SECTION HBB
HYBRID BATTERY SYSTEM

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PRECAUTION

PRECAUTIONS

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

INFOID:0000000008140881

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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted.
Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, 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 “SRS AIR BAG”.**
- **Never 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:

Always observe the following items for preventing accidental activation.

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never 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 12V battery, and wait at least 3 minutes before performing any service.**

Precaution Necessary for Steering Wheel Rotation after 12V Battery Disconnect

INFOID:0000000008140882

For vehicle with steering lock unit, if the 12V battery is disconnected or discharged, the steering wheel will lock and cannot be turned.
If turning the steering wheel is required with the 12V battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

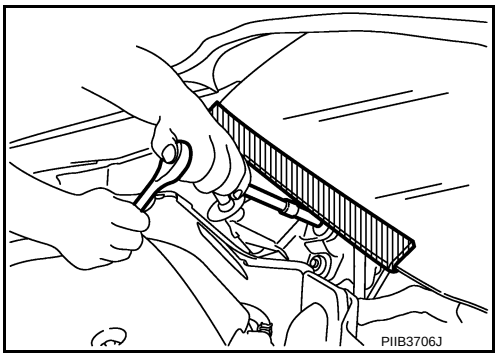
OPERATION PROCEDURE

1. Connect both 12V battery cables.
   NOTE:
   Supply power using jumper cables if 12V battery is discharged.
2. Turn the ignition switch to ACC position.
   (At this time, the steering lock will be released.)
3. Disconnect both 12V battery cables. The steering lock will remain released with both 12V battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both 12V battery cables. With the brake pedal released, turn the ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the ignition switch is turned to LOCK position.)
6. Perform All DTC Reading using CONSULT and delete DTC.
   NOTE:
   Multiple DTCs are detected when 12V battery cable is disconnected while ignition switch is in ACC position.

Precaution for Procedure without Cowl Top Cover

INFOID:0000000008140883

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions For Xenon Headlamp Service

INFOID:0000000008140884

WARNING:

Comply with the following warnings to prevent any serious accident.

- **Disconnect the 12V battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.**
- **Never work with wet hands.**
- **Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)**
- **Never touch the bulb glass immediately after turning it OFF. It is extremely hot.**

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- **Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)**
- **Never perform HID circuit inspection with a tester.**
- **Never touch the xenon bulb glass with hands. Never put oil and grease on it.**
- **Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.**
- **Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).**

High Voltage Precautions

INFOID:0000000008140885

WARNING:

- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield, and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

The colors of the high voltage harnesses and connectors are all orange. Orange "High Voltage" labels are applied to the Li-ion battery and other high voltage devices. Do not carelessly touch these harnesses and parts.

HANDLING OF HIGH VOLTAGE HARNESS AND TERMINALS

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

REGULATIONS 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.

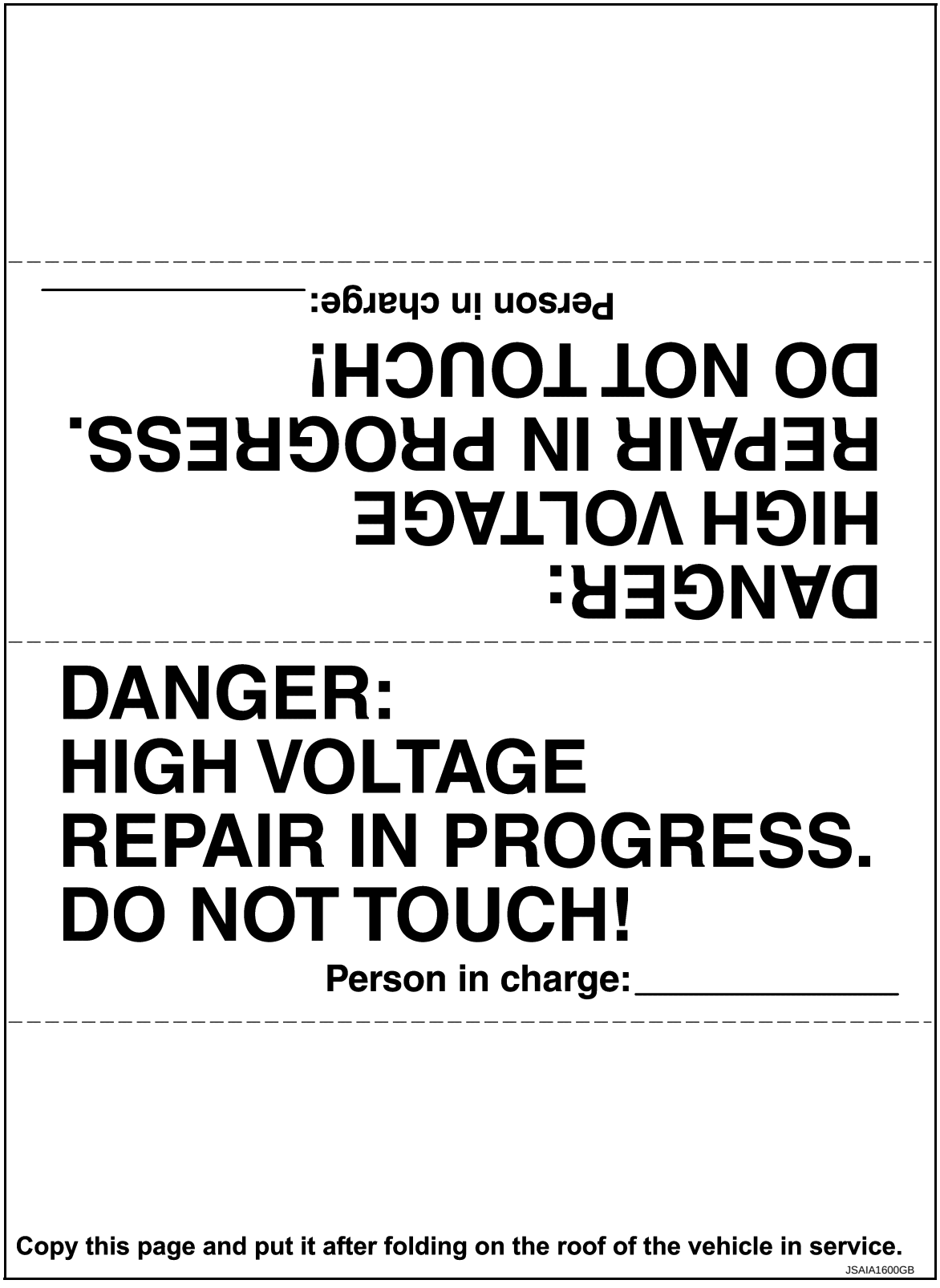
PROHIBITED ITEMS TO CARRY DURING THE WORK

Because this vehicle uses components that contain high voltage and powerful magnetism, due not carry any metal products which may cause short circuits, or any magnetic media (cash cards, prepaid cards, etc.) which may be damaged on your person when working.

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

< PRECAUTION >

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

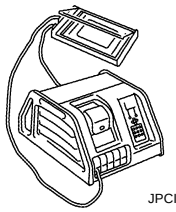


PREPARATION

PREPARATION

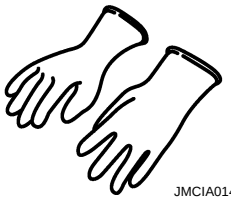
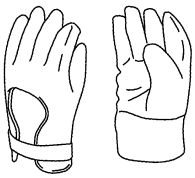
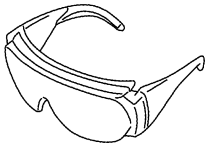
Special Service Tools

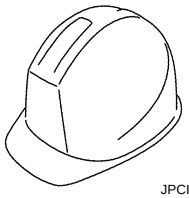
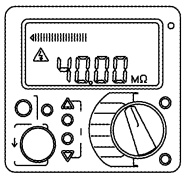
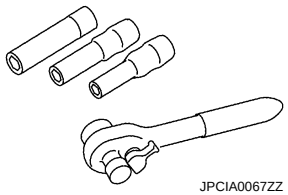
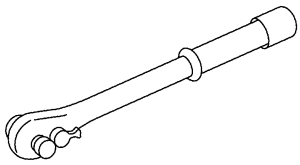
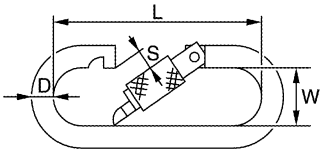
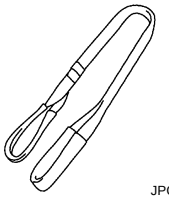
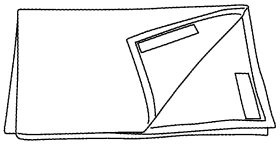
INFOID:0000000008140886

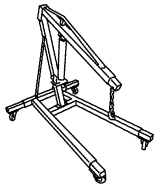
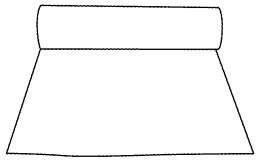
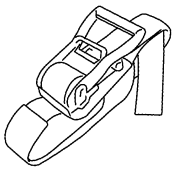
Tool name Tool number (Kent-Moore No.)	Description
Module charge balancer — (J-50346)  JPCIA0070ZZ	Module voltage adjustment

Commercial Service Tools

INFOID:0000000008478232

Tool name	Description
Insulated gloves [Guaranteed insulation performance for 1000V/300A]  JMCIA0149ZZ	Removing and installing high voltage components
Leather gloves [Use leather gloves that can fasten the wrist tight]  JPCIA0066ZZ	• Removing and installing high voltage components • Protect insulated gloves
Insulated safety shoes  JPCIA0011ZZ	Removing and installing high voltage components
Safety glasses [ANSI Z87.1]  JPCIA0012ZZ	• Removing and installing high voltage components • To protect eye 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
Insulated hand tools  JPCIA0067ZZ	Removing and installing high voltage components
Insulated torque wrench  JPCIA0068ZZ	Removing and installing high voltage components
Carabineer [small]  JPCIA0016ZZ	Removing and installing battery module stack **NOTE:** D: 8.0 mm (0.31 in) L: 74.0 mm (2.91 in) S: 10.0 mm (0.39 in) W: 22.5 mm (0.89 in)
Belt slinger  JPCIA0021ZZ	Removing and installing battery module stack Length: 1.0 m (3.281 ft)
Insulated cover sheet  JPCIA0018ZZ	Removing and installing high voltage components

Tool name		Description
Mobile floor crane	 JPCIA0020ZZ	Removing and installing battery module stack
Insulated rubber sheet	 JPCIA0019ZZ	Removing and installing high voltage components
Lashing belt	 JPCIA0022ZZ	Removing and installing battery rear module stack

SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

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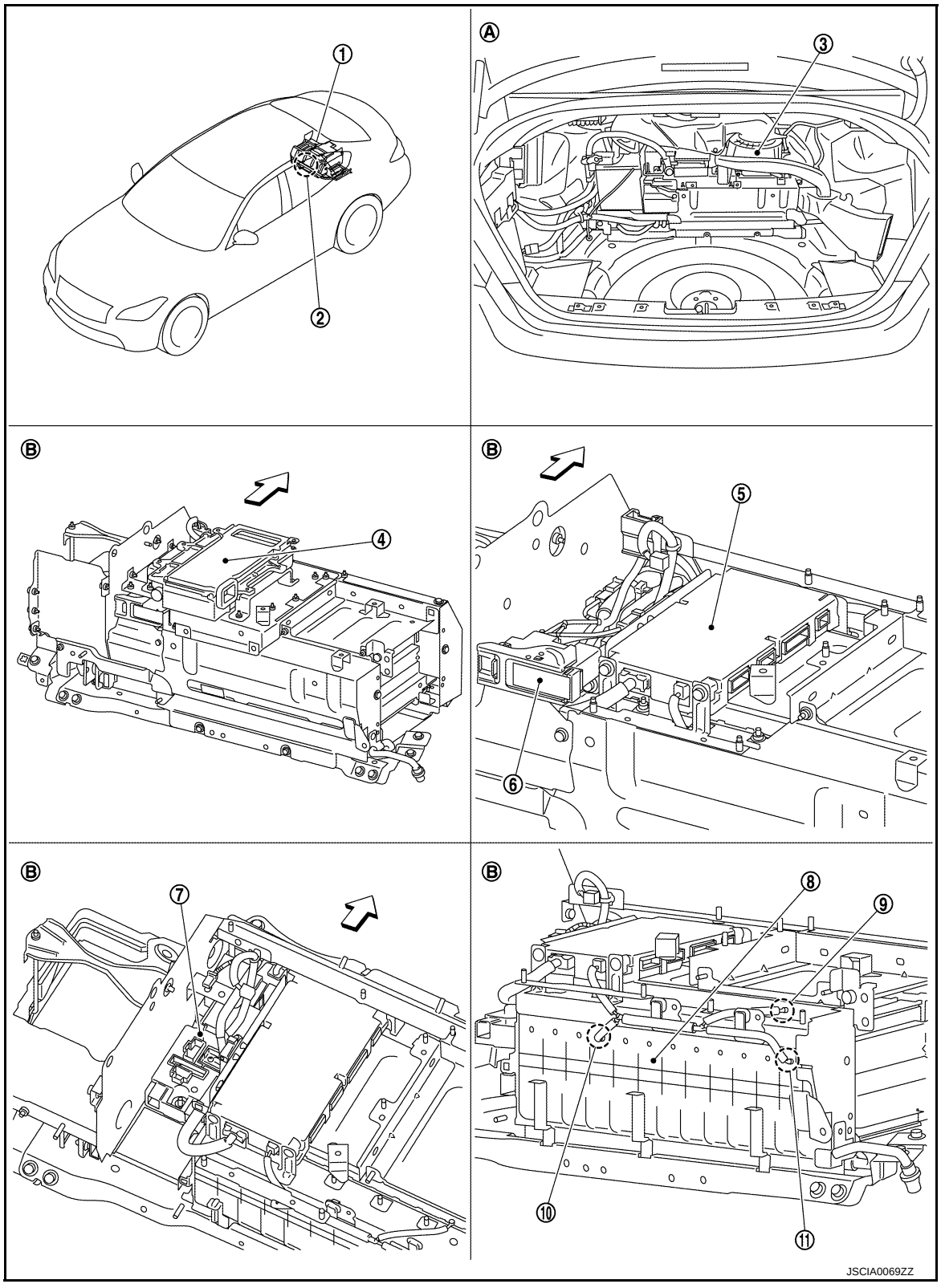

A. Trunk room
B. Inside Li-ion battery
⇦ : Vehicle front

No.	Component	Function
1	Li-ion battery	Refer to HBB-13, "Li-ion Battery".
2.	HPCM	Receives various information which is transmitted from each vehicle control unit, and controls the vehicle comprehensively. Shuts off the main relay when a malfunction is detected in the Li-ion battery. Refer to HBC-15, "HPCM" for detailed installation location.
3.	Battery cooling fan	Refer to HBB-16, "Battery Cooling Fan".
4.	DC/DC converter	Refer to HBC-15, "DC/DC Converter".
5.	Li-ion battery controller (LBC)	Refer to HBB-14, "Li-ion Battery Controller".
6.	Service plug	Refer to HBB-16, "Service Plug".
7.	Battery junction box	Refer to HBB-16, "Battery Junction Box".
8.	Module	Refer to HBB-14, "Module".
9.	Battery temperature sensor 3 (Intake)	Refer to HBB-15, "Battery Temperature Sensor".
10.	Battery temperature sensor 1 (Module 9)	
11.	Battery temperature sensor 2 (Module 1)	

Li-ion Battery

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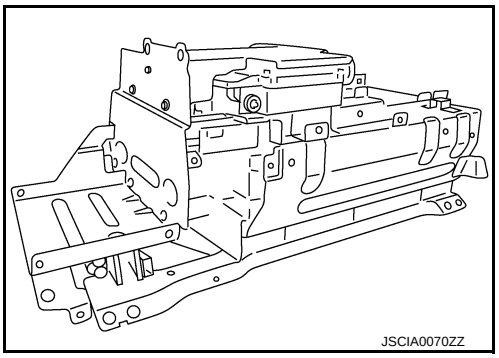
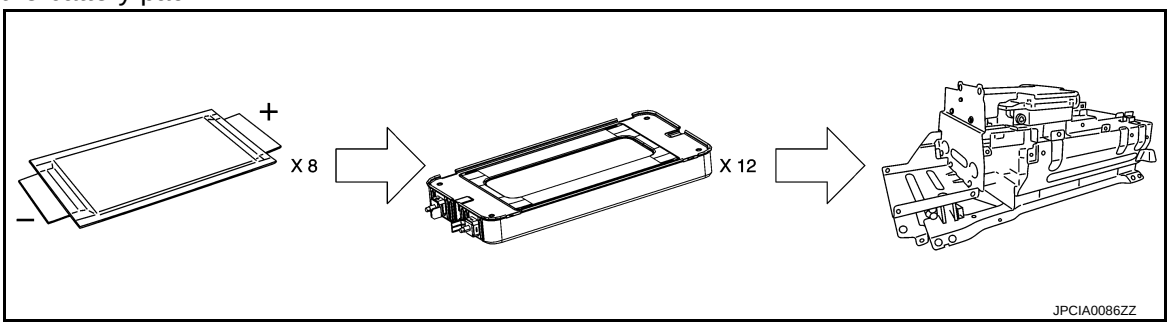
- The Li-ion battery (battery pack) is installed inside the trunk room.
- The Li-ion battery controller, DC/DC converter, and battery junction box are installed on the battery pack.



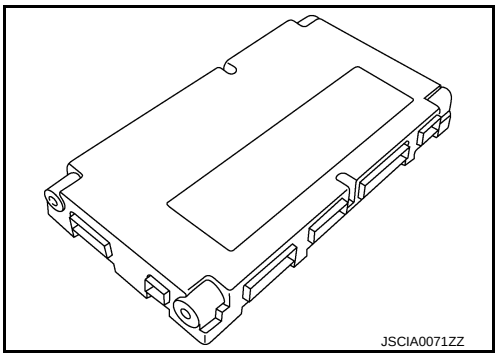
- 8 cells are connected in series to create one module. 12 of these modules are arranged in series to compose the battery pack.



Li-ion Battery Controller

INFOID:0000000008140890

- The Li-ion battery controller (LBC) is installed inside the battery pack.
- The LBC is the core of battery control. It detects the battery pack voltage and current, temperature inside the battery and intake temperature, and the voltage of each cell to determine the SOC (state of charge). It also calculates the allowable input/output values, and transmits the calculation data to the HPCM (Hybrid power train control module). The HPCM controls the vehicle according to the battery status.



MAIN ROLE OF LI-ION BATTERY CONTROLLER

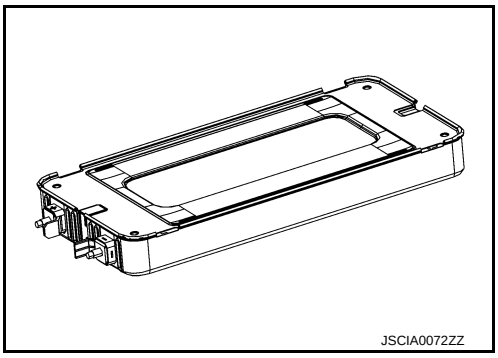
1. Li-ion battery state check
   - SOC (state of charge)
   - Possible output power value
   - Possible input power value
   - Temperature
2. Optimization of cell voltage deviation
3. Prevention of overvoltage and overcurrent
4. Prevention of overheat
5. Detection of decrease in insulation resistance of high-voltage circuit

Module

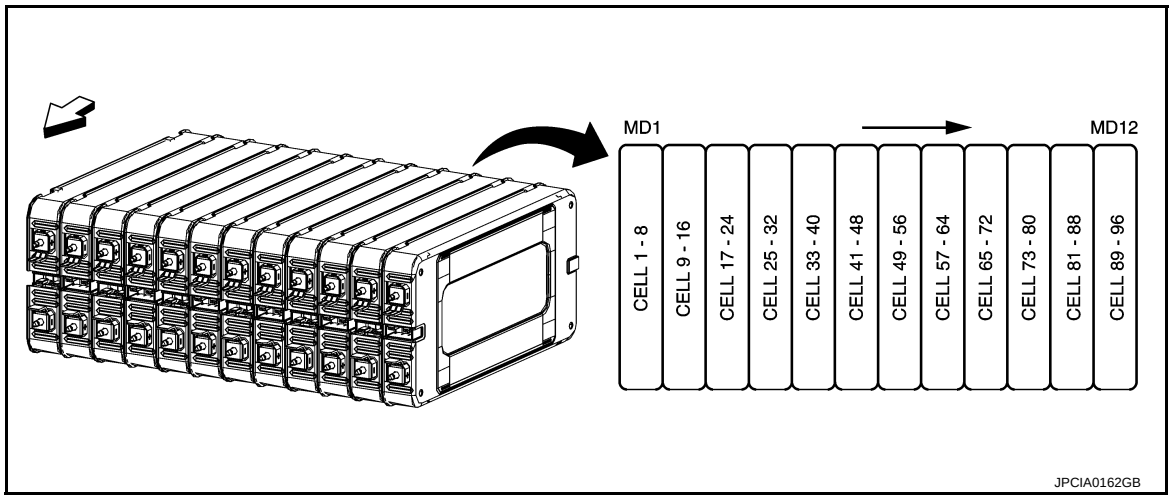
INFOID:0000000008140891

- Each module contains 8 laminated cells joined together.
- The Li-ion battery contains 12 modules.
- There are two kinds of modules, according to the location of positive and negative terminals.

Positive terminal	: Red
Negative terminal	: Black



MODULE LAYOUT

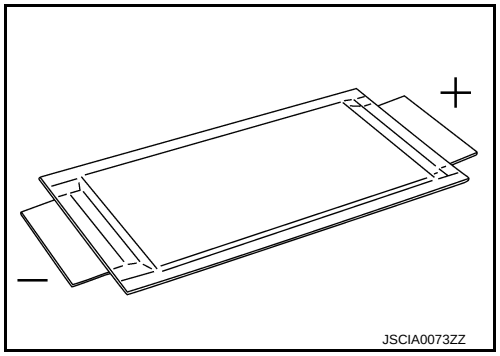


⇦ : Vehicle front

NOTE:
Module 1 (MD1) has the highest electrical potential, and module 12 (MD12) has the lowest electrical potential.

CELL

The cells that are used have a thin laminated structure that provides excellent cooling performance.



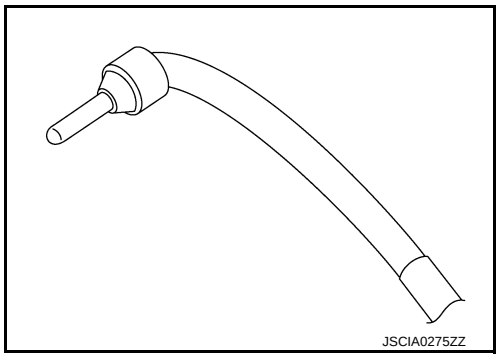
The Features of laminated cell

- Large surface area with excellent cooling performance reduces heat load to the battery and improves batterylife.
- The light and thin structure increases the flexibility in layout.

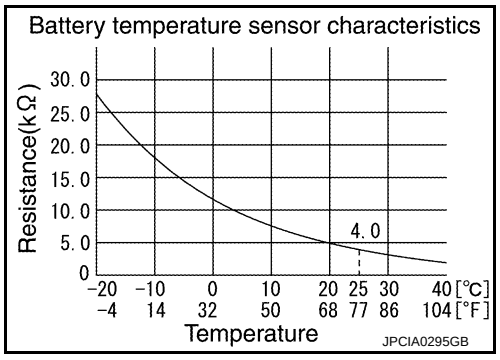
Battery Temperature Sensor

INFOID:0000000008140892

- The battery temperature sensors are installed inside the battery pack. They measure the temperature inside the battery pack and the intake temperature.



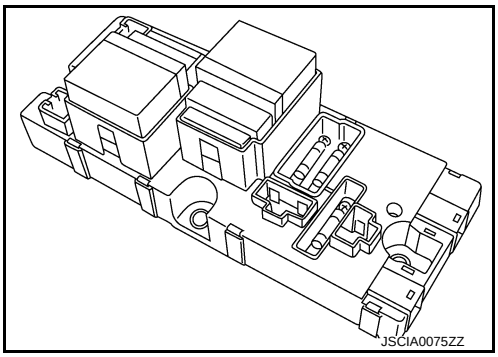
- The sensor uses a thermistor with a resistance value that varies according to changes in temperature. The electrical resistance of the thermistor decreases as the temperature increases.



Battery Junction Box

INFOID:0000000008140893

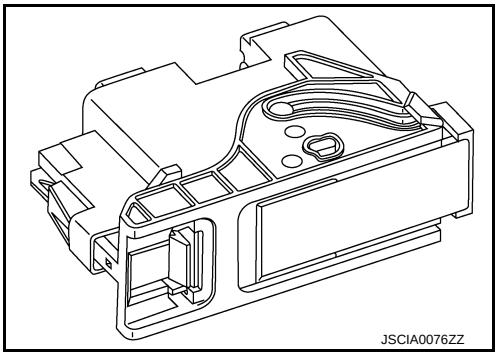
- The battery junction box is installed onto the bottom of the battery pack.
- The battery junction box contains the system main relays for supply of DC electrical power from the Li-ion battery, as well as the current sensor which measures the DC current.
- A system main relay is installed on both the positive side and negative side. They supply DC power to the high-voltage components. They also supply DC power to the Li-ion battery during motor regeneration and charging.
- When a system malfunction occurs, the system main relays immediately turn OFF based on the command from the HPCM (Hybrid Power-train Control Module), shutting off the Li-ion battery in order to ensure safety.


JSCIA0075ZZ

Service Plug

INFOID:0000000008140894

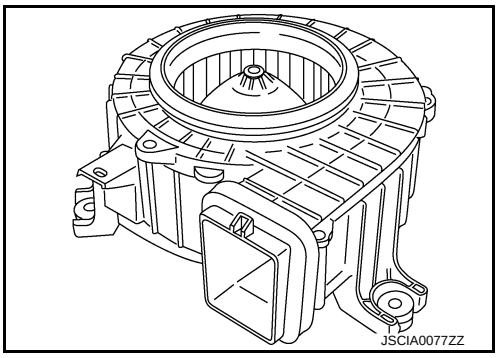
- A service plug is installed on the high-voltage battery in order to securely shut off the high-voltage circuit during inspection and servicing of high-voltage components.
- When the service plug cover is opened, the service plug can be removed.
- Be sure to use insulated protective gear when removing and installing the service plug.


JSCIA0076ZZ

Battery Cooling Fan

INFOID:0000000008140895

The battery fan is installed on the top of the Li-ion battery underneath the rear parcel shelf (left side) inside the trunk room.


