MAIN HARNESS
63G	–	TO MAIN HARNESS
64G	–	TO MAIN HARNESS
65G	–	TO MAIN HARNESS
66G	–	TO MAIN HARNESS
67G	–	TO MAIN HARNESS
68G	–	TO MAIN HARNESS
69G	–	TO MAIN HARNESS
70G	–	TO MAIN HARNESS
71G	–	TO MAIN HARNESS
72G	–	TO MAIN HARNESS
73G	–	TO MAIN HARNESS
74G	–	TO MAIN HARNESS
75G	–	TO MAIN HARNESS
76G	–	TO MAIN HARNESS
77G	–	TO MAIN HARNESS
78G	LA/R	TO MAIN HARNESS
79G	LA/V	TO MAIN HARNESS
80G	LA/B	TO MAIN HARNESS
81G	LA/L	TO MAIN HARNESS
82G	–	TO MAIN HARNESS
83G	–	TO MAIN HARNESS
84G	–	TO MAIN HARNESS
85G	–	TO MAIN HARNESS
86G	–	TO MAIN HARNESS
87G	–	TO MAIN HARNESS
88G	–	TO MAIN HARNESS
89G	–	TO MAIN HARNESS
90G	–	TO MAIN HARNESS
91G	R	TO MAIN HARNESS
92G	BR	TO MAIN HARNESS
93G	W	TO MAIN HARNESS
94G	LA/V	TO MAIN HARNESS
95G	V	TO MAIN HARNESS
96G	G	TO MAIN HARNESS
97G	P	TO MAIN HARNESS
98G	GR	TO MAIN HARNESS
99G	LA/Y	TO MAIN HARNESS
100G	Y	TO MAIN HARNESS

Connector No.	B140
Connector Name	WIRE TO WIRE
Connector Type	NS16FW-CS
Connector Color	WHITE

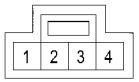
H.S.



Terminal No.	Color of Wire	Signal Name
1	GR	TO BODY HARNESS
2	W	TO BODY HARNESS
3	LA/Y	TO BODY HARNESS
4	V	TO BODY HARNESS
5	SB	TO BODY HARNESS
6	LA/BR	TO BODY HARNESS
7	LA/V	TO BODY HARNESS
8	L	TO BODY HARNESS
9	Y	TO BODY HARNESS
10	R	TO BODY HARNESS
11	V	TO BODY HARNESS
12	LG	TO BODY HARNESS
13	L	TO BODY HARNESS
14	Y	TO BODY HARNESS
15	LA/GR	TO BODY HARNESS
16	LA/LG	TO BODY HARNESS

Connector No.	B163
Connector Name	BATTERY COOLING FAN
Connector Type	NS04FW-CS
Connector Color	WHITE

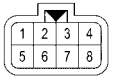
H.S.



Terminal No.	Color of Wire	Signal Name
1	Y	IGN
2	SB	SI
3	V	VM
4	B	GND

Connector No.	E4
Connector Name	WIRE TO WIRE
Connector Type	RS08MGY-PR
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
1	Y	TO ENGINE CONTROL HARNESS
2	–	TO ENGINE CONTROL HARNESS
3	L	TO ENGINE CONTROL HARNESS
4	G	TO ENGINE CONTROL HARNESS
5	–	TO ENGINE CONTROL HARNESS
6	–	TO ENGINE CONTROL HARNESS
7	–	TO ENGINE CONTROL HARNESS
8	–	TO ENGINE CONTROL HARNESS

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	E6
Connector Name	BRAKE PEDAL POSITION SWITCH
Connector Type	M02FBR-LC
Connector Color	BROWN

H.S.



Terminal No.	Color of Wire	Signal Name
1	P	IGNITION
2	GR	SWITCH OUTPUT

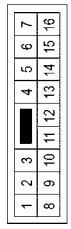
Connector No.	E16
Connector Name	ECM
Connector Type	RH24FB-RZ8-L-LH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
121	L	EVAP CONTROL SYSTEM PRESSURE SENSOR
122	-	-
123	P	CAN-L
124	L	CAN-H
125	R	SENSOR POWER SUPPLY
126	-	-
127	-	-
128	BG	FUEL TANK TEMPERATURE SENSOR
129	-	-
130	-	-
131	-	-
132	-	-
133	LG	IGNITION SWITCH
134	-	-
135	-	-
136	-	-
137	G	HEV CAN-L
138	L	HEV CAN-H
139	Y	STOP LAMP SWITCH
140	GR	BRAKE PEDAL POSITION SWITCH
141	Y	EVAP CANISTER VENT CONTROL VALVE
142	-	-
143	-	-
144	-	-
145	G	ECM POWER SUPPLY
146	-	-
147	GR	ECM GROUND
148	B	SENSOR GROUND
149	GR	ECM GROUND
150	-	-
151	-	-
152	GR	ECM GROUND

Connector No.	E19
Connector Name	WIRE TO WIRE
Connector Type	NS16MBR-CS
Connector Color	BROWN

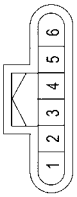
H.S.



Terminal No.	Color of Wire	Signal Name
1	B	TO ENGINE CONTROL HARNESS
2	BG	TO ENGINE CONTROL HARNESS
3	B	TO ENGINE CONTROL HARNESS
4	B	TO ENGINE CONTROL HARNESS
5	B	TO ENGINE CONTROL HARNESS
6	B	TO ENGINE CONTROL HARNESS
7	B	TO ENGINE CONTROL HARNESS
8	W	TO ENGINE CONTROL HARNESS
9	BR	TO ENGINE CONTROL HARNESS
10	BR	TO ENGINE CONTROL HARNESS
11	L	TO ENGINE CONTROL HARNESS
12	BR	TO ENGINE CONTROL HARNESS
13	R	TO ENGINE CONTROL HARNESS
14	G	TO ENGINE CONTROL HARNESS
15	W	TO ENGINE CONTROL HARNESS
16	W	TO ENGINE CONTROL HARNESS

Connector No.	E25
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	LG	SENSOR GROUND
2	R	SENSOR GROUND
3	GR	ACCELERATOR PEDAL POSITION SENSOR 1
4	V	ACCELERATOR PEDAL POSITION SENSOR 2
5	SB	SENSOR POWER SUPPLY
6	BR	ACCELERATOR PEDAL POSITION SENSOR 2

Connector No.	E28
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS10FW-CS
Connector Color	WHITE

H.S.



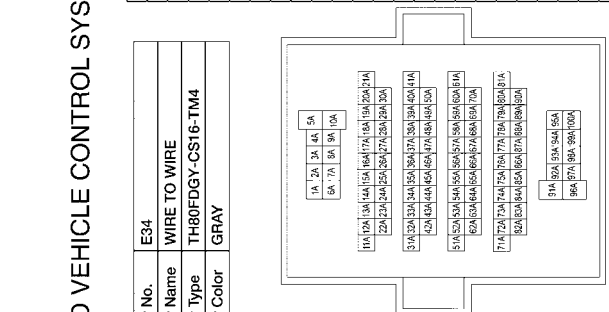
Terminal No.	Color of Wire	Signal Name
1M	-	-
2M	-	-
3M	-	-
4M	-	-
5M	V	BATTERY
6M	Y	O LIGHT POSITION REAR LH
7M	-	-
8M	-	-
9M	-	-
10M	-	-

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	E34
Connector Name	WIRE TO WIRE
Connector Type	TH80FDGY-CS16-TM4
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
1A	–	TO BODY HARNESS
2A	–	TO BODY HARNESS
3A	–	TO BODY HARNESS
4A	–	TO BODY HARNESS
5A	–	TO BODY HARNESS
6A	L	TO BODY HARNESS
7A	R	TO BODY HARNESS
8A	GR	TO BODY HARNESS
9A	BR	TO BODY HARNESS
10A	–	TO BODY HARNESS
11A	–	TO BODY HARNESS
12A	–	TO BODY HARNESS
13A	–	TO BODY HARNESS
14A	–	TO BODY HARNESS
15A	–	TO BODY HARNESS
16A	–	TO BODY HARNESS
17A	–	TO BODY HARNESS
18A	–	TO BODY HARNESS
19A	–	TO BODY HARNESS
20A	–	TO BODY HARNESS
21A	–	TO BODY HARNESS
22A	–	TO BODY HARNESS
23A	–	TO BODY HARNESS
24A	–	TO BODY HARNESS
25A	–	TO BODY HARNESS
26A	–	TO BODY HARNESS
27A	–	TO BODY HARNESS
28A	–	TO BODY HARNESS
29A	–	TO BODY HARNESS
30A	–	TO BODY HARNESS
31A	–	TO BODY HARNESS
32A	–	TO BODY HARNESS
33A	–	TO BODY HARNESS
34A	–	TO BODY HARNESS
35A	–	TO BODY HARNESS
36A	–	TO BODY HARNESS
37A	–	TO BODY HARNESS
38A	–	TO BODY HARNESS
39A	–	TO BODY HARNESS
40A	–	TO BODY HARNESS
41A	–	TO BODY HARNESS
42A	–	TO BODY HARNESS
43A	–	TO BODY HARNESS
44A	–	TO BODY HARNESS
45A	–	TO BODY HARNESS
46A	–	TO BODY HARNESS
47A	–	TO BODY HARNESS
48A	–	TO BODY HARNESS
49A	–	TO BODY HARNESS
50A	–	TO BODY HARNESS
51A	–	TO BODY HARNESS
52A	–	TO BODY HARNESS
53A	–	TO BODY HARNESS
54A	R	TO BODY HARNESS
55A	L	TO BODY HARNESS
56A	BR	TO BODY HARNESS
57A	W	TO BODY HARNESS
58A	V	TO BODY HARNESS
59A	Y	TO BODY HARNESS
60A	B	TO BODY HARNESS
61A	SHIELD	TO BODY HARNESS
62A	–	TO BODY HARNESS
63A	L	TO BODY HARNESS
64A	Y	TO BODY HARNESS
65A	P	TO BODY HARNESS
66A	R	TO BODY HARNESS
67A	SB	TO BODY HARNESS
68A	BG	TO BODY HARNESS
69A	GR	TO BODY HARNESS
70A	LG	TO BODY HARNESS
71A	–	TO BODY HARNESS
72A	–	TO BODY HARNESS
73A	–	TO BODY HARNESS
74A	–	TO BODY HARNESS
75A	B	TO BODY HARNESS
76A	G	TO BODY HARNESS
77A	SB	TO BODY HARNESS
78A	BG	TO BODY HARNESS
79A	LG	TO BODY HARNESS
80A	BR	TO BODY HARNESS
81A	G	TO BODY HARNESS
82A	–	TO BODY HARNESS
83A	–	TO BODY HARNESS
84A	–	TO BODY HARNESS
85A	–	TO BODY HARNESS
86A	–	TO BODY HARNESS
87A	–	TO BODY HARNESS
88A	–	TO BODY HARNESS
89A	–	TO BODY HARNESS
90A	–	TO BODY HARNESS
91A	–	TO BODY HARNESS
92A	–	TO BODY HARNESS
93A	–	TO BODY HARNESS
94A	–	TO BODY HARNESS
95A	–	TO BODY HARNESS
96A	G	TO BODY HARNESS
97A	–	TO BODY HARNESS
98A	GR	TO BODY HARNESS
99A	W	TO BODY HARNESS
100A	G	TO BODY HARNESS

Connector No.	E38
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1	V	BATTERY
2	LG	I BRAKE SW2
3	L	IGNITION
4	W	STOP LAMP SWITCH OUTPUT

Connector No.	E40
Connector Name	WIRE TO WIRE
Connector Type	M04MW-LC
Connector Color	WHITE

H.S.

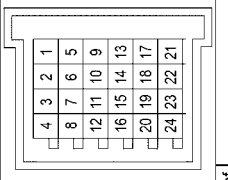
Terminal No.	Color of Wire	Signal Name
1	–	TO FRONT END MODULE HARNESS
2	GR	TO FRONT END MODULE HARNESS
3	B	TO FRONT END MODULE HARNESS
4	–	TO FRONT END MODULE HARNESS

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	E44
Connector Name	JOINT CONNECTOR-E01
Connector Type	NH24FG-J
Connector Color	GREEN

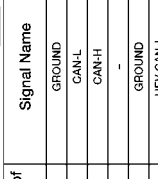
H.S.



Terminal No.	Color of Wire	Signal Name
1	V	SENSOR GROUND
2	LG	I BRAKE SW2
3	P	CAN-L
4	L	CAN-H
5	B	SENSOR GROUND
6	LG	I BRAKE SW2
7	P	CAN-L
8	L	CAN-H
9	W	SENSOR GROUND
10	Y	STOP LAMP SWITCH
11	P	CAN-L
12	L	CAN-H
13	–	–
14	R	STOP LAMP SWITCH
15	P	CAN-L
16	L	CAN-H
17	BR	EVAP CONTROL SYSTEM PRESSURE SENSOR
18	–	–
19	P	CAN-L
20	L	CAN-H
21	L	EVAP CONTROL SYSTEM PRESSURE SENSOR
22	–	–
23	–	–
24	–	–

Connector No.	E45
Connector Name	JOINT CONNECTOR-E03
Connector Type	NH24FW-J
Connector Color	WHITE

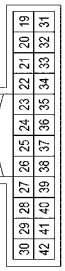
H.S.



Terminal No.	Color of Wire	Signal Name
1	B	GROUND
2	G	CAN-L
3	L	CAN-H
4	–	–
5	B	GROUND
6	G	HEV CAN-L
7	L	HEV CAN-H
8	–	–
9	B	GROUND
10	G	CAN-L
11	L	CAN-H
12	–	–
13	SHIELD	SHIELD
14	G	CAN-L
15	L	CAN-H
16	–	–
17	B	GROUND
18	G	HEV CAN-L
19	L	HEV CAN-H
20	–	–
21	B	GROUND
22	–	–
23	–	–
24	–	–

Connector No.	E120
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH24FGY-NH
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
19	LG	IGN ECM
20	–	–
21	–	–
22	P	CAN-L
23	–	–
24	L	CAN-H
25	–	–
26	–	–
27	SB	CABIN MOTOR 5
28	R	CABIN MOTOR 6
29	LG	CABIN MOTOR 7
30	Y	CABIN MOTOR 8
31	B	2ND SIGNAL GROUND
32	GR	LI PUSH SW
33	BR	AUTO STOP WIPER
34	–	–
35	–	–
36	–	–
37	–	–
38	–	–
39	L	HEV CAN-H
40	G	HEV CAN-L
41	W	CABIN MOTOR 3
42	R	CABIN MOTOR 4

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	E125
Connector Name	ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
Connector Type	SAZ34FB-HS2-SJZ2-DH
Connector Color	BLACK

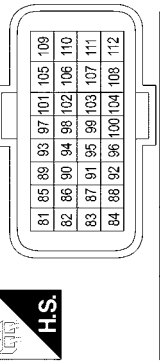
H.S.



Terminal No.	Color of Wire	Signal Name
1	BR	UB VR
2	B	GND MR
3	Y	UB MR
4	B	GND ECU
5	–	–
6	–	–
7	–	–
8	W	SKS1 (S1)
9	BR	VDC OFF
10	G	SKS2 (S2)
11	V	WSP FR
12	SB	WSS FR
13	BR	WSP RL
14	G	WSS RL
15	–	–
16	–	–
17	–	–
18	–	–
19	L	CAN- H
20	–	–
21	–	–
22	–	–
23	W	WSP FL
24	P	WSS FL
25	BG	WSP RR
26	LG	WSS RR
27	–	–
28	GR	WAU
29	–	–
30	P	CAN- L
31	B	VSSG (GND)
32	–	–
33	R	ASSM (VCC)
35	–	–
36	–	–
37	–	–
38	–	–

Connector No.	E130
Connector Name	HPCM
Connector Type	RH24FB-RZ8-L-RH
Connector Color	BLACK

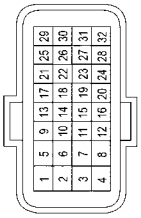
H.S.



Terminal No.	Color of Wire	Signal Name
81	R	12V BATTERY VOLTAGE
82	–	–
83	P	CAN-L
84	L	CAN-H
85	–	–
86	–	–
87	–	–
88	B	DC/DC CONVERTER VOLTAGE STABILIZER SIGNAL
89	–	–
90	–	–
91	–	–
92	–	–
93	Y	IGNITION SIGNAL
94	G	ASCD STEERING SWITCH
95	BR	ASCD STEERING SWITCH GROUND
96	–	–
97	L	HEV SYSTEM CAN-H
98	G	HEV SYSTEM CAN-L
99	R	STOP LAMP SWITCH
100	W	BRAKE PEDAL POSITION SWITCH
101	–	–
102	SB	SENSOR POWER SUPPLY
103	BR	ACCELERATOR PEDAL POSITION SENSOR 2
104	LG	SENSOR GROUND
105	BR	POWER SUPPLY FOR HPCM
106	V	SENSOR POWER SUPPLY
107	–	–
108	B	HPCM GND
109	–	–
110	GR	ACCELERATOR PEDAL POSITION SENSOR 1
111	R	SENSOR GROUND
112	GR	HPCM GND

Connector No.	E131
Connector Name	HPCM
Connector Type	RH24FGY-RZ8-R-RH
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
1	GR	SYSTEM MAIN RELAY 2
2	SB	PRE-CHARGE SIGNAL
3	–	–
4	BG	SYSTEM MAIN RELAY 1
5	V	SELF SHUT OFF RELAY
6	–	–
7	–	–
8	–	–
9	–	–
10	–	–
11	–	–
12	–	–
13	–	–
14	–	–
15	–	–
16	–	–
17	–	–
18	W	ELECTRIC WATER PUMP
19	–	–
20	–	–
21	B	ELECTRIC WATER PUMP (FEED BACK)
22	–	–
23	–	–
24	R	HIGH VOLTAGE COOLING WATER TEMPERATURE SENSOR
25	LG	SENSOR GROUND
26	–	–
27	–	–
28	–	–
29	–	–
30	W	CONNECTION DETECTING CIRCUIT
31	–	–
32	Y	SERVICE PLUG

AACIA0388GB

HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	E132
Connector Name	HPCM
Connector Type	RH40FBR-RZ8-L-RH
Connector Color	BROWN

H.S.

33	37	41	45	49	53	57	61	65	69	73	77
34	38	42	46	50	54	58	62	66	70	74	78
35	39	43	47	51	55	59	63	67	71	75	79
36	40	44	46	52	56	60	64	68	72	76	80

Terminal No.	Color of Wire	Signal Name
33	–	–
34	–	–
35	–	–
36	SB	P/N SIGNAL
37	–	–
38	–	–
39	–	–
40	–	–
41	–	–
42	–	–
43	–	–
44	–	–
45	–	–
46	–	–
47	–	–
48	–	–
49	–	–
50	B	HPCM GROUND
51	SHIELD	SHIELD
52	–	–
53	–	–
54	B	HPCM GROUND
55	–	–
56	–	–
57	B	HPCM GROUND
58	–	–
59	–	–
60	–	–
61	–	–
62	–	–
63	LG	12V BATTERY TEMPERATURE SENSOR
64	–	–
65	–	–
66	–	–
67	–	–
68	–	–
69	V	12V BATTERY CURRENT SENSOR
70	W	SENSOR GROUND
71	–	–
72	BR	SENSER POWER SUPPLY
73	–	–
74	–	–
75	–	–
76	–	–
77	L	POWER SUPPLY FOR HPCM
78	–	–
79	GR	SHIFT LOCK SOLENOID
80	–	–

Connector No.	E152
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1J	–	TO MAIN HARNESS
2J	Y	TO MAIN HARNESS
3J	–	TO MAIN HARNESS
4J	–	TO MAIN HARNESS
5J	–	TO MAIN HARNESS
6J	–	TO MAIN HARNESS
7J	–	TO MAIN HARNESS
8J	–	TO MAIN HARNESS
9J	BR	TO MAIN HARNESS
10J	–	TO MAIN HARNESS
11J	–	TO MAIN HARNESS
12J	–	TO MAIN HARNESS
13J	–	TO MAIN HARNESS
14J	–	TO MAIN HARNESS
15J	–	TO MAIN HARNESS
16J	–	TO MAIN HARNESS
17J	–	TO MAIN HARNESS
18J	–	TO MAIN HARNESS
19J	–	TO MAIN HARNESS
20J	–	TO MAIN HARNESS
21J	GR	TO MAIN HARNESS
22J	SHIELD	TO MAIN HARNESS
23J	LG	TO MAIN HARNESS
24J	V	TO MAIN HARNESS
25J	L	TO MAIN HARNESS
26J	BR	TO MAIN HARNESS
27J	G	TO MAIN HARNESS
28J	R	TO MAIN HARNESS
29J	L	TO MAIN HARNESS
30J	V	TO MAIN HARNESS
31J	–	TO MAIN HARNESS
32J	–	TO MAIN HARNESS
33J	R	TO MAIN HARNESS
34J	L	TO MAIN HARNESS
35J	BG	TO MAIN HARNESS
36J	LG	TO MAIN HARNESS
37J	GR	TO MAIN HARNESS
38J	BR	TO MAIN HARNESS
39J	–	TO MAIN HARNESS
40J	–	TO MAIN HARNESS
41J	G	TO MAIN HARNESS
42J	W	TO MAIN HARNESS
43J	L	TO MAIN HARNESS
44J	B	TO MAIN HARNESS
45J	SB	TO MAIN HARNESS
46J	BR	TO MAIN HARNESS
47J	W	TO MAIN HARNESS
48J	W	TO MAIN HARNESS
49J	L	TO MAIN HARNESS
50J	P	TO MAIN HARNESS
51J	W	TO MAIN HARNESS
52J	R	TO MAIN HARNESS
53J	SB	TO MAIN HARNESS
54J	LG	TO MAIN HARNESS
55J	W	TO MAIN HARNESS
56J	BG	TO MAIN HARNESS
57J	R	TO MAIN HARNESS
58J	V	TO MAIN HARNESS
59J	BR	TO MAIN HARNESS
60J	P	TO MAIN HARNESS
61J	L	TO MAIN HARNESS
62J	P	TO MAIN HARNESS
63J	L	TO MAIN HARNESS
64J	R	TO MAIN HARNESS
65J	L	TO MAIN HARNESS
66J	BG	TO MAIN HARNESS
67J	–	TO MAIN HARNESS
68J	–	TO MAIN HARNESS
69J	G	TO MAIN HARNESS
70J	L	TO MAIN HARNESS
71J	–	TO MAIN HARNESS
72J	–	TO MAIN HARNESS
73J	–	TO MAIN HARNESS
74J	–	TO MAIN HARNESS
75J	–	TO MAIN HARNESS
76J	–	TO MAIN HARNESS
77J	–	TO MAIN HARNESS
78J	–	TO MAIN HARNESS
79J	SHIELD	TO MAIN HARNESS
80J	B	TO MAIN HARNESS
81J	W	TO MAIN HARNESS
82J	–	TO MAIN HARNESS
83J	–	TO MAIN HARNESS
84J	–	TO MAIN HARNESS
85J	–	TO MAIN HARNESS
86J	–	TO MAIN HARNESS
87J	–	TO MAIN HARNESS
88J	–	TO MAIN HARNESS
89J	–	TO MAIN HARNESS
90J	–	TO MAIN HARNESS
91J	–	TO MAIN HARNESS
92J	L	TO MAIN HARNESS
93J	L	TO MAIN HARNESS
94J	L	TO MAIN HARNESS
95J	BR	TO MAIN HARNESS
96J	–	TO MAIN HARNESS
97J	GR	TO MAIN HARNESS
98J	P	TO MAIN HARNESS
99J	W	TO MAIN HARNESS
100J	Y	TO MAIN HARNESS

AACIA0389GB

HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	E160
Connector Name	BATTERY COOLING FAN RELAY
Connector Type	MS02FL-M2-LC
Connector Color	BLUE

H.S.



Terminal No.	Color of Wire	Signal Name
1	P	BATTERY
2	R	FCTL
3	GR	BATTERY
5	L	IGNITION

Connector No.	E201
Connector Name	WIRE TO WIRE
Connector Type	M04FW-LC
Connector Color	WHITE

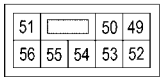
H.S.



Terminal No.	Color of Wire	Signal Name
1	–	TO FRONT END MODULE HARNESS
2	B	TO FRONT END MODULE HARNESS
3	B	TO FRONT END MODULE HARNESS
4	–	TO FRONT END MODULE HARNESS

Connector No.	E217
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS08FBR-CS
Connector Color	BROWN

H.S.



Terminal No.	Color of Wire	Signal Name
49	R	LIGHT DTRL LH
50	L	LIGHT LBEAM LH
51	V	LIGHT FR FOG LAMPS LH
52	R	LI HOOD SW
53	GR	LI LED DETECTION 2
54	LG	LIGHT HBEAM RH
55	–	–
56	BG	LIGHT PARKING FR LH

Connector No.	E223
Connector Name	HOOD SWITCH
Connector Type	RK03MBR
Connector Color	BROWN

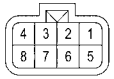
H.S.



Terminal No.	Color of Wire	Signal Name
1	W	HOOD SW2
2	R	LI HOOD SW
3	B	GROUND

Connector No.	F6
Connector Name	WIRE TO WIRE
Connector Type	RS08FGY-PR
Connector Color	GRAY

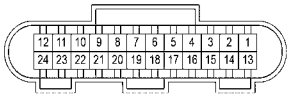
H.S.



Terminal No.	Color of Wire	Signal Name
1	P	TO ENGINE ROOM HARNESS
2	–	TO ENGINE ROOM HARNESS
3	L	TO ENGINE ROOM HARNESS
4	G	TO ENGINE ROOM HARNESS
5	–	TO ENGINE ROOM HARNESS
6	–	TO ENGINE ROOM HARNESS
7	–	TO ENGINE ROOM HARNESS
8	–	TO ENGINE ROOM HARNESS

Connector No.	F7
Connector Name	JOINT CONNECTOR-F02
Connector Type	SAA24FB-J
Connector Color	BLACK

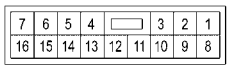
H.S.



Terminal No.	Color of Wire	Signal Name
1	–	–
2	W	REFRIGERANT PRESSURE SENSOR
3	W	REFRIGERANT PRESSURE SENSOR
4	B	SENSOR GROUND
5	B	SENSOR GROUND
6	B	SENSOR GROUND
7	B	SENSOR GROUND
8	–	–
9	Y	SENSOR POWER SUPPLY
10	Y	SENSOR POWER SUPPLY
11	Y	SENSOR POWER SUPPLY
12	Y	SENSOR POWER SUPPLY
13	B	GROUND
14	SHIELD	SHIELD
15	SHIELD	SHIELD
16	SHIELD	SHIELD
17	B	GROUND
18	–	–
19	–	–
20	G	ENGINE OIL PRESSURE SENSOR
21	G	ENGINE OIL PRESSURE SENSOR
22	–	–
23	G	FUEL RAIL PRESSURE SENSOR
24	G	FUEL RAIL PRESSURE SENSOR

Connector No.	F33
Connector Name	WIRE TO WIRE
Connector Type	NS16FBR-CS
Connector Color	BROWN

H.S.



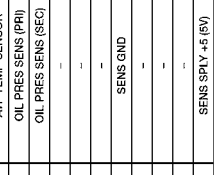
Terminal No.	Color of Wire	Signal Name
1	R	TO ENGINE ROOM HARNESS
2	BG	TO ENGINE ROOM HARNESS
3	B	TO ENGINE ROOM HARNESS
4	B	TO ENGINE ROOM HARNESS
5	B	TO ENGINE ROOM HARNESS
6	GR	TO ENGINE ROOM HARNESS
7	B	TO ENGINE ROOM HARNESS
8	W	TO ENGINE ROOM HARNESS
9	BR	TO ENGINE ROOM HARNESS
10	BR	TO ENGINE ROOM HARNESS
11	L	TO ENGINE ROOM HARNESS
12	Y	TO ENGINE ROOM HARNESS
13	R	TO ENGINE ROOM HARNESS
14	G	TO ENGINE ROOM HARNESS
15	W	TO ENGINE ROOM HARNESS
16	W	TO ENGINE ROOM HARNESS

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	F74
Connector Name	CVT UNIT
Connector Type	RK22FGY
Connector Color	GRAY

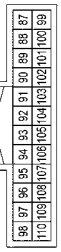
H.S.



Terminal No.	Color of Wire	Signal Name
1	BR	LINEAR SOL 1
2	V	LINEAR SOL 2
3	SB	LINEAR SOL 3
4	BG	LINEAR SOL 4
5	GR	LINEAR SOL 5
6	G	R1
7	B	S4
8	W	S2
9	LG	S3
10	V	S1
11	Y	R2
12	LG	ATF TEMP SENSOR
13	L	OIL PRES SENS (PRI)
14	R	OIL PRES SENS (SEC)
15	–	–
16	–	–
17	–	–
18	W	SENS GND
19	–	–
20	–	–
21	–	–
22	P	SENS SPLY +5 (5V)

Connector No.	F42
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH24FB-NH
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
87	L	HEV CAN-H
88	G	HEV CAN-L
89	W	MOTOR CABIN 3
90	R	MOTOR CABIN 4
91	–	–
92	BG	LI NP SW
93	P	LI ECM DRIVER
94	–	–
95	–	–
96	–	–
97	–	–
98	–	–
99	BG	MOTOR CABIN 5
100	GR	MOTOR CABIN 6
101	LG	MOTOR CABIN 7
102	Y	MOTOR CABIN 8
103	W	HOOD SW2
104	–	–
105	–	–
106	BR	LO FAN RELAY2(PWM)
107	–	–
108	–	–
109	–	–
110	–	–

Connector No.	F35
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS
Connector Color	WHITE

H.S.

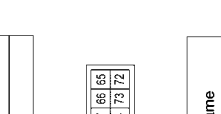


Terminal No.	Color of Wire	Signal Name
65	–	–
66	W	ACTUATOR1 (3FBI)
67	V	LI ECM ACT5 DRIVER
68	–	–
69	–	–
70	R	IGN AT LPG
71	Y	IGN REVERSE SW AC VALVE
72	LG	ACTUATOR5 (3FBA)
73	G	ACTUATOR1 2 (3FB)
74	–	–
75	R	ACTUATOR3 (3FB3)
76	P	LI FUEL PUMP DRIVER
77	–	–
78	BR	ACTUATOR2 (3FB2)
79	G	LI LIGHT REVERSE SW
80	–	–

4	G	TRACTION MOTOR RESOLVER SIGNAL R1
5	–	–
6	–	–
7	R	POWER SUPPLY (IGN)
8	–	–
9	P	CONNECTION DETECTION (+)
10	LG	TRACTION MOTOR RESOLVER SIGNAL S3
11	–	–
12	Y	TRACTION MOTOR RESOLVER SIGNAL R2
13	–	–
14	–	–
15	–	–
16	–	–
17	W	CONNECTION DETECTION (-)
18	–	–
19	–	–
20	W	TRACTION MOTOR RESOLVER SIGNAL S2
21	–	–
22	–	–
23	–	–
24	–	–
25	–	–
26	–	–
27	L	HEV SYSTEM CAN-H
28	B	TRACTION MOTOR RESOLVER SIGNAL S4
29	–	–
30	–	–
31	–	–
32	–	–
33	–	–
34	–	–
35	G	HEV SYSTEM CAN-L
36	–	–
37	B	GND
38	P	POWER SUPPLY (BAT)
39	B	GND
40	P	POWER SUPPLY (BAT)

Connector No.	F36
Connector Name	TRACTION MOTOR INVERTER
Connector Type	SAZ36FB-HS4-1V-LH
Connector Color	BLACK

H.S.



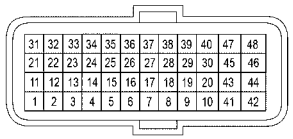
Terminal No.	Color of Wire	Signal Name
1	–	–
2	V	TRACTION MOTOR RESOLVER SIGNAL S1
3	–	–

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	F75
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Type	RH40FB-RZ8-L-LH
Connector Color	BLACK

H.S.

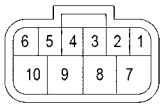


Terminal No.	Color of Wire	Signal Name
1	–	–
2	SB	L RANGE SW
3	LG	CLUTCH 2 TEMP SENSOR
4	Y	D RANGE SW
5	R	N RANGE SW
6	G	R RANGE SW
7	V	P RANGE SW
8	–	–
9	–	–
10	–	–
11	W	SENSOR GND
12	LG	CVT FLUID TEMP SENS
13	–	–
14	–	–
15	B	SENSOR GND
16	R	SEC PRESS SENS
17	L	PRI PRESS SENS
18	–	–
19	–	–
20	–	–
21	–	–
22	–	–
23	G	HEV CAN–L
24	–	–
25	W	EOP SIG
26	P	SENS PWR SUPPLY
27	–	–
28	–	–
29	–	–
30	BR	LINE PRESS SOL VALVE
31	–	–
32	P	EOP STATE
33	L	HEV CAN–H
34	R	OUTPUT SPEED SENS
35	LG	PRI SPEED SENS
36	–	–
37	BG	SELECT SOL VALVE
38	GR	TCC SOL VALVE
39	SB	SEC PRESS SOL VALVE
40	V	PRI PRESS SOL VALVE
41	B	GND
42	B	GND
43	–	–
44	–	–
45	LG	BATT
46	LG	BATT
47	R	VIGN
48	R	VIGN

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Connector No.	F78
Connector Name	TRANSMISSION RANGE SWITCH
Connector Type	YDX06FB-HS4
Connector Color	BLACK

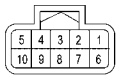
H.S.