JSCIA0077ZZ

Specifications

Blower unit	Fan	Type	Sirroco fan
		Outside diameter × width [mm (in)]	ϕ150 (5.91) × 64.5 (2.54)
	Motor	Type	Brushless motor
		Power consumption (W)	235
		Motor drive signal duty ratio (%)	16 – 91

Warning Label

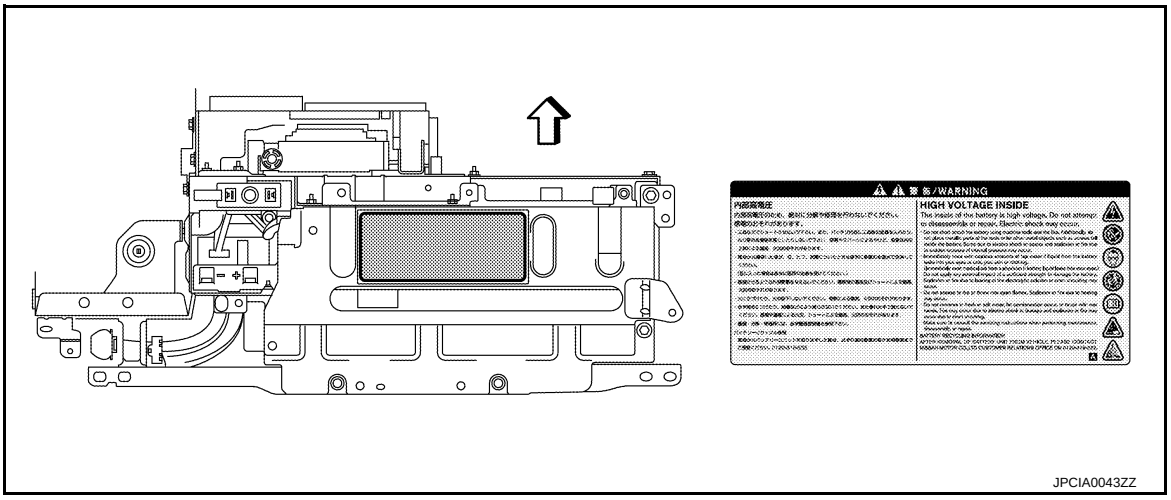
INFOID:0000000008140896

Warning label is affix on each component parts below.
After replacing a part, check that the part is affixed with a label. If the label is not affixed, be sure to affix the label to the original position.

HIGH VOLTAGE WARNING

Li-ion Battery

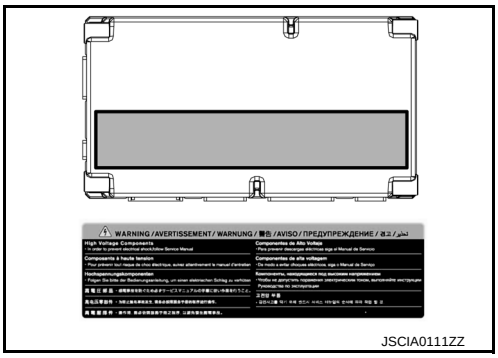
The label is affixed on the rear of Li-ion battery.



⇦ : Vehicle upper

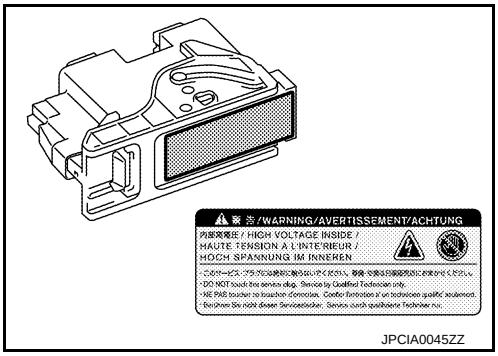
Li-ion Battery Controller

The label is affixed on the main body of controller.



Service Plug·

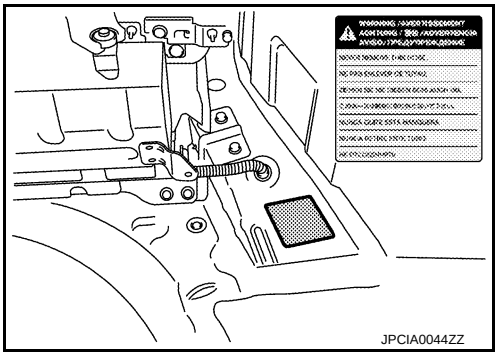
The label is affixed on service plug.



EXCEPT HIGH VOLTAGE WARNING

Li-ion Battery Gas Discharge Tube

The label is affixed on trunk room right side.

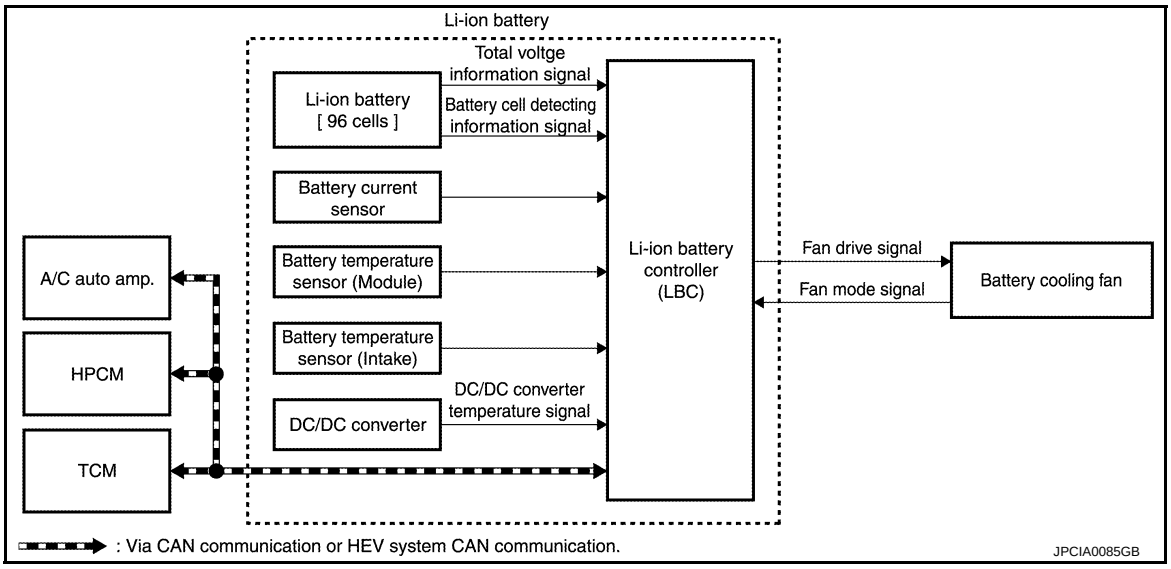


SYSTEM

System Description

INFOID:0000000008140897

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL ITEM

Input signal item

Transmit unit	Signal name		Description
HPCM	HEV system CAN	Total power signal	The engine and traction motor output is received from the HPCM.
		High voltage harness connector detecting signal	The connection detection signal of the high voltage connector and service plug is received from the HPCM.
A/C auto amp.		A/C intake door status signal	The A/C intake door status signal is received from the A/C auto amp.
		A/C blower motor speed signal	The A/C blower motor speed signal is received from the A/C auto amp.
		In-vehicle temperature signal	The in-vehicle temperature signal is received from the A/C auto amp.
TCM		Output shaft revolution signal	Output shaft revolution signal is received from TCM.
Traction motor inverter		Motor speed signal	Motor speed signal is received from traction motor inverter.
		Motor output torque signal	Motor output torque signal is received from traction motor inverter.

Output signal item

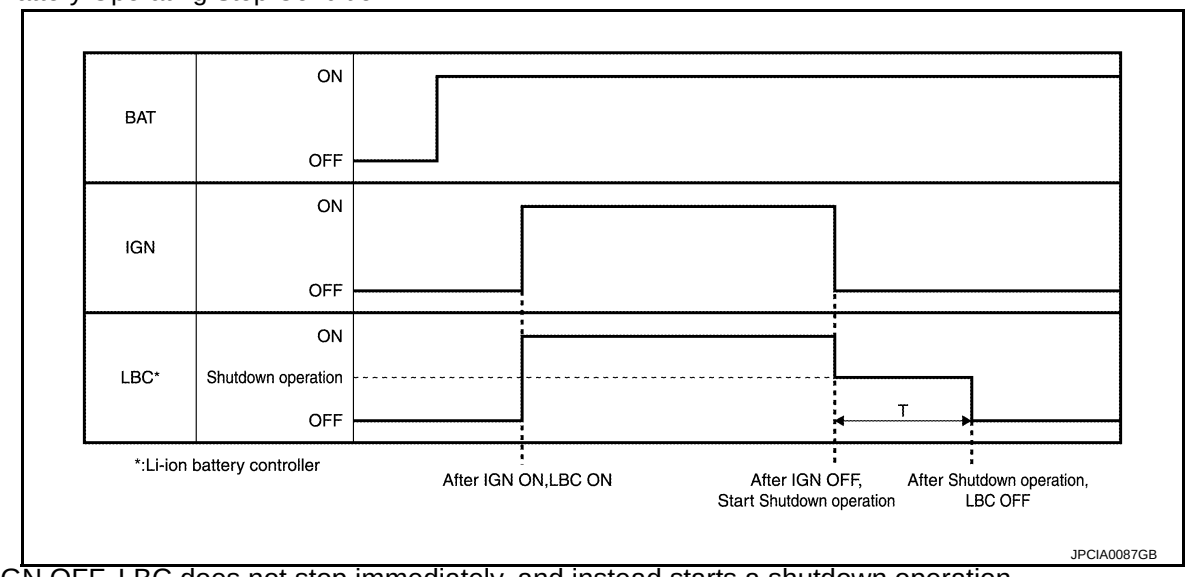
Receive unit	Signal name		Description
HPCM	HEV system CAN	Li-ion battery temperature signal	The Li-ion battery temperature signal is transmitted to HPCM.
		Li-ion battery state of charge signal	The LI-ion battery state of charge signal is transmitted to HPCM.
		Li-ion battery voltage signal	The Li-ion battery voltage signal is transmitted to HPCM.
		Li-ion battery current signal	The Li-ion battery current signal is transmitted to HPCM.
		Charge control electricity signal	The chargeable electric power signal is transmitted to HPCM.
		Discharge control electricity signal	The dischargeable electric power signal is transmitted to HPCM.
		DC/DC converter cooling mode signal	Cooling fan mode request signal from the DC/DC converter is transmitted to HPCM.
A/C auto amp.		A/C outlet request signal	A/C outlet request signal of the A/C system is transmitted to HPCM.

DESCRIPTION

The Li-ion battery controller (LBC) constantly monitors the conditions inside the battery, and transmits the battery charge status (SOC), the electrical power that can be input and output in the vehicle, and other information via HEV system CAN communication.
Vehicle information from each unit is received via HEV system CAN communication.
The Li-ion battery controller performs the following control.

- The battery status is monitored constantly, and the available charge/discharge power is transferred to the HPCM (Hybrid Powertrain Control Module) so that battery malfunctions (overvoltage, over-discharge, or overheating) may not occur.
- The battery malfunctioning status (overvoltage, over-discharge, or overheating) is immediately detected when it occurs. The system main relay cut-off request is transmitted to HPCM, and the charge/discharge line is shut off.
- The battery is maintained in optimal conditions according to the cell capacity adjustment function so that a decrease in the battery charge/discharge capability, which may be caused by cell capacity fluctuation, can be prevented.
- The insulation resistance status is detected according to the detection function for isolation resistance drop between high voltage and low voltage. The status is transmitted to the HPCM so that the vehicle may not be started in a malfunctioning status.

Li-ion Battery Operating Stop Condition



After IGN OFF, LBC does not stop immediately, and instead starts a shutdown operation.
The shutdown time varies according to the battery capacity adjustment time that is performed in order to eliminate voltage differences between the cells.

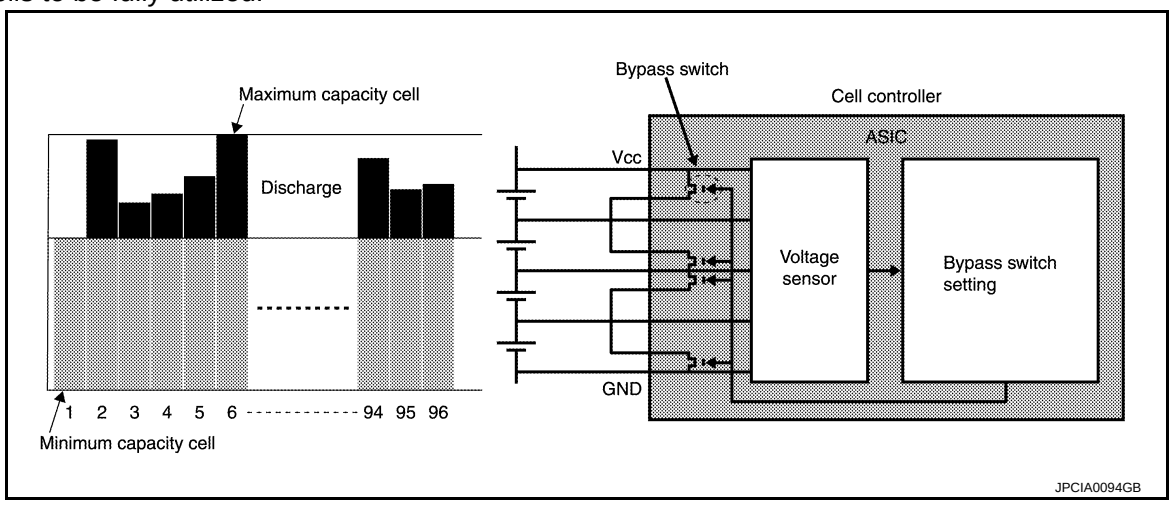
BATTERY PROTECTION

The Li-ion battery has a voltage range capable of charge/discharge. If charged/discharged exceeding the range, excessive low capacity or malfunction may be caused. To prevent this, the Li-ion battery controller detects voltage of each cell and requests the control of charging/discharging energy to HPCM so that the cell voltage stays within the voltage range.

Control item	Control	Operating condition
Overvoltage/overcurrent protection	Charging energy control	Gradual control of charging energy as the cell voltage approaches the upper limit of the voltage capable of charging.
	System main relay cut	Cell voltage exceeds the voltage judged as overvoltage and maintains the voltage for more than the specified time.
Over discharge protection	Discharging energy control	Gradual control of discharging energy as the cell voltage approaches the lower limit of the voltage capable of discharging.
	System main relay cut	Cell voltage exceeds the voltage judged as over discharge and maintains the voltage for more than the specified time.
Excessive temperature rise protection	Charging/discharging energy control	Gradual control of charging/discharging energy as a Li-ion battery temperature approaches the upper limit of the temperature capable of use.
	System main relay cut	Li-ion battery temperature exceeds the temperature judged as excessive temperature rise and maintains the temperature for more than the specified time.

CELL CAPACITY ADJUSTMENT METHOD

During cell capacity adjustment, the capacity of each cell is estimated based on the no-load voltage when the system starts, and the capacities are adjusted so that they are all at the target level. The voltage of each cell is detected inside the Li-ion battery controller. The bypass switches are then turned ON to discharge the cells that have excess capacity. In this way, capacity adjustment by the Li-ion battery controller allows the capacity of all cells to be fully utilized.



Battery Cooling Control

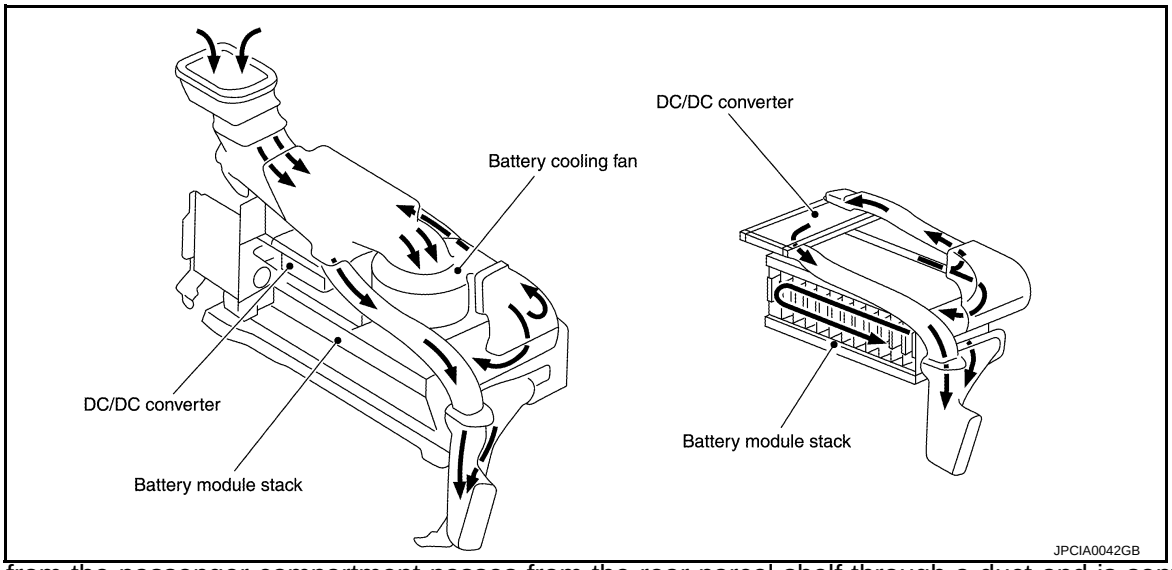
INFOID:0000000008140898

DESCRIPTION

Cooling of the Li-ion battery is performed by delivering cooled air from the passenger compartment into the trunk room.

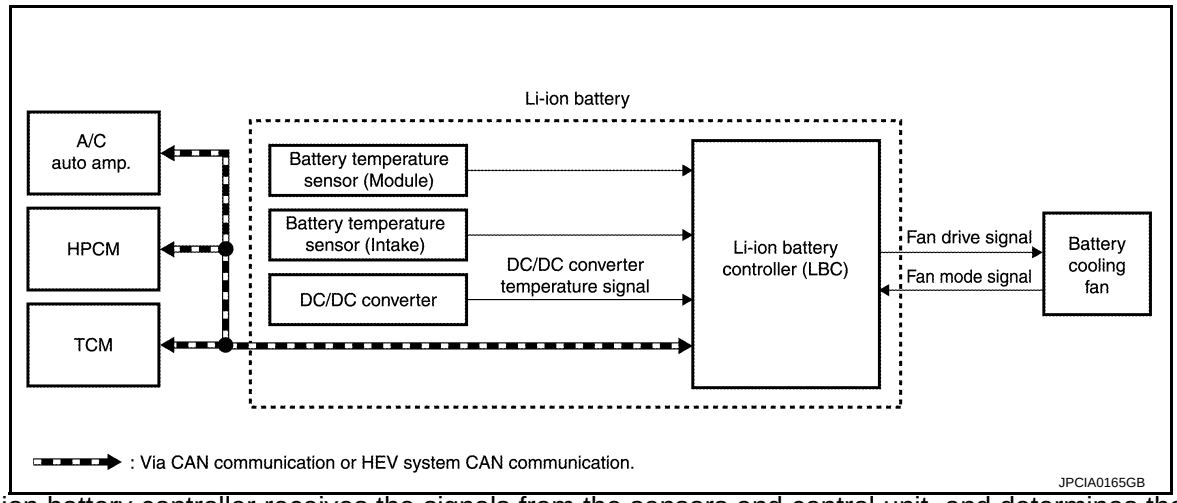
The air from the passenger compartment cools the Li-ion battery, maintaining a suitable battery temperature and improving the lifetime of the Li-ion battery.

AIR FLOW



The air from the passenger compartment passes from the rear parcel shelf through a duct and is sent to the battery cooling fan. The air is then divided for 2 systems (battery module stack and DC/DC converter) to cool the entire battery pack.

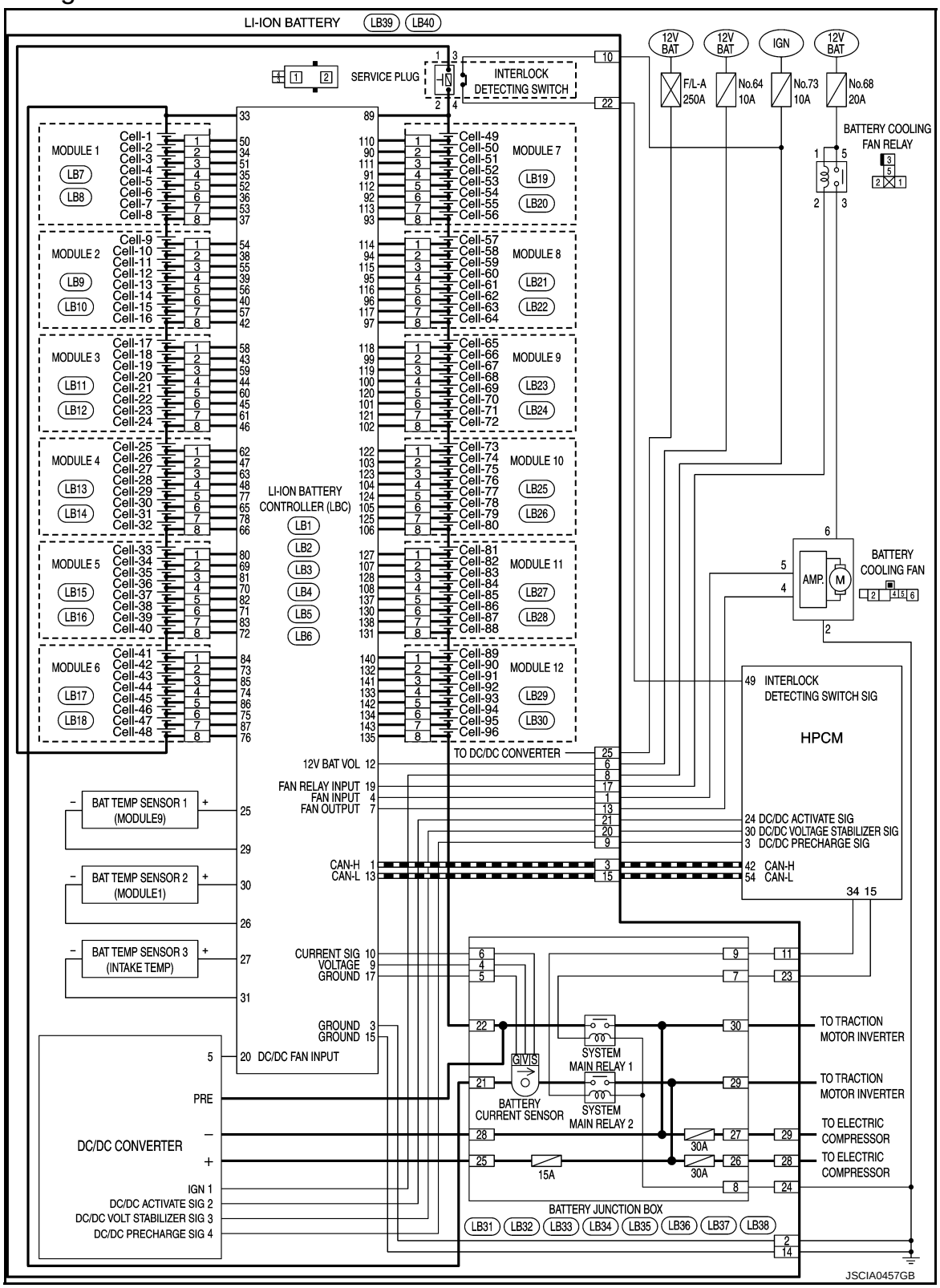
CONTROL

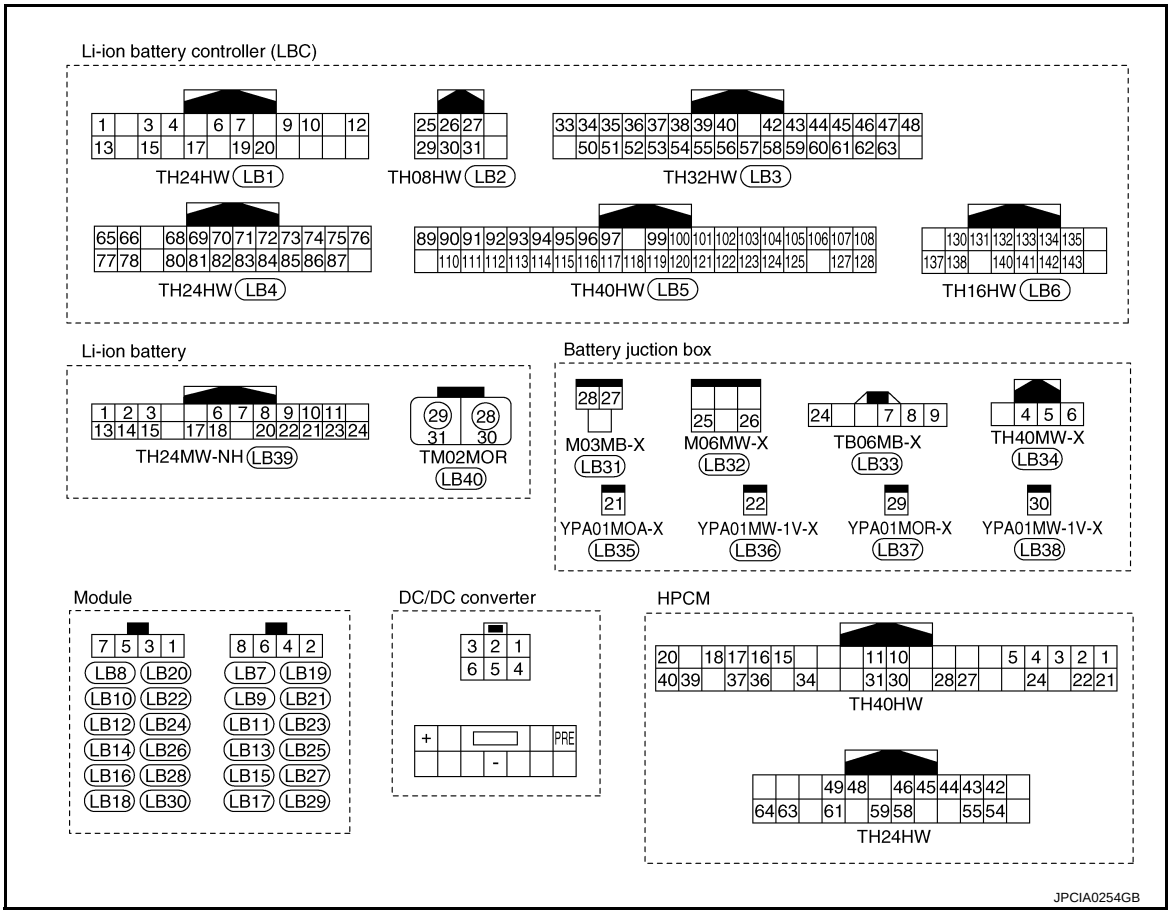


The Li-ion battery controller receives the signals from the sensors and control unit, and determines the target airflow. Based on this target airflow, the Li-ion battery controller changes the duty value of the cooling fan drive signal, allowing stepless control of the airflow.
The target fan speed is determined by calculating the vehicle noise state according to the output shaft revolution signal, total power signal, and A/C blower fan speed, based on the temperature signals from the battery temperature sensors, intake temperature sensor, and DC/DC converter.

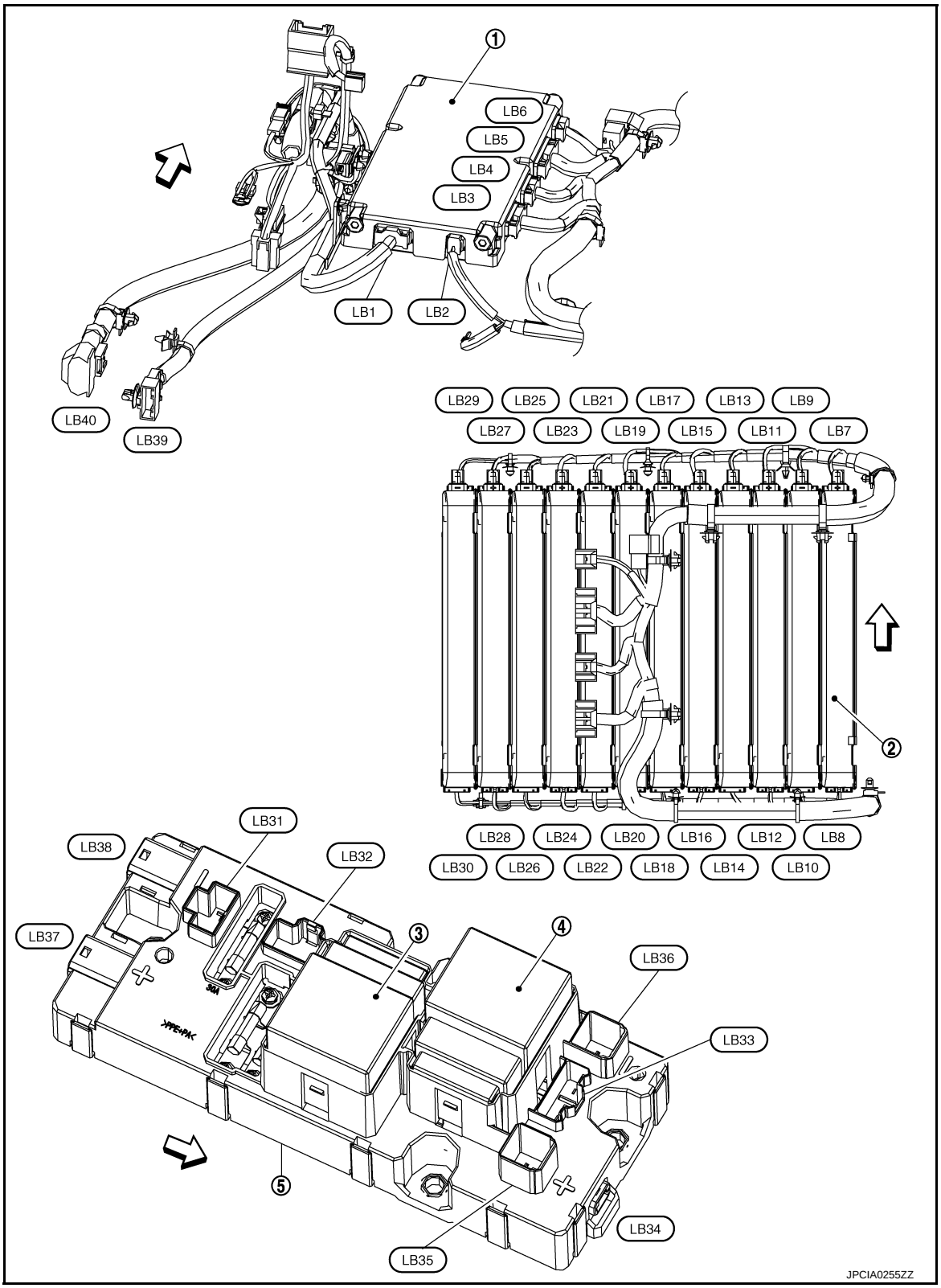
Circuit Diagram

INFOID:0000000008140899





HARNESS LAYOUT



1. Li-ion battery controller
2. Module stack
3. System main relay 2
4. System main relay 1
5. Battery junction box

⇦ : Vehicle front

HANDLING PRECAUTION

Hybrid Battery System

INFOID:0000000008140900

PRECAUTIONS FOR STORAGE OF THE LI-ION BATTERY

1. Apply insulating tape to the service plug and high-voltage harness connector, and protect the terminals so that nothing contacts them.
2. Store in a well-ventilated location that is not exposed to direct sunlight.
   (Storing outdoors or unprotected is prohibited.)
3. Never set directly on the floor.
4. Lay an anti-static rubber sheet underneath the battery.
5. Never invert the battery.
6. Never stack batteries.
7. Cover with an anti-static cover sheet.
8. Put a caution display stating "CAUTION! HIGH VOLTAGE" on the insulated cover sheet.
9. Put identification display showing the name of person in charge on the insulated cover sheet.
10. Never allow water to contact the battery.
11. Prevent other objects from falling onto the battery.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000008140901

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the 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:0000000008140902

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-58, "CONSULT/GST Data Link Connector (DLC) Circuit".

NOTE:

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

DIAGNOSIS SYSTEM (LBC)
DIAGNOSIS DESCRIPTION
DIAGNOSIS DESCRIPTION : 1 Trip Detection Diagnosis and 2 Trip Detection Diagnosis

INFOID:0000000008140903

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 Li-ion battery controller (LBC) memory. The MIL does not illuminate at this stage. There are diagnoses that illuminate the hybrid system 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 LBC memory, and the MIL, hybrid system warning 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 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 LBC memory. There are diagnoses that illuminate the MIL, the hybrid system 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 HBB-39, "DTC Index".)	—	—	×	—	×	—
Two trip detection diagnosis (Refer to HBB-39, "DTC Index".)	×	—	—	×	—	×

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000008140904

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 Li-ion battery controller (LBC) memory. At this time, the MIL does not illuminate. Some of the diagnoses illuminate the hybrid system 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 LBC memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the LBC memory and the MIL, the hybrid system warning lamp illuminate.
The procedure for erasing the DTC and the 1st trip DTC from LBC memory is described in “How to Erase DTC and 1st Trip DTC” in HBB-32, "CONSULT Function".
Refer to HBB-39, "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 HBB-44, "Work Flow".
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

LBC stores the Li-ion battery status, such as voltage, current, temperature, and SOC (state of charge) at malfunction detection.
Data which are stored in the LBC 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.
LBC 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 LBC 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 LBC

memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the LBC.
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 LBC memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the LBC.
The LBC 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 LBC memory is erased. For the procedure for erasing the LBC memory, refer to “How to Erase DTC and 1st Trip DTC” of HBB-32, "CONSULT Function".

DIAGNOSIS DESCRIPTION : Counter System

INFOID:0000000008140905

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 Li-ion battery controller (LBC) memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the LBC memory, and the MIL will come on.
- 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:0000000008140906

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 (32°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.

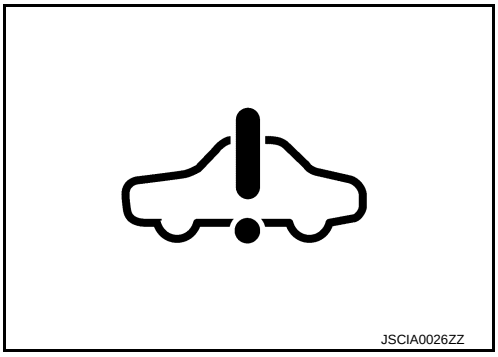
NOTE:

- 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.

DIAGNOSIS DESCRIPTION : Hybrid System Warning Lamp

INFOID:0000000008140907

- When a control module related to the hybrid system detects a DTC, the lamp activation request signal is transmitted to HPCM via CAN communication.
  HPCM decides the order of priority (lamp ON or blinking) for the signals sent from the control modules related to the hybrid system and the DTC stored in the HPCM, and transmits the hybrid system warning lamp activation signal to the combination meter via CAN communication.
  Based on the signal from HPCM, the combination meter causes the hybrid system warning lamp to turn ON or blink, notifying the driver that a malfunction is detected.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- Control modules which record DTC that cause the hybrid system warning lamp to turn ON or blink.
  (The control module which stores the DTC is different for each DTC.)

- HPCM
- ECM
- TCM
- Traction motor inverter
- Li-ion battery controller

1. When the ignition switch is turned ON, the hybrid system warning lamp turns ON.
   NOTE:
   If the hybrid system warning lamp does not turn ON, inspect the warning lamp system circuit. HBC-330, "Component Function Check".
2. When the vehicle is READY, the hybrid system warning lamp turns OFF.
   NOTE:
   If the hybrid system warning lamp turns ON or flashes continuously, this means a DTC related to the hybrid system is detected. Execute self-diagnosis, and perform inspection or repair.

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

INFOID:0000000008140908

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.

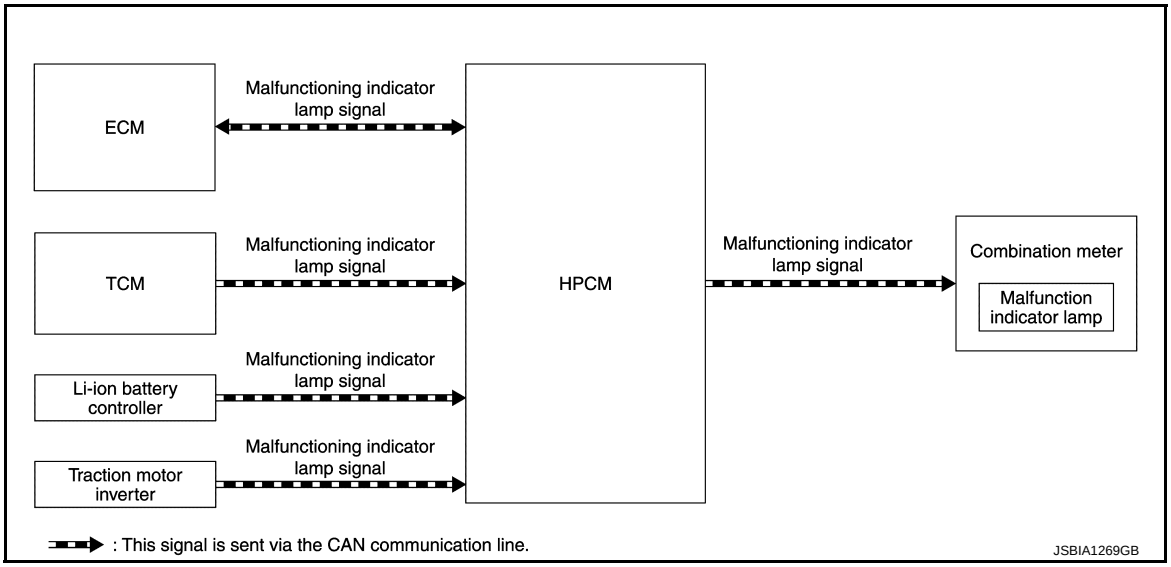
PERMANENT DTC SET TIMING

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

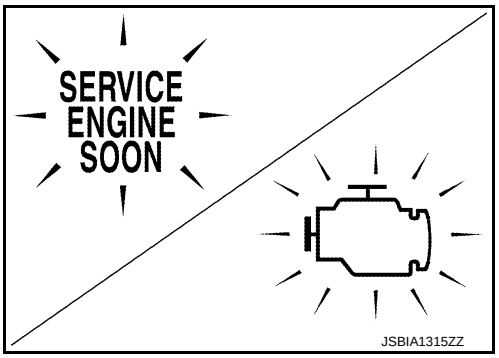
DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

INFOID:0000000008140909

SYSTEM DIAGRAM



SYSTEM DESCRIPTION



- If the emission-related control module detects emission-related DTC, illuminating or blinking of the MIL notifies the driver that a malfunction is detected.
  - When the Li-ion battery controller, traction motor inverter or TCM* detects emission-related DTC, a malfunctioning indicator lamp signal to is sent HPCM via CAN communication.
    If TCM detects emission-related DTC, it sends a malfunctioning indicator lamp signal to ECM via HPCM (gateway) in CAN communication.
    *: If DTC related to hybrid is detected, a signal is sent.
  - HPCM sends a malfunctioning indicator lamp signal from Li-ion battery controller, traction motor inverter and TCM and a malfunctioning indicator lamp signal with emission-related DTC stored in HPCM to ECM.
  - ECM compares malfunctioning indicator lamp signal from TCM and HPCM with emission-related DTC stored in ECM, and determines whether to illuminate or blink the MIL. ECM sends a malfunctioning indicator lamp signal to HPCM in CAN communication.
  - HPCM sends a malfunctioning indicator lamp signal (illuminating or blinking) from ECM to the combination meter via CAN communication.
  - The MIL in the combination meter illuminates or blinks based on the malfunctioning indicator lamp signal from HPCM.
- Control module that memorizes DTC for illuminating or blinking of the MIL
  (The control module memorized for each DTC varies.)
  - ECM
  - TCM
  - HPCM
  - Li-ion battery controller
  - Traction motor inverter

1. The MIL illuminates when ignition switch is turned ON.
   NOTE:
   When the MIL does not illuminate, check the circuit of the MIL. Refer to EC-422, "Component Function Check".
2. The MIL turns off when the ignition switch is set to READY.
   NOTE:
   When the MIL continues to illuminate or blink, emission-related DTC is detected. Perform total self-diagnosis and inspect or repair the unit.

CONSULT Function

INFOID:0000000008140910

APPLICATION ITEM

CONSULT performs the following functions via CAN communication with Li-ion battery controller (LBC).

Item	Function
Work Support	Allows system settings to be changed or adjusted.
ECU Identification	Allows the LBC part No. to be displayed.
Self-diagnosis Result	Allows the self-diagnosis results judged by the LBC to be displayed and erased*.
Data Monitor	Allows the LBC input/output data to be displayed and recorded.
Active Test	Allows the system functions to be forcibly stopped or started by CONSULT.

*: The following diagnostic information is cleared when the LBC memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

Work Support

Work item	Condition
Save battery information data	Allows the battery information stored in the LBC to be saved.
Write battery information data	Allows the battery information read by CONSULT from LBC to be written to the LBC.
Clear battery information	Allows the battery information stored in the LBC to be cleared.

ECU IDENTIFICATION

Part number of LBC can be checked.

SELF-DIAGNOSIS RESULT

Self Diagnostic Item

Regarding items of DTC, refer to HBB-39, "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 LBC detects a 1st trip DTC, “1t” is displayed for “TIME”.
- When LBC has detected a current DTC, “0” is displayed for “TIME”.
- If “TIME” is neither “0” nor “1t”, the DTC occurred in the past and LBC 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.

1. Select “HV BAT” with CONSULT.
2. Select “SELF-DIAG RESULTS”.
3. Touch “ERASE”. (DTC in LBC will be erased.)

FREEZE FRAME DATA (FFD)

The following vehicle status is recorded when DTC is detected and is displayed on CONSULT.

Monitored item	Unit	Description
DTC	—	Displays the DTC which caused FFD memory
BATT ELECTRIC CURRENT	A	Displays the current value detected by the current sensor.
INPUT POSSIBLE POWER	kW	Displays the power which can be input to the Li-ion battery.
OUTPUT POSSIBLE POWER	kW	Displays the power which can be output from the Li-ion battery.
12V BATTERY VOLTAGE	mV	Displays the 12V power voltage.

Monitored item	Unit	Description
IR SEN SHORT PULSE AMPLITUDE	mV	Displays the difference between the maximum voltage and minimum voltage in the voltage amplitude for insulation resistance drop detection.
SOC	%	Displays the charge status of the Li-ion battery.
SERVICE PLUG INTERLOCK	OPEN/ CLOSE	Displays the service plug connected/disconnected status.
CELL VOLTAGE 01 – 96	mV	Displays the voltage of each cell.
TOTAL BATTERY VOLTAGE	V	Displays the total voltage of the Li-ion battery.
TEMPERATURE COUNTER	—	Displays the cumulative battery stress value based on the average battery temperature.
LIFE MAX BAT TEMP	degC	Displays the maximum battery temperature that is reached.
LOW TEMP START COUNTER	count	Displays the cumulative number of trips for low-temperature starts.
VEHICLE RUNNING CONTROL NG COUNTER	count	Displays the cumulative number of trips for irregularities in vehicle driving control.
LIFE MINIMUM STATE OF CHARGE	%	Displays the lowest SOC (charge status) that occurs during the course of use.
OVER DISCHARGE NG COUNTER	count	Displays the cumulative number of trips for over-discharge malfunction detection.
LIFE MINIMUM TOTAL VOLTAGE	V	Displays the lowest cumulative voltage that occurs during the course of use.
BATTERY CALCULATION CALL TIME COUNTER	count	Displays the cumulative time during which battery stress is calculated.
BATTERY CALCULATION CALL COUNTER	count	Displays the cumulative number of trips for battery stress calculation.
BATTERY TEMPERTURE 1	degC	Displays the temperature calculated using the signal voltage from battery temperature sensor 1 (Module 9).
BATTERY TEMPERTURE 2	degC	Displays the temperature calculated using the signal voltage from battery temperature sensor 2 (Module 1).
BATTERY TEMPERTURE 3	degC	Displays the temperature calculated using the signal voltage from the battery temperature sensor 3 (Intake air).

DATA MONITOR

NOTE:

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

Monitored item	Unit	Description
BATT ELECTRIC CURRENT	A	Displays the current value detected by the current sensor.
INPUT POSSIBLE POWER	kW	Displays the power which can be input to the Li-ion battery.
OUTPUT POSSIBLE POWER	kW	Displays the power which can be output from the Li-ion battery.
12V BATTERY VOLTAGE	mV	Displays the 12V power voltage.
IR SEN SHORT PULSE	mV	Displays the difference between the maximum voltage and minimum voltage in the voltage amplitude for insulation resistance drop detection.
SOC	%	Displays the charge status of the Li-ion battery.
SERVICE PLUG INTERLOCK	OPEN/ CLOSE	Displays the service plug connected/disconnected status.
CELL VOLTAGE 01 – 96	mV	Displays the voltage of each cell.
TOTAL BATTERY VOLTAGE	V	Displays the total voltage of the Li-ion battery.
MAXIMUM CELL VOLTAGE	mV	Displays the current highest cell voltage.
MINIMUM CELL VOLTAGE	mV	Displays the current lowest cell voltage.
FAIL STATUS	NO ACT/ RLY Off	Displays the vehicle fail-safe status.

Monitored item	Unit	Description
LBC MODE STATUS	NORMAL/ TRQ Off/ BALESS/ BLANK	Displays the fail-safe status of the Li-ion battery controller (LBC).
BATTERY TEMPERTURE 1	degC	Displays the temperature calculated using the signal voltage from battery temperature sensor 1 (Module 9).
BATTERY TEMPERTURE 2	degC	Displays the temperature calculated using the signal voltage from battery temperature sensor 2 (Module 1).
BATTERY TEMPERTURE 3	degC	Displays the temperature calculated using the signal voltage from the battery temperature sensor 3 (Intake air).
AD VALUE OF AVCC VOLTAGE	mV	Displays the analog power voltage.
HIGH TEMP COUNTER	count	Displays the cumulative total time during which the battery temperature is high.
BATTERY CAL CALL COUNT	count	Displays the total number of trips when battery stress calculation is called.
BATT CAL CALL TIME COUNT	count	Displays the total time when battery stress calculation is called.
LOW TEMP START COUNTER	count	Displays the total number of trips for low-temperature starts.
LIFE MAX BATT TEMP	degC	Displays the recorded maximum battery temperature.
LIFE MINIMUM SOC	%	Displays the recorded minimum SOC (charge status).
LIFE MIN TOTAL VOLT	V	Displays the recorded total voltage.
OVER DISCHARGE NG COUNT	count	Displays the total number of trips for over-discharge malfunction detection.
BAT HIGH TEMP NG COUNT 1	count	Displays the total number of trips for battery high temperature malfunction detection.
VHCL RUN CONT NG COUNT	count	Displays the total number of trips for vehicle driving control malfunction detection.
TEMPERATURE COUNTER	count	Displays the cumulative temperature stress coefficient based on the average battery temperature.
TOTAL/V OVR VOL COUNT	count	Displays the cumulative number of trips for total voltage overvoltage malfunction detection.
TOTAL/V OVR DISCHG COUNT	count	Displays the cumulative number of trips for total voltage over-discharge malfunction detection.
CELL/V OVR VOLT COUNT	count	Displays the cumulative number of trips for cell voltage overvoltage malfunction detection.
CELL/V OVR DISCHG COUNT	count	Displays the cumulative number of trips for cell voltage over-discharge malfunction detection.
BAT HIGH TEMP NG COUNT 2	count	Displays the weighted average value of the internal resistance used for battery age calculation.

ACTIVE TEST

Item	Description
HV BATTERY COOLING FAN	Allows the duty value of the battery cooling fan to be changed to any value, and allows the fan to be forcibly stopped and started.

ECU DIAGNOSIS INFORMATION

HYBRID BATTERY SYSTEM

Reference Value

INFOID:0000000008140911

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.

CONSULT MONITOR ITEM

Monitor Item	Condition		Values/Status
BATT ELECTRIC CURRENT	Ignition switch: ON		–250 – 150 A
INPUT POSSIBLE POWER	READY		0 – 27 kW
OUTPUT POSSIBLE POWER	READY		0 – 60 kW
12V BATTERY VOLTAGE	Ignition switch: ON		9 – 16 V
IR SEN SHORT PULSE	Ignition switch: ON		—
SOC	Ignition switch: ON		30 – 80 %
SERVICE PLUG INTERLOCK	Ignition switch: ON	Service plug is connected	CLOSE
		Service plug is not connected	OPEN
CELL VOLTAGE 01	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 02	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 03	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 04	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 05	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 06	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 07	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 08	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 09	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 10	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 11	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 12	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 13	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 14	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 15	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 16	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 17	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 18	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 19	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 20	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 21	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 22	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 23	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 24	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 25	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 26	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 27	Ignition switch: ON		1,560 – 4,265 mV

Monitor Item	Condition	Values/Status
CELL VOLTAGE 28	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 29	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 30	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 31	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 32	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 33	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 34	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 35	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 36	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 37	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 38	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 39	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 40	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 41	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 42	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 43	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 44	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 45	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 46	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 47	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 48	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 49	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 50	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 51	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 52	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 53	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 54	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 55	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 56	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 57	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 58	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 59	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 60	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 61	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 62	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 63	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 64	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 65	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 66	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 67	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 68	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 69	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 70	Ignition switch: ON	1,560 – 4,265 mV
CELL VOLTAGE 71	Ignition switch: ON	1,560 – 4,265 mV

Monitor Item	Condition		Values/Status
CELL VOLTAGE 72	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 73	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 74	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 75	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 76	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 77	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 78	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 79	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 80	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 81	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 82	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 83	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 84	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 85	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 86	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 87	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 88	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 89	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 90	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 91	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 92	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 93	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 94	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 95	Ignition switch: ON		1,560 – 4,265 mV
CELL VOLTAGE 96	Ignition switch: ON		1,560 – 4,265 mV
TOTAL BATTERY VOLTAGE	Ignition switch: ON		150 – 412 V
MAXIMUM CELL VOLTAGE	READY		1,560 – 4,265 mV
MINIMUM CELL VOLTAGE	READY		1,560 – 4,265 mV
FAIL STATUS	Ignition switch: ON, or READY	Fail-safe: System main relay OFF	RLY Off
		Fail-safe: System main relay ON	NO ACT
LBC MODE STATUS	Ignition switch: ON, or READY	System normal operation	NORMAL
		Fail-safe: Motor torque OFF	TRQ Off
		Fail-safe: Battery less	BALESS
		Fail-safe: Normal vehicle behavior	BLANK
BATTERY TEMPERATURE 1	Ignition switch: ON		(–40) – (+70) degC
BATTERY TEMPERATURE 2	Ignition switch: ON		(–40) – (+70) degC
BATTERY TEMPERATURE 3	Ignition switch: ON		(–40) – (+70) degC
AD VALUE OF AVCC VOLTAGE	Ignition switch: ON		2,000 mV
HIGH TEMP COUNTER	Ignition switch: ON		Depends on the environment
BATTERY CAL CALL COUNT	Ignition switch: ON		Depends on the environment
BATT CAL CALL COUNT	Ignition switch: ON		Depends on the environment
LOW TEMP START COUNTER	Ignition switch: ON		Depends on the environment

Monitor Item	Condition	Values/Status
LIFE MAX BATT TEMP	Ignition switch: ON	(–40) – (+70) degC
LIFE MINIMUM SOC	Ignition switch: ON	30 – 80 %
LIFE MIN TOTAL VOLTAGE	Ignition switch: ON	150 – 412 V
OVER DISCHARGE NG COUNT	Ignition switch: ON	Depends on the environment
BAT HIGH TEMP NG COUNT 1	Ignition switch: ON	Depends on the environment
VHCL RUN CONT NG COUNT	Ignition switch: ON	Depends on the environment
TEMPERATURE COUNTER	Ignition switch: ON	Depends on the environment
TOTAL/V OVR VOL COUNT	Ignition switch: ON	Depends on the environment
TOTAL/V OVR DISCHG COUNT	Ignition switch: ON	Depends on the environment
CELL/V OVR VOLT COUNTER	Ignition switch: ON	Depends on the environment
CELL/V OVR DISCHG COUNT	Ignition switch: ON	Depends on the environment
BAT HIGH TEMP NG COUNT 2	Ignition switch: ON	Depends on the environment

Fail-safe

INFOID:0000000008140912

When detecting a malfunction in Li-ion battery, the Li-ion battery controller (LBC) issues a request to HPCM (Hybrid power train control module) for limiting or stopping the output from the Li-ion batter so that the system can be protected.

Fail-safe	Description	Symptom	HPCM-detected DTC
SYSTEM MAIN RELAY OFF	The system main relay is turned OFF.	• The engine cannot be started. • Illuminate hybrid system warning lamp.	P3182
BATTERY LESS	After engine start, the system main relay is turned OFF, and the vehicle is driven only by the driving force of the engine. The traction motor torque becomes limited.	• Driving force decreases. • Possible to travel by 12V battery remaining quantity. • Illuminate hybrid system warning lamp.	P3181
MOTOR TORQUE OFF	The vehicle travels under the condition that the traction motor torque and the input/output power to the Li-ion battery are limited.	• Only auxiliary part can be recharged. • Idling stop is prohibited. • Driving force decreases • Possible to travel by fuel remaining quantity. • Illuminate hybrid system warning lamp	P317F
—	The hybrid system warning lamp turns ON.	Illuminate hybrid system warning lamp	P3180

DTC Inspection Priority Chart

INFOID:0000000008140913

If multiple DTC are displayed at the same time, check each of them one at a time in accordance with the following priority table.