Terminal No.	Color of Wire	Signal Name
1	–	–
2	Y	D RANGE SW
3	–	–
4	R	VIGN
5	V	P RANGE SW
6	SB	L RANGE SW
7	Y	IGN AT LPG
8	G	R RANGE SW
9	R	N RANGE SW
10	BG	LI NP SW

Connector No.	F79
Connector Name	WIRE TO WIRE
Connector Type	RH10FB
Connector Color	BLACK

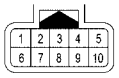
H.S.



Terminal No.	Color of Wire	Signal Name
1	–	TO ENGINE CONTROL SUB HARNESS
2	R	TO ENGINE CONTROL SUB HARNESS
3	W	TO ENGINE CONTROL SUB HARNESS
4	BG	TO ENGINE CONTROL SUB HARNESS
5	B	TO ENGINE CONTROL SUB HARNESS
6	GR	TO ENGINE CONTROL SUB HARNESS
7	LG	TO ENGINE CONTROL SUB HARNESS
8	Y	TO ENGINE CONTROL SUB HARNESS
9	B	TO ENGINE CONTROL SUB HARNESS
10	W	TO ENGINE CONTROL SUB HARNESS

Connector No.	F201
Connector Name	WIRE TO WIRE
Connector Type	RH10MB
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	–	TO ENGINE CONTROL HARNESS
2	B	TO ENGINE CONTROL HARNESS
3	W	TO ENGINE CONTROL HARNESS
4	BG	TO ENGINE CONTROL HARNESS
5	B	TO ENGINE CONTROL HARNESS
6	Y	TO ENGINE CONTROL HARNESS
7	LG	TO ENGINE CONTROL HARNESS
8	Y	TO ENGINE CONTROL HARNESS
9	B	TO ENGINE CONTROL HARNESS
10	W	TO ENGINE CONTROL HARNESS

Connector No.	F202
Connector Name	ELECTRIC WATER PUMP
Connector Type	RS04FG
Connector Color	GREEN

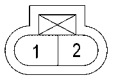
H.S.



Terminal No.	Color of Wire	Signal Name
1	BG	SELF SHUT OFF RELAY OUTPUT
2	B	ELECTRIC WATER PUMP (FEED BACK)
3	B	GROUND
4	W	ELECTRIC WATER PUMP

Connector No.	F203
Connector Name	HIGH VOLTAGE COOLANT TEMPERATURE SENSOR
Connector Type	E02FGY-RS
Connector Color	GRAY

H.S.

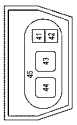


Terminal No.	Color of Wire	Signal Name
1	Y	SENSOR POWER SUPPLY
2	LG	SENSOR GROUND

HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	H1
Connector Name	TRACTION MOTOR INVERTER
Connector Type	24340_3JV1A
Connector Color	ORANGE

H.S.



Terminal No.	Color of Wire	Signal Name
41	–	CONNECTION DETECTION
42	–	CONNECTION DETECTION
43	O	HIGH VOLTAGE (+)
44	O	HIGH VOLTAGE (-)
45	SHIELD	SHIELD

Connector No.	H2
Connector Name	TRACTION MOTOR INVERTER
Connector Type	24340_3JV0B
Connector Color	ORANGE

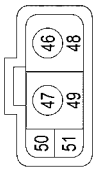
H.S.



Terminal No.	Color of Wire	Signal Name
4	SHIELD	SHIELD
U	B/O	V
V	B/W	U
W	W/B	W

Connector No.	H3
Connector Name	TRACTION MOTOR INVERTER
Connector Type	TM02FOR-3V
Connector Color	ORANGE

H.S.



Terminal No.	Color of Wire	Signal Name
46	O	AC COMP N
47	O	AC COMP P
48	SHIELD	SHIELD
49	SHIELD	SHIELD
50	B	CONNECTION DETECTION
51	B	CONNECTION DETECTION

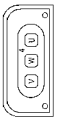
Connector No.	H4
Connector Name	DC/DC CONVERTER
Connector Type	24340_CG000
Connector Color	-

H.S.

Terminal No.	Color of Wire	Signal Name
5	B/Y	12V BATTERY VOLTAGE

Connector No.	H5
Connector Name	CVT UNIT (MOTOR GENERATOR)
Connector Type	24340_3JV0C
Connector Color	ORANGE

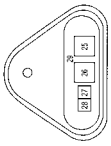
H.S.



Terminal No.	Color of Wire	Signal Name
4	SHIELD	SHIELD
U	B/O	V
V	B/W	U
W	W/B	W

Connector No.	H6
Connector Name	LI-ION BATTERY
Connector Type	24342-3JV1A
Connector Color	ORANGE

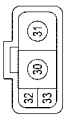
H.S.



Terminal No.	Color of Wire	Signal Name
25	O	HIGH VOLTAGE (-)
26	O	HIGH VOLTAGE (+)
27	–	CONNECTION DETECTION
28	–	CONNECTION DETECTION
29	SHIELD	SHIELD

Connector No.	H7
Connector Name	LI-ION BATTERY
Connector Type	TM02FOR-2V
Connector Color	ORANGE

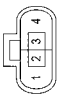
H.S.



Terminal No.	Color of Wire	Signal Name
30	–	HIGH VOLTAGE (+)
31	–	HIGH VOLTAGE (-)
32	–	CONNECTION DETECTION
33	–	CONNECTION DETECTION

Connector No.	H8
Connector Name	ELECTRIC COMPRESSOR
Connector Type	SHZ02FOR
Connector Color	ORANGE

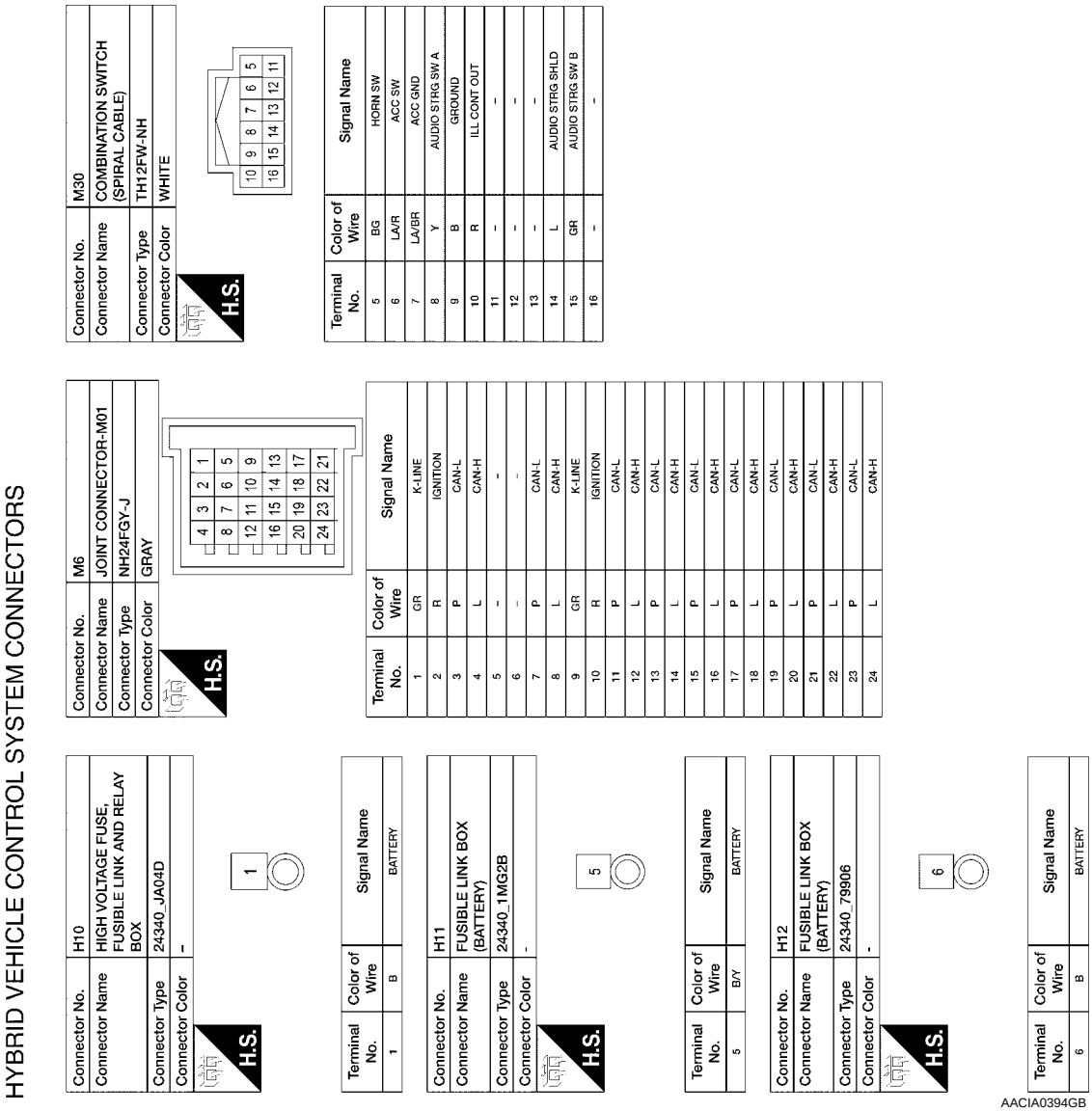
H.S.



Terminal No.	Color of Wire	Signal Name
1	SHIELD	SHIELD
2	O	AC COMP N
3	O	AC COMP P
4	SHIELD	SHIELD

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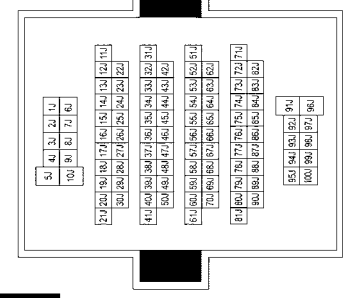
HYBRID VEHICLE CONTROL SYSTEM CONNECTORS



HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	M31
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4
Connector Color	WHITE

H.S.



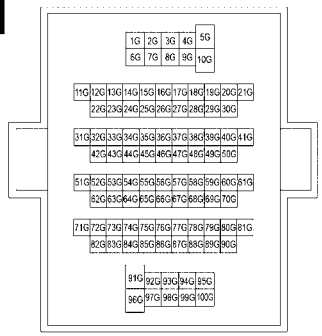
Terminal No.	Color of Wire	Signal Name
1J	–	TO ENGINE ROOM HARNESS
2J	R	TO ENGINE ROOM HARNESS
3J	–	TO ENGINE ROOM HARNESS
4J	–	TO ENGINE ROOM HARNESS
5J	–	TO ENGINE ROOM HARNESS
6J	–	TO ENGINE ROOM HARNESS
7J	–	TO ENGINE ROOM HARNESS
8J	–	TO ENGINE ROOM HARNESS
9J	W	TO ENGINE ROOM HARNESS
10J	–	TO ENGINE ROOM HARNESS
11J	–	TO ENGINE ROOM HARNESS
12J	–	TO ENGINE ROOM HARNESS
13J	–	TO ENGINE ROOM HARNESS
14J	–	TO ENGINE ROOM HARNESS
15J	–	TO ENGINE ROOM HARNESS
16J	–	TO ENGINE ROOM HARNESS
17J	–	TO ENGINE ROOM HARNESS
18J	–	TO ENGINE ROOM HARNESS
19J	–	TO ENGINE ROOM HARNESS
20J	–	TO ENGINE ROOM HARNESS
21J	LA/L	TO ENGINE ROOM HARNESS
22J	SHIELD	TO ENGINE ROOM HARNESS
23J	LG	TO ENGINE ROOM HARNESS
24J	V	TO ENGINE ROOM HARNESS
25J	L	TO ENGINE ROOM HARNESS
26J	BR	TO ENGINE ROOM HARNESS
27J	G	TO ENGINE ROOM HARNESS
28J	Y	TO ENGINE ROOM HARNESS
29J	L	TO ENGINE ROOM HARNESS
30J	V	TO ENGINE ROOM HARNESS
31J	–	TO ENGINE ROOM HARNESS
32J	–	TO ENGINE ROOM HARNESS
33J	R	TO ENGINE ROOM HARNESS
33J	Y	TO ENGINE ROOM HARNESS - (WITH DRIVER ASSISTNACE SYSTEM)
34J	L	TO ENGINE ROOM HARNESS
35J	BG	TO ENGINE ROOM HARNESS
36J	GR	TO ENGINE ROOM HARNESS
37J	Y	TO ENGINE ROOM HARNESS
38J	LA/BR	TO ENGINE ROOM HARNESS
39J	–	TO ENGINE ROOM HARNESS
40J	–	TO ENGINE ROOM HARNESS
41J	LA/R	TO ENGINE ROOM HARNESS
42J	W	TO ENGINE ROOM HARNESS
43J	L	TO ENGINE ROOM HARNESS
44J	B	TO ENGINE ROOM HARNESS
45J	SB	TO ENGINE ROOM HARNESS
46J	BR	TO ENGINE ROOM HARNESS
47J	W	TO ENGINE ROOM HARNESS
48J	R	TO ENGINE ROOM HARNESS
49J	SB	TO ENGINE ROOM HARNESS
50J	GR	TO ENGINE ROOM HARNESS
51J	W	TO ENGINE ROOM HARNESS
52J	R	TO ENGINE ROOM HARNESS
53J	BR	TO ENGINE ROOM HARNESS
54J	LG	TO ENGINE ROOM HARNESS
55J	LA/Y	TO ENGINE ROOM HARNESS
56J	LA/V	TO ENGINE ROOM HARNESS
57J	LA/R	TO ENGINE ROOM HARNESS
58J	W	TO ENGINE ROOM HARNESS
59J	BR	TO ENGINE ROOM HARNESS
60J	P	TO ENGINE ROOM HARNESS
61J	L	TO ENGINE ROOM HARNESS
62J	R	TO ENGINE ROOM HARNESS
63J	L	TO ENGINE ROOM HARNESS
64J	R	TO ENGINE ROOM HARNESS
65J	L	TO ENGINE ROOM HARNESS
66J	BG	TO ENGINE ROOM HARNESS
67J	–	TO ENGINE ROOM HARNESS
68J	–	TO ENGINE ROOM HARNESS
69J	G	TO ENGINE ROOM HARNESS
70J	L	TO ENGINE ROOM HARNESS
71J	–	TO ENGINE ROOM HARNESS
72J	–	TO ENGINE ROOM HARNESS
73J	–	TO ENGINE ROOM HARNESS
74J	–	TO ENGINE ROOM HARNESS
75J	–	TO ENGINE ROOM HARNESS
76J	–	TO ENGINE ROOM HARNESS
77J	–	TO ENGINE ROOM HARNESS
78J	–	TO ENGINE ROOM HARNESS
79J	SHIELD	TO ENGINE ROOM HARNESS
80J	B	TO ENGINE ROOM HARNESS
81J	W	TO ENGINE ROOM HARNESS
82J	–	TO ENGINE ROOM HARNESS
83J	–	TO ENGINE ROOM HARNESS
84J	–	TO ENGINE ROOM HARNESS
85J	–	TO ENGINE ROOM HARNESS
86J	–	TO ENGINE ROOM HARNESS
87J	–	TO ENGINE ROOM HARNESS
88J	–	TO ENGINE ROOM HARNESS
89J	–	TO ENGINE ROOM HARNESS
90J	–	TO ENGINE ROOM HARNESS
91J	–	TO ENGINE ROOM HARNESS
92J	Y	TO ENGINE ROOM HARNESS
93J	G	TO ENGINE ROOM HARNESS
94J	L	TO ENGINE ROOM HARNESS
95J	P	TO ENGINE ROOM HARNESS
96J	–	TO ENGINE ROOM HARNESS
97J	SB	TO ENGINE ROOM HARNESS
98J	P	TO ENGINE ROOM HARNESS
99J	LA/R	TO ENGINE ROOM HARNESS
100J	R	TO ENGINE ROOM HARNESS

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	M36
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4
Connector Color	WHITE

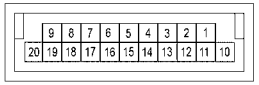
H.S.



Terminal No.	Color of Wire	Signal Name
1G	LA/R	TO BODY NO. 2 HARNESS
2G	W	TO BODY NO. 2 HARNESS
3G	Y	TO BODY NO. 2 HARNESS
4G	BG	TO BODY NO. 2 HARNESS
5G	G	TO BODY NO. 2 HARNESS
6G	SB	TO BODY NO. 2 HARNESS
7G	P	TO BODY NO. 2 HARNESS
8G	LA/Y	TO BODY NO. 2 HARNESS
9G	LA/W	TO BODY NO. 2 HARNESS
10G	R	TO BODY NO. 2 HARNESS
11G	G	TO BODY NO. 2 HARNESS
12G	L	TO BODY NO. 2 HARNESS
13G	BR	TO BODY NO. 2 HARNESS
14G	–	TO BODY NO. 2 HARNESS
15G	Y	TO BODY NO. 2 HARNESS
16G	–	TO BODY NO. 2 HARNESS
17G	–	TO BODY NO. 2 HARNESS
18G	R	TO BODY NO. 2 HARNESS
19G	LA/R	TO BODY NO. 2 HARNESS
20G	W	TO BODY NO. 2 HARNESS
21G	BR	TO BODY NO. 2 HARNESS
22G	P	TO BODY NO. 2 HARNESS
23G	L	TO BODY NO. 2 HARNESS
24G	W	TO BODY NO. 2 HARNESS
25G	L	TO BODY NO. 2 HARNESS
26G	–	TO BODY NO. 2 HARNESS
27G	–	TO BODY NO. 2 HARNESS
28G	–	TO BODY NO. 2 HARNESS
29G	–	TO BODY NO. 2 HARNESS
30G	–	TO BODY NO. 2 HARNESS
31G	–	TO BODY NO. 2 HARNESS
32G	–	TO BODY NO. 2 HARNESS
33G	–	TO BODY NO. 2 HARNESS
34G	V	TO BODY NO. 2 HARNESS
35G	BR	TO BODY NO. 2 HARNESS
36G	SHIELD	TO BODY NO. 2 HARNESS
37G	LG	TO BODY NO. 2 HARNESS
38G	V	TO BODY NO. 2 HARNESS
39G	SHIELD	TO BODY NO. 2 HARNESS
40G	G	TO BODY NO. 2 HARNESS
41G	R	TO BODY NO. 2 HARNESS
42G	–	TO BODY NO. 2 HARNESS
43G	–	TO BODY NO. 2 HARNESS
44G	BG	TO BODY NO. 2 HARNESS
45G	SHIELD	TO BODY NO. 2 HARNESS
46G	L	TO BODY NO. 2 HARNESS
47G	Y	TO BODY NO. 2 HARNESS
48G	SHIELD	TO BODY NO. 2 HARNESS
49G	W	TO BODY NO. 2 HARNESS
50G	R	TO BODY NO. 2 HARNESS
51G	–	TO BODY NO. 2 HARNESS
52G	–	TO BODY NO. 2 HARNESS
53G	–	TO BODY NO. 2 HARNESS
54G	–	TO BODY NO. 2 HARNESS
55G	–	TO BODY NO. 2 HARNESS
56G	–	TO BODY NO. 2 HARNESS
57G	–	TO BODY NO. 2 HARNESS
58G	–	TO BODY NO. 2 HARNESS
59G	–	TO BODY NO. 2 HARNESS
60G	GR	TO BODY NO. 2 HARNESS
61G	BR	TO BODY NO. 2 HARNESS
62G	–	TO BODY NO. 2 HARNESS
63G	–	TO BODY NO. 2 HARNESS
64G	–	TO BODY NO. 2 HARNESS
65G	–	TO BODY NO. 2 HARNESS
66G	–	TO BODY NO. 2 HARNESS
67G	–	TO BODY NO. 2 HARNESS
68G	–	TO BODY NO. 2 HARNESS
69G	–	TO BODY NO. 2 HARNESS
70G	–	TO BODY NO. 2 HARNESS
71G	–	TO BODY NO. 2 HARNESS
72G	–	TO BODY NO. 2 HARNESS
73G	–	TO BODY NO. 2 HARNESS
74G	–	TO BODY NO. 2 HARNESS
76G	–	TO BODY NO. 2 HARNESS
77G	–	TO BODY NO. 2 HARNESS
78G	LA/Y	TO BODY NO. 2 HARNESS
79G	LA/V	TO BODY NO. 2 HARNESS
80G	LA/B	TO BODY NO. 2 HARNESS
81G	LA/L	TO BODY NO. 2 HARNESS
82G	–	TO BODY NO. 2 HARNESS
83G	–	TO BODY NO. 2 HARNESS
84G	–	TO BODY NO. 2 HARNESS
85G	–	TO BODY NO. 2 HARNESS
86G	–	TO BODY NO. 2 HARNESS
87G	–	TO BODY NO. 2 HARNESS
88G	–	TO BODY NO. 2 HARNESS
89G	–	TO BODY NO. 2 HARNESS
90G	–	TO BODY NO. 2 HARNESS
91G	R	TO BODY NO. 2 HARNESS
92G	LA/L	TO BODY NO. 2 HARNESS
93G	W	TO BODY NO. 2 HARNESS
94G	LG	TO BODY NO. 2 HARNESS
95G	GR	TO BODY NO. 2 HARNESS
96G	SB	TO BODY NO. 2 HARNESS
97G	LA/BR	TO BODY NO. 2 HARNESS
98G	GR	TO BODY NO. 2 HARNESS
99G	Y	TO BODY NO. 2 HARNESS
100G	V	TO BODY NO. 2 HARNESS

Connector No.	M43
Connector Name	JOINT CONNECTOR-M02
Connector Type	NH20FG-DC
Connector Color	GREEN

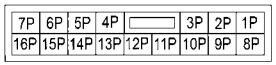
H.S.



Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	L	CAN-H
4	L	CAN-H
5	L	CAN-H
6	–	–
7	L	CAN-H
8	L	CAN-H
9	L	CAN-H
10	–	–
11	–	–
12	–	–
13	–	–
14	G	CAN-L
15	G	CAN-L
16	G	CAN-L
17	–	–
18	P	CAN-L
19	P	CAN-L
20	P	CAN-L

Connector No.	M44
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FW-CS
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1P	R	IGNITION
2P	G	IGNITION
3P	Y	IGNITION RELAY-2 CONTROL
4P	LG	REAR WINDOW DEFOGGER RELAY OUTPUT
5P	GR	REAR WINDOW DEFOGGER RELAY OUTPUT
6P	LA/R	REAR WINDOW DEFOGGER RELAY CONTROL
7P	Y	IGNITION
8P	V	IGNITION
9P	L	BATTERY
10P	LG	IGNITION
11P	–	–
12P	–	–
13P	G	BATTERY
14P	–	–
15P	L	BATTERY
16P	LA/W	FRONT BLOWER MOTOR RELAY CONTROL

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	M56
Connector Name	STEERING ANGLE SENSOR
Connector Type	TH08GY-NH
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	GND
2	P	CAN-L
3	–	–
4	G	IGN
5	L	CAN-H
6	–	–
7	–	–
8	–	–

Connector No.	M68
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FBR-CS
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1R	V	ILLUMINATION +
2R	G	IGNITION
3R	V	BATTERY
4R	–	–
5R	–	–
6R	LA/L	ACCESSORY
7R	LA/V	BATTERY
8R	–	–
9R	–	–
10R	GR	BATTERY
11R	–	–
12R	–	–
13R	–	–
14R	W	BATTERY
15R	W	BATTERY

16R	GR	ACCESSORY

Connector No.	M69
Connector Name	WIRE TO WIRE
Connector Type	TH32FW-NH
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	TO BODY HARNESS
2	BR	TO BODY HARNESS
3	L	TO BODY HARNESS
4	L	TO BODY HARNESS
5	W	TO BODY HARNESS
6	Y	TO BODY HARNESS
7	LG	TO BODY HARNESS
8	BG	TO BODY HARNESS
9	BR	TO BODY HARNESS
10	Y	TO BODY HARNESS
11	G	TO BODY HARNESS
12	L	TO BODY HARNESS
13	W	TO BODY HARNESS
14	GR	TO BODY HARNESS
15	Y	TO BODY HARNESS
16	P	TO BODY HARNESS
17	R	TO BODY HARNESS
18	W	TO BODY HARNESS
19	R	TO BODY HARNESS
20	–	TO BODY HARNESS
21	–	TO BODY HARNESS
22	–	TO BODY HARNESS
23	–	TO BODY HARNESS
24	P	TO BODY HARNESS
25	L	TO BODY HARNESS
26	BR	TO BODY HARNESS
27	R	TO BODY HARNESS
28	L	TO BODY HARNESS
29	SHIELD	TO BODY HARNESS
30	W	TO BODY HARNESS
31	B	TO BODY HARNESS
32	R	TO BODY HARNESS

Connector No.	M76
Connector Name	COMBINATION METER
Connector Type	TH40FW-NH
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	GND
2	–	–
3	–	–
4	–	–
5	–	–
6	–	–
7	BG	SECURITY
8	–	–
9	GR	ECO MODE SW
10	–	–
11	–	–
12	–	–
13	–	–
14	–	–
15	L	OUTSIDE TEMP SENSOR
16	–	–
17	BG	SATELLITE SW GND
18	SB	TRIP RESET SW
19	–	–
20	Y	OUTSIDE TEMP GND
21	L	GND (STRG SW GND)
22	Y	STRG SW A
23	GR	STRG SW B
24	BR	WASHER SW
25	V	BRAKE OIL SW
26	G	PKB SW
27	–	–
28	Y	DR BELT SW
29	R	SPORT MODE SW
30	LG	M RANGE
31	SB	NOT M RANGE
32	BG	AT SHIFT UP
33	BR	AT SHIFT DOWN
34	–	–
35	–	–
36	GR	ILL UP SW
37	V	ILL DOWN SW
38	G	8P/R OUTPUT

39	W	2P/R OUTPUT
40	–	–

Connector No.	M77
Connector Name	COMBINATION METER
Connector Type	TH12FW-NH
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
41	L	CAN-H
42	P	CAN-L
43	R	ILL CONT OUT
44	LA/B	FUEL SENSOR GND
45	G	BAT
46	V	IGN
47	SB	M-CAN H
48	LG	M-CAN L
49	–	–
50	–	–
51	LA/L	FUEL SENSOR
52	B	G1

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HYBRID VEHICLE CONTROL SYSTEM CONNECTORS

Connector No.	M90
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TH12FW-NH
Connector Color	WHITE

H.S.

22 21 20 19 18 17
28 27 26 25 24 23

Terminal No.	Color of Wire	Signal Name
17	–	–
18	L	AUDIO STRG SW B
19	G	AUDIO STRG SHLD
20	–	–
21	–	–
22	–	–
23	R	ILL (+)
24	Y	ILL (-)
25	P	AUDIO STRG SW A
26	GR	ACC GND
27	V	ACC SW
28	BR	HORN SW

Connector No.	M193
Connector Name	JOINT CONNECTOR-M18
Connector Type	SAC08JW
Connector Color	WHITE

H.S.

8 7 6 5 4 3 2 1

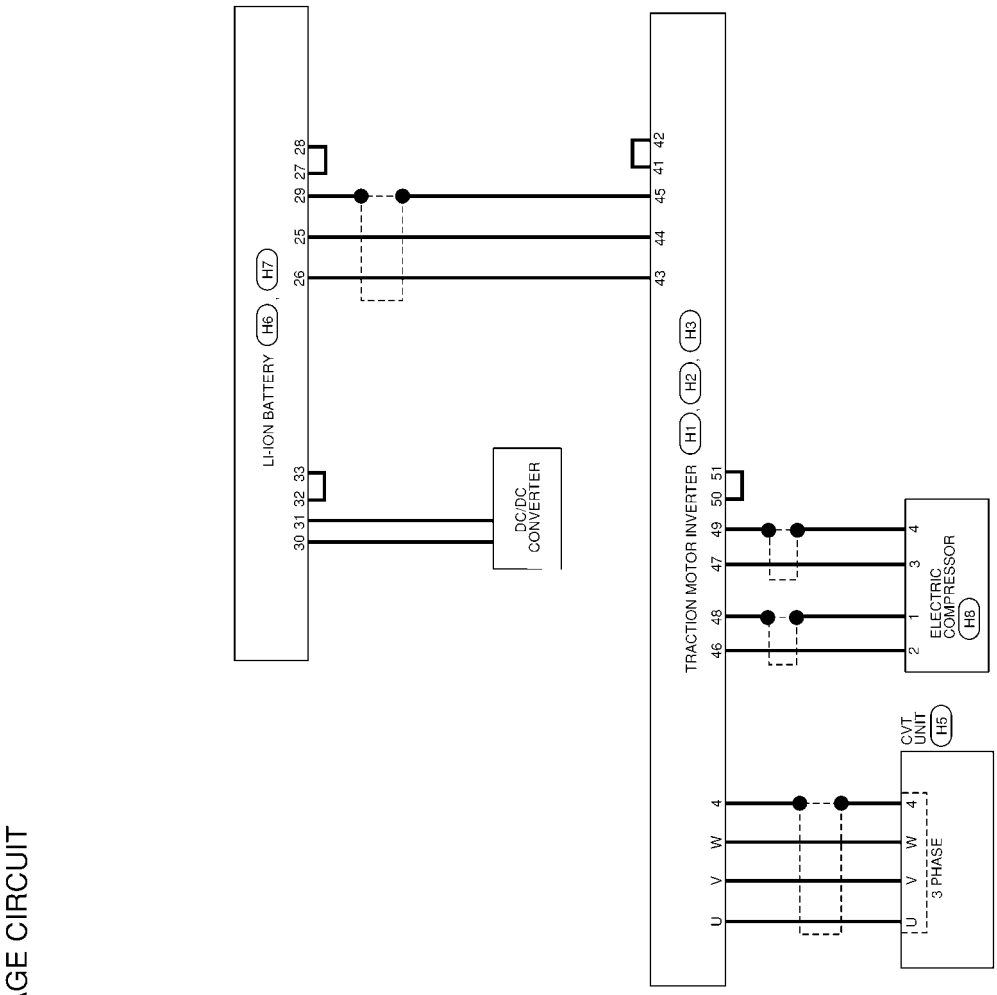
Terminal No.	Color of Wire	Signal Name
1	GR	ACCESSORY
2	GR	ACCESSORY
3	GR	ACCESSORY
4	GR	ACCESSORY
5	SB	AUTO ACC
6	GR	ACCESSORY
7	GR	ACCESSORY
8	W	ACCESSORY

AACIA0422GB

HIGH VOLTAGE CIRCUIT

Wiring Diagram

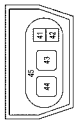
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HIGH VOLTAGE CIRCUIT CONNECTORS

Connector No.	H1
Connector Name	TRACTION MOTOR INVERTER
Connector Type	24340_3JV1A
Connector Color	ORANGE

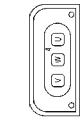
H.S.



Terminal No.	Color of Wire	Signal Name
41	–	CONNECTION DETECTION
42	–	CONNECTION DETECTION
43	O	HIGH VOLTAGE (+)
44	O	HIGH VOLTAGE (-)
45	SHIELD	SHIELD

Connector No.	H2
Connector Name	TRACTION MOTOR INVERTER
Connector Type	24340_3JV0B
Connector Color	ORANGE

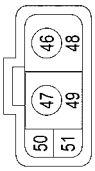
H.S.



Terminal No.	Color of Wire	Signal Name
4	SHIELD	SHIELD
U	B/O	V
V	B/W	U
W	W/B	W

Connector No.	H3
Connector Name	TRACTION MOTOR INVERTER
Connector Type	TM02FOR-3V
Connector Color	ORANGE

H.S.



Terminal No.	Color of Wire	Signal Name
46	O	AC COMP N
47	O	AC COMP P
48	SHIELD	SHIELD
49	SHIELD	SHIELD
50	B	CONNECTION DETECTION
51	B	CONNECTION DETECTION

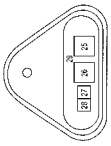
Connector No.	H5
Connector Name	CVT UNIT (MOTOR GENERATOR)
Connector Type	24340_3JV0C
Connector Color	ORANGE

H.S.

Terminal No.	Color of Wire	Signal Name
4	SHIELD	SHIELD
U	B/O	V
V	B/W	U
W	W/B	W

Connector No.	H6
Connector Name	LI-ION BATTERY
Connector Type	24342-3JV1A
Connector Color	ORANGE

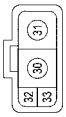
H.S.



Terminal No.	Color of Wire	Signal Name
25	O	HIGH VOLTAGE (-)
26	O	HIGH VOLTAGE (+)
27	–	CONNECTION DETECTION
28	–	CONNECTION DETECTION
29	SHIELD	SHIELD

Connector No.	H7
Connector Name	LI-ION BATTERY
Connector Type	TM02FOR-2V
Connector Color	ORANGE

H.S.



Terminal No.	Color of Wire	Signal Name
30	–	HIGH VOLTAGE (+)
31	–	HIGH VOLTAGE (-)
32	–	CONNECTION DETECTION
33	–	CONNECTION DETECTION

Connector No.	H8
Connector Name	ELECTRIC COMPRESSOR
Connector Type	SHZ02FOR
Connector Color	ORANGE

H.S.

Terminal No.	Color of Wire	Signal Name
1	SHIELD	SHIELD
2	O	AC COMP N
3	O	AC COMP P
4	SHIELD	SHIELD

AACIA0406GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Flowchart of Trouble Diagnosis

INFOID:0000000014736112

DETAILS OF TROUBLE DIAGNOSIS FLOWCHART

1.OBTAIN INFORMATION ABOUT SYMPTOM

Refer to HBC-102, "Question Sheet" and interview the customer to obtain the malfunction information (conditions and environment when the malfunction occurred) as much as possible when the customer brings in the vehicle.

>> GO TO 2.

2.CHECK DTC

1. Before checking the malfunction, check whether any DTC exists on the “All DTC Reading” screen.
2. If DTC exists, perform the following operations.

- Record the DTC and freeze frame data. (Print out using CONSULT and affix to the Work Order Sheet.)
- Erase the “EV/HEV” DTC. (Refer to “How to Erase DTC and 1st Trip DTC” in HBC-43, "CONSULT Function".)
- Turn ignition switch OFF.
- Check the relationship between the cause that is clarified with DTC and the malfunction information described by the customer. (HBC-330, "Symptom Table" is effective.)

3. Check the relevant information including STI, etc.

Do malfunction information and DTC exist?

Malfunction information and DTC exist.>>GO TO 3.
Malfunction information exists but no DTC.>>GO TO 4.
No malfunction information, but DTC exists.>>GO TO 5.

3.REPRODUCE MALFUNCTION SYMPTOM

Check the vehicle for malfunctions other than the malfunction indicator lamp (MIL) reported by the customer, the hybrid system warning lamp, and the 12-volt battery charge warning lamp.
Check if the behavior results from fail-safe operation. (Refer to HBC-67, "Fail-safe".)
When a malfunction symptom is reproduced, the question sheet is effective.
Inspect the relation of the symptoms and the condition when the symptoms occur.

>> GO TO 5.

4.REPRODUCE MALFUNCTION SYMPTOM

Check the malfunction described by the customer on the vehicle.
Check if the behavior results from fail-safe operation. (Refer to HBC-67, "Fail-safe".)
When a malfunction symptom is reproduced, the question sheet is effective.
Inspect the relation of the symptoms and the condition when the symptoms occur.

>> GO TO 6.

5.PERFORM “DTC CONFIRMATION PROCEDURE”

Perform “DTC Confirmation Procedure” of the appropriate DTC to check if DTC is detected again.
When multiple DTCs are detected, refer to HBC-70, "DTC Inspection Priority Chart" and then determine the order for performing the diagnosis.

NOTE:

- If no DTC is detected, refer to the freeze frame data.
- If there is no “DTC Confirmation Procedure” for that DTC, instead perform “Component Parts Function Inspection”. This step does not detect DTC, however the simplified check method is an effective substitute procedure.
  If the results of the “Component Parts Function Inspection” are NG, use the same “DTC Confirmation Procedure” as when a DTC is detected.

>> GO TO 7.

6. IDENTIFY MALFUNCTIONING SYSTEM WITH “DIAGNOSIS CHART BY SYMPTOM”

Use HBC-330, "Symptom Table" from the symptom inspection result in step 4. Then identify where to start performing the diagnosis based on possible causes and symptoms.

>> GO TO 7.

7. DETECT MALFUNCTIONING PARTS WITH THE “DIAGNOSIS PROCEDURE”.

Perform the inspection of the corresponding system according to “Diagnosis Procedure”.

NOTE:

The HBC section “Diagnosis Procedure”. mainly consists of a check for an open circuit. The circuit check in the diagnosis procedure also requires the check for a short circuit. Refer to GI-56, "Circuit Inspection" for details.

Is a malfunctioning part detected?

YES >> GO TO 8.
NO >> Use CONSULT and monitor the output data from the related sensor, or check the voltage at the related HPCM terminal. Refer to HBC-58, "Reference Value".

8. REPAIR OR REPLACE THE MALFUNCTIONING PARTS

Repair or replace the detected malfunctioning parts.

After repairing or replacing, reconnect the parts and connectors that are disconnected in “Diagnosis Procedure”, and then erase the DTC if one is present. (Refer to “How to Erase DTC and 1st Trip DTC” in HBC-43, "CONSULT Function".)

>> GO TO 9.

9. FINAL CHECK

Perform the “DTC Confirmation Procedure” or “Component Parts Function Inspection” to make sure that the repair is correctly performed.

Check that malfunctions are not reproduced when obtaining the malfunction information from the customer, referring to the symptom inspection result in step 3 or 4.

Is DTC or malfunction symptom reproduced?

YES-1 (DTC is reproduced.)>>GO TO 7.
YES-2 (Malfunction is reproduced.)>>GO TO 6.
NO >> Before delivering the vehicle to the customer, make sure that DTC is erased. (Refer to “DTC at 1st trip and method to read DTC” in HBC-43, "CONSULT Function".)

Question Sheet

INFOID:0000000014736113

DESCRIPTION

There are many operating conditions that may cause a malfunction of the hybrid system parts. By understanding those conditions properly, a quick and exact diagnosis can be achieved.

In general, customers have their own criteria for a problem. Therefore, it is important to understand the symptom and status well enough by asking the customer about his/her concerns carefully. Use the diagnosis sheet to systemize all information related to malfunction diagnosis.

In some cases, multiple conditions that appear simultaneously may activate the hybrid system warning lamp, which causes a DTC to be detected.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

EXAMPLE OF QUESTION SHEET

Question sheet					
Customer's name	MR/MS	Registration number		Initial year registration	Year Month Day
		Vehicle type		Chassis No.	
Storage date	Year Month Day	Engine		Mileage	km

Symptom		☐Warning lamp activated ( ) ☐ Vehicle not READY ☐ Poor starting ☐ Engine stall ☐Rough idle ☐Idling stop does not occur. ☐ Poor driving control ☐ Overheating ☐Abnormal noise, gear noise ☐ Shock ☐ Vibration (judder) ☐ Slipping ☐ Poor shifting ☐Fixed shift position ☐ Poor operating feel ☐ Does not shift. ☐ Shifting is heavy. ☐ Gear slipout ☐Switch malfunction ☐ Driving not possible ☐ Other
	Details of problem	
	Noise description	
Date of malfunction		☐ >From when car is new ☐ Recent (approx. date: , km)
Frequency of occurrence		☐ Always ☐ Once only ☐ Occasionally (times in past) ☐ Other ( )
Location of malfunction		☐ Not applicable ☐ Ordinary road ☐ Expressway ☐ Mountain road (ascending / descending) ☐ Rough road ☐ Flat road ☐ Turning (right / left) ☐ Other ( )
Engine speed		☐ Not applicable ☐ Cold ☐ During warm-up ☐ Warm ☐ Other ( )
Climate conditions		☐ Not applicable
	Weather	☐ Clear ☐ Overcast ☐ Rain ☐ Snow ☐ Other ( )
	Temperature	_☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Temp. (approx. ˚C)
	Relative humidity	☐ High ☐ Medium ☐ Low
Selector lever position		☐ Not applicable ☐ P ☐ R ☐ N ☐ D ☐ L ☐ S ☐ 3 ☐ 2 ☐ 1 ☐ M mode ( ) ☐ 1st ☐ 2nd ☐ 3rd ☐ 4th ☐ 5th ☐ 6th ☐ 7th
Condition of shift lever operation		☐ Not applicable ☐ AT/CVT select ( ) → ( ) ☐ MT shift operation ( ) → ( ) ☐ Shift-up ( ) → ( ) ☐ Shift down ( ) → ( ) ☐ Other ( )
Driving pattern		☐ Not applicable ☐ At engine start ☐ Idling ☐ Stopped, D position ☐ Starting from stop ☐ Accelerating ☐ Constant-speed driving ☐ Decelerating ☐ Just before stopping ☐ Just after stopping ☐ Engine stopped ☐ A/C ON ☐ P/S turned ☐ Engine driving ☐ Motor driving ☐ Shifting ( ) → ( ) ☐ Cruise control ON ☐ ECO mode ON ☐ SPORT mode ON ☐ SNOW mode ON ☐ Other ( )
		☐ ENG speed: rpm ☐ Vehicle speed: km/h ☐ TH position:
When is malfunction corrected?		☐ Is not corrected. ☐ While idling ☐ While engine is running ☐ During motor driving ☐ When ignition is turned OFF ☐ When shift lever is operated ☐ When clutch pedal is operated ☐ Other ( )
Other conditions		
Customer comments		

JSCIA1012GB

ADDITIONAL SERVICE WHEN REPLACING HPCM

Description

INFOID:0000000014736114

When replacing HPCM, the following procedure must be performed.
For details, refer to HBC-104, "Work Procedure".

PROGRAMMING OPERATION

NOTE:
- After replacing with a blank HPCM, programming is required to write HPCM information. Be sure to follow the procedure to perform the programming.
- Part number of blank HPCM is 237A1 - XXXXX.

Work Procedure

INFOID:0000000014736115

1. SAVE HPCM PART NUMBER

Read out the part number from the old HPCM and save the number, following the programming instructions. Refer to CONSULT Operation Manual.
NOTE:
- The HPCM part number is saved in CONSULT.
- Even when HPCM part number is not saved in CONSULT, go to 2.

>> GO TO 2.

2. PERFORM HPCM PROGRAMMING

After replacing HPCM, perform the HPCM programming. Refer to CONSULT Operation Manual.
NOTE:
- Refer to HBC-335, "Removal and Installation" for replacement of HPCM.
- During programming, maintain the following conditions:
- Ignition switch: ON
- Electric load: OFF
- Brake pedal: Not depressed
- Battery voltage: 12 – 13.5 V (Be sure to check the value of battery voltage by selecting “BATTERY VOLT” in “Data monitor” of CONSULT.)

>> GO TO 3.

3. REGISTER INTELLIGENT KEYS

For initialization and registration of Intelligent Keys, refer to CONSULT Immobilizer mode and follow the on-screen instructions.

>> GO TO 4.

4. PERFORM CLUTCH 1 ZERO POSITION LEARNING

Perform clutch 1 zero position learning.
Refer to HBC-105, "Description".

>> GO TO 5.

5. PERFORM G SENSOR CALIBRATION

Perform G sensor calibration.
Refer to HBC-106, "Description".

>> END

CLUTCH 1 ZERO POSITION LEARNING

Description

INFOID:0000000014736116

Clutch 1 zero position learning is a function of HPCM to learn the initial position of the clutch 1. It must be performed as per the following conditions:

- HPCM is replaced.
- Transmission assembly is replaced.

For details, refer to HBC-105, "Work Procedure".

Work Procedure

INFOID:0000000014736117

1.PRECONDITIONING

1. If the engine is cold, warm it up for approximately 10 minutes with the vehicle in READY state.
2. Set the vehicle as the following condition.

Li-ion battery level	55 % or more
CVT fluid temperature	60 °C (140 °F) or more
Air conditioning	OFF
DTC	No detected

3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM CLUTCH 1 POSITION LEARNING

With CONSULT

1. Turn ignition switch ON.
2. Shift the selector lever to P position and check that the vehicle stops.
3. Release the accelerator pedal fully.
4. Using CONSULT, select “CLUTCH 1 ZERO POSITION LEARNING” in “WORK SUPPORT” mode of “EV/HEV” and touch “Start”.
5. Check that “Current status” of CONSULT is “Waiting for your operation” and touch “Start”.
6. Set the vehicle to READY.

NOTE:

- When the vehicle becomes READY state, the engine starts.
- Learning finishes within around 120 seconds from idling stop mode.
- Hybrid system warning lamp and 12 V battery charge warning lamp blink during operation.
- When the learning is completed, 12 V battery charge warning lamp turns OFF.
- If the learning is not completed normally, 12 V battery charge warning lamp continues blinking.
- Hybrid system warning lamp turns OFF when the key switch is turned OFF.

Is “COMPLETED” shown on the CONSULT screen?

YES >> END. Turn ignition switch OFF.
NO >> Turn ignition switch OFF. Check that requirements for learning are met, and perform step 1 to step 6, once again.

CALIBRATION OF G SENSOR

Description

INFOID:0000000014736118

G SENSOR CALIBRATION is a learning function for initial gradient value of G sensor based on monitoring the G sensor value on a flat surface as the gradient value on installation of G sensor is at zero point. Operate this function under the following conditions.

- HPCM is replaced.
- G sensor is replaced.

For details, refer to HBC-106, "Work Procedure".

Work Procedure

INFOID:0000000014736119

1.CHECK THE VEHICLE STATUS

CAUTION:

When performing “G SENSOR CALIBRATION”, check that the vehicle satisfy the below conditions.

- **Be sure to perform on a flat surface.**
- **Never allow passenger or load on the vehicle.**
- **No DTC is detected.**

1. Steer the steering wheel to the straight-ahead position. Stop the vehicle on level surface.
2. Turn ignition switch OFF.

Does the vehicle satisfy the above conditions?

YES >> GO TO 2.
NO >> Check the vehicle conditions again.

2.PREPARATION BEFORE CALIBRATION PROCEDURE

With CONSULT

1. Turn ignition switch ON.
2. Select “ABS”, “DATA MONITOR”, “ECU INPUT SIGNALS”, “DECEL G-SEN” in this order. Check that the signal is within the specified value.

DECEL G-SEN : Applox ±0.08 G

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 1.

3.PERFORM G SENSOR CALIBRATION

CAUTION:

When performing “G SENSOR CALIBRATION”, never operate the following actions.

- **Never apply vibration to the vehicle body when opening or closing door during calibration.**
- **Never set the vehicle to READY because engine may start running.**

With CONSULT

1. Select “G SENSOR” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Touch “Start”.
3. After “COMPLETED” is displayed, check that “G SEN CORRECT ERROR” is “Off” (normal) at “DATA MONITOR” mode of “EV/HEV”.

Is the inspection result normal?

YES >> INSPECTION END
NO-1 >> If it is the first attempt: GO TO 1.
NO-2 >> If the result is still ON after 2nd or more attempts: Remove G Sensor and install (refer to BRC-204, "Removal and Installation"). Perform the work procedures again. GO TO 1.

HOW TO ERASE PERMANENT DTC

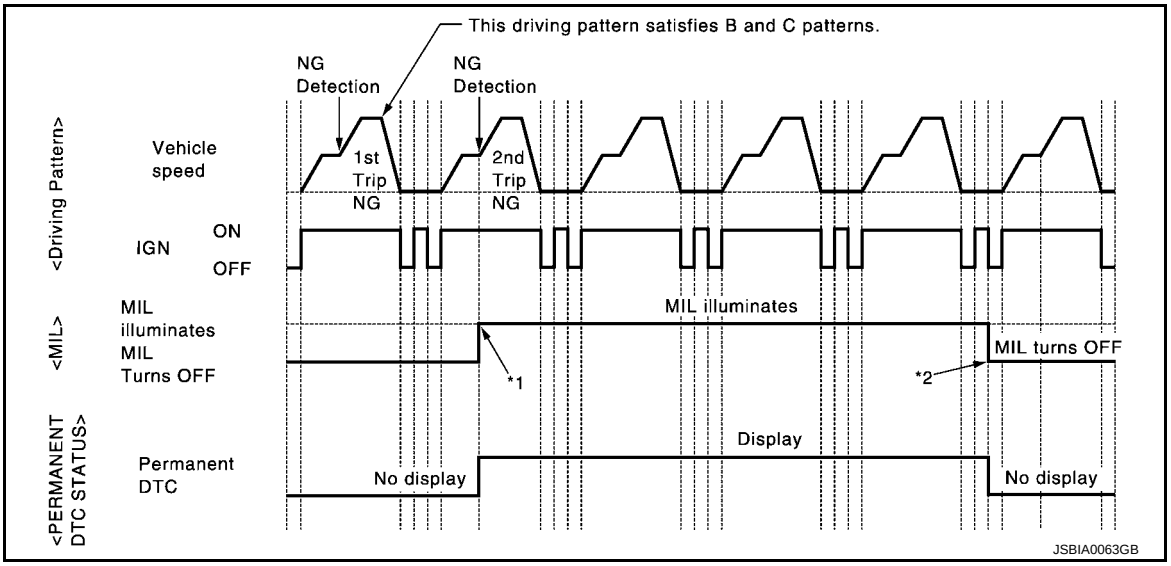
Description

INFOID:0000000014944565

OUTLINE

When a DTC is stored in control module

When a DTC is stored in control module and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a raw.



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in control module

The erasing method depends on a permanent DTC stored in control module. Refer to the following table.

NOTE:

If the applicable permanent DTC includes multiple groups, perform the procedure of Group B first. If the permanent DTC is not erased, perform the procedure of Group A.

×: Applicable —: Not applicable

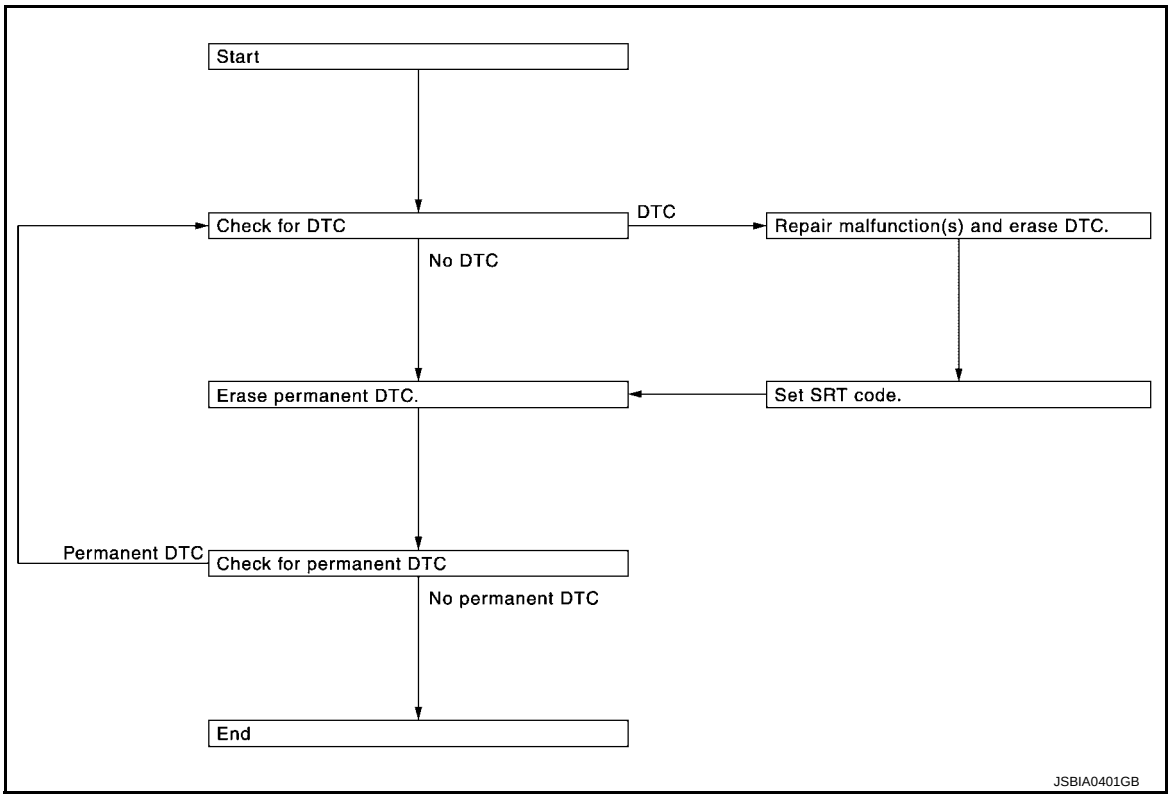
Group*	Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern		Reference
		B	D	
A	×	—	—	HBC-108, "Work Procedure (Group A)"
B	—	×	×	HBC-110, "Work Procedure (Group B)"

*: For group, refer to "DTC Index" of each control module.

PERMANENT DTC ITEM

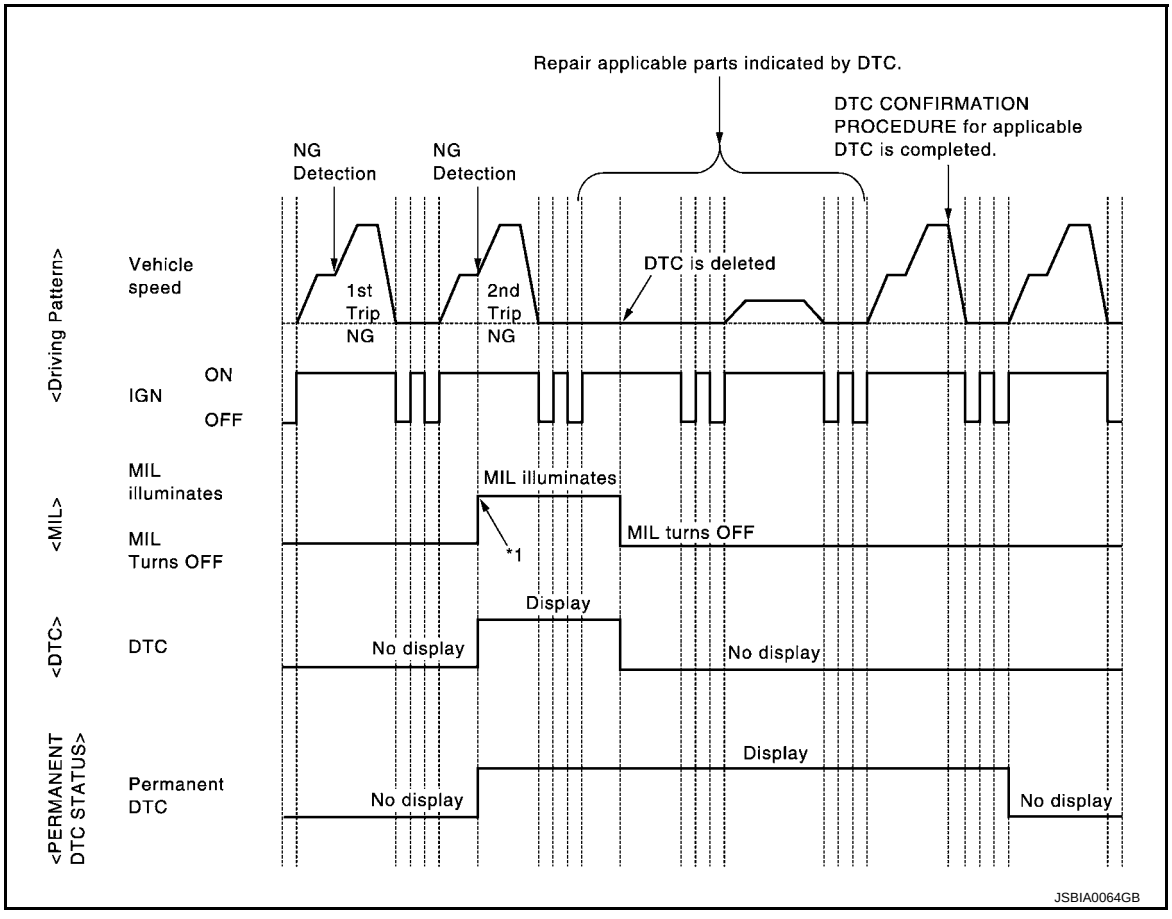
For permanent DTC items, MIL turns ON. Refer to "DTC Index" of each control module.

PERMANENT DTC SERVICE PROCEDURE



Work Procedure (Group A)

INFOID:0000000014944566



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to “DTC Index” of each control module.
NO >> GO TO 2.

2.CHECK PERMANENT DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.
NO >> END

3.PERFORM DTC CONFIRMATION PROCEDURE

Perform “DTC CONFIRMATION PROCEDURE” for DTCs which are the same as permanent DTCs stored in control module.

>> GO TO 4.

4.CHECK PERMANENT DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

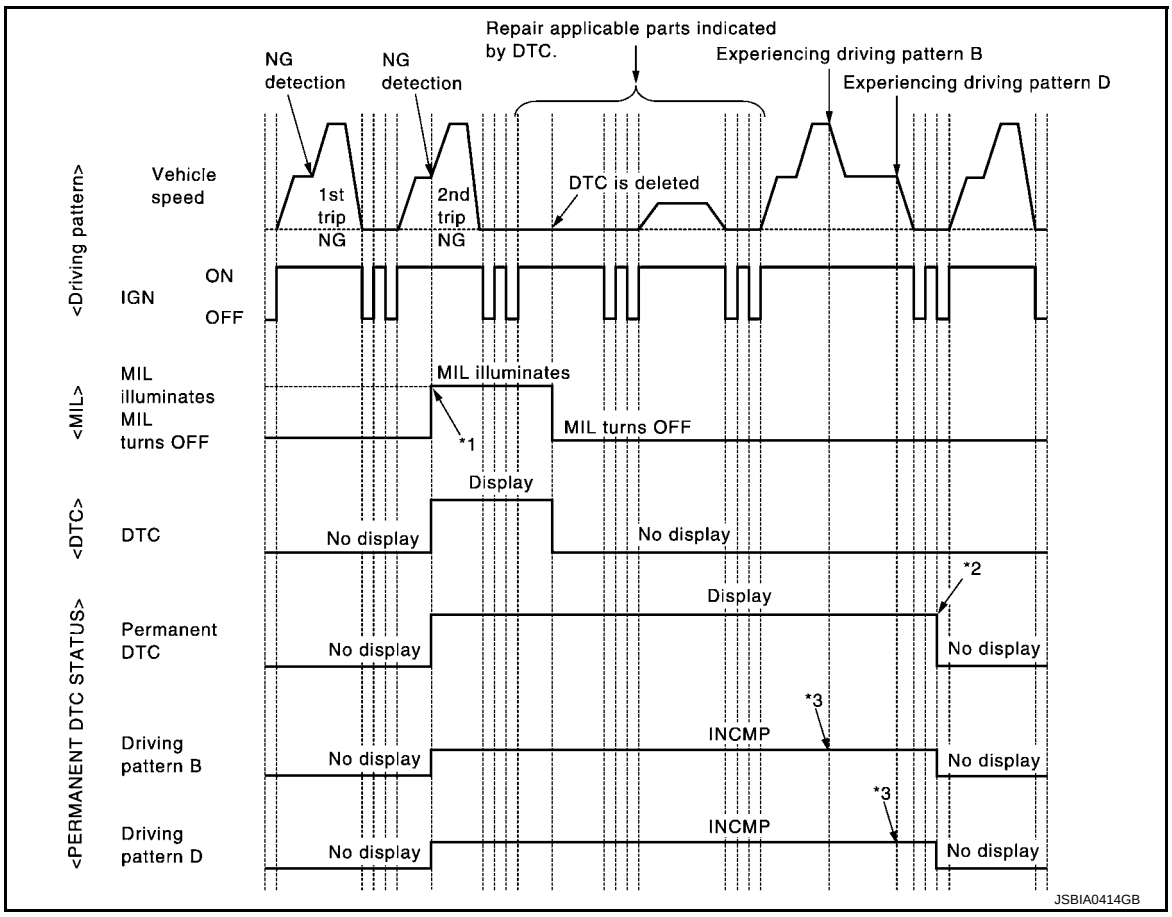
With GST
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1.
NO >> END

Work Procedure (Group B)

INFOID:0000000015015398



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: After experiencing driving pattern B and D, permanent DTC is erased.

*3: Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing driving pattern B or D.

NOTE:
Drive the vehicle according to only driving patterns indicating “INCMP” in driving patterns B and D on the “PERMANENT DTC STATUS” screen.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC.
NO >> GO TO 2.

2.CHECK PERMANENT DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.

5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.
NO >> END

3. DRIVE DRIVING PATTERN B

CAUTION:
- **Always drive at a safe speed.**
- **Never erase self-diagnosis results.**
- **If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.**

With CONSULT
1. Turn ignition switch ON.
2. Perform INSPECTION MODE 5. Refer to HBC-113, "Description".
3. Start engine and warm it up to normal operating temperature.
4. Use “PERMANENT DTC WORK SUPPORT” mode with CONSULT to drive the vehicle according to driving pattern B. Refer to EC-78, "CONSULT Function", HBC-41, "DIAGNOSIS DESCRIPTION : Driving Pattern".

With GST
1. Turn ignition switch ON.
2. Perform INSPECTION MODE 5. Refer to HBC-113, "Description".
3. Start engine and warm it up to normal operating temperature.
4. Drive the vehicle according to driving pattern B. Refer to HBC-41, "DIAGNOSIS DESCRIPTION : Driving Pattern".

>> GO TO 4.

4. CHECK PERMANENT DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 5.
NO >> END

5. DRIVE DRIVING PATTERN D

CAUTION:
- **Always drive at a safe speed.**
- **Never erase self-diagnosis results.**
- **If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.**

1. Drive the vehicle according to driving pattern D. Refer to HBC-41, "DIAGNOSIS DESCRIPTION : Driving Pattern".

>> GO TO 6.

6. CHECK PERMANENT DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1.
NO >> END

INSPECTION MODE

Description

INFOID:0000000014736120

- When the engine is warm and the Li-ion battery is sufficiently charged, the engine automatically stops when the vehicle is stopped. For this reason, when continuous engine operation is required, it is necessary to use inspection mode.
- When turning the vehicle wheels on a chassis dynamometer or similar equipment, it is necessary to use inspection mode to change the vehicle to suitable conditions.
- Inspection mode 7 enables engine to crank by stop of fuel injection control and ignition timing control.

Inspection mode*1	Primary purpose	Control	Combination meter		Reference
			Hybrid system warning lamp	12-volt battery charge warning lamp	
Inspection mode 1*2, *3	Example: inspections that are performed with no load on the engine	• Disengage clutch 1 to eliminate any load on the engine. (P position only) • Operate the engine continuously.	Blink	—	HBC-113
Inspection mode 2	Example: driving on a 2-axle chassis dynamometer	Change the balance of the regenerative brake at the front and rear wheels.	—	Blink	HBC-114
Inspection mode 3	Example: driving on a 4-axle chassis dynamometer	Prohibit slope estimation.	Blink	Blink	HBC-114
Inspection mode 5*3	Example: driving using the engine only	Operate the engine continuously.	Blink	—	HBC-115
Inspection mode 7	Example: measurement of engine compression pressure or scavenging combustion chamber when eliminating moisture from fuel on the spark plugs	Run the engine with cutoff of fuel.	—	—	HBC-115

CAUTION:

- ***1: Inspection mode is canceled when the ignition switch is turned OFF. It is not canceled when the mode changed from CONSULT "EV/HEV" "ACTIVE TEST" mode to another mode. However, inspection mode 1 is temporarily canceled when the select lever is shifted from P position to D position.**
- ***2: Check the conditions listed below before using inspection mode 1.**
- **If maintenance mode 1 is engaged when the Li-ion battery level is low, then in order to engage clutch 1 and charge the battery from the engine, use CONSULT "EV/HEV" "DATA MONITOR" mode and check that the "HV BATTERY LEVEL" reading is 50% or more, or else use the "Li-ion battery state of charge" in the information display on the combination meter and check that the battery level is 50% or more.**
- **Check that the engine coolant temperature is 80 °C (176 °F) or more.**
- ***3: When the select lever is in the P or N position, adjustments to the throttle position prevent the engine speed from exceeding 3,000 rpm.**

Work Procedure (Inspection Mode 1)

INFOID:0000000014736121

CAUTION:

- **Before using inspection mode 1 when the Li-ion battery level is low, in order to engage clutch 1 and charge the battery from the engine, use CONSULT "EV/HEV" "DATA MONITOR" mode and check that the "HV BATTERY LEVEL" reading is 50% or more, or else use the "Li-ion battery state of charge" in the information display on the combination meter and check that the battery level is 50% or more.**
- **Check that the engine coolant temperature is 80 °C (176 °F) or more before using inspection mode 1.**

NOTE:

If Li-ion battery level or engine coolant temperature decreases with the mode switched to inspection mode 1, inspection mode 1 may be cancelled.