Priority	DTC	Detection items
1	P0A09, P0A10	DC/DC converter
	P0A84, P0A85	Battery cooling fan
	P0A9D, P0A9D, P0AAE, P0AAF, P0AC7, P0AC8	• Battery temperature sensor • Intake air temperature sensor
	P0AA9, P0AAA	On-board isolation resistance monitoring system
	P0AC0, P0AC1, P0AC2	Battery current sensor
	P3061	Over charge/discharge voltage
	P30D0	State of charge rationality
	P30EF	Internal resistance
	P30F5	Total voltage sensor
	P30FE	12V battery voltage
	P31A5, P31A7, P33E0, P33E1, P33E2, P33F0, P33F1	Communication error
	P3374	Cell over discharge
	U0100, U0101, U0110, U0293, U1000	CAN communication
2	P0A1F	Li-ion battery controller
	P0A7E	Battery high temperature
	P0A7F	Maximum to minimum difference of the battery cell voltage
	P0AA7	On-board isolation resistance monitoring system
	P0ABF	Battery current sensor
	P0C6E	Battery temperature sensor
	P3030, P3030 – P3048	Communication function in Li-ion battery controller
	P30F1	Regeneration control
	P30F2	Discharge control
	P30F4, P30F6	Total voltage sensor
	P30FC	Over current
	P30FD	Total voltage monitor switch
	P3300	Total voltage over
	P3373	Total voltage over discharge
3	P3062	Bypass switch
	P3049 – P3060	Li-ion battery controller A/D circuit
	P308B – P30A2	Cell voltage
	P30F3	Communication function in Li-ion battery controller
	P3301	Cell over voltage

DTC Index

INFOID:0000000008140914

DTC[*1] CONSULT[*2]	Items (CONSULT screen terms)	Trip	MIL[*3]	Permanent DTC group[*4]	Hybrid system warning lamp	Reference
P0A09	DC/DC CONVERTER	1	—	—	—	HBB-55
P0A10	DC/DC CONVERTER	1	—	—	—	HBB-57
P0A1F	BATTERY ENERGY CONTROL MODULE	1	ON	B	ON	HBB-59
P0A7E	HYBRID BAT PACK OVER TEMP	1	ON	B	ON	HBB-61
P0A7F	CELL CONTROLLER	2	ON	B	ON	HBB-62
P0A84	HYBRID BAT PACK COOLING FAN 1	1	—	—	—	HBB-64

DTC[*1] CONSULT[*2]	Items (CONSULT screen terms)	Trip	MIL[*3]	Permanent DTC group[*4]	Hybrid system warning lamp	Reference
P0A85	HYBRID BAT PACK COOLING FAN 1	1	—	—	—	HBB-69
P0A9D	HYBRID BAT TEMP SENSOR A	1	ON	B	ON	HBB-70
P0A9E	HYBRID BAT TEMP SENSOR A	1	ON	B	ON	HBB-72
P0AA7	HYBRID BAT VOLTAGE ISOLATION SEN	1	—	—	—	HBB-74
P0AA9	HYBRID BAT VOLTAGE ISOLATION SEN	1	—	—	—	HBB-75
P0AAA	HYBRID BAT VOLTAGE ISOLATION SEN	1	—	—	—	HBB-76
P0AAE	HYBRID BAT PACK AIR TEMP SEN A	1	—	—	ON	HBB-77
P0AAF	HYBRID BAT PACK AIR TEMP SEN A	1	—	—	ON	HBB-79
P0ABF	HYBRID BAT PACK CURRENT SEN	2	ON	B	ON	HBB-81
P0AC0	HYBRID BAT PACK CURRENT SEN	1	ON	B	ON	HBB-83
P0AC1	HYBRID BAT PACK CURRENT SEN	1	ON	B	ON	HBB-85
P0AC2	HYBRID BAT PACK CURRENT SEN	1	ON	B	ON	HBB-87
P0AC7	HYBRID BAT TEMP SENSOR B	1	ON	B	ON	HBB-89
P0AC8	HYBRID BAT TEMP SENSOR B	1	ON	B	ON	HBB-91
P0C6E	HYBRID BAT TEMP SENSOR A/B	2	ON	B	ON	HBB-93
P3030	CELL CONT LIN	1	ON	B	ON	HBB-95
P3031	CELL CONT ASIC1	1	ON	B	ON	HBB-99
P3032	CELL CONT ASIC2	1	ON	B	ON	HBB-99
P3033	CELL CONT ASIC3	1	ON	B	ON	HBB-99
P3034	CELL CONT ASIC4	1	ON	B	ON	HBB-99
P3035	CELL CONT ASIC5	1	ON	B	ON	HBB-99
P3036	CELL CONT ASIC6	1	ON	B	ON	HBB-99
P3037	CELL CONT ASIC7	1	ON	B	ON	HBB-99
P3038	CELL CONT ASIC8	1	ON	B	ON	HBB-99
P3039	CELL CONT ASIC9	1	ON	B	ON	HBB-99
P303A	CELL CONT ASIC10	1	ON	B	ON	HBB-99
P303B	CELL CONT ASIC11	1	ON	B	ON	HBB-99
P303C	CELL CONT ASIC12	1	ON	B	ON	HBB-99
P303D	CELL CONT ASIC13	1	ON	B	ON	HBB-100
P303E	CELL CONT ASIC14	1	ON	B	ON	HBB-100
P303F	CELL CONT ASIC15	1	ON	B	ON	HBB-100
P3040	CELL CONT ASIC16	1	ON	B	ON	HBB-100
P3041	CELL CONT ASIC17	1	ON	B	ON	HBB-100
P3042	CELL CONT ASIC18	1	ON	B	ON	HBB-100
P3043	CELL CONT ASIC19	1	ON	B	ON	HBB-100
P3044	CELL CONT ASIC20	1	ON	B	ON	HBB-100
P3045	CELL CONT ASIC21	1	ON	B	ON	HBB-100
P3046	CELL CONT ASIC22	1	ON	B	ON	HBB-100
P3047	CELL CONT ASIC23	1	ON	B	ON	HBB-100
P3048	CELL CONT ASIC24	1	ON	B	ON	HBB-100
P3049	CELL CONT ASIC1 VOLT	1	ON	B	ON	HBB-101
P304A	CELL CONT ASIC2 VOLT	1	ON	B	ON	HBB-101
P304B	CELL CONT ASIC3 VOLT	1	ON	B	ON	HBB-101

DTC[*1] CONSULT[*2]	Items (CONSULT screen terms)	Trip	MIL[*3]	Permanent DTC group[*4]	Hybrid system warning lamp	Reference
P304C	CELL CONT ASIC4 VOLT	1	ON	B	ON	HBB-101
P304D	CELL CONT ASIC5 VOLT	1	ON	B	ON	HBB-101
P304E	CELL CONT ASIC6 VOLT	1	ON	B	ON	HBB-101
P304F	CELL CONT ASIC7 VOLT	1	ON	B	ON	HBB-101
P3050	CELL CONT ASIC8 VOLT	1	ON	B	ON	HBB-101
P3051	CELL CONT ASIC9 VOLT	1	ON	B	ON	HBB-101
P3052	CELL CONT ASIC10 VOLT	1	ON	B	ON	HBB-101
P3053	CELL CONT ASIC11 VOLT	1	ON	B	ON	HBB-101
P3054	CELL CONT ASIC12 VOLT	1	ON	B	ON	HBB-101
P3055	CELL CONT ASIC13 VOLT	1	ON	B	ON	HBB-105
P3056	CELL CONT ASIC14 VOLT	1	ON	B	ON	HBB-105
P3057	CELL CONT ASIC15 VOLT	1	ON	B	ON	HBB-105
P3058	CELL CONT ASIC16 VOLT	1	ON	B	ON	HBB-105
P3059	CELL CONT ASIC17 VOLT	1	ON	B	ON	HBB-105
P305A	CELL CONT ASIC18 VOLT	1	ON	B	ON	HBB-105
P305B	CELL CONT ASIC19 VOLT	1	ON	B	ON	HBB-105
P305C	CELL CONT ASIC20 VOLT	1	ON	B	ON	HBB-105
P305D	CELL CONT ASIC21 VOLT	1	ON	B	ON	HBB-105
P305E	CELL CONT ASIC22 VOLT	1	ON	B	ON	HBB-105
P305F	CELL CONT ASIC23 VOLT	1	ON	B	ON	HBB-105
P3060	CELL CONT ASIC24 VOLT	1	ON	B	ON	HBB-105
P3061	CELL BATTERY VOLT	1	ON	B	ON	HBB-109
P3062	BYPASS SW	1	—	—	ON	HBB-110
P308B	CELL CONT ASIC1 OPEN	1	ON	B	ON	HBB-111
P308C	CELL CONT ASIC2 OPEN	1	ON	B	ON	HBB-111
P308D	CELL CONT ASIC3 OPEN	1	ON	B	ON	HBB-111
P308E	CELL CONT ASIC4 OPEN	1	ON	B	ON	HBB-111
P308F	CELL CONT ASIC5 OPEN	1	ON	B	ON	HBB-111
P3090	CELL CONT ASIC6 OPEN	1	ON	B	ON	HBB-111
P3091	CELL CONT ASIC7 OPEN	1	ON	B	ON	HBB-111
P3092	CELL CONT ASIC8 OPEN	1	ON	B	ON	HBB-111
P3093	CELL CONT ASIC9 OPEN	1	ON	B	ON	HBB-111
P3094	CELL CONT ASIC10 OPEN	1	ON	B	ON	HBB-111
P3095	CELL CONT ASIC11 OPEN	1	ON	B	ON	HBB-111
P3096	CELL CONT ASIC12 OPEN	1	ON	B	ON	HBB-111
P3097	CELL CONT ASIC13 OPEN	1	ON	B	ON	HBB-114
P3098	CELL CONT ASIC14 OPEN	1	ON	B	ON	HBB-114
P3099	CELL CONT ASIC15 OPEN	1	ON	B	ON	HBB-114
P309A	CELL CONT ASIC16 OPEN	1	ON	B	ON	HBB-114
P309B	CELL CONT ASIC17 OPEN	1	ON	B	ON	HBB-114
P309C	CELL CONT ASIC18 OPEN	1	ON	B	ON	HBB-114
P309D	CELL CONT ASIC19 OPEN	1	ON	B	ON	HBB-114
P309E	CELL CONT ASIC20 OPEN	1	ON	B	ON	HBB-114

DTC[*1] CONSULT[*2]	Items (CONSULT screen terms)	Trip	MIL[*3]	Permanent DTC group[*4]	Hybrid system warning lamp	Reference
P309F	CELL CONT ASIC21 OPEN	1	ON	B	ON	HBB-114
P30A0	CELL CONT ASIC22 OPEN	1	ON	B	ON	HBB-114
P30A1	CELL CONT ASIC23 OPEN	1	ON	B	ON	HBB-114
P30A2	CELL CONT ASIC24 OPEN	1	ON	B	ON	HBB-114
P30D0	SOC RATIONALITY	2	ON	B	—	HBB-117
P30EF	INTERNAL RESISTANCE	2	ON	B	ON	HBB-118
P30F1	REGENERATION CONTROL	1	—	—	ON	HBB-122
P30F2	DISCHARGE CONTROL	1	—	—	ON	HBB-123
P30F3	TOTAL VOLT SENSOR	1	ON	B	ON	HBB-124
P30F4	TOTAL VOLT SENSOR	1	ON	B	ON	HBB-125
P30F5	TOTAL VOLT SENSOR	2	ON	B	ON	HBB-126
P30F6	TOTAL VOLT SENSOR	1	ON	B	ON	HBB-127
P30FC	OVER CURRENT	1	ON	B	ON	HBB-129
P30FD	TOTAL VOLTAGE MONITOR SWITCH	1	—	—	ON	HBB-130
P30FE	12V BATTERY VOLTAGE	1	—	—	ON	HBB-131
P31A5	CAN ERROR HPCM	1	ON	B	ON	HBB-134
P31A7	CAN ERROR INV/MC	1	ON	B	ON	HBB-135
P3300	TOTAL VOLTAGE OVER	1	ON	B	ON	HBB-136
P3301	CELL VOLTAGE OVER	1	ON	B	ON	HBB-138
P3373	TOTAL VOLTAGE OVER DISCHARGE	1	ON	B	ON	HBB-152
P3374	CELL VOLTAGE OVER DISCHARGE	1	ON	B	ON	HBB-154
P33E0	DLC DIAGNOSIS HPCM	1	—	—	ON	HBB-168
P33E1	DLC DIAGNOSIS ECM	1	—	—	ON	HBB-169
P33E2	DLC DIAGNOSIS TCM	1	—	—	ON	HBB-170
P33F0	DLC DIAGNOSIS TCM	1	—	—	ON	HBB-171
P33F1	DLC DIAGNOSIS TCM	1	—	—	ON	HBB-172
U0100	LOST COMM ECM	1	ON	B	ON	HBB-173
U0101	LOST COMM TCM	1	—	—	ON	HBB-175
U0110	LOST COMM INV/MC	1	ON	B	ON	HBB-177
U0293	LOST COMM HPCM	1	ON	B	ON	HBB-179
U1000	CAN COMM CIRCUIT	1	—	—	ON	HBB-181

*1: 1st trip DTC No. is the same as DTC No.
*2: These numbers are prescribed by SAE J2012/ISO 15031-6.
*3: Refer to EC-52, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)".
*4: Refer to HBB-54, "Description".

Index of HPCM-detected DTC

INFOID:0000000008140915

When a DTC in the following table is detected by Li-ion battery controller (LBC), HPCM also detects a DTC.

DTC	DTC of HPCM
P0A1F, P0A7F, P0ABF, P0AC0, P0AC1, P0AC2, P0C6E, P3030, P3031, P3032, P3033, P3034, P3035, P3036, P3037, P3038, P3039, P303A, P303B, P303C, P303D, P303E, P303F, P3040, P3041, P3042, P3043, P3044, P3045, P3046, P3047, P3048, P3049, P304A, P304B, P304C, P304D, P.304E, P304F, P3050, P3051, P3052, P3053, P3054, P3055, P3056, P3057, P3058, P3059, P305A, P305B, P305C, P305D, P305E, P305F, P3060, P308B, P308C, P308D, P308E, P308F, P3090, P3091, P3092, P3093, P3094, P3095, P3096, P3097, P3098, P3099, P309A, P309B, P309C, P309D, P309E, P309F, P30A0, P30A1, P30A2, P30F3, P30F4, P30F5, P30F6, P31A5, P31A7, U0110	P317F
P0AF, P0A82, P0A84, P0A85, P0A9D, P0A9E, P0AAE, P0AAF, P0AC7, P0AC8, P3061, P3062, P30EF, P30FD, P33E0, P33E1, P33E2, P33F0, P33F1, U0100, U0101	P3180
P0A7E, P3030, P3031, P3032, P3033, P3034, P3035, P3036, P3037, P3038, P3039, P303A, P303B, P303C, P303D, P303E, P303F, P3040, P3041, P3042, P3043, P3044, P3045, P3046, P3047, P3048, P3049, P304A, P304B, P304C, P304D, P.304E, P304F, P3050, P3051, P3052, P3053, P3054, P3055, P3056, P3057, P3058, P3059, P305A, P305B, P305C, P305D, P305E, P305F, P3060, P308B, P308C, P308D, P308E, P308F, P3090, P3091, P3092, P3093, P3094, P3095, P3096, P3097, P3098, P3099, P309A, P309B, P309C, P309D, P309E, P309F, P30A0, P30A1, P30A2, P30F1, P30F2, P30FC, P30FE, P31A5, P3300, P3301, P3373, P3374	P3181
P0A1F, P0A7E, P30FE, P3300, P3301, P3373, P3374	P3182

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000008140916

1.OBTAIN INFORMATION ABOUT SYMPTOM

Refer to HBB-45, "Diagnostic Work 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 AND FFD

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 “HV BAT” DTC. (Refer to “How to Erase DTC and 1st Trip DTC” in HBB-32, "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.

3. Check the relevant information including STI, etc.

Do malfunction information and DTC exist?

YES >> GO TO 4.
NO >> GO TO 3.

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.
Check if the behavior results from fail-safe operation. (Refer to HBB-38, "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.

YES >> GO TO 5.
NO >> Check GI-49, "Intermittent Incident".

4.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 HBB-38, "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.

YES >> GO TO 5.
NO >> Check GI-49, "Intermittent Incident".

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

Perform the inspection of the corresponding system according to “Diagnosis Procedure”.
NOTE:
The hybrid battery system “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-52, "Circuit Inspection" for details.

>> GO TO 6.

6.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 HBB-32, "CONSULT Function".)

>> GO TO 7.

7. 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.

>> 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 HBB-32, "CONSULT Function".)

Diagnostic Work Sheet

INFOID:0000000008140917

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 ( )				

Question sheet		
	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 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		

SAVE BATTERY INFORMATION DATA

Description

INFOID:0000000008140918

This function enables the saving of data stored in Li-ion battery controller (LBC) into CONSULT.

Work Procedure

INFOID:0000000008140919

1.PERFORM SAVE BATTERY INFORMATION DATA

With CONSULT
1. Turn ignition switch ON.
2. Select “WORK SUPPORT” mode of “HV BAT”.
3. Select “SAVE BATTERY INFORMATION DATA”.
4. Save the LBC internal information.

>> END

WRITE BATTERY INFORMATION DATA

Description

INFOID:0000000008140920

This function enables the writing of Li-ion battery (LBC) data saved in CONSULT into a new LBC.

Work Procedure

INFOID:0000000008140921

1.PERFORM WRITE BATTERY INFORMATION DATA

With CONSULT
1. Turn ignition switch ON.
2. Select “WORK SUPPORT” mode of “HV BAT”.
3. Select “WRITE BATTERY INFORMATION DATA”.
4. Write LBC data saved in CONSULT into a new LBC.

>> END

CLEAR BATTERY INFORMATION

Description

INFOID:0000000008140922

This function enables the erasing of the data stored in Li-ion battery controller (LBC).

Work Procedure

INFOID:0000000008140923

1.PERFORM CLEAR BATTERY INFORMATION

With CONSULT
1. Turn ignition switch ON.
2. Select “WORK SUPPORT” mode of “HV BAT”.
3. Select “CLEAR BATTERY INFORMATION”.
4. Clear the LBC internal information.

>> END

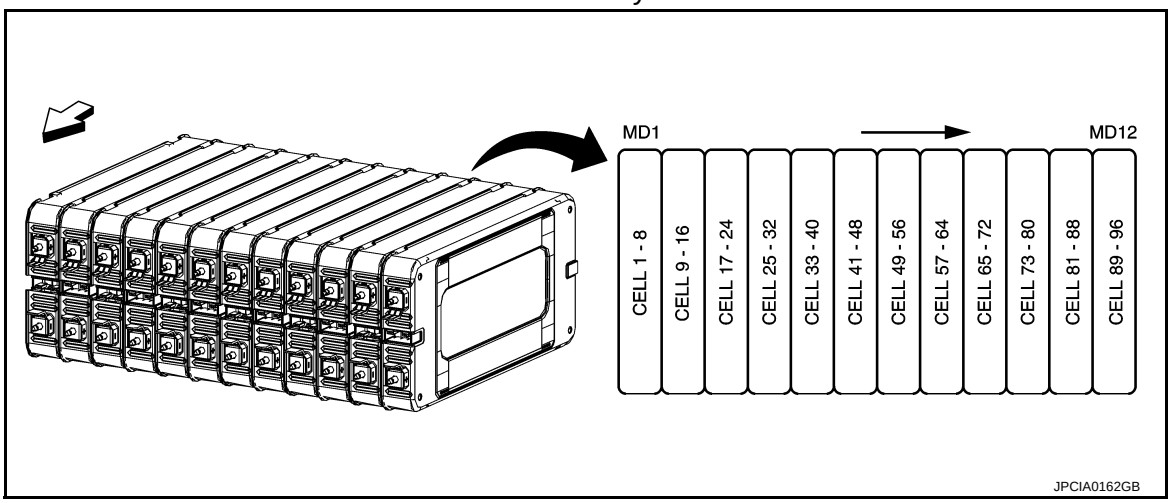
MODULE CHARGE BALANCE

Description

INFOID:0000000008140924

- If a malfunction, such as abnormal voltage, occurs in a Li-ion battery cell, replace the module including a malfunctioning cell.

Module layout



⇦ : Vehicle front MD: Module

- To replace module, select the minimum module voltage among normal modules as an adjustment voltage and adjust all 12 modules to the adjustment voltage.

MODULE REPLACEMENT CONDITIONS

Only one module can be replaced with a new one. If any of the following conditions apply, replace all of the 12 modules with new ones.

- More than 17 months from the date of manufacture of Li-ion battery
- More than one module needs to be replaced with new ones
- There is a single module replacement history.

  NOTE:
  Single module replacement is possible if the same module needs to be replaced for the second and subsequent times.

NOTE:
For the date of manufacture of Li-ion battery, check its module serial number label. For the position of module serial number label, refer to HBB-208, "MODULE STACK : Inspection".

Work Procedure

INFOID:0000000008140925

SINGLE MODULE REPLACEMENT PROCEDURE

CAUTION:

Even when replacing only one module, voltage adjustment must be performed for all of the other 11 modules.

1.CHECK ADJUSTMENT VOLTAGE VALUE

1. Measure voltage of all modules (12), using a circuit tester.
2. Use the minimum module voltage for the voltage adjustment value.

   CAUTION:

   - **If the measured minimum module voltage is less than 28.0 V, use 28.0 V for the adjustment voltage.**
   - **Adjustment voltage must be in 100 mV. (Drop all digits less than 100.)**
     Example: 28.825 V (MINIMUM MODULE VOLTAGE) = 28.800 V (Adjustment voltage value)

Adjustment voltage value	**: MINIMUM MODULE VOLTAGE (If MINIMUM VOLTAGE VALUE is less than 28.0 V, use 28.0 V.)**

>> GO TO 2.

2.CHECK MODULE VOLTAGE

CAUTION:
- **This operation must be performed in an ambient temperature of 0 to 40°C.**
- **For details on the module charge balancer operation, refer to the adjuster operation manual.**

1. Set the new module to the module charge balancer.
2. Measure module voltage and compare it with “adjustment voltage value” confirmed in STEP1.

Module voltage is lower than adjustment voltage value>>GO TO 4.
Module voltage is higher than adjustment voltage value>>GO TO 3.

3.DISCHARGE OF MODULE VOLTAGE

CAUTION:
- **This operation must be performed in an ambient temperature of 0 to 40°C.**
- **For details on the module charge balancer operation, refer to the adjuster operation manual.**

Discharge the module to 26.0 V using module charge balancer.

Discharge voltage : 26.0 V

>> GO TO 4.

4.MODULE VOLTAGE ADJUSTMENT

CAUTION:
- **This operation must be performed in an ambient temperature of 0 to 40°C.**
- **For details on the module charge balancer operation, refer to the adjuster operation manual.**

1. Enter the “adjustment voltage value” in the module charge balancer.

Adjustment voltage value : MINIMUM MODULE VOLTAGE (If MINIMUM VOLTAGE VALUE is less than 28.0 V, use 28.0 V.)

2. Start the voltage adjustment.

>> After module voltage adjustment, GO TO 5.

5.CHECK CELL VOLTAGE

With CONSULT
1. After adjusting the voltage, install the module to the vehicle.
2. Select “DATA MONITOR” mode.
3. Check the difference between "MAXIMUM CELL VOLTAGE" and "MINIMUM CELL VOLTAGE" to see that the difference is within the specified value.

Standard : 100 mV or less

CAUTION:
If the difference between the maximum cell voltage and the minimum cell voltage is more than 100 mV, DTC is detected. Be sure to check that the difference is 100 mV or less.

>> END

12-MODULE REPLACEMENT PROCEDURE

1.INSPECTION BEFORE REPLACEMENT

Check the date of production of all the new modules to see that they are 1-month-old or less.

CAUTION:
Never use modules older than one year.

NOTE:
The manufacturing date is stamped on the side of module.

YY. MM. DD Y = Year
M = Month
D = Date

Example: 10. 11. 02 = November 2, 2010

Is the production date within 1 month?

YES >> Voltage adjustment is not necessary. Assemble and install module to vehicle. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".
NO >> GO TO 2.

2. CHECK CELL VOLTAGE DIFFERENCE AMONG MODULES

1. Measure cell voltage of each module, using a module charge balancer.
   NOTE:
   Record measured cell voltage.
2. Identify the difference between the maximum voltage and the minimum voltage in the same module, according to the measured cell voltage of each module.

Standard : 100 mV or less

CAUTION:
Never use module of which cell voltage in the same module is more than 100 mV.

Is the voltage difference 100 mV or less?

YES >> GO TO 3.
NO >> After replacing applicable module, GO TO 3.

3. CHECK CELL VOLTAGE DIFFERENCE AMONG MODULES

Check all the cell voltages (96 cells) measured at Step 2 to see the voltage difference between the maximum and the minimum.

Standard : 100 mV or less

Is the voltage difference 100 mV or less?

YES >> Voltage adjustment is not necessary. Assemble and install module to vehicle. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".
NO >> GO TO 4.

4. CHECK ADJUSTMENT VOLTAGE VALUE

1. Check all the cell voltages measured at Step 2 to identify the module of which voltage is minimum.
   NOTE:
   CELL VOLTAGE × 8 = MODULE VOLTAGE
2. Use the minimum module voltage for the adjustment voltage value of module voltage.
   CAUTION:
   - **If the measured minimum module voltage is less than 28.0 V, use 28.0 V for the adjustment voltage.**
   - **Adjustment voltage must be in 100 mV. (Drop all digits less than 100.)**
     Example: 28.825 V (MINIMUM MODULE VOLTAGE) = 28.800 V (Adjustment voltage value)

Adjustment voltage value : MINIMUM MODULE VOLTAGE (If MINIMUM VOLTAGE VALUE is less than 28.0 V, use 28.0 V.)

>> GO TO 5.

5. CHECK MODULE VOLTAGE

CAUTION:
- **This operation must be performed in an ambient temperature of 0 to 40°C.**
- **For details on the module charge balancer operation, refer to the adjuster operation manual.**

1. Set the new module to the module charge balancer.
2. Measure module voltage and compare it with “adjustment voltage value” confirmed in STEP1.

Module voltage is lower than adjustment voltage value>>GO TO 7.
Module voltage is higher than adjustment voltage value>>GO TO 6.

6. DISCHARGE OF MODULE VOLTAGE

CAUTION:
- **This operation must be performed in an ambient temperature of 0 to 40°C.**
- **For details on the module charge balancer operation, refer to the adjuster operation manual.**

Discharge the module to 26.0 V using module charge balancer.

Discharge voltage : 26.0 V

>> GO TO 7.

7. MODULE VOLTAGE ADJUSTMENT

CAUTION:
- **This operation must be performed in an ambient temperature of 0 to 40°C.**
- **For details on the module charge balancer operation, refer to the adjuster operation manual.**

1. Enter the “adjustment voltage value” in the module charge balancer.

Adjustment voltage value : MINIMUM MODULE VOLTAGE (If MINIMUM VOLTAGE VALUE is less than 28.0 V, use 28.0 V.)

2. Start the voltage adjustment.

>> After module voltage adjustment, GO TO 8.

8. CHECK CELL VOLTAGE

With CONSULT
1. After adjusting the voltage, install the module to the vehicle.
2. Select “DATA MONITOR” mode.
3. Check the difference between "MAXIMUM CELL VOLTAGE" and "MINIMUM CELL VOLTAGE" to see that the difference is within the specified value.

Standard : 100 mV or less

CAUTION:
If the difference between the maximum cell voltage and the minimum cell voltage is more than 100 mV, DTC is detected. Be sure to check that the difference is 100 mV or less.

>> END

HOW TO ERASE PERMANENT DTC

Description

INFOID:0000000008140926

Permanent DTC can be erased by driving each driving pattern.
ECM recognizes each driving pattern; it transmits signals to each control module when the driving is complete. Each control module erases permanent DTC based on those signals. For details, refer to EC-123, "Description".

DTC/CIRCUIT DIAGNOSIS

P0A09 DC/DC CONVERTER

DTC Logic

INFOID:0000000008140927

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A09	DC/DC CONVERTER	When the frequency of a monitor signal received from DC/DC converter remains less than 100 Hz at least for 2.0 seconds.	• DC/DC CONVERTER • Li-ion battery controller • HPCM • Harness or connector

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0A09 detected?

YES >> Refer to HBB-55, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140928

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1. PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the “P2519” is detected in “Self Diagnostic Result” of “EV/HEV”.

Is P2519 detected?

YES >> Perform hybrid control system diagnosis procedure. Refer to HBC-233, "Diagnosis Procedure".
NO >> GO TO 2.