INSPECTION MODE 1

1.CHANGING TO INSPECTION MODE

With CONSULT
1. Set the vehicle to READY with the selector lever at the P position.
2. Select “INSPECTION MODE 1” in “ACTIVE TEST” mode of “EV/HEV”.
3. Touch “On”.
4. The system changes to inspection mode 1, and the hybrid system warning lamp on the combination meter blinks.

Without CONSULT
1. Perform the following steps within 60 seconds.
- Turn ignition switch ON with the selector lever at the P position.
- Fully depress the accelerator pedal, then fully release it 2 times.
- While depressing the brake pedal, shift the select lever to the N position.
- Fully depress the accelerator pedal, then fully release it 2 times.
- While depressing the brake pedal, shift the select lever to the P position.
- Fully depress the accelerator pedal, then fully release it 2 times.
2. The system changes to inspection mode 1, and the hybrid system warning lamp on the combination meter blinks.
3. Set the vehicle to READY.

>> END

CANCELING INSPECTION MODE 1
- Inspection mode 1 is canceled when the ignition switch turns OFF.
- Inspection mode 1 is temporarily canceled when shift the select lever from P position to D position.

Work Procedure (Inspection Mode 2)

INFOID:0000000014736122

INSPECTION MODE 2

1.CHANGING TO INSPECTION MODE

With CONSULT
1. Turn ignition switch ON.
2. Select “INSPECTION MODE 2” in “ACTIVE TEST” mode of “EV/HEV”.
3. Touch “On”.
4. Set the vehicle to READY.
5. The system changes to inspection mode 2, and the 12-volt battery charge warning lamp on the combination meter blinks.

Without CONSULT
1. Perform the following steps within 60 seconds.
- Turn ignition switch ON with the selector lever at the P position.
- Fully depress the accelerator pedal, then fully release it 3 times.
- While depressing the brake pedal, shift the select lever to the N position.
- Fully depress the accelerator pedal, then fully release it 3 times.
- While depressing the brake pedal, shift the select lever to the P position.
- Fully depress the accelerator pedal, then fully release it 3 times.
2. Set the vehicle to READY.
3. The system changes to inspection mode 2, and the 12-volt battery charge warning lamp on the combination meter blinks.

>> END

CANCELING INSPECTION MODE 2

Inspection mode 2 is canceled when the ignition switch turns OFF.

Work Procedure (Inspection Mode 3)

INFOID:0000000014736123

INSPECTION MODE 3

1.CHANGING TO INSPECTION MODE

With CONSULT
1. Turn ignition switch ON.
2. Select “INSPECTION MODE 3” in “ACTIVE TEST” mode of “EV/HEV”.
3. Touch “On”.
4. The system changes to inspection mode 3, and both the hybrid system warning lamp and the 12-volt battery charge warning lamp on the combination meter blinks.
5. Set the vehicle to READY.

Without CONSULT
1. Perform the following steps within 60 seconds.
- Turn ignition switch ON with the selector lever at the P position.
- Fully depress the accelerator pedal, then fully release it 4 times.
- While depressing the brake pedal, shift the select lever to the N position.
- Fully depress the accelerator pedal, then fully release it 4 times.
- While depressing the brake pedal, shift the select lever to the P position.
- Fully depress the accelerator pedal, then fully release it 4 times.
2. The system changes to inspection mode 3, and both the hybrid system warning lamp and the 12-volt battery charge warning lamp on the combination meter blinks.
3. Set the vehicle to READY.

>> END

CANCELING INSPECTION MODE 3

Inspection mode 3 is canceled when the ignition switch turns OFF.

Work Procedure (Inspection Mode 5)

INFOID:0000000014736124

INSPECTION MODE 5

1.CHANGING TO INSPECTION MODE

With CONSULT
1. Turn ignition switch ON.
2. Select “INSPECTION MODE 5” in “ACTIVE TEST” mode of “EV/HEV”.
3. Touch “On”.
4. The system changes to inspection mode 5, and the hybrid system warning lamp on the combination meter blinks.
5. Set the vehicle to READY.

Without CONSULT
1. Perform the following steps within 60 seconds.
- Turn ignition switch ON with the selector lever at the P position.
- Fully depress the accelerator pedal, then fully release it 6 times.
- While depressing the brake pedal, shift the select lever to the N position.
- Fully depress the accelerator pedal, then fully release it 6 times.
- While depressing the brake pedal, shift the select lever to the P position.
- Fully depress the accelerator pedal, then fully release it 6 times.
2. The system changes to inspection mode 5, and the hybrid system warning lamp on the combination meter blinks.
3. Set the vehicle to READY.

>> END

CANCELING INSPECTION MODE 5

Inspection mode 5 is canceled when the ignition switch turns OFF.

Work Procedure (Inspection Mode 7)

INFOID:0000000014736125

INSPECTION MODE 7

1.CHANGING TO INSPECTION MODE

With CONSULT
1. Turn ignition switch ON.
2. Select “ENGINE CRANKING” in “ACTIVE TEST” mode of “EV/HEV”.
3. Touch “On”.
4. The system changes to inspection mode 7.
5. Set the vehicle to READY.

Without CONSULT
1. Perform the following steps within 60 seconds.
- Turn ignition switch ON with the selector lever at the P position.
- Fully depress the accelerator pedal, then fully release it 8 times.
- While depressing the brake pedal, shift the select lever to the N position.
- Fully depress the accelerator pedal, then fully release it 8 times.
- While depressing the brake pedal, shift the select lever to the P position.
- Fully depress the accelerator pedal, then fully release it 8 times.
2. The system changes to inspection mode 7.
3. Set the vehicle to READY.

>> END

CANCELING INSPECTION MODE 7

Inspection mode 7 is canceled when the ignition switch turns OFF.

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

HPCM

HPCM : Diagnosis Procedure

INFOID:0000000014736126

1. CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
High voltage fuse, fusible link and relay box	#70	10 A
	#74	10 A
IPDM E/R	#50	10 A

Is the fuse blown (open)?

YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 2.

2. CHECK HPCM POWER SUPPLY-1

1. Insert the fuse which pulled out.
2. Check the voltage between HPCM harness connector terminals.

HPCM			Voltage
Connector	+	–	
	Terminal		
E130	81	112	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3. CHECK HPCM POWER SUPPLY-2

Check the voltage between HPCM harness connector and ground.

+		–	Voltage
HPCM			
Connector	Terminal		
E130	81	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 4.

4. CHECK HPCM POWER SUPPLY CIRCUIT-1

1. Check the continuity between HPCM harness connector and high voltage fuse, fusible link and relay box harness connector.

+		–	Continuity
HPCM			
Connector	Terminal	Fuse No.	
E130	81	#74	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5. CHECK SELF SHUT-OFF RELAY OPERATION

Operate the ignition switch from ON to OFF or from OFF to ON, and check the operating sound of self shut-OFF relay.

NOTE:
The self shut-OFF relay is activated after a lapse of a few seconds when the ignition switch is turned OFF.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK SELF SHUT-OFF RELAY POWER SUPPLY-1

1. Remove self shut-OFF relay.
2. Turn ignition switch ON.
3. Check the voltage between HPCM harness connector and self shut-OFF relay.

+		
Self shut-OFF relay	–	Voltage
Terminal		
2	Ground	More than battery voltage−2.0 V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. CHECK SELF SHUT-OFF RELAY SIGNAL CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between HPCM harness connector and self shut-OFF relay.

+		–	
HPCM		Self shut-OFF relay	Continuity
Connector	Terminal	Terminal	
E131	5	2	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform GI-54, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

8. CHECK SELF SHUT-OFF RELAY SIGNAL CIRCUIT-2

1. Check the continuity between self shut-OFF relay and ground.

+		
Self shut-OFF relay	–	Continuity
Terminal		
1	Ground	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair or replace error-detected parts.

9.CHECK HPCM POWER SUPPLY-3

1. Turn ignition switch ON.
2. Check the voltage between HPCM harness connector terminals.

HPCM			Voltage
Connector	+	–	
	Terminal		
E132	77	112	Battery voltage
E130	105		

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 10.

10.CHECK HPCM POWER SUPPLY-4

Check the voltage between HPCM harness connector and ground.

+		–	Voltage
HPCM			
Connector	Terminal		
E132	77	Ground	Battery voltage
E130	105		

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 11.

11.CHECK HPCM POWER SUPPLY CIRCUIT-2

1. Check the continuity between HPCM harness connector and high voltage fuse, fusible link and relay box harness connector.

+		–	Continuity
HPCM			
Connector	Terminal	Fuse No.	
E132	77	#70	Existed
E130	105		

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace error-detected parts.

12.CHECK SELF SHUT-OFF RELAY POWER SUPPLY-2

1. Check the voltage between self shut-OFF relay and ground.

+	–	Voltage
Self shut-OFF relay		
Terminal		
3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 15.
NO >> Perform the trouble diagnosis for power supply circuit.

13. CHECK IGNITION POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between HPCM harness connector and ground.

+		–	Voltage
HPCM			
Connector	Terminal		
E130	93	Ground	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 14.

14. CHECK IGNITION POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between HPCM harness connector and IPDM E/R harness connector.

+		–		Continuity
HPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E130	93	F35	71	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-46, "Removal and Installation".
NO >> Repair or replace error-detected parts.

15. CHECK SELF SHUT-OFF RELAY

Check self shut-OFF relay.

Is the inspection result normal?

YES >> Perform GI-54, "Intermittent Incident".
NO >> Replace self shut-OFF relay.

16. CHECK GROUND CONNECTION

Check the ground connection E9 and E15. Refer to GI-56, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace ground connection.

17. CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
E132	50	Ground	Existed
	54		
	57		
E130	108		
	112		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Repair or replace error-detected parts.

DC/DC CONVERTER

DC/DC CONVERTER : Diagnosis Procedure

INFOID:0000000014736127

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
High voltage fuse, fusible link and relay box	#73	10 A

Is the fuse blown (open)?

YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 3.

3.CHECK DC/DC CONVERTER CONTROL POWER SUPPLY

1. Reinstall fuse.
2. Disconnect DC/DC converter harness connector.
3. Turn ignition switch ON.
4. Check the voltage between DC/DC converter harness connector and ground.

+		–	Voltage
DC/DC converter			
Connector	Terminal		
B50	1	Ground	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK DC/DC CONVERTER CONTROL POWER SUPPLY CIRCUIT

1. Remove #73 fuse.
2. Turn ignition switch OFF.
3. Check the continuity between DC/DC converter harness connector and fuse and high voltage fuse, fusible link and relay box.

+		−	Continuity
DC/DC converter			
Connector	Terminal	Fuse No.	
B50	1	#73	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

U0100 CAN COMMUNICATION

DTC Description

INFOID:0000000014736128

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition		
U0100	ECM/PCM A (Lost communication with ECM/PCM “A”)	1	Diagnosis condition	—
			Signal (terminal)	CAN communication signal
			Threshold	HPCM cannot receive a CAN communication signal from ECM.
			Diagnosis delay time	2 seconds or more in a row
		2	Diagnosis condition	—
			Signal (terminal)	CAN communication signal
			Threshold	HPCM cannot receive a CAN communication signal from ECM.
			Diagnosis delay time	A short period of less than 2 seconds

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted)
- Harness or connectors (Intermittent malfunction in the CAN communication circuit)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Engine	If engine fuel is cut off or ECM CAN communication are abnormal	The engine is stopped and the vehicle is driven by the traction motor alone.
	If ECM stopped control of the electric throttle control actuator	• The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.
	If ECM is limiting speed due to fuel cut-off	Engine stop control is prohibited and the vehicle is driven by the engine alone with a limit on the engine speed. For this reason, acceleration performance decreases.
	If ECM reduces the engine output	• HPCM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. • ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U0100, U0101, U0111 or U0293 detected?

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111 or U0293 is stored in “Motor Control” at the time of receiving.)>>GO TO 3.
NO-2 (Repaired after performing HBC-124, "Diagnosis Procedure".)>>To check malfunction symptom before repair: Refer to GI-56, "Circuit Inspection".
NO-3 >> Confirmation after repair: INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT
1. Perform “CAN Diagnosis”.
2. Check diagnosis results.

>> Proceed to HBC-124, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736129

CAUTION:
- **To perform diagnosis, observe LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-16, "Precautions for Harness Repair".**

1.INSPECTION START

Confirm the detected malfunction (result of “CAN Diagnosis”).

Is there any malfunction at present or a malfunction history?

YES >> Proceed to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2.IDENTIFY MALFUNCTIONING PART

WITH CONSULT
Check “Self Diagnostic Result” of “MOTOR CONTROL”.

Detected DTC	Malfunction part
DTC U0100, U0101, U0111 and U0293	• CAN communication system (Short circuit and traction motor inverter branch lines*1) • ECM • HPCM • TCM • LBC • Traction motor inverter
DTC U0100	• ECM branch lines*2 • ECM
DTC U0101	• TCM branch lines • TCM

Detected DTC	Malfunction part
DTC U0111	• LBC branch lines • LBC
DTC U0293	• HPCM branch lines • HPCM*3

NOTE:
- *1: If DTC “U0110” is detected by “EV/HEV”, check traction motor inverter branch lines first.
- *2: If DTC “U0293” is detected by “ENGINE”, check ECM branch lines first.
- *3: When replacing HPCM, replace Li-ion battery together with HPCM.

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U0101 CAN COMMUNICATION (TCM)

DTC Description

INFOID:0000000014736130

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition		
U0101	TCM (Lost communication with TCM)	1	Diagnosis condition	—
			Signal (terminal)	CAN communication signal
			Threshold	HPCM cannot receive a CAN communication signal from TCM.
			Diagnosis delay time	2 seconds or more in a row
		2	Diagnosis condition	—
			Signal (terminal)	CAN communication signal
			Threshold	HPCM cannot receive a CAN communication signal from TCM.
			Diagnosis delay time	A short period of less than 2 seconds

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted)
- Harness or connectors (Intermittent malfunction in the CAN communication circuit)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Transmission	Transmission malfunction (If clutch 2 is unable to slip)	• The engine and traction motor are stopped after the vehicle is stopped. • The hybrid system can be activated, but the engine and traction motor are stopped when the selector lever is shifted to a drivable position.
	Primary speed sensor malfunction	The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed.
	Secondary speed sensor malfunction	
	Transmission range switch malfunction	
	If CAN communication with the TCM computing unit or TCM are abnormal	• The engine and traction motor are stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

Ⓔ With CONSULT

1. Perform “INSPECTION MODE 5”. Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.

3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U0100, U0101, U0111 or U0293 detected?

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111 or U0293 is stored in “Motor Control” at the time of receiving.)>>GO TO 3.
NO-2 (Repaired after performing HBC-127, "Diagnosis Procedure".)>>To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-3 >> Confirmation after repair: INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT
1. Perform “CAN Diagnosis”.
2. Check diagnosis results.

>> Proceed to HBC-127, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736131

CAUTION:
- **To perform diagnosis, observe LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-16, "Precautions for Harness Repair".**

1.INSPECTION START

Confirm the detected malfunction (result of “CAN Diagnosis”).

Is there any malfunction at present or a malfunction history?

YES >> Proceed to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2.IDENTIFY MALFUNCTIONING PART

WITH CONSULT
Check “Self Diagnostic Result” of “MOTOR CONTROL”.

Detected DTC	Malfunction part
DTC U0100, U0101, U0111 and U0293	• CAN communication system (Short circuit and traction motor inverter branch lines*1) • ECM • HPCM • TCM • LBC • Traction motor inverter
DTC U0100	• ECM branch lines*2 • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• LBC branch lines • LBC
DTC U0293	• HPCM branch lines • HPCM*3

NOTE:
- *1: If DTC “U0110” is detected by “EV/HEV”, check traction motor inverter branch lines first.
- *2: If DTC “U0293” is detected by “ENGINE”, check ECM branch lines first.
- *3: When replacing HPCM, replace Li-ion battery together with HPCM.

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U0107 CAN COMMUNICATION (ADAS C/U)

DTC Description

INFOID:0000000014736132

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U0107	TAC MODULE (Lost communication with throttle actuator “A” control module)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	CAN communication signal
		Threshold	ECM cannot receive a CAN communication signal from ADAS control unit.
		Diagnosis delay time	2.5 seconds or more

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted)

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-128, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736133

1.PERFORM THE TROUBLE DIAGNOSIS FOR CAN COMMUNICATION SYSTEM

Perform the trouble diagnosis for CAN communication system. Refer to LAN-26, "Trouble Diagnosis Flow Chart".

>> INSPECTION END

U0110 CAN COMMUNICATION (TRACTION MOTOR INVERTER)

DTC Description

INFOID:0000000014736134

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition		
U0110	DRIVE MOTOR CONTROL MODULE A (Lost Communication With Drive Motor Control Module “A”)	1	Diagnosis condition	—
			Signal (terminal)	CAN communication signal
			Threshold	HPCM cannot receive a CAN communication signal from traction motor inverter.
			Diagnosis delay time	2 seconds or more in a row
		2	Diagnosis condition	—
			Signal (terminal)	CAN communication signal
			Threshold	HPCM cannot receive a CAN communication signal from traction motor inverter.
			Diagnosis delay time	A short period of less than 2 seconds

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted)
- Harness or connectors (Intermittent malfunction in the CAN communication circuit)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Perform “INSPECTION MODE 5”. Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U0100, U0101, U0111 or U0293 detected?

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111 or U0293 is stored in “Motor Control” at the time of receiving.)>>GO TO 3.
NO-2 (Repaired after performing HBC-130, "Diagnosis Procedure".)>>To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-3 >> Confirmation after repair: INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT
1. Perform “CAN Diagnosis”.
2. Check diagnosis results.

>> Proceed to HBC-130, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736135

CAUTION:
- **To perform diagnosis, observe LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-16, "Precautions for Harness Repair".**

1.INSPECTION START

Confirm the detected malfunction (result of “CAN Diagnosis”).

Is there any malfunction at present or a malfunction history?

YES >> Proceed to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2.IDENTIFY MALFUNCTIONING PART

WITH CONSULT
Check “Self Diagnostic Result” of “MOTOR CONTROL”.

Detected DTC	Malfunction part
DTC U0100, U0101, U0111 and U0293	• CAN communication system (Short circuit and traction motor inverter branch lines*1) • ECM • HPCM • TCM • LBC • Traction motor inverter
DTC U0100	• ECM branch lines*2 • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• LBC branch lines • LBC
DTC U0293	• HPCM branch lines • HPCM*3

NOTE:
- *1: If DTC “U0110” is detected by “EV/HEV”, check traction motor inverter branch lines first.
- *2: If DTC “U0293” is detected by “ENGINE”, check ECM branch lines first.
- *3: When replacing HPCM, replace Li-ion battery together with HPCM.

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U0111 CAN COMMUNICATION (LI-ION BATTERY CONTROLER)

DTC Description

INFOID:0000000014736136

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition		
U0111	BATTERY ENERGY CONTROL MODULE A (Lost communication with battery energy control module “A”)	1	Diagnosis condition	—
			Signal (terminal)	CAN communication signal
			Threshold	HPCM cannot receive a CAN communication signal from Li-ion battery controller.
			Diagnosis delay time	2 seconds or more in a row
		2	Diagnosis condition	—
			Signal (terminal)	CAN communication signal
			Threshold	HPCM cannot receive a CAN communication signal from Li-ion battery controller.
			Diagnosis delay time	A short period of less than 2 seconds

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted)
- Harness or connectors (Intermittent malfunction in the CAN communication circuit)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Perform “INSPECTION MODE 5”. Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U0100, U0101, U0111 or U0293 detected?

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111 or U0293 is stored in “Motor Control” at the time of receiving.)>>GO TO 3.
NO-2 (Repaired after performing HBC-132, "Diagnosis Procedure".)>>To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-3 >> Confirmation after repair: INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT
1. Perform “CAN Diagnosis”.
2. Check diagnosis results.

>> Proceed to HBC-132, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736137

CAUTION:
- **To perform diagnosis, observe LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-16, "Precautions for Harness Repair".**

1.INSPECTION START

Confirm the detected malfunction (result of “CAN Diagnosis”).

Is there any malfunction at present or a malfunction history?

YES >> Proceed to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2.IDENTIFY MALFUNCTIONING PART

WITH CONSULT
Check “Self Diagnostic Result” of “MOTOR CONTROL”.

Detected DTC	Malfunction part
DTC U0100, U0101, U0111 and U0293	• CAN communication system (Short circuit and traction motor inverter branch lines*1) • ECM • HPCM • TCM • LBC • Traction motor inverter
DTC U0100	• ECM branch lines*2 • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• LBC branch lines • LBC
DTC U0293	• HPCM branch lines • HPCM*3

NOTE:
- *1: If DTC “U0110” is detected by “EV/HEV”, check traction motor inverter branch lines first.
- *2: If DTC “U0293” is detected by “ENGINE”, check ECM branch lines first.
- *3: When replacing HPCM, replace Li-ion battery together with HPCM.

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U1000 CAN COMMUNICATION

DTC Description

INFOID:0000000014736138

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC DETECTION LOGIC

When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) for 2 seconds or more.

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1000	CAN COMM CIRCUIT (CAN communication circuit)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	CAN communication signal
		Threshold	When HPCM is not transmitting or receiving CAN communication signal.
		Diagnosis delay time	2 seconds or more

POSSIBLE CAUSE

Harness and connectors (CAN communication line is open or shorted)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
CAN Communication	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-133, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736139

1.PERFORM TROUBLE DIAGNOSIS FOR CAN COMMUNICATION SYSTEM

Perform the trouble diagnosis for CAN communication system. Refer to LAN-26, "Trouble Diagnosis Flow Chart".

>> INSPECTION END

P0510 THROTTLE POSITION SENSOR

DTC Description

INFOID:0000000014736140

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0510	CLOSED THROTTLE POSITION SWITCH (Closed throttle position switch)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects self-diagnosis signal from ECM.
		Diagnosis delay time	—

POSSIBLE CAUSE

ECM-detected DTC
Refer to EC-113, "Index of HPCM-detected DTC".

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Engine	If engine fuel is cut off or ECM CAN communication are abnormal	The engine is stopped and the vehicle is driven by the traction motor alone.
	If ECM stopped control of the electric throttle control actuator	• The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.
	If ECM is limiting speed due to fuel cut-off	Engine stop control is prohibited and the vehicle is driven by the engine alone with a limit on the engine speed. For this reason, acceleration performance decreases.
	If ECM reduces the engine output	• HPCM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. • ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH ECM

Check the DTC which detected with ECM. Refer to EC-113, "Index of HPCM-detected DTC".

>> Proceed to HBC-134, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736141

Check the DTC which detected with ECM. Refer to EC-113, "Index of HPCM-detected DTC".

P0613 TCM

DTC Description

INFOID:0000000014736142

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0613	TCM (TCM processor)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	—
		Threshold	When HPCM detects communication data error between HPCM and TCM.
		Diagnosis delay time	—

POSSIBLE CAUSE

TCM

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Transmission	Transmission malfunction (If clutch 2 is unable to slip)	• The engine and traction motor are stopped after the vehicle is stopped. • The hybrid system can be activated, but the engine and traction motor are stopped when the selector lever is shifted to a drivable position.
	Primary speed sensor malfunction	The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed.
	Secondary speed sensor malfunction	
	Transmission range switch malfunction	
	If CAN communication with the TCM computing unit or TCM are abnormal	• The engine and traction motor are stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0613 is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-135, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736143

1.CHECK DTC PRIORITY

< DTC/CIRCUIT DIAGNOSIS >

If DTC P0613 is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2. CHECK DTC WITH TCM

Check DTC with TCM.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer toTM-70, "DTC Index" .

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-135, "DTC Description".

Is the DTC P0613 displayed again?

YES >> Replace TCM. Refer to TM-213, "Removal and Installation".
NO >> INSPECTION END

P0701 TRANSMISSION CONTROL SYSTEM

DTC Description

INFOID:0000000014736144

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0701	T/M CONTROL SYSTEM (Transmission control system)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects self-diagnosis signal from TCM.
		Diagnosis delay time	—

POSSIBLE CAUSE

TCM-detected DTC
Refer to TM-72, "Index of HPCM-detected DTC".

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to TM-117, "DTC Description".

Is DTC detected?

YES >> Proceed to HBC-137, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736145

1.PERFORM TCM DIAGNOSIS

Perform TCM diagnosis. Refer to TM-117, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P0851, P0852 PARK/NEUTRAL SWITCH

DTC Description

INFOID:0000000014736146

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0851	PARK/NEUTRAL SWITCH (Park/neutral switch input circuit low)	Diagnosis condition	—
		Signal (terminal)	Park/neutral position (PNP) signal
		Threshold	HPCM detects the signal from the transmission range switch remains at OFF with selector lever position is P or N.
		Diagnosis delay time	2.5 seconds or more
P0852	PARK/NEUTRAL SWITCH (Park/neutral switch input circuit high)	Diagnosis condition	—
		Signal (terminal)	Park/neutral position (PNP) signal
		Threshold	HPCM detects the signal from the transmission range switch remains at ON with selector lever position is except for P or N.
		Diagnosis delay time	2.5 seconds or more

POSSIBLE CAUSE

- Harness or connectors (Transmission range switch circuit is open or shorted.)
- Transmission range switch
- TCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Shift the selector lever to P or N.
2. Turn ignition switch ON and wait at least 3 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-139, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Set the vehicle to READY.
2. Drive the vehicle.
   CAUTION:
   Always drive the vehicle at a safe speed.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-139, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736147

1.CHECK DTC WITH TCM

Check DTC with TCM.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to TM-70, "DTC Index".

2.CHECK TRANSMISSION RANGE SWITCH INPUT SIGNAL

1. Turn ignition switch ON.
2. Check the voltage between HPCM terminals as per the following condition.

HPCM				Condition		Voltage (Approx.)
+		–				
Connector	Terminal	Connector	Terminal			
E132	36	E130	112	Selector lever	P or N	Battery voltage
					Except above	0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.CHECK TRANSMISSION RANGE SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect transmission range switch harness connector.
4. Check the continuity between HPCM harness connector and transmission range switch harness connector.

+		–		Continuity
HPCM		Transmission range switch		
Connector	Terminal	Connector	Terminal	
E132	36	F78	10	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P0930 SHIFT LOCK

DTC Description

INFOID:0000000014736148

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0930	GEAR SHIFT LOCK SOL/ACT A (Shift lock system)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	More than the specified voltage is detected in the shift lock solenoid terminal of HPCM despite the selector lever in P range and no shift lock solenoid signal output.
		Diagnosis delay time	1 seconds or more

POSSIBLE CAUSE

- Harness or connectors (Shift lock circuit is open or shorted.)
- CVT shift selector
- HPCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Shift the selector lever to P.
2. Turn ignition switch ON and wait at least 3 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-140, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736149

1.CHECK SHIFT LOCK SYSTEM

Check the shift lock system. Refer to TM-196, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-140, "DTC Description".

Is DTC P0930 detected?

YES >> Replace HPCM. Refer to HBC-335, "Removal and Installation".
NO >> INSPECTION END

P0A00 HIGH VOLTAGE COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:0000000014736150

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A00	MOTOR ELECT COOLANT TEMP SEN (Motor electronics coolant temperature sensor circuit)	Diagnosis condition	—
		Signal (terminal)	• High voltage coolant temperature sensor signal • Engine coolant temperature sensor signal
		Threshold	During engine cooling and the time there is a big difference between high voltage coolant temperature and engine coolant temperature.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (High voltage coolant temperature sensor circuit is open or shorted.)
- High voltage coolant temperature sensor
- High voltage coolant leaks
- High voltage cooling system
- Engine coolant temperature sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0A00 is displayed with DTC P0A02, P0A03, P0A06, P0A07, P3123, P3124, P3125, P3126, P3127, P3128 or P3157, perform the trouble diagnosis for DTC P0A02, P0A03, P0A06, P0A07, P3123, P3124, P3125, P3126, P3127, P3128 or P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
2. Turn ignition switch OFF and leave the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during this procedure.
   NOTE:
   The vehicle must be cooled with the hood open.
3. Perform INSPECTION MODE 5. Refer to HBC-113, "Description".
4. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to HBC-142, "Diagnosis Procedure".

NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736151

1.CHECK DTC PRIORITY

If DTC P0A00 is displayed with DTC P0A02, P0A03, P0A06, P0A07, P3123, P3124, P3125, P3126, P3127, P3128 or P3157, perform the trouble diagnosis for DTC P0A02, P0A03, P0A06, P0A07, P3123, P3124, P3125, P3126, P3127, P3128 or P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK SELF-DIAGNOSTIC RESULT IN ECM

With CONSULT
Check self-diagnostic result in “ENGINE”.

Is any DTC detected?

YES >> Perform trouble diagnosis for detected DTC. Refer to HBC-71, "DTC Index".
NO >> GO TO 3.

3.CHECK HIGH VOLTAGE COOLING SYSTEM FOR LEAKAGE

Check high voltage cooling system for leakage. Refer to HCO-9, "Inspection".

Is there a leakage?

YES >> Repair or replace error-detected parts.
NO >> GO TO 4.

4.CHECK SUB RADIATOR FOR CLOGGING

Check sub radiator for clogging. Refer to HCO-8, "Inspection".

Is there a clogging?

YES >> Repair or replace error-detected parts.
NO >> GO TO 5.

5.CHECK HIGH VOLTAGE COOLANT LEVEL IN THE RESERVOIR TANK

Check high voltage coolant level in the reservoir tank. Refer to HCO-9, "Inspection".

Is the high voltage coolant level in the reservoir tank below the proper range?

YES >> Repair or replace error-detected parts.
NO >> GO TO 6.

6.CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect high voltage coolant temperature sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between high voltage coolant temperature sensor harness connector terminals.

High voltage coolant temperature sensor			Voltage
Connector	+	–	
	Terminal		
F203	1	2	Approx. 5 V

Is the inspection result normal?

YES >> Replace high voltage coolant temperature sensor. Refer to HCO-12, "Exploded View".
NO >> GO TO 7.

7.CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER SUPPLY-2

Check the voltage between high voltage coolant temperature sensor harness connector and ground.

+		–	Voltage
High voltage coolant temperature sensor			
Connector	Terminal		
F203	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and high voltage coolant temperature sensor harness connector.

+		–		Continuity
IPDM E/R		High voltage coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F42	100	F203	1	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER CIRCUIT-2

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and IPDM E/R harness connector.

+		–		Continuity
HPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E131	24	E120	28	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

10. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and high voltage coolant temperature sensor harness connector.

+		–		Continuity
IPDM E/R		High voltage coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F42	101	F203	2	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT-2

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and IPDM E/R harness connector.

+		–		Continuity
HPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E131	25	E120	29	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P0A02, P0A03 HIGH VOLTAGE COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:0000000014736152

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A02	MOTOR COOLANT TEMP SENSOR (Motor electronics coolant temperature sensor circuit low)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	High voltage coolant temperature sensor signal
		Threshold	An excessively low voltage from the high voltage coolant temperature sensor is sent to HPCM.
		Diagnosis delay time	—
P0A03	MOTOR COOLANT TEMP SENSOR (Motor electronics coolant temperature sensor circuit high)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	High voltage coolant temperature sensor signal
		Threshold	An excessively high voltage from the high voltage coolant temperature sensor is sent to HPCM.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (High voltage coolant temperature sensor circuit is open or shorted.)
- High voltage coolant temperature sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0A02 or P0A03 is displayed with DTC P3157, perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-145, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736153

1.CHECK DTC PRIORITY

If DTC P0A02 or P0A03 is displayed with DTC P3157, perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect high voltage coolant temperature sensor harness connector.
3. Check the voltage between high voltage coolant temperature sensor harness connector terminals.

High voltage coolant temperature sensor			Voltage
Connector	+	–	
	Terminal		
F203	1	2	Approx. 5 V

Is the inspection result normal?

YES >> Replace high voltage coolant temperature sensor. Refer to HCO-12, "Exploded View".
NO >> GO TO 3.

3. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER SUPPLY-2

1. Turn ignition switch ON.
2. Check the voltage between high voltage coolant temperature sensor harness connector and ground.

+		–	Voltage
High voltage coolant temperature sensor			
Connector	Terminal		
F203	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 4.

4. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and high voltage coolant temperature sensor harness connector.

+		–		Continuity
IPDM E/R		High voltage coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F42	100	F203	1	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER CIRCUIT-2

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and IPDM E/R harness connector.

+		–		Continuity
HPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E131	24	E120	28	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and high voltage coolant temperature sensor harness connector.

+		–		Continuity
IPDM E/R		High voltage coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F42	101	F203	2	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT-2

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and IPDM E/R harness connector.