2. CHECK FUSE

1. Turn ignition switch is OFF.
2. Pull out 10A fuse (No.73) and check that the fuse is not fusing.
   NOTE:
   Refer to PG-43, "Fuse and Fusible Link Arrangement" for fuse layout.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK 12V BATTERY CHARGING OUTPUT CIRCUIT-1

Check connection status Li-ion battery (DC/DC converter) harness connector and Battery terminal with fusible link harness connector.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Recover the connection status.

4.CHECK 12V BATTERY CHARGING OUTPUT CIRCUIT-2

Check continuity between Li-ion battery (DC/DC converter) harness connector and Battery terminal with fusible link harness connector.

Li-ion battery (DC/DC converter)		Battery terminal with fusible link		Continuity
Connector	Terminal	Connector	Terminal	
B304	25	B301	6	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair harness or connector.

5.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 6.

6.CHECK DC/DC CONVERTER HARNESS CIRCUIT

1. Check continuity between Li-ion battery controller harness connector and DC/DC converter harness connector.

Li-ion battery controller		DC/DC converter		Continuity
Connector	Terminal	Connector	Terminal	
LB1	20	—	5	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair harness or connector.

7.CHECK LI-ION BATTERY CONTROLLER

Check continuity between Li-ion battery controller harness connector.

Li-ion battery controller				Continuity
Connector	Terminal	Connector	Terminal	
LB1	20	LB1	17	Existed

Is the inspection result normal?

YES >> Replace DC/DC converter [Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly"] and Li-ion battery controller [Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly"].
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

P0A10 DC/DC CONVERTER

DTC Logic

INFOID:0000000008140929

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A10	DC/DC CONVERTER	When the frequency of a monitor signal received from DC/DC converter remains more than 900 Hz at least for 2.0 seconds.	• DC/DC converter • Li-ion battery controller • The mixing of noise into DC/DC converter fan input signal line.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0A10 detected?

YES >> Refer to HBB-57, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140930

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 2.

2.CHECK DC/DC CONVERTER SIGNAL CIRCUIT

Check continuity between DC/DC converter harness connector and Li-ion battery controller harness connector.

DC/DC converter		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
—	5	LB1	20	Existed

Is the inspection result normal?

YES >> Replace DC/DC converter [Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly"] and Li-ion battery controller [Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly"].

NO >> Repair harness or connector.

P0A1F BATTERY ENERGY CONTROL MODULE

DTC Logic

INFOID:0000000008140931

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A1F	BATTERY ENERGY CONTROL MODULE	When a malfunction is detected in the function of Li-ion battery controller electronic circuit.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0A1F detected?

YES >> Refer to HBB-59, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140932

1.CHECK LI-ION BATTERY CONTROLLER POWER SUPPLY

WITH CONSULT
1. Select “DATA MONITOR” mode of “HV BAT” using CONSULT.
2. Check “AD VALUE OF AVCC VOLTAGE” indication under the following conditions.

Monitor item	Conditions	Voltage (V)
AD VALUE OF AVCC VOLTAGE	Ignition switch: ON	1.9- 2.1

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 3.

3.CHECK CURRENT SENSOR CIRCUIT-1

1. Disconnect battery junction box harness connector.
2. Check continuity between battery junction box Harness connector terminal.

Battery junction box				Resistance (Ω)
Connector	Terminal	Connector	Terminal	
LB34	4	LB34	5	1 k--10 M
	6		5	

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

4. CHECK CURRENT SENSOR CIRCUIT-2

1. Disconnect Li-ion battery controller harness connector.
2. Check continuity between Li-ion battery controller harness connector and battery junction box harness connector.

Li-ion battery controller		Battery junction box		Continuity
Connector	Terminal	Connector	Terminal	
LB1	9	LB34	4	Existed
	10		6	Existed
	17		5	Existed

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Repair harness or connector.

P0A7E HYBRID BATTERY PACK OVER TEMPERATURE

DTC Logic

INFOID:0000000008140933

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A7E	HYBRID BATTERY PACK OVER TEMPERATURE	When the temperature of either battery temperature sensor 1 or 2 remains 70°C (158°F) or higher for 5.0 seconds.	• Battery malfunction • External heating • Overcharge • Overdischarge • Traction motor inverter • HPCM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Select “DATA MONITOR” mode of “HV BAT” using CONSULT.
2. Drive the vehicle, according to driving pattern B.

Driving pattern B : HBB-29, "DIAGNOSIS DESCRIPTION : Driving Pattern"

Is P0A7E detected?

YES >> Refer to HBB-61, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140934

1.PERFORM SELF-DIAGNOSIS OF LI-ION BATTERY CONTROLLER

WITH CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Check if the “P0C6E” is detected in “Self Diagnostic Result”.

Is P0C6E detected?

YES >> Perform diagnosis procedure of “P0C6E”. Refer to HBB-93, "Diagnosis Procedure".
NO >> GO TO 2.

2.PERFORM ALL DTC READING

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result” of “EV/HEV” or “MOTOR CONTROL”.

Is DTC detected?

YES >> Perform diagnosis for each system. Replace Li-ion battery (battery pack) after reparing malfunctioning parts.
NO >> Replace Li-ion battery (battery pack). Refer to HBB-188, "Removal and Installation".

P0A7F HYBRID BATTERY PACK DETERIORATION

DTC Logic

INFOID:0000000008140935

DTC DETECTION LOGIC

NOTE:

- If DTC “P0A7F” is displayed with DTC “P3062”, first perform the trouble diagnosis for DTC “P3062”.
- If DTC “P0A7F” is displayed with DTC “P30FD”, first perform the trouble diagnosis for DTC “P30FD”.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A7F	HYBRID BATTERY PACK DETERIORATION	When turning the ignition switch ON under unloaded condition, the difference between the maximum and minimum values of cell voltage is beyond the tolerance (200 mV) of cell variations.	• Li-ion battery controller (By-pass switch) • Module

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0A7F detected?

YES >> Refer to HBB-62, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140936

1.PERFORM DATA MONITOR

WITH CONSULT

1. Turn ignition switch ON.
   CAUTION:
   Never bring into READY.
2. Check “CELL VOLTAGE 01- 96” of “DATA MONITOR” mode.
3. Identify a cell voltage which is ± 100 mV or more higher than the mean voltage of all the cells.

Is abnormal cell identified?

YES-1 >> When a single cell is abnormal, GO TO 2.
YES-2 >> When multiple cells are abnormal, check the module layout. If two or more modules are abnormal, replace all of the 12 modules. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".

2.CHECK THE HISTORY OF REPLACEMENT-1

Check the latest replacement history of the module or battery pack assembly.

Is there a history of part replacement?

YES-1 >> When there is a history of replacing all of the 12 modules, GO TO 3.
YES-2 >> When there is a history of replacing single module, replace all of the 12 modules. However, when replacing a module replaced in the past, it is possible to replace it as a single module replacement if the Li-ion battery is within 17 months from the manufacturing date.
YES-3 >> When there is a history of battery pack assembly replacement, GO TO 4.
NO >> GO TO 4.

3.CHECK THE HISTORY OF REPLACEMENT-2

Check the module manufacturing date recorded during the replacement of all the 12 modules.

Is it more than 17 months from the date of manufacture?

YES >> Replace all of the 12 modules. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".
NO >> Replace a module including abnormal cell. Refer to HBB-195, "Exploded View".

4.CHECK THE DATE OF MANUFACTURE OF LI-ION BATTERY

Check the battery pack assembly manufacturing date included in the module serial number label. For the label location, refer to HBB-208, "MODULE STACK : Inspection".

Is it more than 17 months from the date of manufacture?

YES >> Replace all of the 12 modules. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".

NO >> Replace a module including abnormal cell. Refer to HBB-195, "Exploded View".

P0A84 HYBRID BAT PACK COOLING FAN 1

DTC Logic

INFOID:0000000008140937

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A84	HYBRID BAT PACK COOLING FAN 1	When fan speed remains less than the target speed for the specified period of time or more.	• Battery cooling fan • Battery cooling fan relay • Li-ion battery controller • Harness or connector (Between Battery cooling fan and Li-ion battery controller)

DTC CONFIRMATION PROCEDURE

1.CHECK BATTERY COOLING FAN FUNCTION

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Record DTC and Freeze frame data.
3. Erase DTC.
4. Perform “HV BATTERY COOLING FAN” with the “ACTIVE TEST” mode and wait at least 30 seconds.
5. Select “Self Diagnostic Result” mode of “HV BAT”.
6. Check DTC.

Is P0A84 detected?

YES >> Refer to HBB-64, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140938

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.CHECK BATTERY COOLING FAN OPERATION

WITH CONSULT
1. Turn ignition switch ON.
2. Perform “HV BATTERY COOLING FAN” with the “ACTIVE TEST” mode.

IS the battery cooling fan activated?

YES >> GO TO 2.
NO >> GO TO 5.

2.CHECK BATTERY COOLING FAN MOTOR INPUT SIGNAL CIRCUIT-1

1. Turn ignition switch OFF.
2. Check continuity between battery cooling fan motor harness connector and Li-ion battery harness connector.

Battery cooling fan motor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
B49	5	B283	1	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair harness or connector.

3.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 4.

4.CHECK BATTERY COOLING FAN MOTOR INPUT SIGNAL CIRCUIT-2

1. Disconnect Li-ion battery controller harness connector.
2. Check continuity between Li-ion battery harness connector and Li-ion battery controller harness connector.

Li-ion battery		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB39	1	LB1	4	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Repair harness or connector.

5.CHECK FUSE

1. Turn ignition switch OFF.
2. Pull out 20A fuse (No.68) and check that the fuse is not fusing.
   NOTE:
   Refer to PG-43, "Fuse and Fusible Link Arrangement" for fuse layout.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace the fuse after repairing the applicable circuit.

6.CHECK BATTERY COOLING FAN POWER SUPPLY CIRCUIT-1

1. Disconnect battery cooling fan harness connector.
2. Turn ignition switch ON.
3. Check voltage between battery cooling fan harness connector and ground.

(+)		(–)	Voltage
Battery cooling fan			
Connector	Terminal	Ground	Battery voltage
B49	6		

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 12.

7. CHECK BATTERY COOLING FAN GROUND CIRCUIT

1. Disconnect Li-ion battery harness connector.
2. Check continuity between Li-ion battery harness connector and battery cooling fan harness connector.

Li-ion battery		Battery cooling fan		Continuity
Connector	Terminal	Connector	Terminal	
LB39	1	B49	5	Existed

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair harness or connector.

8. CHECK LI-ION BATTERY CONTROLLER OUTPUT SIGNAL-1

WITH CONSULT
1. Turn ignition switch ON.
2. Perform “HV BATTERY COOLING FAN” in “ACTIVE TEST” mode.
3. Check voltage between battery cooling fan harness connector and ground.

(+)		(–)	Condition	Voltage
Battery cooling fan				
Connector	Terminal			
B49	4	Ground	ACTIVE TEST: Hi	Approx. 12 V

Is the inspection result normal?

YES >> Replace battery cooling fan. Refer to HBB-186, "Removal and Installation".
NO >> GO TO 9.

9. CHECK LI-ION BATTERY CONTROLLER OUTPUT SIGNAL-2

WITH CONSULT
1. Turn ignition switch ON.
2. Perform “HV BATTERY COOLING FAN” in “ACTIVE TEST” mode.
3. Check voltage between Li-ion battery harness connector and ground.

(+)		(–)	Condition	Voltage
Li-ion battery				
Connector	Terminal			
B283	13	Ground	ACTIVE TEST: Hi	Approx. 12 V

Is the inspection result normal?

YES >> Repair harness or connector.
NO >> GO TO 10.

10. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 11.

11. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect Li-ion battery controller harness connector.
2. Check continuity between Li-ion battery controller harness connector and Li-ion battery harness connector.

Li-ion battery controller		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
LB1	7	B283	13	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Repair harness or connector.

12. CHECK BATTERY COOLING FAN POWER SUPPLY CIRCUIT-2

1. Remove battery cooling fan relay.
2. Check voltage between battery cooling fan relay harness connector and ground.

(+)		(–)	Voltage
Battery cooling fan relay			
Connector	Terminal		
B284	1	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair harness or connector.

13. CHECK BATTERY COOLING FAN RELAY

Check battery cooling fan relay.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace Battery cooling fan relay.

14. CHECK BATTERY COOLING FAN RELAY GROUND CIRCUIT-1

Check continuity between battery cooling fan relay harness connector and Li-ion battery harness connector.

Battery cooling fan relay		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
B284	2	B283	17	Existed

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair harness or connector.

15. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 16.

16. CHECK BATTERY COOLING FAN RELAY GROUND CIRCUIT-2

1. Disconnect Li-ion battery controller harness connector.
2. Check continuity between battery cooling fan relay harness connector and Li-ion battery harness connector.

Li-ion battery controller		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
LB39	17	LB1	19	Existed

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Repair harness or connector.

P0A85 HYBRID BAT PACK COOLING FAN 1

DTC Logic

INFOID:0000000008140939

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A85	HYBRID BAT PACK COOLING FAN 1	When fan speed remains more than the target speed for the specified period of time or more.	• Battery cooling fan • Li-ion battery controller • The mixing of noise into signal line

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT

1. Select “DATA MONITOR” mode of “HV BAT” using CONSULT.
2. Drive the vehicle, according to driving pattern B.

Driving pattern B : HBB-29, "DIAGNOSIS DESCRIPTION : Driving Pattern"

Is P0A85 detected?

YES >> Refer to HBB-69, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140940

When this DTC is detected, replace battery cooling fan [Refer to HBB-186, "Removal and Installation"] and Li-ion battery controller [Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly"].

P0A9D HYBRID BATTERY TEMPERATURE SENSOR A

DTC Logic

INFOID:0000000008140941

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A9D	HYBRID BATTERY TEMPERATURE SENSOR A	When a voltage input value of the battery temperature sensor to the Li-ion battery controller remains extremely low for 2 seconds or more.	• Battery temperature sensor 1 • Li-ion battery controller • Harness short

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0A9D detected?

YES >> Refer to HBB-70, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140942

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 2.

2.CHECK BATTERY TEMPERATURE SENSOR 1

Check battery temperature sensor. Refer to HBB-71, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

Component Inspection

INFOID:0000000008140943

1. CHECK BATTERY TEMPERATURE SENSOR 1

1. Remove battery temperature sensor. Refer to HBB-195, "Exploded View".
2. Check resistance between battery temperature sensor 1 terminals.

Terminals	Condition		Resistance (kΩ)
25 and 29	Temperature	10°C (50°F)	Approx. 7.4
		25°C (77°F)	Approx. 4.0
		40°C (104°F)	Approx. 2.3

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

P0A9E HYBRID BATTERY TEMPERATURE SENSOR A

DTC Logic

INFOID:0000000008140944

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A9E	HYBRID BATTERY TEMPERATURE SENSOR A	When a voltage input value of the battery temperature sensor to the Li-ion battery controller remains extremely high for 2 seconds or more.	• Battery temperature sensor 1 • Harness open • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0A9E detected?

YES >> Refer to HBB-72, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140945

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 2.

2.CHECK CONNECTION STATUS OF LI-ION BATTERY CONTROLLER HARNESS CONNECTOR

Check connection status of Li-ion battery controller harness connector.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair the connection of harness.

3.CHECK BATTERY TEMPERATURE SENSOR 1

Refer to HBB-73, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

Component Inspection

INFOID:0000000008140946

1. CHECK BATTERY TEMPERATURE SENSOR 1

1. Remove battery temperature sensor. Refer to HBB-195, "Exploded View".
2. Check resistance between battery temperature sensor 1 terminals.

Terminals	Condition		Resistance (kΩ)
25 and 29	Temperature	10°C (50°F)	Approx. 7.4
		25°C (77°F)	Approx. 4.0
		40°C (104°F)	Approx. 2.3

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

P0AA7 HYBRID BATTERY VOLTAGE ISOLATION SENSOR

DTC Logic

INFOID:0000000008140947

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AA7	HYBRID BATTERY VOLTAGE ISOLATION SENSOR	When there is no amplitude fluctuation in signal voltage of the insulation resistance loss monitoring system.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT”.

Is P0AA7 detected?

YES >> Refer to HBB-74, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140948

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
1. Perform “All DTC Reading”.
2. Check if the DTC is detected in “Self Diagnostic Result”.

Is DTC detected except for P0AA7?

YES-1 >> When detected simultaneously with DTC of “MOTOR CONTROL”, perform the diagnosis procedure of the traction motor system. Refer to TMS-31, "DTC Index".
YES-2 >> When detected simultaneously with “P0AA9”, replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
YES-3 >> When detected simultaneously with “P0AA6”, GO TO 2.
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
1. Erase DTC of “EV/HEV” and “HV BAT”.
2. Turn ignition switch OFF.
3. Turn ignition switch ON and wait at least 1 minutes.
4. Perform “All DTC Reading”.
5. Check DTC.

Is P0AA9 detected simultaneously with P0AA7?

YES >> When detected simultaneously with “P0AA9”, replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Perform the diagnosis procedure of “P0AA6”. Refer to HBB-75, "Diagnosis Procedure".

P0AA9 HYBRID BAT VOLTAGE ISOLATION SEN

DTC Logic

INFOID:0000000008140949

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AA9	HYBRID BAT VOLTAGE ISOLATION SEN	When the signal voltage of the insulation resistance loss monitoring system is too low.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0AA9 detected?

YES >> Refer to HBB-75, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140950

When this DTC is detected, replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

P0AAA HYBRID BAT VOLTAGE ISOLATION SEN

DTC Logic

INFOID:0000000008140951

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AAA	HYBRID BAT VOLTAGE ISOLATION SEN	When the signal voltage of the insulation resistance loss monitoring system is too high.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0AAA detected?

YES >> Refer to HBB-76, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140952

When this DTC is detected, replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

P0AAE HYBRID BATTERY PACK AIR TEMPERATURE SENSOR A

DTC Logic

INFOID:0000000008140953

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AAE	HYBRID BATTERY PACK AIR TEMPERATURE SENSOR A	When the voltage input value of the intake air temperature sensor to the Li-ion battery controller remains extremely low for 2 seconds or more.	• Battery temperature sensor 3 (Intake) • Harness short • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0AAE detected?

YES >> Refer to HBB-77, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140954

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 2.

2.CHECK BATTERY TEMPERATURE SENSOR 3 (INTAKE)

Refer to HBB-78, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

Component Inspection

INFOID:0000000008140955

1. CHECK BATTERY TEMPERATURE SENSOR 3 (INTAKE)

1. Remove battery temperature sensor. Refer to HBB-195, "Exploded View".
2. Check resistance between battery temperature sensor 3 (Intake) terminals.

Terminals	Condition		Resistance (kΩ)
27 and 31	Temperature	10°C (50°F)	Approx. 7.4
		25°C (77°F)	Approx. 4.0
		40°C (104°F)	Approx. 2.3

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

P0AAF HYBRID BATTERY PACK AIR TEMPERATURE SENSOR A

DTC Logic

INFOID:0000000008140956

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AAF	HYBRID BATTERY PACK AIR TEMPERATURE SENSOR A	When the voltage input value of the intake air temperature sensor to the Li-ion battery controller remains extremely high for 2 seconds or more.	• Battery temperature sensor 3 (Intake) • Harness open • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0AAF detected?

YES >> Refer to HBB-79, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140957

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 2.

2.CHECK CONNECTION STATUS OF LI-ION BATTERY CONTROLLER HARNESS CONNECTOR

Check connection status of Li-ion battery controller harness connector.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair the connection of harness.

3.CHECK BATTERY TEMPERATURE SENSOR 3 (INTAKE)

Refer to HBB-73, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

Component Inspection

INFOID:0000000008140958

1. CHECK BATTERY TEMPERATURE SENSOR 3 (INTAKE)

1. Remove battery temperature sensor. Refer to HBB-195, "Exploded View".
2. Check resistance between battery temperature sensor 3 (Intake) terminals.

Terminals	Condition		Resistance (kΩ)
27 and 31	Temperature	10°C (50°F)	Approx. 7.4
		25°C (77°F)	Approx. 4.0
		40°C (104°F)	Approx. 2.3

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

P0ABF HYBRID BATTERY PACK CURRENT SENSOR

DTC Logic

INFOID:0000000008140959

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0ABF	HYBRID BATTERY PACK CURRENT SENSOR	When there is difference between a battery input/output current detected by the Li-ion battery controller and a consumption/regenerative current detected by the drive motor inverter.	• Current sensor • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0ABF detected?

YES >> Refer to HBB-81, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140960

Perform self-diagnosis of the motor control system and the hybrid control system. Perform inspection, according to the diagnosis procedure for applicable DTC.

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the DTC is detected in “Self Diagnostic Result” of “EV/HEV” or “MOTOR CONTROL”.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable system.
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 3.

3.CHECK CURRENT SENSOR HARNESS

1. Disconnect battery junction box harness connector.
2. Disconnect Li-ion battery controller harness connector.
3. Check continuity between battery junction box (current sensor) harness connector and Li-ion battery controller harness connector.

Battery junction box (current sensor)		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB34	4	LB1	9	Existed
	5		17	
	6		10	

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK CURRENT SENSOR

Refer to HBB-82, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace battery junction box (current sensor). Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

5. CHECK RESISTANCE OF LI-ION BATTERY CONTROLLER

Check resistance between Li-ion battery controller terminals.

Li-ion battery controller				Resistance
Connector	Terminal	Connector	Terminal	
LB1	10	LB1	17	Approx. 4.7 kΩ

Is the inspection result normal?

YES >> Replace Li-ion battery controller [Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly"] and battery junction box [Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly"].
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

Component Inspection

INFOID:0000000008140961

1. CHECK CURRENT SENSOR

Check resistance between battery junction box (current sensor) terminals.

Battery junction box (current sensor)				Resistance
Connector	Terminal	Connector	Terminal	
LB34	4	LB34	5	1.0 kΩ- 10 MΩ
	6		5	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

P0AC0 HYBRID BATTERY PACK CURRENT SENSOR

DTC Logic

INFOID:0000000008140962

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AC0	HYBRID BATTERY PACK CURRENT SENSOR	When a current sensor offset voltage learned at IGN ON is outside the range of 2.9 V- 3.1 V.	• Li-ion battery controller • Current sensor • Between Li-ion battery controller and current sensor harness • System main relay stuck at ON

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0AC0 detected?

YES >> Refer to HBB-83, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140963

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the “P0AA0”or “P0AA1” is detected in “Self Diagnostic Result” of “EV/HEV”.

Is DTC detected?

YES >> Perform diagnosis procedure of hybrid control system. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 3.

3.CHECK CURRENT SENSOR HARNESS

1. Disconnect battery junction box harness connector.
2. Disconnect Li-ion battery controller harness connector.
3. Check continuity between battery junction box (current sensor) harness connector and Li-ion battery controller harness connector.

Battery junction box (current sensor)		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB34	4	LB1	9	Existed
	5		17	
	6		10	

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair harness or connector.

4.CHECK CURRENT SENSOR

Refer to HBB-86, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace battery junction box (current sensor). Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

5.CHECK RESISTANCE OF LI-ION BATTERY CONTROLLER

Check resistance between Li-ion battery controller terminals.

Li-ion battery controller				Resistance
Connector	Terminal	Connector	Terminal	
LB1	10	LB1	17	Approx. 4.7 kΩ

Is the inspection result normal?

YES >> Replace Li-ion battery controller [Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly"] and battery junction box [Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly"].
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

Component Inspection

INFOID:0000000008140964

1.CHECK CURRENT SENSOR

Check resistance between battery junction box (current sensor) terminals.

Battery junction box (current sensor)				Resistance
Connector	Terminal	Connector	Terminal	
LB34	4	LB34	5	1.0 kΩ- 10 MΩ
	6		5	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

P0AC1 HYBRID BAT PACK CURRENT SEN

DTC Logic

INFOID:0000000008140965

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AC1	HYBRID BAT PACK CURRENT SEN	When a current sensor input voltage to the Li-ion battery controller remains extremely low for 2 seconds or more.	• Li-ion battery controller • Current sensor • Between Li-ion battery controller and current sensor harness

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0AC1 detected?

YES >> Refer to HBB-85, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140966

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the “P0AA0” or “P0AA1” are detected in “Self Diagnostic Result” of “EV/HEV”.

Is DTC detected?

YES >> Perform diagnosis procedure of hybrid control system. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 3.

3.CHECK CURRENT SENSOR HARNESS

1. Disconnect battery junction box harness connector.
2. Disconnect Li-ion battery controller harness connector.
3. Check continuity between battery junction box (current sensor) harness connector and Li-ion battery controller harness connector.

Battery junction box (current sensor)		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB34	4	LB1	9	Existed
	5		17	
	6		10	

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair harness or connector.

4.CHECK CURRENT SENSOR

Refer to HBB-86, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace battery junction box (current sensor). Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

5.CHECK RESISTANCE OF LI-ION BATTERY CONTROLLER

Check resistance between Li-ion battery controller terminals.

Li-ion battery controller				Resistance
Connector	Terminal	Connector	Terminal	
LB1	10	LB1	17	Approx. 4.7 kΩ

Is the inspection result normal?

YES >> Replace Li-ion battery controller [Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly"] and battery junction box [Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly"].
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

Component Inspection

INFOID:0000000008140967

1.CHECK CURRENT SENSOR

Check resistance between battery junction box (current sensor) terminals.

Battery junction box (current sensor)				Resistance
Connector	Terminal	Connector	Terminal	
LB34	4	LB34	5	1.0 kΩ- 10 MΩ
	6		5	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

P0AC2 HYBRID BAT PACK CURRENT SEN

DTC Logic

INFOID:0000000008140968

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AC2	HYBRID BAT PACK CURRENT SEN	When a current sensor input voltage to the Li-ion battery controller remains extremely high for 2 seconds or more.	• Li-ion battery controller • Current sensor • Between Li-ion battery controller and current sensor harness

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0AC2 detected?

YES >> Refer to HBB-87, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140969

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the “P0AA0”or “P0AA1”are detected in “Self Diagnostic Result” of “EV/HEV”.

Is DTC detected?

YES >> Perform diagnosis procedure of hybrid control system. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 3.

3.CHECK CURRENT SENSOR HARNESS

1. Disconnect battery junction box harness connector.
2. Disconnect Li-ion battery controller harness connector.
3. Check continuity between battery junction box (current sensor) harness connector and Li-ion battery controller harness connector.

Battery junction box (current sensor)		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB34	4	LB1	9	Existed
	5		17	
	6		10	

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair harness or connector.

4.CHECK CURRENT SENSOR

Refer to HBB-88, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace battery junction box (current sensor). Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

5.CHECK RESISTANCE OF LI-ION BATTERY CONTROLLER

Check resistance between Li-ion battery controller terminals.

Li-ion battery controller				Resistance
Connector	Terminal	Connector	Terminal	
LB1	10	LB1	17	Approx. 4.7 kΩ

Is the inspection result normal?

YES >> Replace Li-ion battery controller [Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly"] and battery junction box [Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly"].
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

Component Inspection

INFOID:0000000008140970

1.CHECK CURRENT SENSOR

Check resistance between battery junction box (current sensor) terminals.

Battery junction box (current sensor)				Resistance
Connector	Terminal	Connector	Terminal	
LB34	4	LB34	5	1.0 kΩ- 10 MΩ
	6		5	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

P0AC7 HYBRID BATTERY TEMPERATURE SENSOR B

DTC Logic

INFOID:0000000008140971

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AC7	HYBRID BATTERY TEMPERATUR SENSOR B	When the voltage input value of the battery temperature sensor to the Li-ion battery controller remains extremely low for 2 seconds or more.	• Li-ion battery controller • Battery temperature sensor 2 • Between Li-ion battery controller and battery temperature sensor harness

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0AC7 detected?

YES >> Refer to HBB-89, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140972

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 2.

2.CHECK BATTERY TEMPERATURE SENSOR 2

Refer to HBB-90, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

Component Inspection

INFOID:0000000008140973

1. CHECK BATTERY TEMPERATURE SENSOR 2

1. Remove battery temperature sensor. Refer to HBB-188, "Exploded View".
2. Check resistance between battery temperature sensor 2 terminals.

Terminals	Condition		Resistance(kΩ)
30 and 26	Temperature	10°C (50°F)	Approx. 7.4
		25°C (77°F)	Approx. 4.0
		40°C (104°F)	Approx. 2.3

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery temperature sensor. Refer to HBB-188, "Exploded View".

P0AC8 HYBRID BATTERY TEMPERATURE SENSOR B

DTC Logic

INFOID:0000000008140974

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0AC8	HYBRID BATTERY TEMPERATUR SENSOR B	When the voltage input value of the battery temperature sensor to the Li-ion battery controller remains extremely high for 2 seconds or more.	• Li-ion battery controller • Battery temperature sensor 2 • Between Li-ion battery controller and battery temperature sensor harness

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0AC8 detected?

YES >> Refer to HBB-91, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140975

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 2.

2.CHECK CONNECTION STATUS OF LI-ION BATTERY CONTROLLER HARNESS CONNECTOR

Check connection status of Li-ion battery controller harness connector.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair the connection of harness.

3.CHECK BATTERY TEMPERATURE SENSOR 2

Refer to HBB-73, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Replace battery temperature sensor. Refer to HBB-195, "Exploded View".

Component Inspection

INFOID:0000000008140976

1. CHECK BATTERY TEMPERATURE SENSOR 2

1. Remove battery temperature sensor. Refer to HBB-188, "Exploded View".
2. Check resistance between battery temperature sensor 2 terminals.

Terminals	Condition		Resistance(kΩ)
30 and 26	Temperature	10°C (50°F)	Approx. 7.4
		25°C (77°F)	Approx. 4.0
		40°C (104°F)	Approx. 2.3

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery temperature sensor. Refer to HBB-188, "Exploded View".

P0C6E HYBRID BATTERY TEMPERATURE SENSOR A/B

DTC Logic

INFOID:0000000008140977

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0C6E	HYBRID BATTERY TEMPERATUR SENSOR A/B	When there is a considerable temperature difference between battery temperature sensor 1 and 2 remains extremely.	• Li-ion battery controller • Battery temperature sensor • Clogged battery cooling path • Between Li-ion battery controller and battery temperature sensor harness

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P0C6E detected?

YES >> Refer to HBB-93, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140978

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses/ before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Check if the “P0A9E” or “P0AC8” is detected in “Self Diagnostic Result” of “EV/HEV”.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable system.
NO >> GO TO 2.

2.CHECK LI-ION BATTERY COOLING PATH FOR CLOGGING

Check the cooling path of the Li-ion battery for clogging (e.g. air suction opening, duct).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Remove obstacles or replace clogged part.

3. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 4.

4. CHECK BATTERY TEMPERATURE SENSOR

1. Check battery temperature sensor 1. Refer to HBB-71, "Component Inspection".
2. Check battery temperature sensor 2. Refer to HBB-90, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Replace battery temperature sensor 1 or 2. Refer to HBB-195, "Exploded View".

P3030 CELL CONTROLLER LIN

DTC Logic

INFOID:0000000008140979

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3030	CELL CONTROLLER LIN	When a malfunction occurs in the communication system of the Li-ion battery controller.	• Li-ion battery controller • Cell overdischarge • Between Li-ion battery controller and cell harness or connector

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P3030 detected?

YES >> Refer to HBB-95, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140980

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the DTC is detected in “Self Diagnostic Result” of “EV/HEV” and “MOTOR CONTROL”.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
Check if the “P3374 ” is detected in “Self Diagnostic Result” of “HV BAT”

Is P3374 detected?

YES >> Perform diagnosis procedure of “P3374 ”. Refer to HBB-154, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK CELL VOLTAGE

WITH CONSULT
Check “01-96 CELL VOLTAGE” in “DATA MONITOR” mode.

Is the inspection result normal?

When “DATA MONITOR” works normally>>GO TO 4.
When “DATA MONITOR” works but has a malfunction>>Replace applicable module. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".
When “DATA MONITOR” does not work>>Replace Li-ion battery. Refer to HBB-188, "Removal and Installation".

4.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 5.

5.CHECK HARNESS

Check continuity between Li-ion battery controller harness connector and cell (module) harness connector.

Module No.	Cell No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
Module 1	Cell 1	LB8	1	LB3	50	Existed
	Cell 3		3		51	
	Cell 5		5		52	
	Cell 7		7		53	
	Cell 2	LB7	2	LB3	34	
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	
Module 2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	
	Cell 10	LB9	2	LB3	38	
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	
Module 3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	
	Cell 18	LB11	2	LB3	43	
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	
Module 4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	
	Cell 26	LB13	2	LB3	47	
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	
Module 5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	
	Cell 34	LB15	2	LB4	69	
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	

Module No.	Cell No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
Module 6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	
	Cell 42	LB17	2	LB4	73	
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	
Module 7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	
	Cell 50	LB19	2	LB5	90	
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	
Module 8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	
	Cell 58	LB21	2	LB5	94	
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	
Module 9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	
	Cell 66	LB23	2	LB5	99	
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	
Module 10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	
	Cell 74	LB25	2	LB5	103	
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	

Module No.	Cell No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
Module 11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	
	Cell 82	LB27	2	LB5	107	
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	
Module 12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	
	Cell 90	LB29	2	LB6	132	
	Cell 92		4		133	
	Cell 94		6		134	
	Cell 96		8		135	

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Repair harness or connector.

P3031 - P303C CELL CONTROLLER ASIC

DTC Logic

INFOID:0000000008140981

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3031	CELL CONTROLLER ASIC1	When a malfunction occurs in the communication system of the Li-ion battery controller.	• Li-ion battery controller • Cell overdischarge • Between Li-ion battery controller and cell harness or connector
P3032	CELL CONTROLLER ASIC2		
P3033	CELL CONTROLLER ASIC3		
P3034	CELL CONTROLLER ASIC4		
P3035	CELL CONTROLLER ASIC5		
P3036	CELL CONTROLLER ASIC6		
P3037	CELL CONTROLLER ASIC7		
P3038	CELL CONTROLLER ASIC8		
P3039	CELL CONTROLLER ASIC9		
P303A	CELL CONTROLLER ASIC10		
P303B	CELL CONTROLLER ASIC11		
P303C	CELL CONTROLLER ASIC12		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P3031-P303C detected?

YES >> Refer to HBB-99, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140982

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Check if the “P3030” is detected in “Self Diagnostic Result” of “HV BAT”.

Is P3030 detected?

YES >> Perform diagnosis procedure of “P3030”. Refer to HBB-95, "Diagnosis Procedure".
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

P303D - P3048 CELL CONTROLLER ASIC

DTC Logic

INFOID:0000000008140983

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P303D	CELL CONTROLLER ASIC13	When a malfunction occurs in the communication system of the Li-ion battery controller.	• Li-ion battery controller • Cell overdischarge • Between Li-ion battery controller and cell harness or connector
P303E	CELL CONTROLLER ASIC14		
P303F	CELL CONTROLLER ASIC15		
P3040	CELL CONTROLLER ASIC16		
P3041	CELL CONTROLLER ASIC17		
P3042	CELL CONTROLLER ASIC18		
P3043	CELL CONTROLLER ASIC19		
P3044	CELL CONTROLLER ASIC20		
P3045	CELL CONTROLLER ASIC21		
P3046	CELL CONTROLLER ASIC22		
P3047	CELL CONTROLLER ASIC23		
P3048	CELL CONTROLLER ASIC24		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P303D-P3048 detected?

YES >> Refer to HBB-100, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140984

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Check if the “P3030” is detected in “Self Diagnostic Result” of “HV BAT”.

Is P3030 detected?

YES >> Perform diagnosis procedure of “P3030”. Refer to HBB-95, "Diagnosis Procedure".
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

P3049 - P3054 CELL CONTROLLER ASIC VOLTAGE

DTC Logic

INFOID:0000000008140985

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3049	CELL CONTROLLER ASIC1 VOLTAGE	When an A/D value by the A/D converter of the Li-ion battery controller is abnormal.	• Li-ion battery controller • Cell overdischarge • Cell overcharge
P304A	CELL CONTROLLER ASIC2 VOLTAGE		
P304B	CELL CONTROLLER ASIC3 VOLTAGE		
P304C	CELL CONTROLLER ASIC4 VOLTAGE		
P304D	CELL CONTROLLER ASIC5 VOLTAGE		
P304E	CELL CONTROLLER ASIC6 VOLTAGE		
P304F	CELL CONTROLLER ASIC7 VOLTAGE		
P3050	CELL CONTROLLER ASIC8 VOLTAGE		
P3051	CELL CONTROLLER ASIC9 VOLTAGE		
P3052	CELL CONTROLLER ASIC10 VOLTAGE		
P3053	CELL CONTROLLER ASIC11 VOLTAGE		
P3054	CELL CONTROLLER ASIC12 VOLTAGE		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 60 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P3049-P3054 detected?

YES >> Refer to HBB-101, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140986

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
Select “Self Diagnostic Result” mode of “EV/HEV” and “MOTOR CONTROL” using CONSULT.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
Check if the “P3374” is detected in “Self Diagnostic Result” of “HV BAT”.

Is P3374 detected?

YES >> Perform diagnosis procedure of “P3374”. Refer to HBB-154, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK CELL VOLTAGE

WITH CONSULT
Check “01-96 CELL VOLTAGE” in “DATA MONITOR” mode.

Is the inspection result normal?

When voltage is measurable and normal>>GO TO 4.
When voltage is not measurable>>Replace Li-ion battery controller, harness and applicable module.

4.CHECK HARNESS

Check continuity between Li-ion battery controller harness connector and cell (module) harness connector.

Module No.	Cell no.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
Module 1	Cell 1	LB8	1	LB3	50	Existed
	Cell 3		3		51	
	Cell 5		5		52	
	Cell 7		7		53	
	Cell 2	LB7	2	LB3	34	
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	
Module 2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	
	Cell 10	LB9	2	LB3	38	
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	
Module 3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	
	Cell 18	LB11	2	LB3	43	
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	
Module 4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	
	Cell 26	LB13	2	LB3	47	
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	
Module 5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	
	Cell 34	LB15	2	LB4	69	
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	

Module No.	Cell no.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
Module 6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	
	Cell 42	LB17	2	LB4	73	
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	
Module 7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	
	Cell 50	LB19	2	LB5	90	
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	
Module 8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	
	Cell 58	LB21	2	LB5	94	
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	
Module 9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	
	Cell 66	LB23	2	LB5	99	
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	
Module 10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	
	Cell 74	LB25	2	LB5	103	
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	

Module No.	Cell no.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
Module 11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	
	Cell 82	LB27	2	LB5	107	
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	
Module 12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	
	Cell 90	LB29	2	LB6	132	
	Cell 92		4		133	
	Cell 94		6		134	
	Cell 96		8		135	

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Repair harness or connector.

P3055 - P3060 CELL CONTROLLER ASIC VOLTAGE

DTC Logic

INFOID:0000000008140987

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3055	CELL CONTROLLER ASIC13 VOLTAGE	When an A/D value by the A/D converter of the Li-ion battery controller is abnormal.	• Li-ion battery controller • Cell overdischarge • Cell overcharge
P3056	CELL CONTROLLER ASIC14 VOLTAGE		
P3057	CELL CONTROLLER ASIC15 VOLTAGE		
P3058	CELL CONTROLLER ASIC16 VOLTAGE		
P3059	CELL CONTROLLER ASIC17 VOLTAGE		
P305A	CELL CONTROLLER ASIC18 VOLTAGE		
P305B	CELL CONTROLLER ASIC19 VOLTAGE		
P305C	CELL CONTROLLER ASIC20 VOLTAGE		
P305D	CELL CONTROLLER ASIC21 VOLTAGE		
P305E	CELL CONTROLLER ASIC22 VOLTAGE		
P305F	CELL CONTROLLER ASIC23 VOLTAGE		
P3060	CELL CONTROLLER ASIC24 VOLTAGE		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 60 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P3055P3060 detected?

YES >> Refer to HBB-105, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140988

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
Select “Self Diagnostic Result” mode of “EV/HEV” and “MOTOR CONTROL” using CONSULT.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
Check if the “P3374” is detected in “Self Diagnostic Result” of “HV BAT”.

Is P3374 detected?

YES >> Refer to HBB-154, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK CELL VOLTAGE

WITH CONSULT
Check “01-96 CELL VOLTAGE” in “DATA MONITOR” mode.

Is the inspection result normal?

When voltage is measurable and normal>>GO TO 4.
When voltage is not measurable>>Replace Li-ion battery controller, harness and applicable module.

4.CHECK HARNESS

Check continuity between Li-ion battery controller harness connector and cell (module) harness connector.

Module No.	Cell no.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
Module1	Cell 1	LB8	1	LB3	50	Existed
	Cell 3		3		51	
	Cell 5		5		52	
	Cell 7		7		53	
	Cell 2	LB7	2	LB3	34	
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	
Module2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	
	Cell 10	LB9	2	LB3	38	
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	
Module3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	
	Cell 18	LB11	2	LB3	43	
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	
Module4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	
	Cell 26	LB13	2	LB3	47	
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	
Module5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	
	Cell 34	LB15	2	LB4	69	
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	

Module No.	Cell no.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
Module6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	
	Cell 42	LB17	2	LB4	73	
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	
Module7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	
	Cell 50	LB19	2	LB5	90	
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	
Module8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	
	Cell 58	LB21	2	LB5	94	
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	
Module9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	
	Cell 66	LB23	2	LB5	99	
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	
Module10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	
	Cell 74	LB25	2	LB5	103	
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	

Module No.	Cell no.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
Module11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	
	Cell 82	LB27	2	LB5	107	
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	
Module12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	
	Cell 90	LB29	2	LB6	132	
	Cell 92		4		133	
	Cell 94		6		134	
	Cell 96		8		135	

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Repair harness or connector.

P3061 CELL BATTERY VOLTAGE

DTC Logic

INFOID:0000000008140989

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3061	CELL BATTERY VOLTAGE	When overcharge is detected in the Li-ion battery controller or a malfunction is detected in the overdischarge detection circuit.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT

1. Turn ignition switch ON and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 60 seconds.
3. Turn ignition switch ON and wait at least 10 seconds.
4. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P3061 detected?

YES >> Refer to HBB-109, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140990

When this DTC is detected, replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

P3062 BYPASS SWITCH

DTC Logic

INFOID:0000000008140991

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3062	BYPASS SWITCH	When a malfunction is detected in the Li-ion battery controller circuit (bypass switch).	• Li-ion battery controller • Between Li-ion battery controller and cell harness or connector

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 60 seconds.
3. Turn ignition switch ON and wait at least 10 seconds.
4. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P3062 detected?

YES >> Refer to HBB-110, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140992

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
Check if the“P3374” or “P308B-P30A2” is detected in “Self Diagnostic Result” of “HV BAT”.

Is P3374 or P308B-P30A2 detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> Replace Li-ion battery (battery pack). Refer to HBB-188, "Removal and Installation".

P308B - P3096 CELL CONTROLLER ASIC OPEN

DTC Logic

INFOID:0000000008140993

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P308B	CELL CONTROLLER ASIC1 OPEN	When a cell voltage recognized by the Li-ion battery controller is lower than 1.25 V or higher than 4.65 V.	• Li-ion battery controller • Between Li-ion battery controller and cell harness or connector
P308C	CELL CONTROLLER ASIC2 OPEN		
P308D	CELL CONTROLLER ASIC3 OPEN		
P308E	CELL CONTROLLER ASIC4 OPEN		
P308F	CELL CONTROLLER ASIC5 OPEN		
P3090	CELL CONTROLLER ASIC6 OPEN		
P3091	CELL CONTROLLER ASIC7 OPEN		
P3092	CELL CONTROLLER ASIC8 OPEN		
P3093	CELL CONTROLLER ASIC9 OPEN		
P3094	CELL CONTROLLER ASIC10 OPEN		
P3095	CELL CONTROLLER ASIC11 OPEN		
P3096	CELL CONTROLLER ASIC12 OPEN		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P308B-P3096 detected?

YES >> Refer to HBB-111, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140994

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield, and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the “P3049-P3060” is detected in “Self Diagnostic Result” of “EV/HEV”.

Is P3049-P3060 detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> GO TO 2.

2. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 3.

3. CHECK CELL VOLTAGE DETECTION HARNESS

Refer to below table and check connection status of connectors and continuity between Li-ion battery controller and Module, according to detected DTC.

DTC	Trouble diagnosis name	Cell detection voltage harness	Module		Li-ion battery controller		Continuity
			Connector	Terminal	Connector	Terminal	
P308B	CELL CONTROLLER ASIC1 OPEN	Cell 1-4 voltage detection harness	—	High voltage harness of Module 1	LB3	33	Existed
			LB8	1		50	
			LB7	2		34	
			LB8	3		51	
			LB7	4		35	
P308C	CELL CONTROLLER ASIC2 OPEN	Cell 5-8 voltage detection harness	LB7	4	LB3	35	Existed
			LB8	5		52	
			LB7	6		36	
			LB8	7		53	
			LB7	8		37	
P308D	CELL CONTROLLER ASIC3 OPEN	Cell 9-12 voltage detection harness	LB7	8	LB3	37	Existed
			LB10	1		54	
			LB9	2		38	
			LB10	3		55	
			LB9	4		39	
P308E	CELL CONTROLLER ASIC4 OPEN	Cell 13-16 voltage detection harness	LB9	4	LB3	39	Existed
			LB10	5		56	
			LB9	6		40	
			LB10	7		57	
			LB9	8		42	
P308F	CELL CONTROLLER ASIC5 OPEN	Cell 17-20 voltage detection harness	LB9	8	LB3	42	Existed
			LB12	1		58	
			LB11	2		43	
			LB12	3		59	
			LB11	4		44	
P3090	CELL CONTROLLER ASIC6 OPEN	Cell 21-24 voltage detection harness	LB11	4	LB3	44	Existed
			LB12	5		60	
			LB11	6		45	
			LB12	7		61	
			LB11	8		46	

DTC	Trouble diagnosis name	Cell detection voltage harness	Module		Li-ion battery controller		Continuity
			Connector	Terminal	Connector	Terminal	
P3091	CELL CONTROLLER ASIC7 OPEN	Cell 25-28 voltage detection harness	LB11	8	LB3	46	Existed
			LB14	1		62	
			LB13	2		47	
			LB14	3		63	
			LB13	4		48	
P3092	CELL CONTROLLER ASIC8 OPEN	Cell 29-32 voltage detection harness	LB13	4	LB3	48	Existed
			LB14	5	LB4	77	
			LB13	6		65	
			LB14	7		78	
			LB13	8		66	
P3093	CELL CONTROLLER ASIC9 OPEN	Cell 33-36 voltage detection harness	LB13	8	LB4	66	Existed
			LB16	1		80	
			LB15	2		69	
			LB16	3		81	
			LB15	4		70	
P3094	CELL CONTROLLER ASIC10 OPEN	Cell 37-40 voltage detection harness	LB15	4	LB4	70	Existed
			LB16	5		82	
			LB15	6		71	
			LB16	7		83	
			LB15	8		72	
P3095	CELL CONTROLLER ASIC11 OPEN	Cell 41-44 voltage detection harness	LB15	8	LB4	72	Existed
			LB18	1		84	
			LB17	2		73	
			LB18	3		85	
			LB17	4		74	
P3096	CELL CONTROLLER ASIC12 OPEN	Cell 45-48 voltage detection harness	LB17	4	LB4	74	Existed
			LB18	5		86	
			LB17	6		75	
			LB18	7		87	
			LB17	8		76	

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Replace cell voltage detection harness.

P3097 - P30A2 CELL CONTROLLER ASIC OPEN

DTC Logic

INFOID:0000000008140995

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3097	CELL CONTROLLER ASIC13 OPEN	When a cell voltage recognized by the Li-ion battery controller is lower than 1.25 V or higher than 4.65 V.	• Li-ion battery controller • Between Li-ion battery controller and cell harness or connector
P3098	CELL CONTROLLER ASIC14 OPEN		
P3099	CELL CONTROLLER ASIC15 OPEN		
P309A	CELL CONTROLLER ASIC16 OPEN		
P309B	CELL CONTROLLER ASIC17 OPEN		
P309C	CELL CONTROLLER ASIC18 OPEN		
P309D	CELL CONTROLLER ASIC19 OPEN		
P309E	CELL CONTROLLER ASIC20 OPEN		
P309F	CELL CONTROLLER ASIC21 OPEN		
P30A0	CELL CONTROLLER ASIC22 OPEN		
P30A1	CELL CONTROLLER ASIC23 OPEN		
P30A2	CELL CONTROLLER ASIC24 OPEN		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P3097-P30A2 detected?

YES >> Refer to HBB-114, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140996

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield, and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the “P3049-P3060” is detected in “Self Diagnostic Result” of “EV/HEV”.

Is P3049-P3060 detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> GO TO 2.

2. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 3.

3. CHECK CELL VOLTAGE DETECTION HARNESS

Refer to below table and check connection status of connectors and continuity between Li-ion battery controller and Module, according to detected DTC.

DTC	Trouble diagnosis name	Cell detection voltage harness	Module		Li-ion battery controller		Continuity
			Connector	Terminal	Connector	Terminal	
P3097	CELL CONTROLLER ASIC13 OPEN	Cell 49-52 voltage detection harness	LB17	8	LB4	76	Existed
			LB20	1	LB5	110	
			LB19	2		90	
			LB20	3		111	
			LB19	4		91	
P3098	CELL CONTROLLER ASIC14 OPEN	Cell 53-56 voltage detection harness	LB19	4	LB5	91	Existed
			LB20	5		112	
			LB19	6		92	
			LB20	7		113	
			LB19	8		93	
P3099	CELL CONTROLLER ASIC15 OPEN	Cell 57-60 voltage detection harness	LB19	8	LB5	93	Existed
			LB22	1		114	
			LB21	2		94	
			LB22	3		115	
			LB21	4		95	
P309A	CELL CONTROLLER ASIC16 OPEN	Cell 61-64 voltage detection harness	LB21	4	LB5	95	Existed
			LB22	5		116	
			LB21	6		96	
			LB22	7		117	
			LB21	8		97	
P309B	CELL CONTROLLER ASIC17 OPEN	Cell 65-68 voltage detection harness	LB21	8	LB5	97	Existed
			LB24	1		118	
			LB23	2		99	
			LB24	3		119	
			LB23	4		100	
P309C	CELL CONTROLLER ASIC18 OPEN	Cell 69-72 voltage detection harness	LB23	4	LB5	100	Existed
			LB24	5		120	
			LB23	6		101	
			LB24	7		121	
			LB23	8		102	

DTC	Trouble diagnosis name	Cell detection voltage harness	Module		Li-ion battery controller		Continuity
			Connector	Terminal	Connector	Terminal	
P309D	CELL CONTROLLER ASIC19 OPEN	Cell 73-76 voltage detection harness	LB23	8	LB5	102	Existed
			LB26	1		122	
			LB25	2		103	
			LB26	3		123	
			LB25	4		104	
P309E	CELL CONTROLLER ASIC20 OPEN	Cell 77-80 voltage detection harness	LB25	4	LB5	104	Existed
			LB26	5		124	
			LB25	6		105	
			LB26	7		125	
			LB25	8		106	
P309F	CELL CONTROLLER ASIC21 OPEN	Cell 81-84 voltage detection harness	LB25	8	LB5	106	Existed
			LB28	1		127	
			LB27	2		107	
			LB28	3		128	
			LB27	4		108	
P30A0	CELL CONTROLLER ASIC22 OPEN	Cell 85-88 voltage detection harness	LB27	4	LB5	108	Existed
			LB28	5	LB6	137	
			LB27	6		130	
			LB28	7		138	
			LB27	8		131	
P30A1	CELL CONTROLLER ASIC23 OPEN	Cell 89-92 voltage detection harness	LB27	8	LB6	131	Existed
			LB30	1		140	
			LB29	2		132	
			LB30	3		141	
			LB29	4		133	
P30A2	CELL CONTROLLER ASIC24 OPEN	Cell 93-96 voltage detection harness	LB29	4	LB6	133	Existed
			LB30	5		142	
			LB29	6		134	
			LB30	7		143	
			LB29	8		135	

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Replace cell voltage detection harness.

P30D0 SOC RATIONALITY

DTC Logic

INFOID:0000000008140997

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30D0	SOC RATIONALITY	A lapse of 5.1 seconds after the difference between the amount of change in the integrated current value and in SOC exceeds the specified value.	Li-ion battery ((Malfunction in SOC arithmetic logic)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT

1. Select “DATA MONITOR” mode of “HV BAT” using CONSULT.“
2. Drive the vehicle, according to driving pattern B.

Driving pattern B : HBB-29, "DIAGNOSIS DESCRIPTION : Driving Pattern"

Is P30D0 detected?

YES >> Refer to HBB-117, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140998

When this DTC is detected, replace Li-ion battery (battery pack). Refer to HBB-188, "Removal and Installation".

P30EF INTERNAL RESISTANCE

DTC Logic

INFOID:0000000008140999

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30EF	INTERNAL RESISTANCE	When the Li-ion battery internal resistance becomes high.	• Li-ion battery controller • Li-ion battery • DC/DC junction box • Service plug

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 15 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P30EF detected?

YES >> Refer to HBB-118, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141000

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.CHECK CONNECTION STATUS OF SERVICE PLUG

Check the connection of service plug.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair the connection of harness.

2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 3.

3.CHECK CONNECTION STATUS OF BUS BAR

Check the connection of bus bar.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair the connection of harness.

4. CHECK THE CONNECTION OF ALL WIRING RELATED TO HIGH VOLTAGE

Check the connection of all wiring related to high voltage.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair the connection of harness.

5. CHECK CELL VOLTAGE DETECTION HARNESS

Check continuity between Li-ion battery controller harness connector and all cell (cell voltage detection harness) harness connector.

Module No.	Cell No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
module 1	Cell 1	LB8	1	LB3	50	Existed
	Cell 3		3		51	
	Cell 5		5		52	
	Cell 7		7		53	
	Cell 2	LB7	2	LB3	34	
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	
module 2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	
	Cell 10	LB9	2	LB3	38	
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	
module 3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	
	Cell 18	LB11	2	LB3	43	
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	
module 4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	
	Cell 26	LB13	2	LB3	47	
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	

Module No.	Cell No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
module 5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	
	Cell 34	LB15	2	LB4	69	
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	
module 6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	
	Cell 42	LB17	2	LB4	73	
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	
module 7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	
	Cell 50	LB19	2	LB5	90	
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	
module 8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	
	Cell 58	LB21	2	LB5	94	
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	
module 9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	
	Cell 66	LB23	2	LB5	99	
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	

Module No.	Cell No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
module 10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	
	Cell 74	LB25	2	LB5	103	
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	
module 11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	
	Cell 82	LB27	2	LB5	107	
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	
module 12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	
	Cell 90	LB29	2	LB6	132	
	Cell 92		4		133	
	Cell 94		6		134	
	Cell 96		8		135	

Is the inspection result normal?