+		–		Continuity
HPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E131	25	E120	29	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P0A06, P0A07 ELECTRIC WATER PUMP

DTC Description

INFOID:0000000014736154

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A06	COOLANT PUMP A (Motor electronics coolant pump “A” control circuit low)	Diagnosis condition	READY
		Signal (terminal)	Electric water pump operation order signal
		Threshold	When the electric water pump operation order signal which HPCM output detected a state of the LO adherence (less than 3%).
		Diagnosis delay time	3 seconds
P0A07	COOLANT PUMP A (Motor electronics coolant pump “A” control circuit high)	Diagnosis condition	READY
		Signal (terminal)	Electric water pump operation order signal
		Threshold	When the electric water pump operation order signal which HPCM output detected a state of the HI adherence (more than 97%).
		Diagnosis delay time	3 seconds

POSSIBLE CAUSE

- Harness or connectors (Electric water pump circuit is open or shorted.)
- Electric water pump

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-148, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736155

1.CHECK ELECTRIC WATER PUMP OPERATION

With CONSULT

1. Turn ignition switch ON.
2. Select “ACTIVE TEST” mode of “EV/HEV” using CONSULT.
3. Perform “WATER PUMP”.
4. With operating the test item, touch in the main body of pump and check the operation vibration of the electric water pump.

ON : Electric water pump operate
OFF : Electric water pump stop

Without CONSULT
1. Set the vehicle to READY.
2. Touch in the main body of pump and check the operation vibration of the electric water pump.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect electric water pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric water pump harness connector terminals.

Electric water pump			Voltage
Connector	+	–	
	Terminal		
F202	1	3	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3. CHECK ELECTRIC WATER PUMP POWER SUPPLY-2

Check the voltage between electric water pump harness connector and ground.

+		–	Voltage
Electric water pump			
Connector	Terminal		
F202	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4. CHECK ELECTRIC WATER PUMP GROUND CIRCUIT

Check the continuity between electric water pump harness connector and ground.

+		–	Continuity
Electric water pump			
Connector	Terminal		
F202	3	Ground	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC WATER PUMP SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and electric water pump harness connector.

+		–		Continuity
HPCM		Electric water pump		
Connector	Terminal	Connector	Terminal	
E131	18	F202	4	Existed
	21		2	

3. Also check harness for short to ground and to power.

YES >> Replace electric water pump. Refer to HCO-18, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0A08 DC/DC CONVERTER

DTC Description

INFOID:0000000014736156

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A08	DC/DC CONVERTER (DC/DC converter status circuit)	Diagnosis condition	READY
		Signal (terminal)	DC/DC converter communication signal transmitted from DC/DC converter to HPCM
		Threshold	When HPCM detects self-diagnosis signal from DC/DC converter.
		Diagnosis delay time	–

POSSIBLE CAUSE

- Harness or connectors (DC/DC converter circuit is open or shorted.)
- Air duct
- DC/DC converter
- 12V battery
- Fusible link (250 A)
- Battery cooling fan

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
DC/DC converter	Vehicle speed is limited according to the drop in 12V battery voltage. After vehicle speed gradually decreases and only creep drive force is output, drive force output stops.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-151, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736157

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**

- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check DTC with Li-ion battery controller.

Is DTC detected?

YES >> Perform diagnosis procedure corresponding to DTC indicated. Refer to HBB-37, "DTC Index".
NO >> GO TO 2.

2.CHECK INTAKE GRILLE OF LUGGAGE SIDE LOWER FINISHER RH

Check whether there is blocking the in the intake grille of luggage side lower finisher RH.

Is there blocking in the intake grill?

YES >> Remove foreign matter.
NO >> GO TO 3.

3.CHECK INLET DUCT

Check whether there is blocking the foreign matter in the inlet ducts and state of the installation of all the inlet-ducts.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK FUSIBLE LINK

1. Turn ignition switch OFF.
2. Check that the following fusible link is not blowing.

Location		Fusible link No.	Capacity
H11	Battery terminal with fusible link	F	250 A

Is the fusible link blown (open)?

YES >> Replace the fusible link after repairing the applicable circuit. Refer to PG-131, "Removal and Installation".
NO >> GO TO 5.

5.CHECK DC/DC CONVERTER POWER SUPPLY

1. Disconnect DC/DC converter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between DC/DC converter harness connector and ground.

+		–	Voltage
DC/DC converter			
Connector	Terminal		
B50	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform the trouble diagnosis for power supply circuit. Refer to HBC-121, "DC/DC CONVERTER : Diagnosis Procedure".

6.PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 7.

7. CHECK HIGH VOLTAGE HARNESS CONNECTOR

1. Check high voltage harness connector visually and tactually.
2. Disconnect high voltage harness connector from Li-ion battery. Refer to HBB-160, "Removal and Installation".
3. Check that the connection detection circuit (connector side) is not open.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. REPLACE DC/DC CONVERTER

Replace DC/DC converter. Refer to HBB-160, "Removal and Installation".

>> GO TO 9.

9. CHECK 12V BATTERY

1. Set the vehicle to READY and wait at least 5 minutes.
2. Check the battery voltage.

Battery voltage : More than 10.5 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Charge or replace 12V battery. Refer to PG-129, "Removal and Installation (Battery)".

P0A0A, P0A0C HV SYSTEM

DTC Description

INFOID:0000000014736158

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A0A	HV SYSTEM INTERLOCK ERROR (High voltage system inter-lock circuit)	Diagnosis condition	—
		Signal (terminal)	Inter lock connector signal transmitted from traction motor inverter to HPCM
		Threshold	When HPCM detects state of inter lock connector OFF when vehicle speed is less than 5 km/h (3.1 MPH).
		Diagnosis delay time	1 second or more
P0A0C	HV SYSTEM INTERLOCK ERROR (High voltage system inter-lock circuit low)	Diagnosis condition	—
		Signal (terminal)	Inter lock connector signal transmitted from traction motor inverter to HPCM
		Threshold	When HPCM detects state of inter lock connector OFF when vehicle speed is more than 5 km/h (3.1 MPH).
		Diagnosis delay time	3 seconds or more

POSSIBLE CAUSE

- Harness or connectors (Inter lock connector circuit is open.)
- Traction motor inverter installation
- Traction motor inverter (Inter lock connector)

FAIL-SAFE

P0A0A

Detection items	Hybrid system operation and vehicle behavior
Inter lock connector	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

P0A0C
Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0A0A or P0A0C is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-155, "Diagnosis Procedure".

NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Set the vehicle to READY.
2. Drive the vehicle at more than 5 km/h (3.1 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-155, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736159

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1. CHECK DTC PRIORITY

If DTC P0A0A or P0A0C is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2. CHECK HIGH VOLTAGE COVER-1

Check high voltage cover visually and tactually.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 4.

4. CHECK HIGH VOLTAGE COVER-2

Check that the connection detection circuit (high voltage cover side) is not open.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK HIGH VOLTAGE HARNESS CONNECTOR-1

1. Remove air duct. Refer to EM-29, "Removal and Installation".
2. Check high voltage harness connector visually and tactually.
3. Disconnect traction motor inverter high voltage harness connector (H1).
4. Check that the connection detection circuit (connector side) is not open.

Traction motor inverter			Continuity
Connector	+	–	
	Terminal		
H1	50	51	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK HIGH VOLTAGE HARNESS CONNECTOR-2

1. Check high voltage harness connector visually and tactually.
2. Disconnect traction motor inverter high voltage harness connector (H3).
3. Check that the connection detection circuit (connector side) is not open.

Traction motor inverter			Continuity
Connector	+	–	
	Terminal		
H3	41	42	Existed

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK CONNECTION DETECTION POWER SUPPLY

1. Disconnect traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter harness connector and ground.

+		–	Voltage
Traction motor inverter			
Connector	Terminal		
F36	9	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform the trouble diagnosis for power supply circuit.

8. CHECK CONNECTION DETECTION CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect traction HPCM harness connector.
3. Check the continuity between traction motor inverter harness connector and HPCM harness connector.

+		–		Continuity
Traction motor inverter		HPCM		
Connector	Terminal	Connector	Terminal	
F36	17	E131	30	Existed

Is the inspection result normal?

YES >> Replace traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0A1D HPCM

DTC Description

INFOID:0000000014736160

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition		
P0A1D	HPCM (Hybrid power train control module)	A	Diagnosis condition	—
			Signal (terminal)	—
			Threshold	HPCM is malfunctioning.
			Diagnosis delay time	—
		B	Diagnosis condition	—
			Signal (terminal)	Signal from traction motor inverter
			Threshold	When HPCM detects signal abnormality from traction motor inverter.
			Diagnosis delay time	—

POSSIBLE CAUSE

P0A1D-A
- HPCM
- 12V battery

P0A1D-B
Traction motor inverter

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
HPCM	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Turn ignition switch OFF.
3. Repeat step 1 and 2 for 10 times slowly.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-159, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Set the vehicle to READY and start the engine.
2. Shift the selector lever to D and release brake pedal slowly.
3. Drive the vehicle at creep speed.
4. Stop the vehicle.
5. Shift the selector lever to P and stop the engine.
6. Perform “All DTC Reading” using CONSULT.
7. Check the DTC of “MOTOR CONTROL” and “EV/HEV”.

Is DTC detected?

YES >> Proceed to HBC-159, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736161

1. CHECK DTC WITH TRACTION MOTOR INVERTER

Check DTC with traction motor inverter.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-38, "DTC Index".

2. CHECK 12V BATTERY

Check 12V battery. Refer to PG-119, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Charge or replace 12V battery. Refer to PG-129, "Removal and Installation (Battery)".

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to HBC-158, "DTC Description".
4. Perform “All DTC Reading” using CONSULT.
5. Check DTC.

Is DTC U0293 detected in DTC P0A1D and an other control unit?

YES-1 >> Only DTC P0A1D detects it: Replace HPCM. Refer to HBC-335, "Removal and Installation".
YES-2 >> Detect DTC U0293 at an other control unit at the same time: Replace HPCM and battery junction box. Refer to HBC-335, "Removal and Installation" and HBB-155, "Removal and Installation".
NO >> INSPECTION END

P0A1F CAN COMMUNICATION (LI-ION BATTERY CONTROLER)

DTC Description

INFOID:0000000014736162

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A1F	BATTERY ENERGY CONTROL MODULE (Battery energy control module)	Diagnosis condition	READY
		Signal (terminal)	CAN communication signal
		Threshold	When HPCM detects CAN communication data error between HPCM and Li-ion battery controller.
		Diagnosis delay time	—

POSSIBLE CAUSE

Li-ion battery controller

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0A1F is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-160, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736163

1.CHECK DTC PRIORITY

If DTC P0A1F is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check DTC with Li-ion battery controller.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to HBB-37, "DTC Index".

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-160, "DTC Description".

Is DTC P0A1F detected again?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> INSPECTION END

P0A93 HIGH VOLTAGE COOLANT TEMPERATURE SENSOR

DTC Description

INFOID:0000000014736164

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A93	MOTOR ELECT COOLANT TEMP SEN (Inverter cooling system performance)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	Voltage signal transmitted from high voltage coolant temperature sensor to HPCM
		Threshold	When the temperature of the high voltage coolant temperature sensor is too high.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (High voltage coolant temperature sensor circuit is open or shorted.)
- High voltage coolant temperature sensor
- High voltage coolant leaks
- High voltage cooling system

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0A93 is displayed with DTC P0A02, P0A03, P0A06, P0A07, P3123, P3124, P3125, P3126, P3127, P3128 or P3157, perform the trouble diagnosis for DTC P0A02, P0A03, P0A06, P0A07, P3123, P3124, P3125, P3126, P3127, P3128 or P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-162, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736165

1.CHECK DTC PRIORITY

If DTC P0A93 is displayed with DTC P0A02, P0A03, P0A06, P0A07, P3123, P3124, P3125, P3126, P3127, P3128 or P3157, perform the trouble diagnosis for DTC P0A02, P0A03, P0A06, P0A07, P3123, P3124, P3125, P3126, P3127, P3128 or P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect high voltage coolant temperature sensor harness connector.
3. Check the voltage between high voltage coolant temperature sensor harness connector terminals.

High voltage coolant temperature sensor			Voltage
Connector	+	–	
	Terminal		
F203	1	2	Approx. 5 V

Is the inspection result normal?

YES >> Replace high voltage coolant temperature sensor. Refer to HCO-12, "Exploded View".
NO >> GO TO 3.

3. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER SUPPLY-2

1. Turn ignition switch ON.
2. Check the voltage between high voltage coolant temperature sensor harness connector and ground.

+		–	Voltage
High voltage coolant temperature sensor			
Connector	Terminal		
F203	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 4.

4. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and high voltage coolant temperature sensor harness connector.

+		–		Continuity
IPDM E/R		High voltage coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F42	100	F203	1	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR POWER CIRCUIT-2

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and IPDM E/R harness connector.

+		–		Continuity
HPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E131	24	E120	28	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

6. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and high voltage coolant temperature sensor harness connector.

+		–		Continuity
IPDM E/R		High voltage coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
F42	101	F203	2	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK HIGH VOLTAGE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT-2

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and IPDM E/R harness connector.

+		–		Continuity
HPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E131	25	E120	29	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P0A95 HIGH VOLTAGE FUSE

DTC Description

INFOID:0000000014736166

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A95	HIGH VOLTAGE FUSE (High voltage fuse)	Diagnosis condition	READY
		Signal (terminal)	• Li-ion battery current signal • Traction motor inverter input voltage signal
		Threshold	When HPCM detects Li-ion battery current is more than −1.8 A and traction motor inverter input voltage is less than 25 V during pre-charge.
		Diagnosis delay time	0.45 second

POSSIBLE CAUSE

- Harness or connectors (High voltage direct current circuit is open or short.)
- System main relay 1, 2
- Pre-charge relay
- Traction motor inverter
- Li-ion battery controller
- High voltage fuse
- DC/DC converter
- Electric compressor

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
High-voltage power wiring	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0A95 is displayed with DTC UXXXX, P0A08, P0A0A, P0A0C, P0A1F, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0, P0AE2, P0AE6, P0AE7, P0B35, P0B37, P3179, P317A, P317B, P317F, P3180, P3181 or P3182, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0A08, P0A0A, P0A0C, P0A1F, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0, P0AE2, P0AE6, P0AE7, P0B35, P0B37, P3179, P317A, P317B, P317F, P3180, P3181 or P3182.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-166, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736167

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK DTC PRIORITY

If DTC P0A95 is displayed with DTC UXXXX, P0A08, P0A0A, P0A0C, P0A1F, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0, P0AE2, P0AE6, P0AE7, P0B35, P0B37, P3179, P317A, P317B, P317F, P3180, P3181 or P3182, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0A08, P0A0A, P0A0C, P0A1F, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0, P0AE2, P0AE6, P0AE7, P0B35, P0B37, P3179, P317A, P317B, P317F, P3180, P3181 or P3182.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check DTC with Li-ion battery controller.

Is DTC detected?

YES >> Perform diagnosis procedure corresponding to DTC indicated. Refer to HBB-37, "DTC Index".
NO >> GO TO 3.

3.CHECK DTC WITH TRACTION MOTOR INVERTER

Check DTC with traction motor inverter.

Is DTC detected?

YES >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-38, "DTC Index".
NO >> GO TO 4.

4.CHECK SYSTEM MAIN RELAY OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV P MAIN RLY ACTIV”, “HV N MAIN RLY ACTIV”, and “HV PRE CHG RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Without CONSULT
Check the voltage between HPCM harness connector and ground.

+		−	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
E131	4	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage−2.0 V
	1		Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage−2.0 V
	2		Ignition switch: ON	Less than 2.0 V
			Ignition switch: ON → READY	More than battery voltage−2.0 V
			READY	Less than 2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 5.
YES-2 >> Without CONSULT: GO TO 6.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-117, "HPCM : Diagnosis Procedure".

5. SYSTEM MAIN RELAY OPERATION

With CONSULT
1. Select “HV P MAIN RLY ACTIV”, “HV N MAIN RLY ACTIV”, “HV PRE CHG RLY ACTIV”, “HV P MAIN RLY ACTIV MONI”, “PRE-CHARGE RELAY ACTIVATION”, and “HV N MAIN RLY ACTIV MONI” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On
PRE-CHARGE RELAY ACTIVATION	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 6.

6. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.
1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 7.

7. CHECK SYSTEM MAIN RELAY 1 CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect Li-ion battery harness connector.
4. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	4	B59	11	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK SYSTEM MAIN RELAY 2 CIRCUIT

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	1	B59	23	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK PRE-CHARGE RELAY CIRCUIT

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	2	B59	9	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT

Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B59	2	Ground	Existed
	7		
	14		
	24		

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11. CHECK DC/DC CONVERTER

1. Disconnect DC/DC converter harness from Li-ion battery.
2. Check resistance values between DC/DC converter harness connector.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

DC/DC converter		Resistance
+	–	
Terminal		
30	31	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

DC/DC converter		Resistance
+	–	
Terminal		
31	30	1 MΩ or more

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace DC/DC converter. Refer to HBB-160, "Removal and Installation". And then, GO TO 17.

12. CHECK TRACTION MOTOR INVERTER HARNESS

1. Disconnect traction motor inverter high voltage harness connector (H3).
2. Check resistance values between traction motor inverter high voltage harness connector.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

Traction motor inverter			Resistance
Connector	+	–	
	Terminal		
H3	46	47	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.

CAUTION:

- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

Traction motor inverter			Resistance
Connector	+	–	
	Terminal		
H3	47	46	1 MΩ or more

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 13.

13. CHECK ELECTRIC COMPRESSOR

1. Disconnect electric compressor harness connector (H8).
2. Check resistance values between electric compressor harness connector.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

Electric compressor		Resistance
+	–	
Terminal		
2	3	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

Electric compressor		Resistance
+	–	
Terminal		
3	2	1 MΩ or more

Is the inspection result normal?

YES >> Replace the high voltage harness between electric compressor to traction motor inverter. And then, GO TO 17.
NO >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation". And then, GO TO 17.

14. CHECK LI-ION BATTERY HARNESS

1. Disconnect Li-ion battery high voltage harness connector (H6).
2. Check resistance values between Li-ion battery high voltage harness connector.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

Li-ion battery			Resistance
Connector	+	–	
	Terminal		
H6	26	25	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

Li-ion battery			Resistance
Connector	+	–	
	Terminal		
H6	25	26	1 MΩ or more

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 15.

15. CHECK TRACTION MOTOR INVERTER

1. Disconnect traction motor inverter high voltage harness connector (H1).
2. Check resistance values between traction motor inverter terminals.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

Traction motor inverter		Resistance
+	–	
Terminal		
43	44	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

Traction motor inverter		Resistance
+	–	
Terminal		
44	43	1 MΩ or more

Is the inspection result normal?

YES >> Replace the high voltage harness between traction motor inverter to Li-ion battery. And then, GO TO 17.
NO >> Replace traction motor inverter. Refer to TMS-132, "Removal and Installation". And then, GO TO 17.

16. CHECK HIGH VOLTAGE FUSE-1

Check high voltage fuse (service plug integrated). Refer to HBB-68, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> Replace service plug and Li-ion battery. Refer to HBB-155, "Removal and Installation".

17. CHECK HIGH VOLTAGE FUSE-2

Check high voltage fuse (service plug integrated). Refer to HBB-68, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Replace the service plug. And then, GO TO 18.

18. CHECK LI-ION BATTERY

1. Replace the malfunctioning part. And then reconnect all harness connectors.
2. Set the vehicle to READY.

Is vehicle to READY?

YES >> INSPECTION END
NO >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".

P0AA0 SYSTEM MAIN RELAY

DTC Description

INFOID:0000000014736168

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0AA0	HYBRID BATT POSITIVE CONTACTOR (Hybrid/EV battery positive contactor circuit)	Diagnosis condition	READY
		Signal (terminal)	—
		Threshold	When the traction motor inverter voltage was more than 240 V, in ignition switch ON, the voltage that attracted a Li-ion battery voltage from the traction motor inverter voltage detected the state that did not exceed 74 V.
		Diagnosis delay time	1.5 seconds

POSSIBLE CAUSE

- Harness or connectors (System main relay circuit is open or shorted.)
- System main relay 1, 2
- Traction motor inverter
- Li-ion battery controller

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
System main relay	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0AA0 is displayed with DTC UXXXX, P0A1D, P0AA1, P0AA4, P31A7, P31A9, P3179, P317A, P317B, P317F, P3180, P3181 or P3182, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0A1D, P0AA1, P0AA4, P31A7, P31A9, P3179, P317A, P317B, P317F, P3180, P3181 or P3182.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

Set the vehicle to READY.

Is vehicle set to READY?

YES >> GO TO 4.
NO >> Proceed to HBC-174, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE-2

Check DTC.

Is DTC detected?

YES >> Proceed to HBC-174, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736169

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK DTC PRIORITY

If DTC P0AA0 is displayed with DTC UXXXX, P0A1D, P0AA1, P0AA4, P31A7, P31A9, P3179, P317A, P317B, P317F, P3180, P3181 or P3182, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0A1D, P0AA1, P0AA4, P31A7, P31A9, P3179, P317A, P317B, P317F, P3180, P3181 or P3182.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH TRACTION MOTOR INVERTER

Check DTC with traction motor inverter.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-38, "DTC Index".

3.CHECK SYSTEM MAIN RELAY OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV P MAIN RLY ACTIV” and “HV N MAIN RLY ACTIV” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
E131	4	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V
	1		Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Perform trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-117, "HPCM : Diagnosis Procedure".

4. CHECK SYSTEM MAIN RELAY OPERATION

With CONSULT

1. Select “HV P MAIN RLY ACTIV”, “HV N MAIN RLY ACTIV”, “HV P MAIN RLY ACTIV MONI” and “HV N MAIN RLY ACTIV MONI” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 6.

6. CHECK SYSTEM MAIN RELAY 1 CIRCUIT

1. Disconnect Li-ion battery harness connector.
2. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	4	B59	11	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK SYSTEM MAIN RELAY 2 CIRCUIT

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	1	B59	23	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT

Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B59	2	Ground	Existed
	7		
	14		
	24		

Is the inspection result normal?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0AA1 SYSTEM MAIN RELAY

DTC Description

INFOID:0000000014736170

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0AA1	HYBRID BATT POSITIVE CONTACTOR (Hybrid/EV battery positive contactor circuit stuck closed)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When the pre-charge relay was turned ON after discharge, and the voltage of traction motor inverter rises.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (System main relay 1circuit is shorted.)
- System main relay 1

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
System main relay	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0AA1 is displayed with DTC UXXXX, P0ADB, P0ADC, P0AE6, P0AE7, P3179, P317A, P317B, P317F, P3180, P3181, P3182 or P31A7, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0ADB, P0ADC, P0AE6, P0AE7, P3179, P317A, P317B, P317F, P3180, P3181, P3182 or P31A7.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

Set the vehicle to READY.

Is vehicle set to READY?

YES >> GO TO 4.
NO >> Proceed to HBC-178, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Turn ignition switch ON.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-178, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736171

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK DTC PRIORITY

If DTC P0AA1 is displayed with DTC UXXXX, P0ADB, P0ADC, P0AE6, P0AE7, P3179, P317A, P317B, P317F, P3180, P3181, P3182 or P31A7, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0ADB, P0ADC, P0AE6, P0AE7, P3179, P317A, P317B, P317F, P3180, P3181, P3182 or P31A7.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK SYSTEM MAIN RELAY 1 OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV P MAIN RLY ACTIV” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
E131	4	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage−2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.
YES-2 >> Without CONSULT: GO TO 4.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-117, "HPCM : Diagnosis Procedure".

3.CHECK SYSTEM MAIN RELAY 1 OPERATION

With CONSULT

1. Select “HV P MAIN RLY ACTIV” and “HV P MAIN RLY ACTIV MONI” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.
1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 5.

5. CHECK SYSTEM MAIN RELAY 1 CIRCUIT

1. Disconnect Li-ion battery harness connector.
2. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	4	B59	11	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT

Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B59	2	Ground	Existed
	7		
	14		
	24		

Is the inspection result normal?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0AA4 SYSTEM MAIN RELAY

DTC Description

INFOID:0000000014736172

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0AA4	HYBRID BATT NEGATIVE CONTACTOR (Hybrid/EV battery negative contactor circuit stuck closed)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When system main relay 2 is intercepted and the voltage of traction motor inverter doesn't drop even if it is discharge.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (System main relay 2 circuit is shorted.)
- Harness or connectors (Pre-charge relay circuit is shorted.)
- System main relay 2
- Pre-charge relay

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
System main relay	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0AA4 is displayed with DTC UXXXX, P0ADF, P0AE0, P0AE6, P0AE7, P3179, P317A, P317B, or P31A7, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0ADF, P0AE0, P0AE6, P0AE7, P3179, P317A, P317B, or P31A7.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

Set the vehicle to READY.

Is vehicle set to READY?

YES >> GO TO 4.
NO >> Proceed to HBC-181, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Turn ignition switch ON.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-181, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736173

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK DTC PRIORITY

If DTC P0AA4 is displayed with DTC UXXXX, P0ADF, P0AE0, P0AE6, P0AE7, P3179, P317A, P317B, or P31A7, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0ADF, P0AE0, P0AE6, P0AE7, P3179, P317A, P317B, or P31A7.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK SYSTEM MAIN RELAY 2 OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV N MAIN RLY ACTIV” and “HV PRE CHG RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
E131	1	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V
	2		Ignition switch: ON	Less than 2.0 V
			Ignition switch: ON → READY	More than battery voltage–2.0 V
			READY	Less than 2.0 V

Is the inspection result normal?

YES-1 >> Ⓔ With CONSULT: GO TO 3.
YES-2 >> Ⓧ Without CONSULT: GO TO 4.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-117, "HPCM : Diagnosis Procedure".

3. CHECK SYSTEM MAIN RELAY 2 OPERATION

Ⓔ With CONSULT

1. Select “HV N MAIN RLY ACTIV”, “HV PRE CHG RLY ACTIV”, “HV N MAIN RLY ACTIV MONI”, and “PRE-CHARGE RELAY ACTIVATION” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On
PRE-CHARGE RELAY ACTIVATION	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 5.

5. CHECK SYSTEM MAIN RELAY 2 CIRCUIT

1. Disconnect HPCM harness connector.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	1	B59	23	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK PRE-CHARGE RELAY SIGNAL CIRCUIT

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	2	B59	9	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT

Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B59	2	Ground	Existed
	7		
	14		
	24		

Is the inspection result normal?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0AA6 HIGH VOLTAGE SYSTEM ISOLATION

DTC Description

INFOID:0000000014736174

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0AA6	HYBRID BATT VOLT SYS ISOLATION (Hybrid/EV battery voltage system isolation fault)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects insulation resistance drop detection signal is less than 2.1 V.
		Diagnosis delay time	More than 30 seconds

POSSIBLE CAUSE

High voltage circuit insulation resistance drop.

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
High-voltage system insulation resistance	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0AA6 is displayed with DTC P0AA7, P3117, P3118 or P3120, perform the trouble diagnosis for DTC P0AA7, P3117, P3118 or P3120.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Set the vehicle as the following condition and wait at least 2 minute.

A/C switch	ON
Selector lever	P position

3. Turn ignition switch OFF and wait at least 1minute.
4. Turn ignition switch ON.
5. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-184, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736175

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK DTC PRIORITY

If DTC P0AA6 is displayed with DTC P0AA7, P3117, P3118 or P3120, perform the trouble diagnosis for DTC P0AA7, P3117, P3118 or P3120.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.ERASE DTC

Erase DTC.

>> GO TO 3.

3.INSULATION RESISTANCE DROP PARTS IDENTIFICATION-1

1. Turn ignition switch ON and wait at least 1 minute.
2. Check the hybrid system warning lamp.

Is DTC P3118 detected?

YES >> Perform the trouble diagnosis for DTC P3118. Refer to HBC-260, "DTC Description".
NO >> GO TO 4.

4.INSULATION RESISTANCE DROP PARTS IDENTIFICATION-2

1. Set the vehicle to following condition.

Air conditioning	OFF
Selector lever	P position

2. Set the vehicle to READY and wait at least 1 minute.
3. Check DTC.

Is DTC P3120 detected?

YES >> Perform the trouble diagnosis for DTC P3120. Refer to HBC-269, "DTC Description".
NO >> GO TO 5.

5.INSULATION RESISTANCE DROP PARTS IDENTIFICATION-3

1. Set the vehicle to following condition and wait at least 2 minute.

Air conditioning	ON
	Air flow volume is maximum
	Cooling is maximum
Accelerator pedal	Fully released
Selector lever	P position

2. Check DTC.

Is DTC P3117 detected?

YES >> Perform the trouble diagnosis for DTC P3117. Refer to HBC-259, "DTC Description".
NO >> GO TO 6.

6. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.
1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 7.

7. CHECK DC/DC CONVERTER INSULATION RESISTANCE

1. Disconnect DC/DC converter high voltage harness connector.
2. Check the insulation resistance DC/DC converter. Refer to HBC-327, "DC/DC CONVERTER : Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace DC/DC converter. Refer to HBB-160, "Removal and Installation".

8. CHECK LI-ION BATTERY INSULATION RESISTANCE

Check the insulation resistance Li-ion battery. Refer to HBB-147, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".

9. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-1

1. Disconnect traction motor inverter high voltage harness connector.
2. Check the insulation resistance high voltage harness connector. Refer to HBC-328, "HIGH VOLTAGE HARNESS : Component Inspection".

Traction motor inverter	
Connector	H1

3. Check whether there are neither a water infiltration mark nor a defective seal in the high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace the high voltage harness between traction motor inverter to Li-ion battery.

10. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-2

1. Disconnect traction motor inverter high voltage harness connector.
2. Check the insulation resistance high voltage harness connector. Refer to HBC-328, "HIGH VOLTAGE HARNESS : Component Inspection".

Traction motor inverter	
Connector	H3

3. Check whether there are neither a water infiltration mark nor a defective seal in the high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. CHECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

Check electric compressor insulation resistance. Refer to HAC-113, "Component Inspection".

Is the inspection result normal?

YES >> Replace the high voltage harness between traction motor inverter to electric compressor.
NO >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation"

12. CHECK TRACTION MOTOR INSULATION RESISTANCE

Check traction motor insulation resistance. Refer to TMS-127, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace the transaxle assembly due to malfunction in the traction motor. Refer to TM-244, "Removal and Installation"

13. CHECK TRACTION MOTOR INVERTER INSULATION RESISTANCE

Check traction motor inverter insulation resistance. Refer to TMS-128, "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace traction motor inverter. Refer toTMS-132, "Removal and Installation" .

P0AA7 LI-ION BATTERY CONTROLER

DTC Description

INFOID:0000000014736176

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0AA7	HYBRID BATT VOLT ISOLATION SENSOR (Hybrid/EV battery voltage isolation sensor circuit)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM receives self-diagnosis signal from Li-ion battery controller.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Insulation resistance drop detection monitoring system
- Li-ion battery controller

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE WITH LI-ION BATTERY CONTROLLER

1. Perform DTC confirmation procedure of detected DTC in Li-ion battery controller which displayed with DTC P0AA7.Refer to HBC-71, "DTC Index".
2. Perform “All DTC Reading”.
3. Check DTC of “HV BATTERY”.

Is DTC detected?

YES >> Proceed to HBC-188, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736177

1.PERFORM DIAGNOSIS PROCEDURE

Perform the diagnosis procedure which detected with HPCM. Refer to HBC-71, "DTC Index".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P0ADB, P0ADC SYSTEM MAIN RELAY

DTC Description

INFOID:0000000014736178

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0ADB	HYBRID BATT POSITIVE CONTACTOR (Hybrid/EV battery positive contactor control circuit low)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects short circuit to ground of system main relay 1 circuit.
		Diagnosis delay time	—
P0ADC	HYBRID BATT POSITIVE CONTACTOR (Hybrid/EV battery positive contactor control circuit high)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects open circuit or short circuit to power supply of system main relay 1 circuit.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (System main relay 1 circuit is open or shorted.)
- Battery junction box (System main relay)
- HPCM

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
System main relay	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-189, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-189, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736179

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1. CHECK SYSTEM MAIN RELAY 1 OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV P MAIN RLY ACTIV” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
E131	4	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage−2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-117, "HPCM : Diagnosis Procedure".

2. CHECK SYSTEM MAIN RELAY 1 OPERATION

With CONSULT

1. Select “HV P MAIN RLY ACTIV” and “HV P MAIN RLY ACTIV MONI” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On

Is the inspection result normal?

YES >> Perform GI-54, "Intermittent Incident".
NO >> GO TO 3.

3. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.
1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 4.

4. CHECK SYSTEM MAIN RELAY 1 CIRCUIT

1. Disconnect Li-ion battery harness connector.
2. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	4	B59	11	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT

Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B59	2	Ground	Existed
	7		
	14		
	24		

Is the inspection result normal?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0ADF, P0AE0 SYSTEM MAIN RELAY

DTC Description

INFOID:0000000014736180

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0ADF	HYBRID BATT NEGATIVE CONTACTOR (Hybrid/EV battery negative contactor control circuit low)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects short circuit to ground of system main relay 2 circuit.
		Diagnosis delay time	—
P0AE0	HYBRID BATT NEGATIVE CONTACTOR (Hybrid/EV battery negative contactor control circuit high)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects open circuit or short circuit to power supply of system main relay 2 circuit.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (System main relay 2 circuit is open or shorted.)
- Battery junction box (System main relay)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
System main relay	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-192, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-192, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736181

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK SYSTEM MAIN RELAY 2 OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV N MAIN RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
E131	1	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Perform trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-117, "HPCM : Diagnosis Procedure".

2.CHECK SYSTEM MAIN RELAY 2 OPERATION

With CONSULT

1. Select “HV N MAIN RLY ACTIV” and “HV N MAIN RLY ACTIV MONI” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 4.

4. CHECK SYSTEM MAIN RELAY 2 CIRCUIT

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	1	B59	23	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT

Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B59	2	Ground	Existed
	7		
	14		
	24		

Is the inspection result normal?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0AE2 PRE-CHARGE RELAY

DTC Description

INFOID:0000000014736182

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0AE2	HYBRID BATT PRECHARGE CONTACTOR (Hybrid/EV battery pre-charge contactor circuit stuck closed)	Diagnosis condition	READY
		Signal (terminal)	—
		Threshold	When system main relay 2 and pre-charge relay are intercepted or the traction motor inverter voltage is more than 91 V.
		Diagnosis delay time	0.1 seconds

POSSIBLE CAUSE

- Harness or connectors (System main relay 2 circuit is shorted.)
- Harness or connectors (Pre-charge relay circuit is shorted.)
- System main relay 2
- Pre-charge relay

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Pre-charge relay	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0AE2 is displayed with DTC UXXXX, P0ADF, P0AE0, P0AE6, P0AE7, P3179, P317A, P317B, or P31A7, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0ADF, P0AE0, P0AE6, P0AE7, P3179, P317A, P317B, or P31A7.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-195, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736183

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are

handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK DTC PRIORITY

If DTC P0AE2 is displayed with DTC UXXXX, P0ADF, P0AE0, P0AE6, P0AE7, P3179, P317A, P317B, or P31A7, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0ADF, P0AE0, P0AE6, P0AE7, P3179, P317A, P317B, or P31A7.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK SYSTEM MAIN RELAY 2 OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV N MAIN RLY ACTIV” and “HV PRE CHG RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
E131	1	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V
	2		Ignition switch: ON	Less than 2.0 V
			Ignition switch: ON → READY	More than battery voltage–2.0 V
			READY	Less than 2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.
YES-2 >> Without CONSULT: GO TO 4.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-117, "HPCM : Diagnosis Procedure".

3. CHECK SYSTEM MAIN RELAY 2 OPERATION

With CONSULT

1. Select “HV N MAIN RLY ACTIV”, “HV PRE CHG RLY ACTIV”, “HV N MAIN RLY ACTIV MONI”, and “PRE-CHARGE RELAY ACTIVATION” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On
PRE-CHARGE RELAY ACTIVATION	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 5.

5. CHECK SYSTEM MAIN RELAY 2 CIRCUIT

1. Disconnect HPCM harness connector.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	1	B59	23	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK PRE-CHARGE RELAY SIGNAL CIRCUIT

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	2	B59	9	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT

Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B59	2	Ground	Existed
	7		
	14		
	24		

Is the inspection result normal?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0AE6, P0AE7 PRE-CHARGE RELAY

DTC Description

INFOID:0000000014736184

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0AE6	HYBRID BATT PRECHARGE CONTACTOR (Hybrid/EV battery pre-charge contactor control circuit low)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	—
		Threshold	When HPCM detects short circuit to ground of pre-charge relay circuit.
		Diagnosis delay time	—
P0AE7	HYBRID BATT PRECHARGE CONTACTOR (Hybrid/EV battery pre-charge contactor control circuit high)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	—
		Threshold	When HPCM detects open circuit or short circuit to power supply of pre-charge relay circuit.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (pre-charge relay circuit is open or shorted.)
- Pre-charge relay
- HPCM

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Pre-charge relay	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-199, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736185

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK PRE-CHARGE RELAY OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
E131	2	Ground	Ignition switch: ON	Less than 2.0 V
			Ignition switch: ON → READY	More than battery voltage–2.0 V
			READY	Less than 2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-117, "HPCM : Diagnosis Procedure".

2.CHECK PRE-CHARGE RELAY OPERATION

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” and “PRE-CHARGE RELAY ACTIVATION” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off
PRE-CHARGE RELAY ACTIVATION	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.
1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 4.

4. CHECK PRE-CHARGE RELAY SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	2	B59	9	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT

Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B59	2	Ground	Existed
	7		
	14		
	24		

Is the inspection result normal?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0B35, P0B37 SDSW

DTC Description

INFOID:0000000014736186

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0B35	HIGH VOLTAGE SERVICE DISCONNECT (High voltage service disconnect circuit low)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects the state of service plug OFF for 3 seconds while driving at the vehicle speed 5 km/h (3.1 MPH) or more.
		Diagnosis delay time	—
P0B37	HIGH VOLTAGE SERVICE DISCONNECT (High voltage service disconnect circuit high)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects the state of service plug OFF for 0.04 second at the vehicle speed 5 km/h (3.1 MPH) or less.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (Service plug circuit is open or shorted.)
- Service plug

FAIL-SAFE

P0B35
Not applicable

P0B37

Detection items	Hybrid system operation and vehicle behavior
Service plug	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P0B35 or P0B37 is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-203, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Set the vehicle to READY.
2. Drive the vehicle at more than 5 km/h (3.1 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-203, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736187

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK DTC PRIORITY

If DTC P0B35 or P0B37 is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.CHECK SERVICE PLUG INSTALLATION

Check whether service plug is installed normally.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair service plug installation.

3.CHECK SERVICE PLUG SIGNAL-1

1. Turn ignition switch ON.
2. Check the voltage between HPCM harness connector terminals.

HPCM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
E131	32	E130	112	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4.CHECK SERVICE PLUG SIGNAL-2

Check the voltage between HPCM harness connector and ground.

+		–	Voltage
HPCM			
Connector	Terminal		
E131	32	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 5.

5.PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.
1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 6.

6.CHECK SERVICE PLUG

Check that the connection detection circuit (service plug side) is not open.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK SERVICE PLUG SIGNAL CIRCUIT-1

1. Disconnect Li-ion battery harness connector.
2. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	32	B59	22	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK FUSE

Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
High voltage fuse, fusible link and relay box	#69	10 A

Is the fuse blown (open)?

YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 9.

9.CHECK SERVICE PLUG SIGNAL CIRCUIT-2

1. Turn ignition switch ON.
2. Check the voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B59	10	Ground	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 10.

10. CHECK SERVICE PLUG POWER SUPPLY CIRCUIT

1. Check the continuity between Li-ion battery harness connector and fuse and high voltage fuse, fusible link and relay box harness connector.

+		–	Continuity
Li-ion battery		High voltage fuse, fusible link and relay box	
Connector	Terminal	Fuse No.	
B59	10	#69	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

11. CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
E132	50	Ground	Existed
	54		
	57		
E130	108		
	112		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P1212 CAN COMMUNICATION [ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)]

DTC Description

INFOID:0000000014736188

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P1212	TCS/CIRC (TCS control unit circuit)	Diagnosis condition	—
		Signal (terminal)	CAN communication signal
		Threshold	When HPCM is not transmitting or receiving CAN communication signal with ABS actuator and electric unit (control unit).
		Diagnosis delay time	—

POSSIBLE CAUSE

ABS actuator and electric unit (control unit).

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1212 is displayed with DTC UXXXX or P0A1D, first perform the trouble diagnosis for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-206, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736189

1.CHECK DTC PRIORITY

If DTC P1212 is displayed with DTC UXXXX or P0A1D, first perform the trouble diagnosis for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-49, "CONSULT Function".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for CAN communication system. Refer to LAN-26, "Trouble Diagnosis Flow Chart"

NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to BRC-61, "DTC Index".

P1550 BATTERY CURRENT SENSOR

DTC Description

INFOID:0000000014736190

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P1550	BAT CURRENT SENSOR (Battery current sensor circuit range/ performance)	Diagnosis condition	—
		Signal (terminal)	Battery current sensor signal
		Threshold	The output voltage of the battery current sensor remains within the specified range.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Battery current sensor

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Battery current sensor	Variable voltage control is prohibited.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1550 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10 V with ignition switch ON

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to HBC-208, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736191

1.CHECK DTC PRIORITY

If DTC P1550 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
B39	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK BATTERY CURRENT SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	4	E132	72	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

4. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	2	E132	70	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	1	E132	69	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK BATTERY CURRENT SENSOR

Check battery current sensor. Refer to HBC-210, "Component Inspection (Battery current sensor)".

Is the inspection result normal?

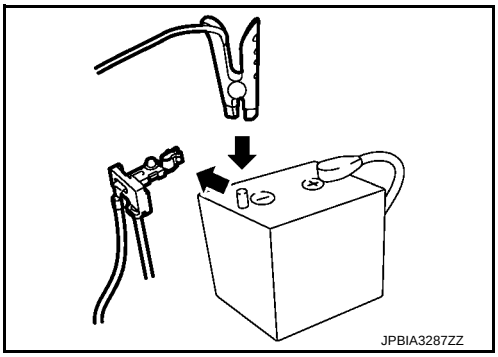
YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-132, "Removal and Installation".

Component Inspection (Battery current sensor)

INFOID:0000000014736192

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between HPCM harness connector terminals under the following conditions.



HPCM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
E132	69	70	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-119, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-132, "Removal and Installation".

P1551, P1552 BATTERY CURRENT SENSOR

DTC Description

INFOID:0000000014736193

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P1551	BAT CURRENT SENSOR (Battery current sensor)	Diagnosis condition	—
		Signal (terminal)	Battery current sensor signal
		Threshold	An excessively low voltage from the sensor is sent to HPCM.
		Diagnosis delay time	—
P1552	BAT CURRENT SENSOR (Battery current sensor)	Diagnosis condition	—
		Signal (terminal)	Battery current sensor signal
		Threshold	An excessively high voltage from the sensor is sent to HPCM.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Battery current sensor

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Battery current sensor	Variable voltage control is prohibited.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1551 or P1552 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V with ignition switch ON

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to HBC-212, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736194

1.CHECK DTC PRIORITY

If DTC P1551 or P1552 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
B39	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK BATTERY CURRENT SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	4	E132	72	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	2	E132	70	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	1	E132	69	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

6. CHECK BATTERY CURRENT SENSOR

Check battery current sensor. Refer to HBC-213, "Component Inspection".

Is the inspection result normal?

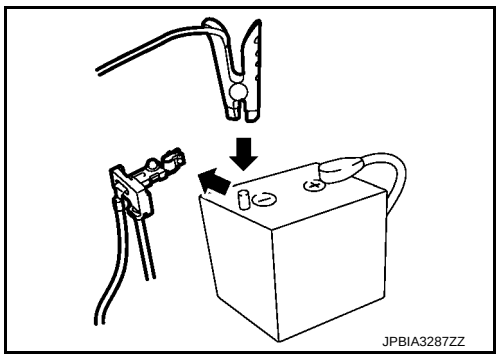
YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-132, "Removal and Installation".

Component Inspection

INFOID:0000000014736195

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between HPCM harness connector terminals under the following conditions.



HPCM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
E132	69	70	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-119, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-132, "Removal and Installation".

P1554 BATTERY CURRENT SENSOR

DTC Description

INFOID:0000000014736196

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P1554	BAT CURRENT SENSOR (Battery current sensor performance)	Diagnosis condition	—
		Signal (terminal)	Battery current sensor signal
		Threshold	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (The sensor circuit is open or shorted.)
- Battery current sensor

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Battery current sensor	Variable voltage control is prohibited.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1554 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 10 V with ignition switch ON**.
- **Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.**

>> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK

NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a DTC might not be confirmed.

1. Set the vehicle to READY.
2. Check the voltage between HPCM harness connector terminals and ground.

HPCM			Voltage
Connector	+	–	
	Terminal		
E132	69	70	Above 2.3V at least once in ten seconds.

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to HBC-215, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736197

1.CHECK DTC PRIORITY

If DTC P1554 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
B39	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK BATTERY CURRENT SENSOR CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	4	E132	72	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	2	E132	70	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	1	E132	69	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK BATTERY CURRENT SENSOR

Check battery current sensor. Refer to HBC-216, "Component Inspection (Battery current sensor)".

Is the inspection result normal?

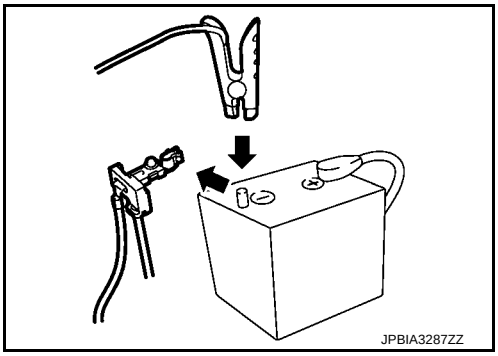
YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-132, "Removal and Installation".

Component Inspection (Battery current sensor)

INFOID:0000000014736198

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between HPCM harness connector terminals under the following conditions.



HPCM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
E132	69	70	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-119, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-132, "Removal and Installation".

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Description

INFOID:0000000014736199

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P1556	BATTMPSEN/CIRC (Battery temperature sensor circuit low input)	Diagnosis condition	—
		Signal (terminal)	Battery temperature sensor signal
		Threshold	Signal voltage from battery temperature sensor remains 0.16V or less.
		Diagnosis delay time	5 seconds or more.
P1557	BATTMPSEN/CIRC (Battery temperature sensor circuit high input)	Diagnosis condition	—
		Signal (terminal)	Battery temperature sensor signal
		Threshold	Signal voltage from battery temperature sensor remains 4.96V or more.
		Diagnosis delay time	5 seconds or more.

POSSIBLE CAUSE

- Harness or connectors (Battery temperature sensor circuit is open or shorted.)
- Battery temperature sensor

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1556 or P1557 is displayed with P3157 first perform trouble diagnosis is for P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to HBC-217, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736200

1.CHECK DTC PRIORITY

If DTC P1556 or P1557 is displayed with P3157 first perform trouble diagnosis is for P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.CHECK BATTERY TEMPERATURE SENSOR INPUT SIGNAL

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
B39	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK BATTERY TEMPERATURE SENSOR INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	3	E132	63	Existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between battery current sensor harness connector and HPCM harness connector.

+		–		Continuity
Battery current sensor		HPCM		
Connector	Terminal	Connector	Terminal	
B39	2	E132	70	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK BATTERY TEMPERATURE SENSOR

Check battery temperature sensor. Refer to HBC-218, "Component Inspection (Battery Temperature Sensor)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery current sensor (battery temperature sensor). Refer to PG-132, "Removal and Installation".

Component Inspection (Battery Temperature Sensor)

INFOID:0000000014736201

1.CHECK BATTERY TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect battery current sensor.
3. Check the resistance between battery current sensor connector terminals.

Battery current sensor		Resistance
+	–	
Terminal		
2	3	continuity with the resistance value 100 Ω or more

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery current sensor (battery temperature sensor). Refer to PG-132, "Removal and Installation".

P1564 ASCD STEERING SWITCH

DTC Description

INFOID:0000000014736202

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P1564	ASCD SW (ASCD steering switch)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When the input signal system from ASCD steering switch is abnormal
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (ASCD steering switch circuit is open or shorted.)
- ASCD steering switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-220, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736203

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD SET SW”, “RESUME/ACC SW”, “CANCEL SW” and “MAIN SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check each item indication as per the following conditions.

Monitor item	Condition		Indication
ASCD SET SW	SET/COAST switch	Pressed	On
		Released	Off
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	On
		Released	Off
CANCEL SW	CANCEL switch	Pressed	On
		Released	Off
MAIN SW	MAIN switch	Pressed	On
		Released	Off

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between HPCM harness connector terminals as per the following.

HPCM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E130	94	95	MAIN switch: Pressed	0 V
			CANCEL switch: Pressed	1.0 V
			SET/COAST switch: Pressed	2.0 V
			RESUME/ACCELERATE switch: Pressed	3.0 V
			All steering switches: Released	4.0 V

Is the inspection result normal?

YES >> Perform GI-54, "Intermittent Incident".
NO >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect combination switch harness connector.
4. Check the continuity between combination switch and HPCM harness connector.

+		–		Continuity
Combination switch		HPCM		
Connector	Terminal	Connector	Terminal	
M30	28	E130	7	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch and HPCM harness connector.

+		–		Continuity
Combination switch		HPCM		
Connector	Terminal	Connector	Terminal	
M30	6	E130	94	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ASCD STEERING SWITCH

Refer to HBC-222, "Component Inspection (ASCD Steering Switch)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch. Refer to ST-27, "Exploded View".

Component Inspection (ASCD Steering Switch)

INFOID:0000000014736204

1.CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Ω)
Connector	+	–		
	Terminal			
M90	27	26	MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 250
			SET/COAST switch: Pressed	Approx. 660
			RESUME/ACCELERATE switch: Pressed	Approx. 1,480
			All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch. Refer to ST-27, "Exploded View".

P1564 ICC STEERING SWITCH

DTC Description

INFOID:0000000014946093

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P1564	ASCD SW (ICC steering switch)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When the input signal system from ICC steering switch is abnormal
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (ICC steering switch circuit is open or shorted.)
- ICC steering switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-223, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014946094

1.CHECK DTC PRIORITY

If DTC P1564 is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-158, "DTC Description".
NO >> GO TO 2.

2.CHECK ICC STEERING SWITCH CIRCUIT

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD SET SW”, “RESUME/ACC SW”, “DISTANCE SW”, “CANCEL SW” and “MAIN SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check each item indication as per the following conditions.

Monitor item	Condition		Indication
ASCD SET SW	SET/COAST switch	Pressed	On
		Released	Off
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	On
		Released	Off
DIST SW	DISTANCE swich	Pressed	On
		Released	Off
CANCEL SW	CANCEL switch	Pressed	On
		Released	Off
MAIN SW	MAIN switch	Pressed	On
		Released	Off

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between HPCM harness connector terminals as per the following.

HPCM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E130	94	95	MAIN switch: Pressed	0 V
			CANCEL switch: Pressed	1.18 V
			DISTANCE switch:Pressed	1.51V
			SET/COAST switch: Pressed	2.0 V
			RESUME/ACCELERATE switch: Pressed	2.71 V

Is the inspection result normal?

YES >> Perform GI-54, "Intermittent Incident".
NO >> GO TO 3.

3. CHECK ICC STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect combination switch harness connector.
4. Check the continuity between combination switch and HPCM harness connector.

+		–		Continuity
Combination switch		HPCM		
Connector	Terminal	Connector	Terminal	
M30	28	E130	7	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK ICC STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch and HPCM harness connector.

+		–		Continuity
Combination switch		HPCM		
Connector	Terminal	Connector	Terminal	
M30	6	E130	94	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ICC STEERING SWITCH

Refer to HBC-225, "Component Inspection (ICC Steering Switch)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ICC steering switch. Refer to ST-27, "Removal and Installation".

Component Inspection (ICC Steering Switch)

INFOID:0000000014946095

1.CHECK ICC STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Ω)
Connector	+	–		
	Terminal			
M90	27	26	MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 310
			DISTANCE switch	Approx. 740
			SET/COAST switch: Pressed	Approx. 1,410
			RESUME/ACCELERATE switch: Pressed	Approx. 2,590
			All ICC steering switches: Released	Approx. 5,460

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace steering wheel. Refer to ST-27, "Removal and Installation".

P1572 BRAKE PEDAL POSITION SWITCH

DTC Description

INFOID:0000000014736205

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P1572	ASCD BRAKE SWITCH (ASCD brake switch)	Diagnosis condition	—
		Signal (terminal)	Brake pedal position switch signal
		Threshold	Brake pedal position switch signal is not sent to HPCM for extremely long time while the vehicle is being driven.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (Brake pedal position switch circuit is shorted.)
- Brake pedal position switch
- Brake pedal position switch installation

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0A1D, P31FB, or P31FD, perform the trouble diagnosis for DTC P0A1D, P31FB, or P31FD.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.ERASE DTC

After a repair or replacement, be sure to erase DTC after performing the following steps.

1. Turn ignition switch ON.
2. Set the vehicle to READY and continue depressing the brake pedal for 10 seconds or more.
3. Release the brake pedal.

NOTE:
If these steps are not performed, then DTC P1572 may be detected again even under normal conditions.

>> GO TO 3.

3.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 4.

4.PERFORM COMPONENT FUNCTION CHECK

NOTE:
Use component function check to check the overall function of the brake pedal position switch circuit. During this check, a DTC might not to be confirmed.

With CONSULT

1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly depressed	Off
		Fully released	On

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage HPCM harness connector terminals as per the following condition.

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
E130	100	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to HBC-227, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736206

1.CHECK DTC PRIORITY

If DTC P1572 is displayed with DTC P0A1D, P31FB, or P31FD, perform the trouble diagnosis for DTC P0A1D, P31FB, or P31FD.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH CIRCUIT

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly depressed	Off
		Fully released	On

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage HPCM harness connector terminals as per the following condition.

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
E130	100	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake pedal position switch harness connector and ground.

+		–	Voltage
Brake pedal position switch			
Connector	Terminal		
E6	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between brake pedal position switch harness connector and HPCM harness connector.

+		–		Continuity
Brake pedal position switch		HPCM		
Connector	Terminal	Connector	Terminal	
E6	2	E130	100	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK BRAKE PEDAL POSITION SWITCH

Check brake pedal position switch. Refer to HBC-228, "Component Inspection (Brake Pedal Position Switch)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to BR-57, "Exploded View".

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000014736207

1.CHECK BRAKE PEDAL POSITION SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Check the continuity between brake pedal position switch terminals as per the following condition.

Brake pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Not existed
			Fully released	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-2

1. Adjust brake pedal position switch installation. Refer to BR-49, "Adjustment".
2. Check the continuity between brake pedal position switch terminals as per the following condition.

Brake pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Not existed
			Fully released	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake pedal position switch. Refer to BR-57, "Exploded View".

P1805 STOP LAMP SWITCH

DTC Description

INFOID:0000000014736208

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P1805	BRAKE SWITCH (Brake switch)	Diagnosis condition	—
		Signal (terminal)	Stop lamp switch signal
		Threshold	Stop lamp switch signal is not sent to HPCM for extremely long time while the vehicle is being driven.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (Stop lamp switch circuit is open or shorted.)
- Stop lamp switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

NOTE:
Use component function check to check the overall function of the stop lamp switch circuit. During this check, a DTC might not to be confirmed.

With CONSULT

1. Turn ignition switch ON.
2. Select “STOP LAMP SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
STOP LAMP SW	Brake pedal	Slightly depressed	On
		Fully released	Off

Without CONSULT

1. Turn ignition switch OFF.
2. Check for stop lamp illumination as per the following condition.

Brake pedal	Stop lamp
Slightly depressed	Illuminated
Fully released	Not illuminated

Is the inspection result normal?

YES-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to HBC-231, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736209

1.CHECK STOP LAMP SWITCH OPERATION

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E38	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for power supply circuit.

3.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between stop lamp switch harness connector and HPCM harness connector.

+		–		Continuity
Stop lamp switch		HPCM		
Connector	Terminal	Connector	Terminal	
E38	2	E130	99	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK STOP LAMP SWITCH

Refer to HBC-231, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-57, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000014736210

1.CHECK STOP LAMP SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-2

1. Adjust stop lamp switch installation. (Refer to BR-49, "Adjustment".)
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-57, "Exploded View".

P2122, P2123 APP SENSOR

DTC Description

INFOID:0000000014736211

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P2122	APP SENSOR D (Throttle/Pedal position sensor/switch “D” circuit low)	Diagnosis condition	—
		Signal (terminal)	Voltage signal from the APP sensor 1
		Threshold	An excessively low voltage from the APP sensor 1 is sent to HPCM.
		Diagnosis delay time	—
P2123	APP SENSOR D (Throttle/Pedal position sensor/switch “D” circuit high)	Diagnosis condition	—
		Signal (terminal)	Voltage signal from the APP sensor 1
		Threshold	An excessively high voltage from the APP sensor 1 is sent to HPCM.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (APP sensor 1 circuit is open or shorted.)
- Accelerator pedal position sensor (APP sensor 1)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Accelerator pedal position sensor	• Engine stop control is prohibited, and the drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2122 or P2123 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 3.

3.DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-234, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736212

1.CHECK DTC PRIORITY

If DTC P2122 or P2123 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector terminals.

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
E25	4	2	5 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK APP SENSOR 1 POWER SUPPLY-2

Check the voltage between APP sensor harness connector and ground.

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E25	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
E25	4	E130	106	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK APP SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
E25	2	E130	111	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
E132	50	Ground	Existed
	54		
	57		
E130	108		
	112		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

7.CHECK APP SENSOR 1 SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and HPCM harness connector.

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
E25	3	E130	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK APP SENSOR 1

Refer to HBC-235, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-3, "Removal and Installation".

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000014736213

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

With CONSULT

1. Select “ACCEL SENSOR 1 VOLTAGE”, “APP SENSOR 1”“ACCEL SENSOR 2 VOLTAGE” and “APP SENSOR 2” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

APP sensor1

Monitor item	Conditions		Indication
ACCEL SENSOR 1 VOLTAGE	Accelerator pedal	Fully released	450 - 1,000 mV
		Fully depressed	4,400 - 4,800 mV

APP sensor 2

Monitor item	Conditions		Indication
ACCEL SENSOR 2 VOLTAGE	Accelerator pedal	Fully released	450 - 1,000 mV
		Fully depressed	4,400 - 4,800 mV

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-3, "Removal and Installation".

P2127, P2128 APP SENSOR

DTC Description

INFOID:0000000014736214

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P2127	APP SENSOR E (Throttle/Pedal position sensor/switch “E” circuit low)	Diagnosis condition	—
		Signal (terminal)	Voltage signal from the APP sensor 2
		Threshold	An excessively low voltage from the APP sensor 2 is sent to HPCM.
		Diagnosis delay time	—
P2128	APP SENSOR E (Throttle/Pedal position sensor/switch “E” circuit high)	Diagnosis condition	—
		Signal (terminal)	Voltage signal from the APP sensor 2
		Threshold	An excessively high voltage from the APP sensor 2 is sent to HPCM.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (APP sensor 2 circuit is open or shorted.)
- Accelerator pedal position sensor (APP sensor 2)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Accelerator pedal position sensor	• Engine stop control is prohibited, and the drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2127 or P2128 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 3.

3.DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-238, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736215

1.CHECK DTC PRIORITY

If DTC P2127 or P2128 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-284, "DTC Description".
NO >> GO TO 2.

2.CHECK APP SENSOR 2 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector terminals.

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
E25	5	1	5 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY-2

Check the voltage between APP sensor harness connector and ground.

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E25	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
E25	5	E130	102	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK APP SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
E25	1	E130	104	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
E132	50	Ground	Existed
	54		
	57		
E130	108		
	112		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

7.CHECK APP SENSOR 2 SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and HPCM harness connector.

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
E25	6	E130	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK APP SENSOR 2

Refer to HBC-239, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-3, "Removal and Installation".

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000014736216

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

With CONSULT

1. Select “ACCEL SENSOR 1 VOLTAGE”, “APP SENSOR 1”“ACCEL SENSOR 2 VOLTAGE” and “APP SENSOR 2” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

APP sensor1

Monitor item	Conditions		Indication
ACCEL SENSOR 1 VOLTAGE	Accelerator pedal	Fully released	450 - 1,000 mV
		Fully depressed	4,400 - 4,800 mV

APP sensor 2

Monitor item	Conditions		Indication
ACCEL SENSOR 2 VOLTAGE	Accelerator pedal	Fully released	450 - 1,000 mV
		Fully depressed	4,400 - 4,800 mV

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-3, "Removal and Installation".

P2138 APP SENSOR

DTC Description

INFOID:0000000014736217

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P2138	APP SENSOR (Throttle/Pedal position sensor/switch "D"/"E" voltage correlation)	Diagnosis condition	—
		Signal (terminal)	Signals from APP sensor 1and APP sensor 2
		Threshold	Rationally incorrect voltage is sent to HPCM compared with the signals from APP sensor 1and APP sensor 2.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (APP sensor 1 or 2 circuit is open or shorted.)
- Accelerator pedal position sensor

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Accelerator pedal position sensor	• Engine stop control is prohibited, and the drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2138 is displayed with DTC P2122, P2123, P2127, P2128, or P3157, first perform the trouble diagnosis for DTC P2122, P2123, P2127, P2128, or P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Depressed accelerator pedal and maintain it more than 2 seconds.
3. Released accelerator pedal.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-241, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736218

1.CHECK DTC PRIORITY

< DTC/CIRCUIT DIAGNOSIS >

If DTC P2138 is displayed with DTC P2122, P2123, P2127, P2128, or P3157, first perform the trouble diagnosis for DTC P2122, P2123, P2127, P2128, or P3157.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK APP SENSOR 1 AND 2 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector terminals.

APP sensor				Voltage (Approx.)
Connector		+	–	
		Terminal		
Sensor 1	E25	4	2	5 V
Sensor 2		5	1	

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK APP SENSOR 1 AND 2 POWER SUPPLY-2

Check the voltage between APP sensor harness connector and ground.

+			–	Voltage (Approx.)
APP sensor				
Connector		Terminal		
Sensor 1	E25	4	Ground	5 V
Sensor 2		5		

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK APP SENSOR 1 AND 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

+			–		Continuity
APP sensor			HPCM		
Connector		Terminal	Connector	Terminal	
Sensor 1	E25	4	E130	106	Existed
Sensor 2		5		102	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK APP SENSOR 1 AND 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

+			–		Continuity
APP sensor			HPCM		
Connector		Terminal	Connector	Terminal	
Sensor 1	E25	2	E130	111	Existed
Sensor 2		1		104	

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
E132	50	Ground	Existed
	54		
	57		
E130	108		
	112		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

7.CHECK APP SENSOR 1 AND 2 SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and HPCM harness connector.

+			–		Continuity
APP sensor			HPCM		
Connector		Terminal	Connector	Terminal	
Sensor 1	E25	3	E130	110	Existed
Sensor 2		6		103	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK APP SENSOR

Refer to HBC-243, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-3, "Removal and Installation".

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000014736219

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

With CONSULT

1. Select “ACCEL SENSOR 1 VOLTAGE”, “APP SENSOR 1”“ACCEL SENSOR 2 VOLTAGE” and “APP SENSOR 2” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

APP sensor1

Monitor item	Conditions		Indication
ACCEL SENSOR 1 VOLTAGE	Accelerator pedal	Fully released	450 - 1,000 mV
		Fully depressed	4,400 - 4,800 mV

APP sensor 2

Monitor item	Conditions		Indication
ACCEL SENSOR 2 VOLTAGE	Accelerator pedal	Fully released	450 - 1,000 mV
		Fully depressed	4,400 - 4,800 mV

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-3, "Removal and Installation".

P2857, P2859 CLUTCH 1

DTC Description

INFOID:0000000014736220

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P2857	CLUTCH A (Clutch “A” pressure engagement performance/too low)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects the state of 500 rpm or more in difference between traction motor speed and the engine speed when the clutch 1 is engaged.
		Diagnosis delay time	4 seconds
P2859	CLUTCH A (Clutch “A” pressure disengagement performance/too low)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects the state of less than 500 rpm in difference between traction motor speed and the engine speed for when clutch 1 is disengaged.
		Diagnosis delay time	4 seconds

POSSIBLE CAUSE

- Clutch 1
- Crankshaft position sensor
- TCM
- Traction motor resolver

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Clutch 1	If there is a malfunction on the clutch 1 engaged side	Engine stop control is prohibited.
	If there is a malfunction on the clutch 1 disengaged side	The engine is stopped and the vehicle is driven by the traction motor alone.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P2857 or P2859 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

Set the vehicle to READY with engine cool condition.

Does the engine start?

YES >> GO TO 4.
NO >> Proceed to HBC-246, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Drive the vehicle.
   CAUTION:
   Always drive the vehicle at a safe speed.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-246, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736221

1. CHECK DTC PRIORITY

If DTC P2857 or P2859 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2. CHECK DTC WITH ECM

Perform self-diagnosis of ECM. Refer to EC-78, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble shooting relevant to DTC indicated. Refer to EC-109, "DTC Index".

3. CHECK DTC WITH TCM

Perform self-diagnosis of TCM. Refer to TM-55, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble shooting relevant to DTC indicated. Refer to TM-70, "DTC Index".

4. CHECK DTC WITH TRACTION MOTOR INVERTER

Perform self-diagnosis of traction motor inverter. Refer to TMS-25, "CONSULT Function".

Is the inspection result normal?

YES >> Replace transmission assembly. Refer to TM-244, "Removal and Installation".
NO >> Perform trouble shooting relevant to DTC indicated. Refer to TMS-38, "DTC Index".

P3109 12V POWER SUPPLY

DTC Description

INFOID:0000000014736222

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3109	12V POWER SUPPLY (12volt power supply)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When the 12V battery voltage is lower than 9.4 V
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (Power supply and ground circuit is open or shorted.)
- HPCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-247, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Drive the vehicle.
   CAUTION:
   Always drive the vehicle at a safe speed.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-247, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736223

1.CHECK POWER SUPPLY AND GROUND CIRCUIT

Check power supply and ground circuit. Refer to HBC-117, "HPCM : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace HPCM. Refer to HBC-335, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P310A HPCM

DTC Description

INFOID:0000000014736224

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P310A	HPCM (Hybrid power train control module)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	HPCM EEP-ROM system is malfunctioning.
		Diagnosis delay time	—

POSSIBLE CAUSE

HPCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat step 1 and 2 for 2 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to HBC-248, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736225

Replace HPCM. Refer to HBC-335, "Removal and Installation".

P310F HYBRID SYS ACTIVATION ERROR

DTC Description

INFOID:0000000014736226

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P310F	HYBRID SYS ACTIVATION ERROR (Hybrid system activation error)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When the engine starts by starter motor, the vehicle is not set to READY within in a specified time.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Crankshaft position sensor
- TCM
- Clutch 1
- Traction motor resolver
- Malfunction in high voltage output power of Li-ion battery

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Engine start control	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON.
2. Depress the accelerator pedal fully while depressing the brake pedal, then press the ignition switch.
3. Release the accelerator pedal within 5 seconds after engine-cranking.
4. Release the brake pedal after stop of cranking and wait for 60 seconds.

Is DTC detected?

YES >> Proceed to HBC-249, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

Press the ignition switch with the brake pedal depressed.

Is vehicle set to READY?

YES-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
YES-2 >> Confirmation after repair: INSPECTION END
NO >> Proceed to HBC-249, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736227

1.CHECK DTC WITH ECM

Check DTC with ECM. Refer to EC-78, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to EC-109, "DTC Index".

2.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-55, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TM-70, "DTC Index".

3.CHECK DTC WITH TRACTION MOTOR INVERTER

Check DTC with traction motor inverter. Refer to TMS-25, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-38, "DTC Index".

4.CHECK DTC WITH LI-ION BATTERY

Check DTC with Li-ion battery. Refer to HBB-29, "CONSULT Function".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to HBB-37, "DTC Index".

P3110 IGNITION RELAY

DTC Description

INFOID:0000000014736228

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3110	IGN RELAY (Ignition relay)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects self shut-OFF hold command of HPCM is turn OFF and IGN signal from IPDM E/R is turn OFF.
		Diagnosis delay time	1 minute

POSSIBLE CAUSE

- Harness or connectors (Self shut-OFF relay circuit is shorted.)
- Self shut-OFF relay

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 2 minutes.
3. Turn ignition switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-251, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736229

1.CHECK SELF SHUT-OFF RELAY OUTPUT SIGNAL CIRCUIT

Check the voltage between HPCM harness connector and ground as per the following conditions.

+ HPCM Connector	+ HPCM Terminal	−	Condition	Voltage (Approx.)
E131	5	Ground	Ignition switch: ON	More than battery voltage−2.0 V
			Ignition switch: OFF	Less than 2.0 V
E132 E130	77 105	Ground	Ignition switch: ON	More than 9.5 V
			Ignition switch: ON → OFF	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0 V.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK SELF SHUT-OFF RELAY CIRCUIT-1

1. Disconnect 12 V battery negative cable terminal.
2. Remove fuse.
3. Check the continuity between fuse terminals.

+	–	Continuity
High voltage fuse,fusible link and relay box		
Fuse No.		
Y	70	Not existed

Refer to PG-13, "Wiring Diagram - BATTERY POWER SUPPLY -"

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK SELF SHUT-OFF RELAY CIRCUIT-2

1. Disconnect HPCM harness connector.
2. Remove self shut-OFF relay.
3. Check the continuity between HPCM harness connector and self shut-OFF relay.

+		–	Continuity
HPCM		Self shut-OFF relay	
Connector	Terminal	Terminal	
E131	5	2	Existed

Refer to PG-13, "Wiring Diagram - BATTERY POWER SUPPLY -"

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P3112 STOP LAMP SWITCH

DTC Description

INFOID:0000000014736230

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3112	STOP LAMP SWITCH (Stop lamp switch)	Diagnosis condition	—
		Signal (terminal)	Stop lamp switch signal
		Threshold	Stop lamp switch is ON state for extremely long time.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (Stop lamp switch circuit is shorted.)
- Stop lamp switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

NOTE:
Use component function check to check the overall function of the stop lamp switch circuit. During this check, a DTC might not be confirmed.

With CONSULT

1. Select “STOP LAMP SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
STOP LAMP SW	Brake pedal	Slightly depressed	On
		Fully released	Off

Without CONSULT

1. Turn ignition switch OFF.
2. Check for stop lamp illumination as per the following condition.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> Proceed to HBC-253, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736231

1.CHECK STOP LAMP SWITCH OPERATION

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E38	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for power supply circuit.

3.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between stop lamp switch harness connector and HPCM harness connector.

+		–		Continuity
Stop lamp switch		HPCM		
Connector	Terminal	Connector	Terminal	
E38	2	E130	99	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK STOP LAMP SWITCH

Refer to HBC-254, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-57, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000014736232

1.CHECK STOP LAMP SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH-2

1. Adjust stop lamp switch installation. (Refer to BR-49, "Adjustment".)
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-57, "Exploded View".

P3114 BRAKE PEDAL POSITION SWITCH

DTC Description

INFOID:0000000014736233

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3114	BRAKE SWITCH (Brake switch)	Diagnosis condition	—
		Signal (terminal)	Brake pedal position switch signal
		Threshold	When depressed brake pedal, brake pedal position switch signal is ON state for long time while the vehicle is driving.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (Brake pedal position switch circuit is open or shorted.)
- Brake pedal position switch

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Drive the vehicle.
   CAUTION:
   Always drive the vehicle at a safe speed.
3. Fully depress the brake pedal.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-256, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736234

1.CHECK BRAKE PEDAL POSITION SWITCH OPERATION

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly depressed	Off
		Fully released	On

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between HPCM harness connector and ground as per the following.

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
E130	100	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake pedal position switch harness connector and ground.

+		–	Voltage
Brake pedal position switch			
Connector	Terminal		
E6	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK BRAKE PEDAL POSITION SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between brake pedal position switch harness connector and HPCM harness connector.

+		–		Continuity
Brake pedal position switch		HPCM		
Connector	Terminal	Connector	Terminal	
E6	2	E130	100	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BRAKE PEDAL POSITION SWITCH

Refer to HBC-257, "Component Inspection (Brake Pedal Position Switch)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to BR-57, "Exploded View".

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000014736235

1.CHECK BRAKE PEDAL POSITION SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Check the continuity between brake pedal position switch terminals as per the following condition.

Brake pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Not existed
			Fully released	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-2

1. Adjust brake pedal position switch installation. Refer to BR-49, "Adjustment".
2. Check the continuity between brake pedal position switch terminals as per the following condition.

Brake pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Not existed
			Fully released	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to BR-57, "Exploded View".

P3117 A/C SYSTEM

DTC Description

INFOID:0000000014736236

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3117	A/C SYSTEM (Air conditioner system)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects a decrease in insulation resistance of A/C system.
		Diagnosis delay time	—

POSSIBLE CAUSE

Electric compressor (Decrease in insulation resistance)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Air conditioning system	A/C control is prohibited.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Touch A/C switch ON and wait at least 2 minute.
3. Turn ignition switch OFF and wait at least 1 minute.
4. Turn ignition switch ON.
5. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-259, "Diagnosis Procedure"
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736237

1.CHECK A/C REFRIGERANT GAS

Interview the customer and check maintenance records to see if there is possibility that a refrigerant gas other than electric compressor specific refrigerant gas is mixed in A/C refrigerant gas.

NOTE:

If A/C refrigerant gas other than electric compressor specific refrigerant gas is used, insulation resistance may decrease.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Change A/C refrigerant gas and compressor oil.

2.CHECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

Check insulation resistance of electric compressor. Refer to HAC-113, "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".

P3118 LI-ION BATTERY

DTC Description

INFOID:0000000014736238

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3118	HYBRID BATTERY ISOLATION (Hybrid battery isolation)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects Li-ion battery insulation resistance drop.
		Diagnosis delay time	—

POSSIBLE CAUSE

Li-ion battery insulation resistance drop.

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
High-voltage system insulation resistance	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 minutes.
2. Turn ignition switch OFF wait at least 1 minutes.
3. Turn ignition switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-260, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736239

CAUTION:
Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.REPLACE LI-ION BATTERY

Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".

>> INSPECTION END

P311D, P311E HIGH VOLTAGE SYSTEM

DTC Description

INFOID:0000000014736240

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P311D	HIGH VOLTAGE SYSTEM (High voltage system)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When the current of the Li-ion battery detects the state whose −1.8 A or less and traction motor inverter input voltage are less than 25 V in pre-charge.
		Diagnosis delay time	0.25 second or more
P311E	HIGH VOLTAGE SYSTEM (High voltage system)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects the state whose difference between the voltage of the Li-ion battery and traction motor inverter input voltage is 21 V or more when pre-charge is completed.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (High voltage direct current circuit is open or shorted.)
- System main relay 1, 2
- Pre-charge relay
- Traction motor inverter
- Li-ion battery controller
- High voltage fuse
- DC/DC converter
- Electric compressor

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
High-voltage power wiring	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P311D or P311E is displayed with DTC UXXXX, P0A08, P0A0A, P0A0C, P0A1F, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0, P0AE2, P0AE6, P0AE7, P0B35, P0B37, P3179, P317A, P317B, P317F, P3180, P3181 or P3182, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0A08, P0A0A, P0A0C, P0A1F, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0, P0AE2, P0AE6, P0AE7, P0B35, P0B37, P3179, P317A, P317B, P317F, P3180, P3181 or P3182.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

NOTE:
When perform DTC confirmation procedure, there is the case that DTC P0A95 is detected.

Is DTC detected?

YES >> Proceed to HBC-262, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736241

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.CHECK DTC PRIORITY

If DTC P311D or P311E is displayed with DTC UXXXX, P0A08, P0A0A, P0A0C, P0A1F, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0, P0AE2, P0AE6, P0AE7, P0B35, P0B37, P3179, P317A, P317B, P317F, P3180, P3181 or P3182, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX, P0A08, P0A0A, P0A0C, P0A1F, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0, P0AE2, P0AE6, P0AE7, P0B35, P0B37, P3179, P317A, P317B, P317F, P3180, P3181 or P3182.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check DTC with Li-ion battery controller.

Is DTC detected?

YES >> Perform diagnosis procedure corresponding to DTC indicated. Refer to HBB-37, "DTC Index".
NO >> GO TO 3.

3.CHECK DTC WITH TRACTION MOTOR INVERTER

Check DTC with traction motor inverter.

Is DTC detected?

YES >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-38, "DTC Index".
NO >> GO TO 4.

4.CHECK SYSTEM MAIN RELAY OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV P MAIN RLY ACTIV”, “HV N MAIN RLY ACTIV”, and “HV PRE CHG RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Without CONSULT
Check the voltage between HPCM harness connector and ground.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
E131	4	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V
	1		Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V
	2		Ignition switch: ON	Less than 2.0 V
			Ignition switch: ON → READY	More than battery voltage–2.0 V
			READY	Less than 2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 5.
YES-2 >> Without CONSULT: GO TO 6.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-117, "HPCM : Diagnosis Procedure".

5. SYSTEM MAIN RELAY OPERATION

With CONSULT
1. Select “HV P MAIN RLY ACTIV”, “HV N MAIN RLY ACTIV”, “HV PRE CHG RLY ACTIV”, “HV P MAIN RLY ACTIV MONI”, “PRE-CHARGE RELAY ACTIVATION”, and “HV N MAIN RLY ACTIV MONI” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV	Ignition switch: ON	Off
	READY	On
HV PRE CHG RLY ACTIV	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	Off
	READY	On

Monitor item	Condition	Indication
PRE-CHARGE RELAY ACTIVATION	Ignition switch: ON	Off
	Ignition switch: ON → READY	On
	READY	Off

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 6.

6. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 7.

7. CHECK SYSTEM MAIN RELAY 1 CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect Li-ion battery harness connector.
4. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	4	B59	11	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK SYSTEM MAIN RELAY 2 CIRCUIT

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	1	B59	23	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK PRE-CHARGE RELAY CIRCUIT

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E131	2	B59	9	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT

Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B59	2	Ground	Existed
	7		
	14		
	24		

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11. CHECK DC/DC CONVERTER

1. Disconnect DC/DC converter harness from Li-ion battery.
2. Check resistance values between DC/DC converter harness connector.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

DC/DC converter		Resistance
+	–	
Terminal		
30	31	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

DC/DC converter		Resistance
+	–	
Terminal		
31	30	1 MΩ or more

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace DC/DC converter. Refer to HBB-160, "Removal and Installation". And then, GO TO 17.

12. CHECK TRACTION MOTOR INVERTER HARNESS

1. Disconnect traction motor inverter high voltage harness connector (H3).
2. Check resistance values between traction motor inverter high voltage harness connector.

CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

Traction motor inverter			Resistance
Connector	+	–	
	Terminal		
H3	46	47	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.
CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

Traction motor inverter			Resistance
Connector	+	–	
	Terminal		
H3	47	46	1 MΩ or more

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 13.

13. CHECK ELECTRIC COMPRESSOR

1. Disconnect electric compressor harness connector (H8).
2. Check resistance values between electric compressor harness connector.
CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

Electric compressor		Resistance
+	–	
Terminal		
2	3	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.
CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

Electric compressor		Resistance
+	–	
Terminal		
3	2	1 MΩ or more

Is the inspection result normal?

YES >> Replace the high voltage harness between electric compressor to traction motor inverter. And then, GO TO 17.
NO >> Replace electric compressor. Refer to TMS-132, "Removal and Installation". And then, GO TO 17.

14. CHECK LI-ION BATTERY HARNESS

1. Disconnect Li-ion battery high voltage harness connector (H6).
2. Check resistance values between Li-ion battery high voltage harness connector.
CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

Li-ion battery			Resistance
Connector	+	–	
	Terminal		
H6	26	25	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.
CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

Li-ion battery			Resistance
Connector	+	–	
	Terminal		
H6	25	26	1 MΩ or more

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 15.

15. CHECK TRACTION MOTOR INVERTER

1. Disconnect traction motor inverter high voltage harness connector (H1).
2. Check resistance values between traction motor inverter terminals.
CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the forward direction to the circuit.**

Traction motor inverter		Resistance
+	–	
Terminal		
43	44	10 KΩ or more

3. Change the polarity of the tester and check resistance value between terminals.
CAUTION:
- **If a measurement value changes, then measure resistance for approximately 10 seconds.**
- **Since a tester is polarized, check the polarity of the tester used and connect it in the reverse direction to the circuit.**

Traction motor inverter		Resistance
+	–	
Terminal		
44	43	1 MΩ or more

Is the inspection result normal?

YES >> Replace the high voltage harness between traction motor inverter to Li-ion battery. And then, GO TO 17.
NO >> Replace traction motor inverter. Refer to HBB-155, "Removal and Installation". And then, GO TO 17.

16. CHECK HIGH VOLTAGE FUSE-1

Check high voltage fuse (service plug integrated). Refer to HBB-68, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".
NO >> Replace service plug and Li-ion battery. Refer to HBB-155, "Removal and Installation".

17. CHECK HIGH VOLTAGE FUSE-2

Check high voltage fuse (service plug integrated). Refer to HBB-68, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Replace the service plug. And then, GO TO 18.

18. CHECK LI-ION BATTERY

1. Replace the malfunctioning part. And then reconnect all harness connectors.
2. Set the vehicle to READY.

Is vehicle to READY?

YES >> INSPECTION END
NO >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".

P3120 HIGH VOLTAGE SYSTEM

DTC Description

INFOID:0000000014736242

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3120	HV SYSTEM ISOLATION (High voltage system isolation)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects the high voltage system insulation resistance drop.
		Diagnosis delay time	—

POSSIBLE CAUSE

High voltage direct current area insulation resistance drop.

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
High-voltage system insulation resistance	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 1 minutes.
2. Turn ignition switch OFF and wait at least 1 minutes.
3. Turn ignition switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-269, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736243

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 2.

2. CHECK DC/DC CONVERTER INSULATION RESISTANCE

Check the insulation resistance of DC/DC converter. Refer to HBC-327, "DC/DC CONVERTER : Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace DC/DC converter. Refer to HBB-160, "Removal and Installation".

3. CHECK LI-ION BATTERY INSULATION RESISTANCE

Check the insulation resistance of Li-ion battery. Refer to HBB-147, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace Li-ion battery. Refer to HBB-155, "Removal and Installation".

4. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-1

1. Check the insulation resistance of high voltage harness connector. Refer to HBC-328, "HIGH VOLTAGE HARNESS : Component Inspection".

Traction motor inverter	
Connector	H1

2. Check whether there are neither a water infiltration mark nor a defective seal in the high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace the high voltage harness between traction motor inverter to Li-ion battery.

5. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-2

1. Check the insulation resistance of high voltage harness connector. Refer to HBC-328, "HIGH VOLTAGE HARNESS : Component Inspection".

Traction motor inverter	
Connector	H3

2. Check whether there are neither a water infiltration mark nor a defective seal in the high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. CHECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

Check insulation resistance of electric compressor. Refer to HAC-113, "Component Inspection".

Is the inspection result normal?

YES >> Replace the high voltage harness between traction motor inverter to electric compressor.
NO >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".

7. CHECK TRACTION MOTOR INSULATION RESISTANCE

Check insulation resistance of traction motor. Refer toTMS-127, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace the transaxle assembly due to malfunction in the traction motor. Refer to TM-244, "Removal and Installation".

8. CHECK TRACTION MOTOR INVERTER INSULATION RESISTANCE

Check insulation resistance of traction motor inverter. Refer to TMS-128, "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace traction motor inverter. Refer to TMS-132, "Removal and Installation".

P3123, P3124 HV SYSTEM COOLING PUMP

DTC Description

INFOID:0000000014736244

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3123	HV SYSTEM COOLING PUMP (High voltage system cooling pump)	Diagnosis condition	READY
		Signal (terminal)	Feedback signal from an electric water pump
		Threshold	When HPCM detects feedback signal from an electric water pump is stuck in HI side (more than 97%).
		Diagnosis delay time	3 seconds
P3124	HV SYSTEM COOLING PUMP (High voltage system cooling pump)	Diagnosis condition	READY
		Signal (terminal)	Feedback signal from an electric water pump
		Threshold	When HPCM detects feedback signal from an electric water pump is stuck in LOW side (less than 3%).
		Diagnosis delay time	3 seconds

POSSIBLE CAUSE

- Harness or connectors (Electric water pump circuit is open or shorted.)
- Electric water pump

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Electric water pump	Controlling the motor torque and drive with the engine power only, therefore the acceleration becomes slower, also the shift shock becomes more obvious.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-272, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736245

1.CHECK ELECTRIC WATER PUMP OPERATION

With CONSULT
1. Turn ignition switch ON.
2. Select “ACTIVE TEST” mode of “EV/HEV” using CONSULT.
3. Perform “WATER PUMP”.
4. With operating the test item, touch in the main body of pump and check the operation vibration of the electric water pump.

ON : Electric water pump operate
OFF : Electric water pump stop

Without CONSULT
1. Set the vehicle to READY.
2. Touch in the main body of pump and check the operation vibration of the electric water pump.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect electric water pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric water pump harness connector terminals.

Electric water pump			Voltage
Connector	+	–	
	Terminal		
F202	1	3	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK ELECTRIC WATER PUMP POWER SUPPLY-2

Check the voltage between electric water pump harness connector and ground.

+		–	Voltage
Electric water pump			
Connector	Terminal		
F202	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK ELECTRIC WATER PUMP GROUND CIRCUIT

Check the continuity between electric water pump harness connector and ground.

+		–	Continuity
Electric water pump			
Connector	Terminal		
F202	3	Ground	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC WATER PUMP SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and electric water pump harness connector.

+		–		Continuity
HPCM		Electric water pump		
Connector	Terminal	Connector	Terminal	
E131	18	F202	4	Existed
	21		2	

3. Also check harness for short to ground and to power.

YES >> Replace electric water pump. Refer to HCO-18, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P3125, P3126, P3127 ELECTRIC WATER PUMP

DTC Description

INFOID:0000000014736246

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3125	ELECTRIC WATER PUMP SYSTEM (Electric water pump system)	Diagnosis condition	—
		Signal (terminal)	Feedback signal from an electric water pump
		Threshold	HPCM detects that a feedback signal from electric water pump is 83% or more or 91% or less.
		Diagnosis delay time	30 seconds
P3126		Diagnosis condition	—
		Signal (terminal)	Feedback signal from an electric water pump
		Threshold	HPCM detects that a feedback signal from electric water pump is 3% or more or 7% or less.
		Diagnosis delay time	70 seconds
P3127		Diagnosis condition	READY
		Signal (terminal)	Feedback signal from an electric water pump
		Threshold	HPCM detects that a feedback signal from electric water pump is less than 18% or more than 82%.
		Diagnosis delay time	75 seconds

POSSIBLE CAUSE

- Harness or connectors (Electric water pump circuit is open or shorted.)
- Electric water pump

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Electric water pump	Controlling the motor torque and drive with the engine power only, therefore the acceleration becomes slower, also the shift shock becomes more obvious.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 2 minutes.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-275, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736247

1.CHECK ELECTRIC WATER PUMP OPERATION

With CONSULT
1. Turn ignition switch ON.
2. Select “ACTIVE TEST” mode of “EV/HEV” using CONSULT.
3. Perform “WATER PUMP”.
4. With operating the test item, touch in the main body of pump and check the operation vibration of the electric water pump.

ON : Electric water pump operate
OFF : Electric water pump stop

Without CONSULT
1. Set the vehicle to READY.
2. Touch in the main body of pump and check the operation vibration of the electric water pump.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect electric water pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric water pump harness connector terminals.

Electric water pump			Voltage
Connector	+	–	
	Terminal		
F202	1	3	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK ELECTRIC WATER PUMP POWER SUPPLY-2

Check the voltage between electric water pump harness connector and ground.

+		–	Voltage
Electric water pump			
Connector	Terminal		
F202	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK ELECTRIC WATER PUMP GROUND CIRCUIT

Check the continuity between electric water pump harness connector and ground.

+		–	Continuity
Electric water pump			
Connector	Terminal		
F202	3	Ground	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC WATER PUMP SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and electric water pump harness connector.

+		–		Continuity
HPCM		Electric water pump		
Connector	Terminal	Connector	Terminal	
E131	18	F202	4	Existed
	21		2	

3. Also check harness for short to ground and to power.

YES >> Replace electric water pump. Refer to HCO-18, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P3128 ELECTRIC WATER PUMP

DTC Description

INFOID:0000000014736248

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3128	ELECTRIC WATER PUMP SYSTEM (Electric water pump system)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	Feedback signal from electric water pump
		Threshold	HPCM detects that a feedback signal from electric water pump is less than 8% or more than 12%.
		Diagnosis delay time	75 seconds

POSSIBLE CAUSE

- Harness or connectors (Electric water pump circuit is open or shorted.)
- Electric water pump

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Electric water pump	Controlling the motor torque and drive with the engine power only, therefore the acceleration becomes slower, also the shift shock becomes more obvious.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 minutes.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-278, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736249

1.CHECK ELECTRIC WATER PUMP OPERATION

With CONSULT

1. Turn ignition switch ON.
2. Select “ACTIVE TEST” mode of “EV/HEV” using CONSULT.
3. Perform “WATER PUMP”.
4. With operating the test item, touch in the main body of pump and check the operation vibration of the electric water pump.

ON : Electric water pump operate
OFF : Electric water pump stop

Without CONSULT

1. Set the vehicle to READY.
2. Touch in the main body of pump and check the operation vibration of the electric water pump.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK ELECTRIC WATER PUMP POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect electric water pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric water pump harness connector terminals.

Electric water pump			Voltage
Connector	+	–	
	Terminal		
F202	1	3	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3. CHECK ELECTRIC WATER PUMP POWER SUPPLY-2

Check the voltage between electric water pump harness connector and ground.

+		–	Voltage
Electric water pump			
Connector	Terminal		
F202	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4. CHECK ELECTRIC WATER PUMP GROUND CIRCUIT

Check the continuity between electric water pump harness connector and ground.

+		–	Continuity
Electric water pump			
Connector	Terminal		
F202	3	Ground	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC WATER PUMP SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between HPCM harness connector and electric water pump harness connector.

+		–		Continuity
HPCM		Electric water pump		
Connector	Terminal	Connector	Terminal	
E131	18	F202	4	Existed
	21		2	

3. Also check harness for short to ground and to power.

YES >> Replace electric water pump. Refer to HCO-18, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P3135 SLIGHT COLLISION DETECTION

DTC Description

INFOID:0000000014736250

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3135	SLIGHT COLLISION DETECTION (Slight collision detection)	Diagnosis condition	—
		Signal (terminal)	Slight collision detection signal
		Threshold	HPCM received slight collision detection signal from air bag diagnosis sensor unit
		Diagnosis delay time	—

POSSIBLE CAUSE

- Air bag inflated
- CAN communication signal
- Air bag diagnosis sensor unit

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Slight collision detection	High voltage power supply stop.

DTC CONFIRMATION PROCEDURE

1.CHECK AIR BAG MODULE

Check that the air bag modules are not inflating.

Is air bag module inflating?

YES >> Refer to SR-5, "FOR FRONTAL COLLISION : When SRS is activated in a collision" (Frontal collision), SR-7, "FOR SIDE AND ROLLOVER COLLISION : When SRS is activated in a collision" (Side and rollover collision).
NO >> GO TO 2.

2.PRECONDITIONING

- Turn ignition switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

Turn ignition switch ON and wait at least 5 seconds.

Is DTC detected?

YES >> Proceed to HBC-280, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736251

1.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to HBC-280, "DTC Description".

Is DTC “P3135” detected again?

YES >> Replace air bag diagnosis sensor unit. Refer to SR-27, "Removal and Installation".
NO >> INSPECTION END

P3137, P3138 CAR CLASH

DTC Description

INFOID:0000000014736252

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3137	CAR CLASH (Car clash)	Diagnosis condition	—
		Signal (terminal)	—
P3138		Threshold	When HPCM receives car crush information signal from air bag diagnosis sensor unit.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Car clash
- Air bag inflated
- Air bag diagnosis sensor unit

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Car crash detection	• High voltage power supply stop. • Hybrid system start is prohibited.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-281, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736253

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-281, "DTC Description".

Is DTC P3137 or P3138 detected again?

YES >> Replace air bag diagnosis sensor unit.
NO >> INSPECTION END

P3139 AIR BAG SYSTEM

DTC Description

INFOID:0000000014736254

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3139	AIR BAG SYSTEM (Air bag system)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects abnormality to a signal transmitted from an air bag diagnosis sensor unit.
		Diagnosis delay time	2 seconds

POSSIBLE CAUSE

Air bag diagnosis sensor unit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-282, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736255

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-282, "DTC Description".

Is DTC P3139 detected again?

YES >> Replace air bag diagnosis sensor unit.
NO >> INSPECTION END

P314D, P314E, P314F, P3151 ENGINE SYSTEM

DTC Description

INFOID:0000000014736256

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P314D	ENGINE SYSTEM (Engine system)	Diagnosis condition	—
P314E		Signal (terminal)	Self-diagnosis signal from ECM
P314F		Threshold	When HPCM detects self-diagnosis signal from ECM.
P3151		Diagnosis delay time	—

POSSIBLE CAUSE

ECM-detected DTC

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Engine	If engine fuel is cut off or ECM CAN communication are abnormal	The engine is stopped and the vehicle is driven by the traction motor alone.
	If ECM stopped control of the electric throttle control actuator	• The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.
	If ECM is limiting speed due to fuel cut-off	Engine stop control is prohibited and the vehicle is driven by the engine alone with a limit on the engine speed. For this reason, acceleration performance decreases.
	If ECM reduces the engine output	• HPCM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. • ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH ECM

Check the DTC which detected with ECM. Refer to EC-113, "Index of HPCM-detected DTC".

>> Proceed to HBC-283, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736257

Check the DTC which detected with ECM. Refer to EC-113, "Index of HPCM-detected DTC".

P3157 SENSOR POWER SUPPLY

DTC Description

INFOID:0000000014736258

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3157	SENSOR POWER SUPPLY (Sensor power supply)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM detects sensor power supply voltage is 5.6 V or more/4.6 V or less.
		Diagnosis delay time	0.05 second

POSSIBLE CAUSE

- Harness or connectors (APP sensor circuit is shorted.)
- Harness or connectors (12V battery current sensor circuit is shorted.)
- Harness or connectors (12V battery temperature sensor circuit is shorted.)
- APP sensor 1, 2
- 12V battery current sensor
- 12V battery temperature sensor

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Sensor power supply	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 8 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-284, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736259

1.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Check the voltage between APP sensor harness connector terminals.

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
E25	4	2	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT-2

Check the voltage between APP sensor harness connector and ground.

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E25	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

HPCM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E130	106	APP sensor 1	E25	4
	102	APP sensor 2		5
E132	72	Battery current sensor	B39	4
	63	Battery temperature sensor		3

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK COMPONENTS

Check the following.

- Accelerator pedal position (APP) sensor (Refer to HBC-235, "Component Inspection (Accelerator Pedal Position Sensor)".)
- Battery current sensor (Proceed to HBC-213, "Component Inspection".)
- Battery temperature sensor (Proceed to HBC-218, "Component Inspection (Battery Temperature Sensor)".)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

5.CHECK HPCM GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

+		–		Continuity
APP sensor 1		HPCM		
Connector	Terminal	Connector	Terminal	
E25	2	E130	111	Existed

+		–		Continuity
APP sensor 2		HPCM		
Connector	Terminal	Connector	Terminal	
E25	1	E130	104	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
E132	50	Ground	Existed
	54		
	57		
E130	108		
	112		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace ground connection.

P3176 MOTOR SYSTEM

DTC Description

INFOID:0000000014736260

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3176	MOTOR SYSTEM (Motor system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from traction motor inverter
		Threshold	When HPCM detects self-diagnosis signal from traction motor inverter.
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter-detected DTC
Refer toTMS-40, "Index of HPCM-detected DTC" .

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

>> Proceed to HBC-287, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736261

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

P3177 MOTOR SYSTEM

DTC Description

INFOID:0000000014736262

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3177	MOTOR SYSTEM (Motor system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from traction motor inverter
		Threshold	When HPCM detects self-diagnosis signal from traction motor inverter.
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter-detected DTC
Refer to TMS-40, "Index of HPCM-detected DTC".

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

>> Proceed to HBC-288, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736263

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

P3178 MOTOR SYSTEM

DTC Description

INFOID:0000000014736264

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3178	MOTOR SYSTEM (Motor system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from traction motor inverter
		Threshold	When HPCM detects self-diagnosis signal from traction motor inverter.
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter-detected DTC
Refer to TMS-40, "Index of HPCM-detected DTC".

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

>> Proceed to HBC-289, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736265

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

P3179 MOTOR SYSTEM

DTC Description

INFOID:0000000014736266

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3179	MOTOR SYSTEM (Motor system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from traction motor inverter
		Threshold	When HPCM detects self-diagnosis signal from traction motor inverter.
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter-detected DTC
Refer to TMS-40, "Index of HPCM-detected DTC".

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

>> Proceed to HBC-290, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736267

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

P317A MOTOR SYSTEM

DTC Description

INFOID:0000000014736268

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P317A	MOTOR SYSTEM (Motor system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from traction motor inverter
		Threshold	When HPCM detects self-diagnosis signal from traction motor inverter.
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter-detected DTC
Refer to TMS-40, "Index of HPCM-detected DTC".

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

>> Proceed to HBC-291, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736269

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

P317B MOTOR SYSTEM

DTC Description

INFOID:0000000014736270

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P317B	MOTOR SYSTEM (Motor system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from traction motor inverter
		Threshold	When HPCM detects self-diagnosis signal from traction motor inverter.
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter-detected DTC
Refer to TMS-40, "Index of HPCM-detected DTC".

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

>> Proceed to HBC-292, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736271

Check the DTC which detected with traction motor inverter. Refer to TMS-40, "Index of HPCM-detected DTC".

P317F HV BATTERY SYSTEM

DTC Description

INFOID:0000000014736272

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P317F	HV BATTERY SYSTEM (High voltage battery system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from Li-ion battery controller
		Threshold	When HPCM detects self-diagnosis signal from Li-ion battery controller.
		Diagnosis delay time	—

POSSIBLE CAUSE

Li-ion battery controller-detected DTC
Refer to HBB-35, "Fail-safe".

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

>> Proceed to HBC-293, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736273

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

P3180 HV BATTERY SYSTEM

DTC Description

INFOID:0000000014736274

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3180	HV BATTERY SYSTEM (High voltage battery system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from Li-ion battery controller
		Threshold	When HPCM detects self-diagnosis signal from Li-ion battery controller.
		Diagnosis delay time	—

POSSIBLE CAUSE

Li-ion battery controller-detected DTC
Refer to HBB-35, "Fail-safe".

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

>> Proceed to HBC-294, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736275

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

P3181 HV BATTERY SYSTEM

DTC Description

INFOID:0000000014736276

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3181	HV BATTERY SYSTEM (High voltage battery system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from Li-ion battery controller
		Threshold	When HPCM detects self-diagnosis signal from Li-ion battery controller.
		Diagnosis delay time	—

POSSIBLE CAUSE

Li-ion battery controller-detected DTC
Refer to HBB-35, "Fail-safe".

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

>> Proceed to HBC-295, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736277

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

P3182 HV BATTERY SYSTEM

DTC Description

INFOID:0000000014736278

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3182	HV BATTERY SYSTEM (High voltage battery system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from Li-ion battery controller
		Threshold	When HPCM detects self-diagnosis signal from Li-ion battery controller.
		Diagnosis delay time	—

POSSIBLE CAUSE

Li-ion battery controller-detected DTC
Refer to HBB-35, "Fail-safe".

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

>> Proceed to HBC-296, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736279

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

P3184 HV BATTERY SYSTEM

DTC Description

INFOID:0000000014736280

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3184	HV BATTERY SYSTEM (High voltage battery system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from Li-ion battery controller
		Threshold	When HPCM detects self-diagnosis signal from Li-ion battery controller.
		Diagnosis delay time	—

POSSIBLE CAUSE

Li-ion battery controller-detected DTC
Refer to HBB-35, "Fail-safe".

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

>> Proceed to HBC-297, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736281

Check the DTC which detected with Li-ion battery controller. Refer to HBB-35, "Fail-safe".

P3185 TRANSMISSION SYSTEM

DTC Description

INFOID:0000000014736282

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3185	TRANSMISSION SYSTEM (Transmission system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from TCM
		Threshold	When HPCM detects self-diagnosis signal from TCM.
		Diagnosis delay time	—

POSSIBLE CAUSE

TCM-detected DTC

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Transmission	Transmission malfunction (If clutch 2 is unable to slip)	• The engine and traction motor are stopped after the vehicle is stopped. • The hybrid system can be activated, but the engine and traction motor are stopped when the selector lever is shifted to a drivable position.
	Primary speed sensor malfunction	The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed.
	Secondary speed sensor malfunction	
	Transmission range switch malfunction	
	If CAN communication with the TCM computing unit or TCM are abnormal	• The engine and traction motor are stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to TM-192, "DTC Description".

Is DTC detected?

YES >> Proceed to HBC-298, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736283

1.PERFORM TCM DIAGNOSIS

Perform TCM diagnosis. Refer to TM-192, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P3186 TRANSMISSION SYSTEM

DTC Description

INFOID:0000000014736284

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3186	TRANSMISSION SYSTEM (Transmission system)	Diagnosis condition	—
		Signal (terminal)	Self-diagnosis signal from TCM
		Threshold	When HPCM detects self-diagnosis signal from TCM.
		Diagnosis delay time	—

POSSIBLE CAUSE

TCM-detected DTC

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Transmission	Transmission malfunction (If clutch 2 is unable to slip)	• The engine and traction motor are stopped after the vehicle is stopped. • The hybrid system can be activated, but the engine and traction motor are stopped when the selector lever is shifted to a drivable position.
	Primary speed sensor malfunction	The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed.
	Secondary speed sensor malfunction	
	Transmission range switch malfunction	
	If CAN communication with the TCM computing unit or TCM are abnormal	• The engine and traction motor are stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TCM

Check the DTC which detected with TCM. Refer to TM-72, "Index of HPCM-detected DTC".

>> Proceed to HBC-299, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736285

Check the DTC which detected with TCM. Refer to TM-72, "Index of HPCM-detected DTC".

P3194 CAN ERROR

DTC Description

INFOID:0000000014736286

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3194	COMMUNICATION ERROR (Communication error)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	CAN communication signal
		Threshold	When HPCM is not transmitting or receiving CAN communication signal with ABS actuator and electric unit (control unit).
		Diagnosis delay time	—

POSSIBLE CAUSE

ABS actuator and electric unit (control unit).

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P3194 is displayed with DTC UXXXX or P0A1D, first perform the trouble diagnosis for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-300, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736287

1.CHECK DTC PRIORITY

If DTC P3194 is displayed with DTC UXXXX or P0A1D, first perform the trouble diagnosis for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit).

Is the inspection result normal?

YES >> Perform the trouble diagnosis for CAN communication system. Refer to LAN-26, "Trouble Diagnosis Flow Chart"
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to BRC-61, "DTC Index".

P31A6 CAN ERROR

DTC Description

INFOID:0000000014736288

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31A6	COMMUNICATION ERROR (Communication error)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	CAN communication signal
		Threshold	When HPCM detected data error of CAN communication.
		Diagnosis delay time	—

POSSIBLE CAUSE

- ECM
- Traction motor inverter
- HPCM

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Engine	If engine fuel is cut off or ECM CAN communication are abnormal	The engine is stopped and the vehicle is driven by the traction motor alone.
	If ECM stopped control of the electric throttle control actuator	• The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.
	If ECM is limiting speed due to fuel cut-off	Engine stop control is prohibited and the vehicle is driven by the engine alone with a limit on the engine speed. For this reason, acceleration performance decreases.
	If ECM reduces the engine output	• HPCM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. • ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31A6 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-302, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736289

1.CHECK DTC PRIORITY

If DTC P31A6 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PERFORM ALL DTC READING

With CONSULT
1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC No.	DTC detection control module	Malfunctioning part
P31A6	“MOTOR CONTROL” only	• ECM • Traction motor inverter
	“EV/HEV” only	HPCM
	• “MOTOR CONTROL” • “EV/HEV”	ECM

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A6.

P31A7 CAN ERROR

DTC Description

INFOID:0000000014736290

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31A7	COMMUNICATION ERROR (Communication error)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	CAN communication signal
		Threshold	When HPCM detected data error of CAN communication.
		Diagnosis delay time	—

POSSIBLE CAUSE

- HPCM
- Traction motor inverter
- Li-ion battery controller

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31A7 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-303, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736291

1.CHECK DTC PRIORITY

If DTC P31A7 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PERFORM ALL DTC READING

With CONSULT
1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC No.	DTC detection control module	Malfunctioning part
P31A7	“EV/HEV” only	• HPCM • Traction motor inverter
	“HV BATTERY” only	Li-ion battery controller
	• “EV/HEV” • “HV BATTERY”	Traction motor inverter

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A7.

P31A8 CAN ERROR

DTC Description

INFOID:0000000014736292

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31A8	COMMUNICATION ERROR (Communication error)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	CAN communication signal
		Threshold	When HPCM detected data error of CAN communication.
		Diagnosis delay time	—

POSSIBLE CAUSE

- HPCM
- TCM
- Traction motor inverter

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Transmission	Transmission malfunction (If clutch 2 is unable to slip)	• The engine and traction motor are stopped after the vehicle is stopped. • The hybrid system can be activated, but the engine and traction motor are stopped when the selector lever is shifted to a drivable position.
	Primary speed sensor malfunction	The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed.
	Secondary speed sensor malfunction	
	Transmission range switch malfunction	
	If CAN communication with the TCM computing unit or TCM are abnormal	• The engine and traction motor are stopped. • Driving is not possible even when the accelerator pedal is depressed.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31A8 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-306, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736293

1.CHECK DTC PRIORITY

If DTC P31A8 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PERFORM ALL DTC READING

With CONSULT
1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC No.	DTC detection control module	Malfunctioning part
P31A8	“MOTOR CONTROL” only	• Traction motor inverter • TCM
	“EV/HEV” only	HPCM
	• “MOTOR CONTROL” • “EV/HEV”	TCM

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A8.

P31A9 CAN ERROR

DTC Description

INFOID:0000000014736294

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31A9	COMMUNICATION ERROR (Communication error)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	CAN communication signal
		Threshold	When HPCM detected data error of CAN communication.
		Diagnosis delay time	—

POSSIBLE CAUSE

- HPCM
- Traction motor inverter
- Li-ion battery controller

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior	
Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
	If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31A9 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-307, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736295

1.CHECK DTC PRIORITY

< DTC/CIRCUIT DIAGNOSIS >

If DTC P31A9 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2. PERFORM ALL DTC READING

With CONSULT
1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC No.	DTC detection control module	Malfunctioning part
P31A9	“MOTOR CONTROL” only	• Traction motor inverter • Li-ion battery controller
	“EV/HEV” only	• HPCM • Li-ion battery controller
	• “MOTOR CONTROL” • “EV/HEV”	Li-ion battery controller

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A9.

P31B1 CAN ERROR

DTC Description

INFOID:0000000014736296

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31B1	COMMUNICATION ERROR (Communication error)	Diagnosis condition	Ignition switch ON
		Signal (terminal)	CAN communication signal
		Threshold	When HPCM is not transmitting or receiving CAN communication signal with 4WD control unit.
		Diagnosis delay time	—

POSSIBLE CAUSE

4WD control unit

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31B1 is displayed with DTC UXXXX or P0A1D, first perform the confirmation procedure (trouble diagnosis) for UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-309, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736297

1.CHECK DTC PRIORITY

If DTC P31B1 is displayed with DTC UXXXX or P0A1D, first perform the confirmation procedure (trouble diagnosis) for UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH 4WD CONTROL UNIT

Check DTC with 4WD control unit.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for CAN communication system. Refer to LAN-26, "Trouble Diagnosis Flow Chart".

NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to DLN-26, "DTC Index".

P31BC CAN ERROR

DTC Description

INFOID:0000000014736298

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31BC	COMMUNICATION ERROR (Communication error)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When HPCM is not transmitting or receiving CAN communication signal with chassis control module.
		Diagnosis delay time	—

POSSIBLE CAUSE

Chassis control module

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
Chassis control module	The following functions are prohibited. • Active trace control • Active engine brake • Active ride control

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31BC is displayed with DTC UXXXX or P0A1D, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-311, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736299

1.CHECK DTC PRIORITY

If DTC P31BC is displayed with DTC UXXXX or P0A1D, first perform the confirmation procedure (trouble diagnosis) for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".

NO >> GO TO 2.

2.CHECK DTC WITH CHASSIS CONTROL MODULE

Check DTC with chassis control module.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for CAN communication system. Refer to LAN-26, "Trouble Diagnosis Flow Chart".

NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to DAS-448, "DTC Index".

P31EF DC/DC CONVERTER COMMUNICATION LINE

DTC Description

INFOID:0000000014736300

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31EF	DC/DC CONVERTER (Direct current/direct current converter)	Diagnosis condition	READY
		Signal (terminal)	DC/DC converter communication signal
		Threshold	When an abnormality is detected in the DC/DC converter communication signal transmitted from DC/DC converter to HPCM.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness and connectors (DC/DC converter communication line is open or shorted.)
- Harness and connectors (Intermittent malfunction in the DC/DC converter communication circuit)
- DC/DC converter

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
DC/DC converter	Vehicle speed is limited according to the drop in 12V battery voltage. After vehicle speed gradually decreases and only creep drive force is output, drive force output stops.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31EF is displayed with DTC UXXXX or P0A1D, first perform the trouble diagnosis for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 5 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-313, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736301

1.CHECK DTC PRIORITY

If DTC P31EF is displayed with DTC UXXXX or P0A1D, first perform the trouble diagnosis for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT

1. Disconnect DC/DC converter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between DC/DC converter harness connector and ground.

+		–	Voltage
DC/DC converter			
Connector	Terminal		
B50	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit. Refer to HBC-121, "DC/DC CONVERTER : Diagnosis Procedure".

3.CHECK DC/DC CONVERTER COMMUNICATION LINE

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between DC/DC converter harness connector and HPCM harness connector.

+		–		Continuity
DC/DC converter		HPCM		
Connector	Terminal	Connector	Terminal	
B50	3	E130	88	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-160, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P31F0 DC/DC CONVERTER COMMUNICATION LINE

DTC Description

INFOID:0000000014736302

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31F0	COMMUNICATION ERROR (Communication error)	Diagnosis condition	READY
		Signal (terminal)	DC/DC converter communication signal
		Threshold	When an abnormality is detected in the DC/DC converter communication signal transmitted from HPCM to the DC/DC converter.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness and connectors (DC/DC converter communication line is open or shorted.)
- Harness and connectors (Intermittent malfunction in the DC/DC converter communication circuit)
- HPCM

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
DC/DC converter	Vehicle speed is limited according to the drop in 12V battery voltage. After vehicle speed gradually decreases and only creep drive force is output, drive force output stops.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31F0 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 5 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-315, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736303

1.CHECK DTC PRIORITY

If DTC P31F0 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT

1. Disconnect DC/DC converter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between DC/DC converter harness connector and ground.

+		–	Voltage
DC/DC converter			
Connector	Terminal		
B50	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit. Refer to HBC-121, "DC/DC CONVERTER : Diagnosis Procedure".

3. CHECK DC/DC CONVERTER COMMUNICATION LINE

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between DC/DC converter harness connector and HPCM harness connector.

+		–		Continuity
DC/DC converter		HPCM		
Connector	Terminal	Connector	Terminal	
B50	3	E130	88	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Replace HPCM. Refer to HBC-335, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P31F1 DC/DC CONVERTER COMMUNICATION LINE

DTC Description

INFOID:0000000014736304

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31F1	COMMUNICATION ERROR (Communication error)	Diagnosis condition	READY
		Signal (terminal)	Communication between HPCM and the DC/DC converter
		Threshold	When an abnormality is detected in the communication between HPCM and the DC/DC converter.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness and connectors (DC/DC converter communication line is open or shorted.)
- Harness and connectors (Intermittent malfunction in the DC/DC converter communication circuit)

FAIL-SAFE

Detection items	Hybrid system operation and vehicle behavior
DC/DC converter	Vehicle speed is limited according to the drop in 12V battery voltage. After vehicle speed gradually decreases and only creep drive force is output, drive force output stops.

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31F1 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 5 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-317, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736305

1.CHECK DTC PRIORITY

If DTC P31F1 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT

1. Disconnect DC/DC converter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between DC/DC converter harness connector and ground.

+		–	Voltage
DC/DC converter			
Connector	Terminal		
B50	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit. Refer to HBC-121, "DC/DC CONVERTER : Diagnosis Procedure".

3. CHECK DC/DC CONVERTER COMMUNICATION LINE

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between DC/DC converter harness connector and HPCM harness connector.

+		–		Continuity
DC/DC converter		HPCM		
Connector	Terminal	Connector	Terminal	
B50	3	E130	88	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

P31FB, P31FD ASCD SYSTEM

DTC Description

INFOID:0000000014736306

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31FB	ASCD SYSTEM (ASCD system)	Diagnosis condition	—
		Signal (terminal)	—
P31FD		Threshold	HPCM calculation function is malfunctioning.
		Diagnosis delay time	—

POSSIBLE CAUSE

HPCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31FB or P31FD is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Press MAIN switch on ASCD steering switch for 1.5 seconds or more, and operate ASCD system.
3. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
4. Press SET/COAST switch.
5. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-319, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736307

1.CHECK DTC PRIORITY

If DTC P31FB or P31FD is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-319, "DTC Description".

Is DTC P31FB or P31FD detected again?

YES >> Replace HPCM. Refer to HBC-335, "Removal and Installation".
NO >> INSPECTION END

P31FE CHASSIS CONTROL MODULE

DTC Description

INFOID:0000000014736308

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31FE	ASCD SYSTEM (ASCD system)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	Command value from chassis control module is abnormal.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Chassis control module
- HPCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31FE is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 5 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-321, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736309

1.CHECK DTC PRIORITY

If DTC P31FE is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH CHASSIS CONTROL MODULE

Check DTC with chassis control module. Refer to DAS-448, "DTC Index".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace chassis control module. Refer to DAS-210, "Removal and Installation".

3.REPLACE CHASSIS CONTROL MODULE

1. Replace chassis control module. Refer to DAS-210, "Removal and Installation".
2. Perform DTC confirmation procedure. Refer to HBC-321, "DTC Description"

Is DTC P31FE detected again?

YES >> Replace HPCM. Refer to HBC-335, "Removal and Installation".
NO >> INSPECTION END

P31FF ASCD VEHICLE SPEED SENSOR

DTC Description

INFOID:0000000014736310

The ECM receives two vehicle speed signals via the CAN communication line. One is sent from “combination meter”, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to HBC-36, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" for ASCD functions.

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31FF	ASCD VEHICLE SPEED SENSOR (ASCD vehicle speed sensor)	Diagnosis condition	—
		Signal (terminal)	Vehicle speed signal
		Threshold	Vehicle speed signal for ASCD is out of the specified range.
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted.)
- Combination meter
- TCM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P31FF is displayed with DTC UXXXX or P0A1D, first perform the trouble diagnosis for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-323, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014736311

1.CHECK DTC PRIORITY

If DTC P31FF is displayed with DTC UXXXX or P0A1D, first perform the trouble diagnosis for DTC UXXXX or P0A1D.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH TCM

Check DTC with TCM.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to TM-70, "DTC Index".

3.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to MWI-32, "DTC Index".

HOOD SWITCH

Component Function Check

INFOID:0000000014736312

1.CHECK HOOD SWITCH FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Select “HOOD SW” in “DATA MONITOR” mode of “IPDM E/R” using CONSULT.
3. Check indication as per the following conditions.

Monitor item	Condition		Indication
HOOD SW	Engine hood	Open	OPEN
		Close	CLOSE

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between hood switch harness connector and ground as per the following conditions.

+		–	Condition		Voltage (Approx.)
Hood switch					
Connector	Terminal				
E223	2	Ground	Engine hood	Close	Battery voltage
				Open	0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-325, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014736313

1.CHECK IPDM E/R OUTPUT

1. Turn ignition switch OFF.
2. Open the engine hood.
3. Disconnect hood switch harness connector.
4. Turn ignition switch ON.
5. Check the voltage between hood switch harness connector and ground.

+		–	Voltage (Approx.)
Hood switch			
Connector	Terminal		
E223	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK HOOD SWITCH SIGNAL CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between hood switch harness connector and IPDM E/R harness connector.

+		–		Continuity
Hood switch		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E223	2	E217	52	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-46, "Removal and Installation".
NO >> Repair or replace error-detected parts.

3.CHECK HOOD SWITCH GROUND CIRCUIT

Check the continuity between hood switch harness connector and ground.

+		–	Continuity
Hood switch			
Connector	Terminal		
E223	1	Ground	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK HOOD SWITCH

Check the hood switch. Refer to HBC-326, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-54, "Intermittent Incident".
NO >> Replace hood lock. Refer to DLK-316, "HOOD LOCK : Removal and Installation".

Component Inspection

INFOID:0000000014736314

1.CHECK HOOD SWITCH

1. Turn ignition switch OFF.
2. Disconnect hood switch harness connector.
3. Check the continuity between hood switch terminals as per the following conditions.

Hood switch		Condition		Continuity
+	–			
Terminal				
1	2	Hood switch	Close	Not existed
			Open	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace hood lock. Refer to DLK-316, "HOOD LOCK : Removal and Installation".

INSULATION RESISTANCE
DC/DC CONVERTER
DC/DC CONVERTER : Component Inspection

INFOID:0000000014736315

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1. PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

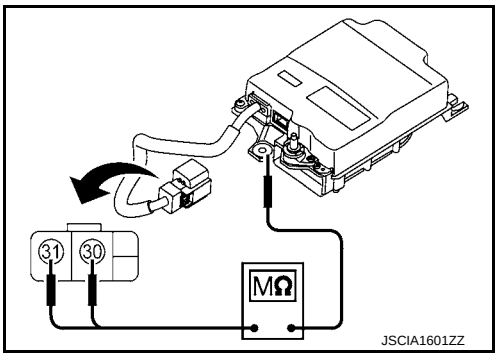
>> GO TO 2.

2. CHECK DC/DC CONVERTER INSULATION RESISTANCE

CAUTION:

Unlike the ordinary tester, the insulation resistance tester applies 500V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully and be sure to work safely.

1. Disconnect DC/DC converter harness from Li-ion battery. Refer to HBB-155, "Removal and Installation".
2. Check insulation resistance between DC/DC converter terminal and DC/DC converter metallic part, using an insulation resistance tester.



CAUTION:

- **Be sure to set the insulation resistance tester to 500V when performing this test.**
- **Using a setting higher than 500V can result in damage to the component being inspected.**

+		
DC/DC converter	–	Resistance
Terminal		
30	DC/DC converter metallic part	20 MΩ or more
31		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace DC/DC converter. Refer to HBB-160, "Removal and Installation".

HIGH VOLTAGE HARNESS

HIGH VOLTAGE HARNESS : Component Inspection

INFOID:0000000014736316

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to HBC-6, "High Voltage Precautions".**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1.PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 2.

2.CHECK HIGH VOLTAGE HARNESS INSULATION RESISTANCE

Check insulation resistance of the high voltage harness with an insulation resistance tester (multi tester).
Measurement point

Vehicle installation state
- Resistance between the harness connector terminal and body

Only as for the harness
- Resistance between the harness connector terminal and harness connector plastic
- Resistance between the harness connector terminal and harness coating (a shield)

CAUTION:

- **Be sure to check that a harness connector and harness coating (a shield) do not have a wound or the damage such as cracks, and change it when there is a wound or a crack.**
- **Be sure to set the insulation resistance tester to 500V when performing this test. Using a setting higher than 500V can result in damage to the component being inspected.**
- **Wait for 30 seconds until the value becomes stable.**

- Li-ion battery

High voltage harness connector		Resistance
Connector	Terminal	
H6	25	More than 100 MΩ
	26	

- Electric compressor

High voltage harness connector		Resistance
Connector	Terminal	
H8	1	More than 100 MΩ
	2	
	3	
	4	

- Traction motor inverter

High voltage harness connector		Resistance
Connector	Terminal	
H1	43	More than 100 MΩ
	44	
H3	46	
	47	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high voltage harness with the malfunction.

SYMPTOM DIAGNOSIS

HYBRID CONTROL SYSTEM

Symptom Table

INFOID:0000000014736317

Engine, Motor

×: Applicable

	SYMPTOM														Refer-ence page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	EXCESSIVE FUEL CONSUMPTION	WARNING LIGHT ON/HYBRID SYSTEM WARNING LAMP	OTHERS/DOES NOT ACTIVATE HYBRID SYSTEM	OTHERS/IMPOSSIBLE OF ACCELERATION	OTHERS/IMPOSSIBLE OF DRIVING	OTHERS/DOES NOT SET TO READY	OTHERS/ENGINE STARTING SHOCK	
Warranty symptom code	AA	AB	AC	AE	AF	AG	AH	AL	HC	ZZ	ZZ	ZZ	ZZ	ZZ	
HPCM power supply and ground circuit	×	×	×	×	×	×	×			×	×	×	×	×	HBC-117
Self shut-OFF relay circuit										×	×	×	×		HBC-251
Electric water pump circuit															HBC-148
ASCD/ICC steering switch circuit															HBC-220 (Without ICC) HBC-223 (With ICC)
Accelerator pedal position sensor 1 circuit			×	×											HBC-234 HBC-241 HBC-284
Accelerator pedal position sensor 2 circuit			×	×											HBC-238 HBC-241 HBC-284
Sensor power supply and ground circuit	×	×	×	×	×	×								×	HBC-284
Brake pedal position switch circuit															HBC-227 HBC-256
CAN system circuit									×	×	×	×	×		HBC-128 HBC-133
HEV system CAN circuit	×	×	×	×	×	×	×	×	×	×	×	×	×	×	HBC-124 HBC-127 HBC-130 HBC-132
Inter lock connector circuit										×	×	×	×		HBC-155
Service plug circuit										×	×	×	×		HBC-203

	SYMPTOM														Refer-ence page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	EXCESSIVE FUEL CONSUMPTION	WARNING LIGHT ON/HYBRID SYSTEM WARNING LAMP	OTHERS/DOES NOT ACTIVATE HYBRID SYSTEM	OTHERS/IMPOSSIBLE OF ACCELERATION	OTHERS/IMPOSSIBLE OF DRIVING	OTHERS/DOES NOT SET TO READY	OTHERS/ENGINE STARTING SHOCK	
Warranty symptom code	AA	AB	AC	AE	AF	AG	AH	AL	HC	ZZ	ZZ	ZZ	ZZ	ZZ	
System main relay 1 signal circuit										×	×	×	×		HBC-166 HBC-174 HBC-178 HBC-189
System main relay 2 signal circuit										×	×	×	×		HBC-166 HBC-174 HBC-181 HBC-192
DC/DC converter signal circuit										×	×	×	×		HBC-151
Pre-charge signal circuit										×	×	×	×		HBC-195 HBC-199
HPCM		×	×	×	×	×	×		×	×	×	×	×	×	HBC-159 HBC-284
High voltage coolant temperature sensor circuit									×						HBC-142
Battery current sensor circuit															HBC-212
Starter motor	×									×					HBC-334
Shift lock signal circuit									×						HBC-140

TM/CLUTCH, CHASSIS/BRAKE/STEERING, AIR CONDITIONING, ELECTRICAL

×: Applicable

	TM/CLUTCH		CHASSIS/BRAKE/ STEERING		AIR CONDITION-ING		ELEC-TRICAL	
	SYMPTOM							
	A/T SHIFT SHOCK	JUDDER	POOR BRAKING	WARNING LIGHT ON/ABS, VDC etc.	POOR HEATING	POOR COOLING	NO OR OMPROPER OPERATION	Reference page
Warranty symptom code	BE	ZP	DA	HC	GA	GB	ZE	
HPCM power supply and ground circuit	×	×	×					HBC-117
Self shut-OFF relay circuit					×	×		HBC-251
Electric water pump circuit							×	HBC-148
ASCD/ICC steering switch circuit							×	HBC-220 (With out ICC) HBC-223 (With ICC)
Accelerator pedal position sensor 1 circuit								HBC-234 HBC-241 HBC-284
Accelerator pedal position sensor 2 circuit								HBC-238 HBC-241 HBC-284
Sensor power supply and ground circuit	×	×	×					HBC-284
Brake pedal position switch circuit							×	HBC-227 HBC-256
CAN system circuit							×	HBC-128 HBC-133
HEV system CAN circuit	×	×			×	×	×	HBC-124 HBC-127 HBC-130 HBC-132
Inter lock connector circuit								HBC-155
Service plug circuit								HBC-203
System main relay 1 signal circuit					×	×		HBC-166 HBC-174 HBC-178 HBC-189
System main relay 2 signal circuit					×	×		HBC-166 HBC-174 HBC-181 HBC-192
DC/DC converter signal circuit								HBC-151
Pre-charge signal circuit								HBC-195 HBC-199

	TM/CLUTCH		CHASSIS/BRAKE/ STEERING		AIR CONDITION-ING		ELEC-TRICAL	
	SYMPTOM							
	A/T SHIFT SHOCK	JUDDER	POOR BRAKING	WARNING LIGHT ON/ABS, VDC etc.	POOR HEATING	POOR COOLING	NO OR OMPROPER OPERATION	Reference page
Warranty symptom code	BE	ZP	DA	HC	GA	GB	ZE	
HPCM	×	×	×	×	×	×		HBC-159 HBC-284
ASCD system							×	HBC-220

STARTER MOTOR NOT ACTIVATED

Diagnosis Procedure

INFOID:0000000014736318

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check DTC.

Is any DTC detected?

YES >> Perform trouble diagnosis of detected DTC.
NO >> GO TO 2.

2.CHECK STARTER MOTOR OPERATION

1. Turn ignition switch ON.
2. Start engine. (Condition: While depressing brake pedal and accelerator pedal, and depress the push-button ignition switch to start position.)
   NOTE:
   After the engine cranking, release the accelerator pedal within 5 seconds.

Is starter motor activated?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK STARTER MOTOR

Check starter motor. Refer to STR-13, "Work Flow (With GR8-1200 NI)" or STR-17, "Work Flow (Without GR8-1200 NI)".

>> INSPECTION END

4.CHECK ENGINE

Check engine. Refer to EC-147, "Work Flow".

Is the inspection normal?

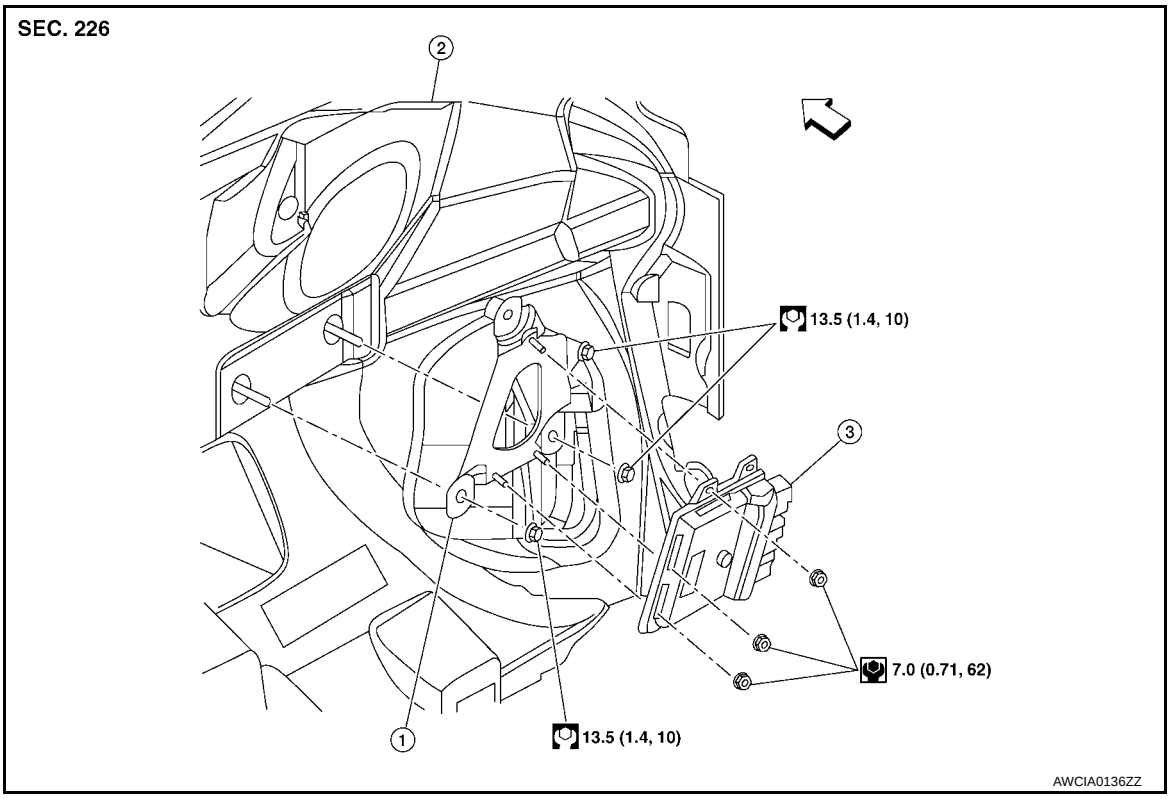
YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

REMOVAL AND INSTALLATION

HPCM

Exploded View

INFOID:0000000014630662



1. HPCM bracket
2. Dash panel
3. HPCM

⇦ Front

Removal and Installation

INFOID:0000000014630663

REMOVAL

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Disconnect the battery negative terminal. Refer to PG-128, "Battery Disconnect".
3. Disconnect harness connectors, from HPCM and remove. Refer to HARNESS CONNECTOR (LEVER LOCKING TYPE) in PG-7, "Harness Connector".
4. Remove HPCM nuts.
5. Remove HPCM.
6. Remove HPCM bracket nuts (if necessary).
7. Remove HPCM bracket (if necessary).

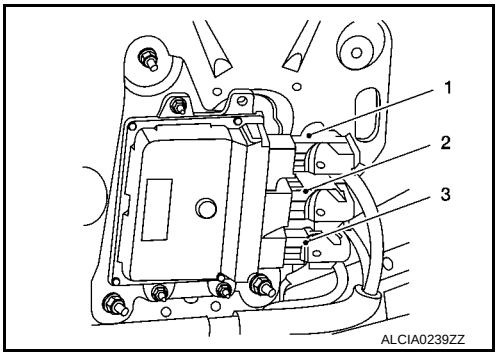
INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

- **Perform ADDITIONAL SERVICE WHEN REPLACING HPCM. Refer to HBC-104, "Description".**
- **Connect the electrical connectors in the following order:**

1. **Connect the black connector.**
2. **Connect the brown connector.**
3. **Connect the gray connector.**



DC/DC CONVERTER

Exploded View

INFOID:0000000014630664

Refer to HBB-160, "Exploded View".

Removal and Installation

INFOID:0000000014630665

To remove and install the DC/DC converter, refer to HBB-160, "Removal and Installation".