YES >> Replace Li-ion battery (battery pack). Refer to HBB-188, "Removal and Installation".
NO >> Replace cell voltage detection harness.

P30F1 REGENERATION CONTROL

DTC Logic

INFOID:0000000008141001

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30F1	REGENERATION CONTROL	When exceeding the SOC usage range with continuous regeneration (charge).	• DC/DC junction box • Li-ion battery controller • HPCM • Traction motor inverter • Between DC/DC junction box and Li-ion battery controller harness

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P30F1 detected?

YES >> Refer to HBB-122, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141002

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the DTC is detected in “Self Diagnostic Result” of “EV/HEV”. and “MOTOR CONTROL”.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
Check if the “P0AC0”, “P0AC1” or “P0AC2” is detected in “Self Diagnostic Result” of “EV/HEV”.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> Replace battery junction box (current sensor) and Li-ion battery controller.

P30F2 DISCHARGE CONTROL

DTC Logic

INFOID:0000000008141003

DTC DETECTION LOGIC

NOTE:

- If DTC “P0AC0”, “P0AC1” or “P0AC2” is displayed with DTC “P30F2”, first perform the trouble diagnosis for DTC “P0AC0”, “P0AC1” or “P0AC2”.
- Prolonged cranking due to running out of gasoline may cause the detection of this DTC.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30F2	DISCHARGE CONTROL	When SOC usage range is not satisfied and the output (discharge) continues.	• DC/DC junction box • Li-ion battery controller • HPCM • Traction motor inverter • Between DC/DC junction box and Li-ion battery controller harness • Out of gasoline

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT

1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P30F2 detected?

YES >> Refer to HBB-123, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141004

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT

Perform “All DTC Reading” with CONSULT.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> Replace battery junction box (current sensor) and Li-ion battery controller.

P30F3 TOTAL VOLTAGE SENSOR

DTC Logic

INFOID:0000000008141005

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30F3	TOTAL VOLTAGE SENSOR	When a malfunction occurs in the communication system of the Li-ion battery controller.	• Li-ion battery controller • Between Li-ion battery controller and cell harness or connector • Cell overdischarge

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P30F3 detected?

YES >> Refer to HBB-124, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141006

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Check if the “P3030” or “P3374” is detected in “Self Diagnostic Result” of “EV/HEV”.

Is P3030 or P3374 detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

P30F4 TOTAL VOLTAGE SENSOR

DTC Logic

INFOID:0000000008141007

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30F4	TOTAL VOLTAGE SENSOR	When a total voltage exceeds the available voltage.	• Li-ion battery controller • Li-ion battery over charge

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P30F4 detected?

YES >> Refer to HBB-125, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141008

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Check if the “P3301” is detected in “Self Diagnostic Result” of “EV/HEV”.

Is P3301 detected?

YES >> Perform diagnosis procedure of “P3301”. Refer to HBB-138, "Diagnosis Procedure".
NO >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

P30F5 TOTAL VOLTAGE SENSOR

DTC Logic

INFOID:0000000008141009

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30F5	TOTAL VOLTAGE SENSOR	When there is a difference larger than 30 V between a total voltage measured by the total voltage detection circuit and the sum of measured cell voltages for 2 seconds or more.	• Li-ion battery controller • High voltage fuse (Service plug integrated)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P30F5 detected?

YES >> Refer to HBB-126, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141010

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

>> GO TO 2.

2. CHECK HIGH VOLTAGE FUSE

Check high voltage fuse (service plug integrated).

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Replace service plug after repairing the part causing the blowout of the fuse.

P30F6 TOTAL VOLTAGE SENSOR

DTC Logic

INFOID:0000000008141011

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30F6	TOTAL VOLTAGE SENSOR	When a total voltage is below the range of available voltage.	• Li-ion battery controller • Between Li-ion battery controller and cell harness or connector • Li-ion battery overdischarge • High voltage fuse (Service plug integrated)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P30F6 detected?

YES >> Refer to HBB-127, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141012

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Check if the “P3374” is detected in “Self Diagnostic Result” of “HV BAT”.

Is P3374 detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> GO TO 2.

2.CHECK CONNECTION STATUS OF SERVICE PLUG

Check the connection of service plug.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair the connection of harness.

3.CHECK HIGH VOLTAGE FUSE

Check high voltage fuse (service plug integrated).

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

NO >> Replace service plug after repairing the part causing the blowout of the fuse.

P30FC OVER CURRENT

DTC Logic

INFOID:0000000008141013

DTC DETECTION LOGIC

NOTE:
If DTC “P0AC0”, “P0AC1” or “P0AC2” is displayed with DTC “P30FC”, first perform the trouble diagnosis for DTC “P0AC0”, “P0AC1” or “P0AC2”.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30FC	OVER CURRENT	When the high voltage harness temperature estimated from a current value is extremely high.	• Traction motor • Traction motor inverter • HPCM • Battery current sensor • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Select “DATA MONITOR” mode of “HV BAT” using CONSULT.“
2. Drive the vehicle, according to driving pattern B.

Driving pattern B : HBB-29, "DIAGNOSIS DESCRIPTION : Driving Pattern"

Is P30D0 detected?

YES >> Refer to HBB-117, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141014

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the DTC is detected in “Self Diagnostic Result” of “EV/HEV”.

Is DTC detected?

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

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Check if the DTC is detected in “Self Diagnostic Result” of “HV BAT”.

Is DTC detected?

YES >> After perform diagnosis procedure of applicable DTC, GO TO 3.
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to HBB-129, "DTC Logic".

Is DTC detected?

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

P30FD TOTAL VOLTAGE MONITOR SWITCH

DTC Logic

INFOID:0000000008141015

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30FD	TOTAL VOLTAGE MONITOR SWITCH	• When the total voltage detection switch of the Li-ion battery controller is malfunctioning (The total voltage detection switch cannot be turned OFF). • When the self-diagnosis detects a malfunction in the total voltage detection circuit stop function of the Li-ion battery controller.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 60 seconds.
3. Turn ignition switch ON and wait at least 10 seconds.
4. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P30FD detected?

YES >> Refer to HBB-130, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141016

When this DTC is detected, replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".

P30FE 12V BATTERY VOLTAGE

DTC Logic

INFOID:0000000008141017

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30FE	12V BATTERY VOLTAGE	When the 12 V battery voltage drops to less than 9 V and maintains the voltage for 1 second or more.	• 12V battery • Li-ion battery controller • Harness or connector

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P30FE detected?

YES >> Refer to HBB-131, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141018

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.CHECK FUSE

1. Turn ignition switch is OFF.
2. Pull out 10A fuse (No.64) and check that the fuse is not fusing.
   NOTE:
   Refer to PG-43, "Fuse and Fusible Link Arrangement" for fuse layout.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace fuse after repairing the part causing the blowout of the fuse.

2.CHECK BATTERY POWER SUPPLY-1

Check voltage between Li-ion battery harness connector terminals.

+		–		Voltage
Li-ion battery				
Connector	Terminal	Connector	Terminal	
B283	6	B283	2	Battery voltage
			14	

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK BATTERY POWER SUPPLY-2

1. Disconnect Li-ion battery harness connector.
2. Check voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B283	6	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace the malfunctioning part.

4.CHECK GROUND-1

Check the installation condition of the ground (B264).

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair the installation state of the ground.

5.CHECK GROUND-2

Check continuity between Li-ion battery harness connector and ground.

Li-ion battery		–	Continuity
Connector	Terminal		
B283	2	Ground	Existed
	14		

Is the inspection result normal?

YES >> Perform intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace the malfunctioning part.

6.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 7.

7.CHECK BATTERY POWER SUPPLY CIRCUIT

Check continuity between Li-ion battery harness connector and Li-ion battery controller harness connector.

Li-ion battery		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB39	6	LB1	12	Existed

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace the malfunctioning part.

8. CHECK GROUND CIRCUIT

Check continuity between Li-ion battery harness connector and Li-ion battery controller harness connector.

Li-ion battery		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB39	2	LB1	3	Existed
	14		15	

Is the inspection result normal?

YES >> Perform intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace the malfunctioning part.

P31A5 CAN ERROR HPCM

DTC Logic

INFOID:0000000008141019

DTC DETECTION LOGIC

NOTE:
If DTC “P31A5” is displayed with DTC “UXXXX”, first perform the trouble diagnosis for DTC “UXXXX”.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P31A5	CAN ERROR HPCM	When the Li-ion battery controller detects an error in CAN data.	• ECM • Li-ion battery controller • Traction motor inverter • HPCM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P31A5 detected?

YES >> Refer to HBB-134, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141020

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result”.

DTC	DTC detected control module	malfunction parts
P31A5	Only in “ENGINE”	• ECM • HPCM
	Only in “HV BAT”	• Li-ion battery controller • HPCM
	Only in “MOTOR CONTROL”	• Traction motor inverter • HPCM
	• “ENGINE” • “MOTOR CONTROL”	HPCM
	• “ENGINE” • “HV BAT”	
	• “MOTOR CONTROL” • “HV BAT”	
	• “ENGINE” • “HV BAT” • “MOTOR CONTROL”	

>> Replace a malfunctioning part corresponding to the control module that DTC “P31A5” is detected.

P31A7 CAN ERROR INV/MC

DTC Logic

INFOID:0000000008141021

DTC DETECTION LOGIC

NOTE:
If DTC “P31A7” is displayed with DTC “UXXXX”, first perform the trouble diagnosis for DTC “UXXXX”.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P31A7	CAN ERROR INV/MC	When the Li-ion battery controller detects an error in CAN data.	• HPCM • Traction motor inverter • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P31A7 detected?

YES >> Refer to HBB-135, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141022

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result”.

DTC	DTC detected control module	malfunction parts
P31A7	Only in “EV/HEV”	• HPCM • Traction motor inverter
	Only in “HV BAT”	Li-ion battery controller
	• “EV/HEV” • “HV BAT”	Traction motor inverter

>> Replace a malfunctioning part corresponding to the control module that DTC “P31A7” is detected.

P3300 TOTAL VOLTAGE OVER

DTC Logic

INFOID:0000000008141023

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3300	TOTAL VOLTAGE OVER	When a total voltage exceeds the available voltage.	• Li-ion battery • Li-ion battery controller • HPCM • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P3300 detected?

YES >> Refer to HBB-136, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141024

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the DTC is detected in “Self Diagnostic Result” of “EV/HEV” and “MOTOR CONTROL”.

Is DTC detected?

YES >> Perform diagnosis of the applicable system.
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is DTC detected?

YES-1 >> If P30EF is detected, refer to HBB-118, "Diagnosis Procedure".
YES-2 >> If P3374 is detected, refer to HBB-154, "Diagnosis Procedure".
NO >> GO TO 3.

3. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

>> GO TO 4.

4. CHECK CONNECTION OF HIGH VOLTAGE HARNESS

Check the connection between the following high voltage parts and the high voltage harness for deterioration in terminals and improper fit.
- Traction motor inverter
- Traction motor
- Electric compressor

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair connection state of the harness or replace the harness.

5. CHECK HIGH VOLTAGE HARNESS

1. Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".
2. Check the connection between the following high voltage parts and the high voltage harness for deterioration in terminals and improper fit.

- Service plug
- Bus bar
- DC/DC converter
- Battery junction box

Is the inspection result normal?

YES >> Replace Li-ion battery (battery pack). Refer to HBB-188, "Removal and Installation".
NO >> Repair or replace the malfunctioning part.

P3301 CELL VOLTAGE OVER

DTC Logic

INFOID:0000000008141025

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3301	CELL VOLTAGE OVER	When a cell voltage exceeds the range of available voltage.	• Li-ion battery • Li-ion battery controller • HPCM • Traction motor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 10 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P3301 detected?

YES >> Refer to HBB-138, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141026

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield, and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the “P3300” is detected in “Self Diagnostic Result” of “EV/HEV”.

Is P3300 detected?

YES >> Perform diagnosis procedure of “P3300”. Refer to HBB-136, "Diagnosis Procedure".
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if a DTC is detected in “Self Diagnostic Result” of other systems.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable DTC.
NO >> GO TO 3.

3. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 4.

4. CHECK FFD (FREEZE-FRAME DATA)

1. Check FFD (freeze-frame data) of “P3301”.
2. Check every “CELL VOLTAGE” to identify cells of which voltage is more than 4,265 mV.

Check results>>The voltage of Cell 1, 3, 5, and 7 is more than 4,265 mV.: GO TO 5.
>> The voltage of Cell 2, 4, 6, and 8 is more than 4,265 mV.: GO TO 6.
>> The voltage of Cell 9, 11, 13, and 15 is more than 4,265 mV.: GO TO 7.
>> The voltage of Cell 10, 12, 14, and 16 is more than 4,265 mV.: GO TO 8.
>> The voltage of Cell 17, 19, 21, and 23 is more than 4,265 mV.: GO TO 9.
>> The voltage of Cell 18, 20, 22, and 24 is more than 4,265 mV.: GO TO 10.
>> The voltage of Cell 25, 27, 29, and 31 is more than 4,265 mV.: GO TO 11.
>> The voltage of Cell 26, 28, 30, and 32 is more than 4,265 mV.: GO TO 12.
>> The voltage of Cell 33, 35, 37, and 39 is more than 4,265 mV.: GO TO 13.
>> The voltage of Cell 34, 36, 38, and 40 is more than 4,265 mV.: GO TO 14.
>> The voltage of Cell 41, 43, 45, and 47 is more than 4,265 mV.: GO TO 15.
>> The voltage of Cell 42, 44, 46, and 48 is more than 4,265 mV.: GO TO 16.
>> The voltage of Cell 49, 51, 53, and 55 is more than 4,265 mV.: GO TO 17.
>> The voltage of Cell 50, 52, 54, and 56 is more than 4,265 mV.: GO TO 18.
>> The voltage of Cell 57, 59, 61, and 63 is more than 4,265 mV.: GO TO 19.
>> The voltage of Cell 58, 60, 62, and 64 is more than 4,265 mV.: GO TO 20.
>> The voltage of Cell 65, 67, 69, and 71 is more than 4,265 mV.: GO TO 21.
>> The voltage of Cell 66, 68, 70, and 72 is more than 4,265 mV.: GO TO 22.
>> The voltage of Cell 73, 75, 77, and 79 is more than 4,265 mV.: GO TO 23.
>> The voltage of Cell 74, 76, 78, and 80 is more than 4,265 mV.: GO TO 24.
>> The voltage of Cell 81, 83, 85, and 87 is more than 4,265 mV.: GO TO 25.
>> The voltage of Cell 82, 84, 86, and 88 is more than 4,265 mV.: GO TO 26.
>> The voltage of Cell 89, 91, 93, and 95 is more than 4,265 mV.: GO TO 27.
>> The voltage of Cell 90, 92, 94, and 96 is more than 4,265 mV.: GO TO 28.

5. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 1	Cell 1	LB8	1	LB3	50	Existed
	Cell 3		3		51	
	Cell 5		5		52	
	Cell 7		7		53	
	Cell 2	LB7	2	LB3	34	
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

6. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 1	Cell 1	LB8	1	LB3	50	Existed
	Cell 3		3		51	
	Cell 5		5		52	
	Cell 7		7		53	
	Cell 2	LB7	2	LB3	34	
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	
Module 2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

7.CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 1	Cell 2	LB7	2	LB3	34	Existed
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	
Module 2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	
	Cell 10	LB9	2	LB3	38	
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

8.CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	
	Cell 10	LB9	2	LB3	38	
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	
Module 3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

9. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 2	Cell 10	LB9	2	LB3	38	Existed
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	
Module 3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	
	Cell 18	LB11	2	LB3	43	
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

10. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	
	Cell 18	LB11	2	LB3	43	
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	
Module 4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

11. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 3	Cell 18	LB11	2	LB3	43	Existed
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	
Module 4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	
	Cell 26	LB13	2	LB3	47	
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

12. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	
	Cell 26	LB13	2	LB3	47	
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	
Module 5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

13. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 4	Cell 26	LB13	2	LB3	47	Existed
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	
Module 5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	
	Cell 34	LB15	2	LB4	69	
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

14. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	
	Cell 34	LB15	2	LB4	69	
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	
Module 6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

15. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 5	Cell 34	LB15	2	LB4	69	Existed
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	
Module 6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	
	Cell 42	LB17	2	LB4	73	
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

16. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	
	Cell 42	LB17	2	LB4	73	
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	
Module 7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

17. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 6	Cell 42	LB17	2	LB4	73	Existed
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	
Module 7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	
	Cell 50	LB19	2	LB5	90	
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

18. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	
	Cell 50	LB19	2	LB5	90	
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	
Module 8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

19. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 7	Cell 50	LB19	2	LB5	90	Existed
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	
Module 8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	
	Cell 58	LB21	2	LB5	94	
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

20. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	
	Cell 58	LB21	2	LB5	94	
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	
Module 9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

21. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 8	Cell 58	LB21	2	LB5	94	Existed
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	
Module 9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	
	Cell 66	LB23	2	LB5	99	
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

22. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	
	Cell 66	LB23	2	LB5	99	
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	
Module 10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

23. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 9	Cell 66	LB23	2	LB5	99	Existed
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	
Module 10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	
	Cell 74	LB25	2	LB5	103	
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

24. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	
	Cell 74	LB25	2	LB5	103	
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	
Module 11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

25. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 10	Cell 74	LB25	2	LB5	103	Existed
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	
Module 11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	
	Cell 82	LB27	2	LB5	107	
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

26. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	
	Cell 82	LB27	2	LB5	107	
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	
Module 12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

27. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 11	Cell 82	LB27	2	LB5	107	Existed
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	
Module 12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	
	Cell 90	LB29	2	LB6	132	
	Cell 92		4		133	
	Cell 94		6		134	
	Cell 96		8		135	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

28. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	
	Cell 90	LB29	2	LB6	132	
	Cell 92		4		133	
	Cell 94		6		134	
	Cell 96		8		135	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

29. CHECK THE HISTORY OF REPLACEMENT-1

Check the latest replacement history of the module or battery pack assembly.

Is there a history of part replacement?

YES-1 >> When there is a history of replacing all of the 12 modules, GO TO 30.
YES-2 >> When there is a history of replacing single module, replace all of the 12 modules. However, when replacing a module replaced in the past, it is possible to replace it as a single module replacement if the Li-ion battery is within 17 months from the manufacturing date. In this case, replace only module including an abnormal cell. Refer to HBB-188, "Exploded View".
YES-3 >> When there is a history of battery pack assembly replacement, GO TO 31.
NO >> GO TO 31.

30. CHECK THE HISTORY OF REPLACEMENT-2

Check the module manufacturing date recorded during the replacement of all the 12 modules.

Is it more than 17 months from the date of manufacture?

YES >> Replace all of the 12 modules. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".
NO >> Replace a module including abnormal cell. Refer to HBB-195, "Exploded View".

31. CHECK THE DATE OF MANUFACTURE OF LI-ION BATTERY

Check the battery pack assembly manufacturing date included in the module serial number label. For the label location, refer to HBB-208, "MODULE STACK : Inspection".

Is it more than 17 months from the date of manufacture?

YES >> Replace all of the 12 modules. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".
NO >> Replace a module including abnormal cell. Refer to HBB-195, "Exploded View".

P3373 TOTAL VOLTAGE OVER DISCHARGE

DTC Logic

INFOID:0000000008141027

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3373	TOTAL VOLTAGE OVER DISCHARGE	When a total voltage is below the range of available voltage.	• Li-ion battery • Li-ion battery controller • HPCM • Traction motor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Select “DATA MONITOR” mode of “HV BAT” using CONSULT.
2. Drive the vehicle, according to driving condition B.

Driving condition B : HBC-44, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Is P3373 detected?

YES >> Refer to HBB-152, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141028

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the DTC is detected in “Self Diagnostic Result” of “EV/HEV” and “MOTOR CONTROL”.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable system. GO TO 2
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is DTC detected?

YES-1 >> If P30EF is detected, refer to HBB-118, "Diagnosis Procedure".
YES-2 >> If P3374 is detected, refer to HBB-154, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK FFD (FREEZE-FRAME DATA)

WITH CONSULT
1. Check FFD (freeze-frame data) of “P3373”.
2. Identify a cell voltage which is ± 100 mV or more higher than the mean voltage of all the cells.

>> Check module including the applicable cell. GO TO 4. Refer to HBB-195, "Exploded View".

4.CHECK THE HISTORY OF REPLACEMENT-1

Check the latest replacement history of the module or battery pack assembly.

Is there a history of part replacement?

YES-1 >> When there is a history of replacing all of the 12 modules, GO TO 5.
YES-2 >> When there is a history of replacing single module, replace all of the 12 modules. However, when replacing a module replaced in the past, it is possible to replace it as a single module replacement if the Li-ion battery is within 17 months from the manufacturing date.
YES-3 >> When there is a history of battery pack assembly replacement, GO TO 6.

NO >> GO TO 6.

5. CHECK THE HISTORY OF REPLACEMENT-2

Check the module manufacturing date recorded during the replacement of all the 12 modules.

Is it more than 17 months from the date of manufacture?

YES >> Replace all of the 12 modules. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".

NO >> Replace a module including abnormal cell. Refer to HBB-195, "Exploded View".

6. CHECK THE DATE OF MANUFACTURE OF LI-ION BATTERY

Check the battery pack assembly manufacturing date included in the module serial number label. For the label location, refer to HBB-208, "MODULE STACK : Inspection".

Is it more than 17 months from the date of manufacture?

YES >> Replace all of the 12 modules. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".

NO >> Replace a module including abnormal cell. Refer to HBB-195, "Exploded View".

P3374 CELL VOLTAGE OVER DISCHARGE

DTC Logic

INFOID:0000000008141029

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3374	CELL VOLTAGE OVER DISCHARGE	When a cell voltage is below the range of available voltage.	• Li-ion battery • Li-ion battery controller • HPCM • Traction motor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Select “DATA MONITOR” mode of “HV BAT” using CONSULT.
2. Drive the vehicle, according to driving condition B.

Driving condition B : HBC-44, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Is P3374 detected?

YES >> Refer to HBB-154, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141030

WARNING:
- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield, and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PERFORM SELF-DIAGNOSIS-1

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check if the DTC is detected in “Self Diagnostic Result” of “EV/HEV” and “MOTOR CONTROL”.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable system. GO TO 3.
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS-2

WITH CONSULT
Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is DTC detected?

YES >> Perform diagnosis procedure of applicable system. GO TO 3.
NO >> GO TO 3

3. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 4.

4. CHECK FFD (FREEZE-FRAME DATA)

1. Check FFD (freeze-frame data) of “P3374”.
2. Identify a cell voltage which is ± 100 mV or more higher than the mean voltage of all the cells.

Check results>>The voltage difference of Cell 1, 3, 5, and 7 is more than ± 100mV, respectively.: GO TO 5.
>> The voltage difference of Cell 2, 4, 6, and 8 is more than ± 100mV, respectively.: GO TO 6.
>> The voltage difference of Cell 9, 11, 13, and 15 is more than ± 100mV, respectively.: GO TO 7.
>> The voltage difference of Cell 10, 12, 14, and 16 is more than ± 100mV, respectively.: GO TO 8.
>> The voltage difference of Cell 17, 19, 21, and 23 is more than ± 100mV, respectively.: GO TO 9.
>> The voltage difference of Cell 18, 20, 22, and 24 is more than ± 100mV, respectively.: GO TO 10.
>> The voltage difference of Cell 25, 27, 29, and 31 is more than ± 100mV, respectively.: GO TO 11.
>> The voltage difference of Cell 26, 28, 30, and 32 is more than ± 100mV, respectively.: GO TO 12.
>> The voltage difference of Cell 33, 35, 37, and 39 is more than ± 100mV, respectively.: GO TO 13.
>> The voltage difference of Cell 34, 36, 38, and 40 is more than ± 100mV, respectively.: GO TO 14.
>> The voltage difference of Cell 41, 43, 45, and 47 is more than ± 100mV, respectively.: GO TO 15.
>> The voltage difference of Cell 42, 44, 46, and 48 is more than ± 100mV, respectively.: GO TO 16.
>> The voltage difference of Cell 49, 51, 53, and 55 is more than ± 100mV, respectively.: GO TO 17.
>> The voltage difference of Cell 50, 52, 54, and 56 is more than ± 100mV, respectively.: GO TO 18.
>> The voltage difference of Cell 57, 59, 61, and 63 is more than ± 100mV, respectively.: GO TO 19.
>> The voltage difference of Cell 58, 60, 62, and 64 is more than ± 100mV, respectively.: GO TO 20.
>> The voltage difference of Cell 65, 67, 69, and 71 is more than ± 100mV, respectively.: GO TO 21.
>> The voltage difference of Cell 66, 68, 70, and 72 is more than ± 100mV, respectively.: GO TO 22.
>> The voltage difference of Cell 73, 75, 77, and 79 is more than ± 100mV, respectively.: GO TO 23.
>> The voltage difference of Cell 74, 76, 78, and 80 is more than ± 100mV, respectively.: GO TO 24.
>> The voltage difference of Cell 81, 83, 85, and 87 is more than ± 100mV, respectively.: GO TO 25.
>> The voltage difference of Cell 82, 84, 86, and 88 is more than ± 100mV, respectively.: GO TO 26.
>> The voltage difference of Cell 89, 91, 93, and 95 is more than ± 100mV, respectively.: GO TO 27.
>> The voltage difference of Cell 90, 92, 94, and 96 is more than ± 100mV, respectively.: GO TO 28.

5. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 1	Cell 1	LB8	1	LB3	50	Existed
	Cell 3		3		51	
	Cell 5		5		52	
	Cell 7		7		53	
	Cell 2	LB7	2	LB3	34	
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

6.CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 1	Cell 1	LB8	1	LB3	50	Existed
	Cell 3		3		51	
	Cell 5		5		52	
	Cell 7		7		53	
	Cell 2	LB7	2	LB3	34	
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	
Module 2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

7.CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 1	Cell 2	LB7	2	LB3	34	Existed
	Cell 4		4		35	
	Cell 6		6		36	
	Cell 8		8		37	
Module 2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	
	Cell 10	LB9	2	LB3	38	
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

8.CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 2	Cell 9	LB10	1	LB3	54	Existed
	Cell 11		3		55	
	Cell 13		5		56	
	Cell 15		7		57	
	Cell 10	LB9	2	LB3	38	
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	
Module 3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

9. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 2	Cell 10	LB9	2	LB3	38	Existed
	Cell 12		4		39	
	Cell 14		6		40	
	Cell 16		8		42	
Module 3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	
	Cell 18	LB11	2	LB3	43	
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

10. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 3	Cell 17	LB12	1	LB3	58	Existed
	Cell 19		3		59	
	Cell 21		5		60	
	Cell 23		7		61	
	Cell 18	LB11	2	LB3	43	
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	
Module 4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

11. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 3	Cell 18	LB11	2	LB3	43	Existed
	Cell 20		4		44	
	Cell 22		6		45	
	Cell 24		8		46	
Module 4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	
	Cell 26	LB13	2	LB3	47	
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

12. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 4	Cell 25	LB14	1	LB3	62	Existed
	Cell 27		3		63	
	Cell 29		5	LB4	77	
	Cell 31		7		78	
	Cell 26	LB13	2	LB3	47	
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	
Module 5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

13. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 4	Cell 26	LB13	2	LB3	47	Existed
	Cell 28		4		48	
	Cell 30		6	LB4	65	
	Cell 32		8		66	
Module 5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	
	Cell 34	LB15	2	LB4	69	
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

14. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 5	Cell 33	LB16	1	LB4	80	Existed
	Cell 35		3		81	
	Cell 37		5		82	
	Cell 39		7		83	
	Cell 34	LB15	2	LB4	69	
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	
Module 6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

15. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 5	Cell 34	LB15	2	LB4	69	Existed
	Cell 36		4		70	
	Cell 38		6		71	
	Cell 40		8		72	
Module 6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	
	Cell 42	LB17	2	LB4	73	
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

16. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 6	Cell 41	LB18	1	LB4	84	Existed
	Cell 43		3		85	
	Cell 45		5		86	
	Cell 47		7		87	
	Cell 42	LB17	2	LB4	73	
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	
Module 7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

17. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 6	Cell 42	LB17	2	LB4	73	Existed
	Cell 44		4		74	
	Cell 46		6		75	
	Cell 48		8		76	
Module 7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	
	Cell 50	LB19	2	LB5	90	
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

18. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 7	Cell 49	LB20	1	LB5	110	Existed
	Cell 51		3		111	
	Cell 53		5		112	
	Cell 55		7		113	
	Cell 50	LB19	2	LB5	90	
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	
Module 8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

19. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 7	Cell 50	LB19	2	LB5	90	Existed
	Cell 52		4		91	
	Cell 54		6		92	
	Cell 56		8		93	
Module 8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	
	Cell 58	LB21	2	LB5	94	
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

20. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 8	Cell 57	LB22	1	LB5	114	Existed
	Cell 59		3		115	
	Cell 61		5		116	
	Cell 63		7		117	
	Cell 58	LB21	2	LB5	94	
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	
Module 9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

21. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 8	Cell 58	LB21	2	LB5	94	Existed
	Cell 60		4		95	
	Cell 62		6		96	
	Cell 64		8		97	
Module 9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	
	Cell 66	LB23	2	LB5	99	
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

22. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 9	Cell 65	LB24	1	LB5	118	Existed
	Cell 67		3		119	
	Cell 69		5		120	
	Cell 71		7		121	
	Cell 66	LB23	2	LB5	99	
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	
Module 10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

23. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 9	Cell 66	LB23	2	LB5	99	Existed
	Cell 68		4		100	
	Cell 70		6		101	
	Cell 72		8		102	
Module 10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	
	Cell 74	LB25	2	LB5	103	
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

24. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 10	Cell 73	LB26	1	LB5	122	Existed
	Cell 75		3		123	
	Cell 77		5		124	
	Cell 79		7		125	
	Cell 74	LB25	2	LB5	103	
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	
Module 11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

25. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 10	Cell 74	LB25	2	LB5	103	Existed
	Cell 76		4		104	
	Cell 78		6		105	
	Cell 80		8		106	
Module 11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	
	Cell 82	LB27	2	LB5	107	
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

26. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 11	Cell 81	LB28	1	LB5	127	Existed
	Cell 83		3		128	
	Cell 85		5	LB6	137	
	Cell 87		7		138	
	Cell 82	LB27	2	LB5	107	
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	
Module 12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

27. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 11	Cell 82	LB27	2	LB5	107	Existed
	Cell 84		4		108	
	Cell 86		6	LB6	130	
	Cell 88		8		131	
Module 12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	
	Cell 90	LB29	2	LB6	132	
	Cell 92		4		133	
	Cell 94		6		134	
	Cell 96		8		135	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

28. CHECK CELL VOLTAGE DETECTION CIRCUIT

Check continuity between Li-ion battery controller harness connector and module (cell) harness connector.

Module No.	Cell No.	Module		LBC		Continuity
		Connector	Terminal	Connector	Terminal	
Module 12	Cell 89	LB30	1	LB6	140	Existed
	Cell 91		3		141	
	Cell 93		5		142	
	Cell 95		7		143	
	Cell 90	LB29	2	LB6	132	
	Cell 92		4		133	
	Cell 94		6		134	
	Cell 96		8		135	

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair harness or connector.

29. CHECK THE HISTORY OF REPLACEMENT-1

Check the latest replacement history of the module or battery pack assembly.

Is there a history of part replacement?

YES-1 >> When there is a history of replacing all of the 12 modules, GO TO 30.
YES-2 >> When there is a history of replacing single module, replace all of the 12 modules. However, when replacing a module replaced in the past, it is possible to replace it as a single module replacement if the Li-ion battery is within 17 months from the manufacturing date. In this case, replace only module including an abnormal cell. Refer to HBB-188, "Exploded View".
YES-3 >> When there is a history of battery pack assembly replacement, GO TO 31.
NO >> GO TO 31.

30. CHECK THE HISTORY OF REPLACEMENT-2

Check the module manufacturing date recorded during the replacement of all the 12 modules.

Is it more than 17 months from the date of manufacture?

YES >> Replace all of the 12 modules. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".
NO >> Replace a module including abnormal cell. Refer to HBB-195, "Exploded View".

31. CHECK THE DATE OF MANUFACTURE OF LI-ION BATTERY

Check the battery pack assembly manufacturing date included in the module serial number label. For the label location, refer to HBB-208, "MODULE STACK : Inspection".

Is it more than 17 months from the date of manufacture?

YES >> Replace all of the 12 modules. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".
NO >> Replace a module including abnormal cell. Refer to HBB-195, "Exploded View".

P33E0 DLC DIAGNOSIS HPCM

DTC Logic

INFOID:0000000008141031

DTC DETECTION LOGIC

NOTE:
If DTC “P33E0” is displayed with DTC “UXXXX”, first perform the trouble diagnosis for DTC “UXXXX”.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33E0	DLC DIAGNOSIS HPCM	When the Li-ion battery controller detects an error in CAN data.	• HPCM • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P33E0 detected?

YES >> Refer to HBB-168, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141032

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result”.

DTC-detected control module and DTC	malfunction parts
“P33E0” is detected only in “HV BAT”.	LBC
• “P33E0” is detected in “HV BAT”. • “P3250” is detected in “MOTOR CONTROL”.	HPCM

>> Replace a malfunctioning part corresponding to the control module detecting DTC.

P33E1 DLC DIAGNOSIS ECM

DTC Logic

INFOID:0000000008141033

DTC DETECTION LOGIC

NOTE:
If DTC “P33E1” is displayed with DTC “UXXXX”, first perform the trouble diagnosis for DTC “UXXXX”.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33E1	DLC DIAGNOSIS ECM	When the Li-ion battery controller detects an error in CAN data.	• ECM • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P33E1 detected?

YES >> Refer to HBB-169, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141034

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result”.

DTC-detected control module and DTC	malfunction parts
“P33E1” is detected only in “HV BAT”.	LBC
• “P33E1” is detected in “HV BAT”. • “P3251” is detected in “MOTOR CONTROL”.	ECM

>> Replace a malfunctioning part corresponding to the control module detecting DTC.

P33E2 DLC DIAGNOSIS TCM

DTC Logic

INFOID:0000000008141035

DTC DETECTION LOGIC

NOTE:
If DTC “P33E2” is displayed with DTC “UXXXX”, first perform the trouble diagnosis for DTC “UXXXX”.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33E2	DLC DIAGNOSIS TCM	When the Li-ion battery controller detects an error in CAN data.	• Li-ion battery controller • Transmission-related parts

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P33E2 detected?

YES >> Refer to HBB-170, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141036

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result”.

DTC-detected control module and DTC	malfunction parts
“P33E2” is detected only in “HV BAT”.	LBC
• “P33E2” is detected in “HV BAT”. • A control module other than “HV BAT” detects a transmission-related DTC.	Perform diagnosis of the transmission-related DTC detected by a control module other than “HV BAT”.

>> Replace a malfunctioning part corresponding to the control module detecting DTC.

P33F0 DLC DIAGNOSIS TCM

DTC Logic

INFOID:0000000008141037

DTC DETECTION LOGIC

NOTE:
If DTC “P33F0” is displayed with DTC “UXXXX”, first perform the trouble diagnosis for DTC “UXXXX”.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33F0	DLC DIAGNOSIS TCM	When the Li-ion battery controller detects an error in CAN data.	• Li-ion battery controller • Transmission-related parts

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P33F0 detected?

YES >> Refer to HBB-171, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141038

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result”.

DTC-detected control module and DTC	malfunction parts
“P33F0” is detected only in “HV BAT”.	LBC
• “P33F0” is detected in “HV BAT”. • A control module other than “HV BAT” detects a transmission-related DTC.	Perform diagnosis of the transmission-related DTC detected by a control module other than “HV BAT”.

>> Replace a malfunctioning part corresponding to the control module detecting DTC.

P33F1 DLC DIAGNOSIS TCM

DTC Logic

INFOID:0000000008141039

DTC DETECTION LOGIC

NOTE:
If DTC “P33F1” is displayed with DTC “UXXXX”, first perform the trouble diagnosis for DTC “UXXXX”.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33F1	DLC DIAGNOSIS TCM	When the Li-ion battery controller detects an error in CAN data.	• Li-ion battery controller • Transmission-related parts

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.

Is P33F1 detected?

YES >> Refer to HBB-172, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008141040

1.PERFORM SELF-DIAGNOSIS

WITH CONSULT
1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result”.

DTC-detected control module and DTC	malfunction parts
“P33F1” is detected only in “HV BAT”.	LBC
• “P33F1” is detected in “HV BAT”. • A control module other than “HV BAT” detects a transmission-related DTC.	Perform diagnosis of the transmission-related DTC detected by a control module other than “HV BAT”.

>> Replace a malfunctioning part corresponding to the control module detecting DTC.

U0100 LOST COMMUNICATION ECM

DTC Logic

INFOID:0000000008141041

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
U0100	LOST COMMUNICATION ECM	Li-ion battery controller cannot receive a CAN communication signal from ECM for 2 seconds or more continuously.	Harness or connector (CAN communication line open or short)

DTC CONFIRMATION PROCEDURE

1.PREPARATION BEFORE STARTING OPERATIONS

If other DTC confirmation Procedure is performed immediately before this procedure, turn the ignition switch OFF and wait at least 10 seconds to start the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Perform work procedure (inspection mode 5). Refer to HBC-91, "Work Procedure (Inspection Mode 5)".
2. Start the engine and wait for 5 seconds or more.
3. Perform “All DTC Reading” with CONSULT.
4. Check if the DTC is detected in “Self Diagnostic Result” of “MOTOR CONTROL”.

Is U0100, U0101, U0111 or U0293 detected?

YES >> GO TO 3.
NO-1 (When DTC “U0100”, “U0101”, “U0111” or “U0293” is stored in “MOTOR CONTROL” at the time of receiving.)>>GO TO 3
NO-2 (When repaired after performing the diagnosis procedure. Refer to HBB-173, "Diagnosis Procedure") >> INSPECTION END

3.PERFORM CAN DIAGNOSIS

WITH CONSULT
1. Perform “CAN DIAGNOSIS”
2. Check diagnosis result.

>> Refer to HBB-173, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008141042

CAUTION:
- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-9, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-9, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check “CAN DIAGNOSIS” results).

Are there any current or past malfunctions?

YES >> Refer to LAN-19, "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 • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch lines • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• Li-ion battery controller branch lines • Li-ion battery controller
DTC U0293	• HPCM branch lines • HPCM*2
DTC U0101, U0111 and U0293	Main line between traction motor inverter and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

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

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-49, "Intermittent Incident".

U0101 LOST COMMUNICATION TCM

DTC Logic

INFOID:0000000008141043

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
U0101	LOST COMMUNICATION TCM	Li-ion battery controller cannot receive a CAN communication signal from TCM for 2 seconds or more continuously.	Harness or connector (CAN communication line open or short)

DTC CONFIRMATION PROCEDURE

1.PREPARATION BEFORE STARTING OPERATIONS

If other DTC confirmation procedure is performed immediately before this procedure, turn the ignition switch OFF and wait at least 10 seconds to start the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Perform work procedure (inspection mode 5). Refer to HBC-91, "Work Procedure (Inspection Mode 5)".
2. Start the engine and wait for 5 seconds or more.
3. Perform “All DTC Reading” with CONSULT.
4. Check if the DTC is detected in “Self Diagnostic Result” of “MOTOR CONTROL”.

Is U0100, U0101, U0111 or U0293 detected?

YES >> GO TO 3.
NO-1 (When DTC “U0100”, “U0101”, “U0111” or “U0293” is stored in “MOTOR CONTROL” at the time of receiving.)>>GO TO 3.
NO-2 (When repaired after performing the diagnosis procedure. Refer to HBB-173, "Diagnosis Procedure") >> INSPECTION END

3.PERFORM CAN DIAGNOSIS

WITH CONSULT
1. Perform “CAN DIAGNOSIS”
2. Check diagnosis result.

>> Refer to HBB-173, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008141044

CAUTION:
- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-9, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-9, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check “CAN DIAGNOSIS” results).

Are there any current or past malfunctions?

YES >> Refer to LAN-19, "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 • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch lines • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• Li-ion battery controller branch lines • Li-ion battery controller
DTC U0293	• HPCM branch lines • HPCM[*2]
DTC U0101, U0111 and U0293	Main line between traction motor inverter and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

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

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-49, "Intermittent Incident".

U0110 LOST COMM INV/MC

DTC Logic

INFOID:0000000008141045

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
U0110	LOST COMMUNICATION INV/MC	Li-ion battery controller cannot receive a CAN communication signal from traction motor inverter for 2 seconds or more continuously.	Harness or connector (CAN communication line open or short)

DTC CONFIRMATION PROCEDURE

1.PREPARATION BEFORE STARTING OPERATIONS

If other DTC confirmation procedure is performed immediately before this procedure, turn the ignition switch OFF and wait at least 10 seconds to start the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT

1. Perform work procedure (inspection mode 5). Refer to HBC-91, "Work Procedure (Inspection Mode 5)".
2. Start the engine and wait for 5 seconds or more.
3. Perform “All DTC Reading” with CONSULT.
4. Check if the DTC is detected in “Self Diagnostic Result” of “MOTOR CONTROL”.

Is U0100, U0101, U0111 or U0293 detected?

YES >> GO TO 3.
NO-1 (When DTC “U0100”, “U0101”, “U0111” or “U0293” is stored in “MOTOR CONTROL” at the time of receiving.)>>GO TO 3.
NO-2 (When repaired after performing the diagnosis procedure. Refer to HBB-173, "Diagnosis Procedure") >> INSPECTION END

3.PERFORM CAN DIAGNOSIS

WITH CONSULT

1. Perform “CAN DIAGNOSIS”
2. Check diagnosis result.

>> Refer to HBB-173, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008141046

CAUTION:

- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-9, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-9, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check “CAN DIAGNOSIS” results).

Are there any current or past malfunctions?

YES >> Refer to LAN-19, "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 • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch lines • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• Li-ion battery controller branch lines • Li-ion battery controller
DTC U0293	• HPCM branch lines • HPCM*2
DTC U0101, U0111 and U0293	Main line between traction motor inverter and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

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

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-49, "Intermittent Incident".

U0293 LOST COMMUNICATION HPCM

DTC Logic

INFOID:0000000008141047

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
U0293	LOST COMMUNICATION HPCM	Li-ion battery controller cannot receive a CAN communication signal from HPCM for 2 seconds or more continuously.	Harness or connector (CAN communication line open or short)

1.PREPARATION BEFORE STARTING OPERATIONS

If other DTC confirmation Procedure is performed immediately before this procedure, turn the ignition switch OFF and wait at least 10 seconds to start the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT
1. Perform work procedure (inspection mode 5). Refer to HBC-91, "Work Procedure (Inspection Mode 5)".
2. Start the engine and wait for 5 seconds or more.
3. Perform “All DTC Reading” with CONSULT.
4. Check if the DTC is detected in “Self Diagnostic Result” of “MOTOR CONTROL”.

Is U0100, U0101, U0111 or U0293 detected?

YES >> GO TO 3.
NO-1 (When DTC “U0100”, “U0101”, “U0111” or “U0293” is stored in “MOTOR CONTROL” at the time of receiving.)>>GO TO 3.
NO-2 (When repaired after performing the diagnosis procedure. Refer to HBB-173, "Diagnosis Procedure") >> INSPECTION END

3.PERFORM CAN DIAGNOSIS

WITH CONSULT
1. Perform “CAN DIAGNOSIS”
2. Check diagnosis result.

>> Refer to HBB-173, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008141048

CAUTION:
- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-9, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-9, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check “CAN DIAGNOSIS” results).

Are there any current or past malfunctions?

YES >> Refer to LAN-19, "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 • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch lines • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• Li-ion battery controller branch lines • Li-ion battery controller
DTC U0293	• HPCM branch lines • HPCM[*2]
DTC U0101, U0111 and U0293	Main line between traction motor inverter and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

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

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-49, "Intermittent Incident".

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000008141049

CAN (Controller Area Network) is a serial communication line for real time applications. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Modern vehicle is equipped with many electronic control units, 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, CAN-L) allowing a high rate of information transmission with less wiring.Each control unit transmits/receives data but selectively reads the required data only.CAN communication signal chart. Refer to LAN-36, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart".

DTC Logic

INFOID:0000000008141050

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
U1000	CAN COMM CIRCUIT	Li-ion battery controller cannot receive a CAN communication signal for 2 seconds or more continuously.	CAN communication system

Diagnosis Procedure

INFOID:0000000008141051

For the diagnosis procedure, refer to LAN-19, "Trouble Diagnosis Flow Chart".

INSULATION RESISTANCE

Component Inspection

INFOID:0000000008141052

WARNING:

- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1. PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 2.

2. CHECK LI-ION BATTERY 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.

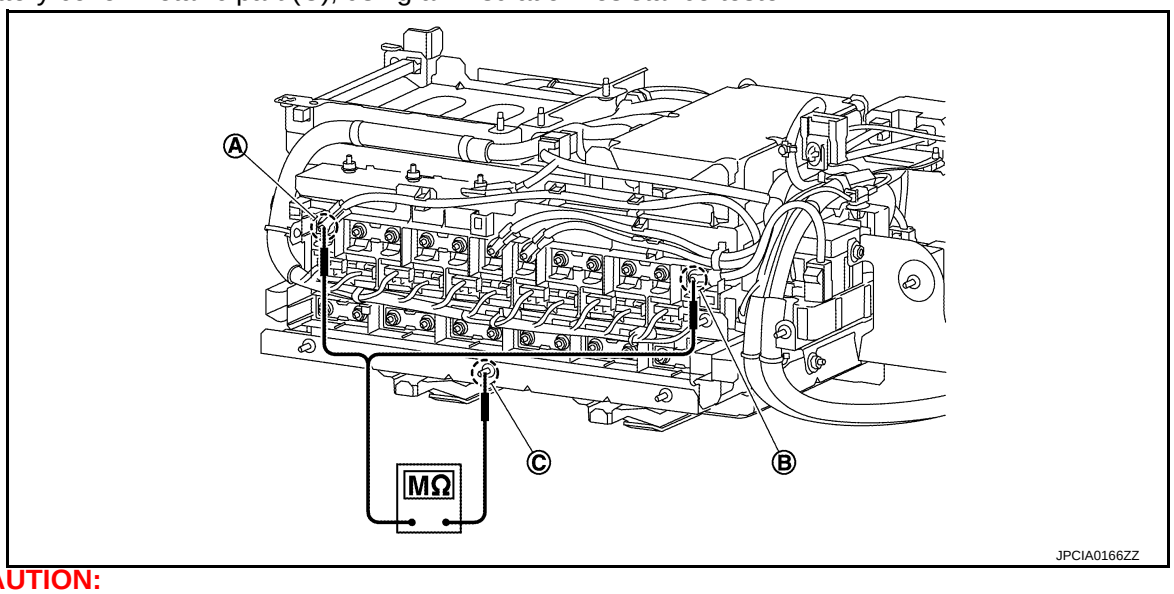
1. Disconnect Li-ion battery controller harness connector.

   WARNING:

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

2. Remove front battery cover from Li-ion battery. Refer to HBB-195, "Exploded View".

3. Check insulation resistance between Li-ion battery positive terminal (A)/negative terminal (B) and lower battery cover metallic part (C), 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.**

Li-ion battery terminals	Ground	Resistance
+	Lower battery cover metallic part	21 MΩ or more
–		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace Li-ion battery (battery pack). Refer to HBB-188, "Removal and Installation".

POWER SUPPLY AND GROUND CIRCUIT
LI-ION BATTERY CONTROLLER
LI-ION BATTERY CONTROLLER : Diagnosis Procedure

INFOID:0000000008141053

WARNING:

- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective gear consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.CHECK FUSE

Check that the 10A fuse (No.64) is not fusing.

NOTE:

Refer to PG-43, "Fuse and Fusible Link Arrangement" for fuse layout.

Is the fuse fusing?

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

2.CHECK POWER SUPPLY-1

Check voltage between Li-ion battery harness connector and ground.

+		–		Voltage
Li-ion battery				
Connector	Terminal	Connector	Terminal	
B283	6	B283	2	Battery voltage
			14	

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK POWER SUPPLY-2

1. Disconnect Li-ion battery harness connector.
2. Check voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B283	6	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4.CHECK GROUND

Check installation status of ground (B264). Refer to GI-52, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Recover the installation status of Ground.

5.CHECK GROUND CIRCUIT-1

Check continuity between Li-ion battery harness connector and ground.

Li-ion battery		–	Continuity
Connector	Terminal		
B283	2	Ground	Existed
	14		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".

>> GO TO 7.

7.CHECK POWER SUPPLY CIRCUIT

Check continuity between Li-ion battery harness connector and Li-ion battery controller harness connector.

Li-ion battery		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB39	6	LB1	12	Existed

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK GROUND CIRCUIT-2

Check continuity between Li-ion battery harness connector and Li-ion battery controller harness connector.

Li-ion battery		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB39	2	LB1	3	Existed
	14		15	

Is the inspection result normal?

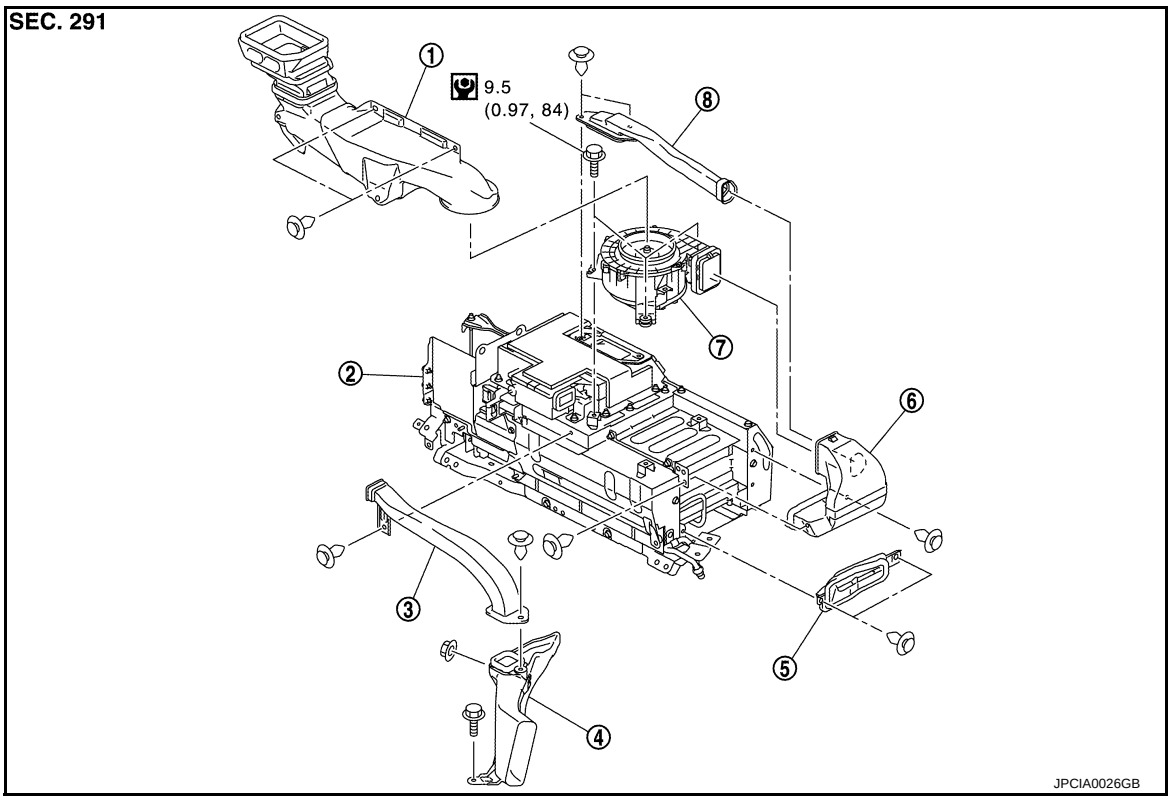
YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

REMOVAL AND INSTALLATION

COOLING SYSTEM

Exploded View

INFOID:0000000008141054



1. Battery inlet duct A
2. Li-ion battery
3. DC/DC outlet duct
4. Battery outlet duct B
5. Battery outlet duct A
6. Battery inlet duct B
7. Battery cooling fan
8. DC/DC inlet duct

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000008141055

WARNING:

- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

REMOVAL

WARNING:

Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

1. Remove the trunk finisher front. Refer to INT-52, "TRUNK FINISHER FRONT : Removal and Installation".
2. Remove the DC/DC outlet duct, battery outlet duct B, and battery inlet duct A.

   WARNING:

   To prevent electric shock hazards, be sure to wear protective gear.

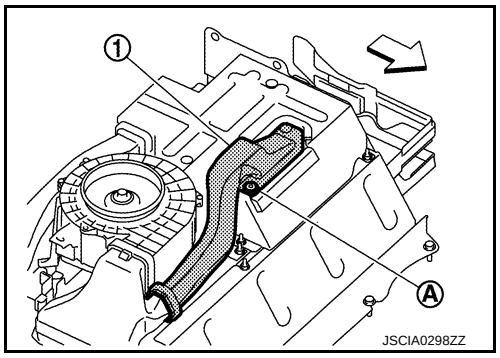
3. Remove the DC/DC inlet duct.
   - Clip (A) is not visible because it is located on the reverse side of the DC/DC inlet duct (1). Remove as shown in the figure.

   ⇦ : Vehicle front

   WARNING:

   To prevent electric shock hazards, be sure to wear protective gear.

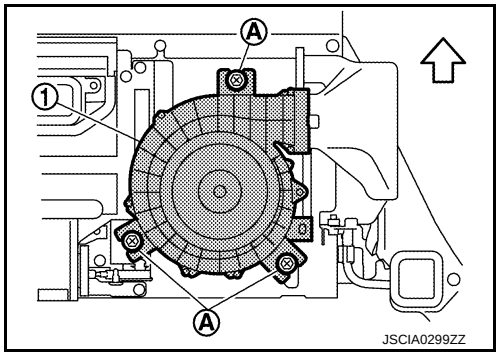
4. Remove the mounting bolts (A) and remove the battery cooling fan (1).

   ⇦ : Vehicle front

   WARNING:

   To prevent electric shock hazards, be sure to wear protective gear.

INSTALLATION

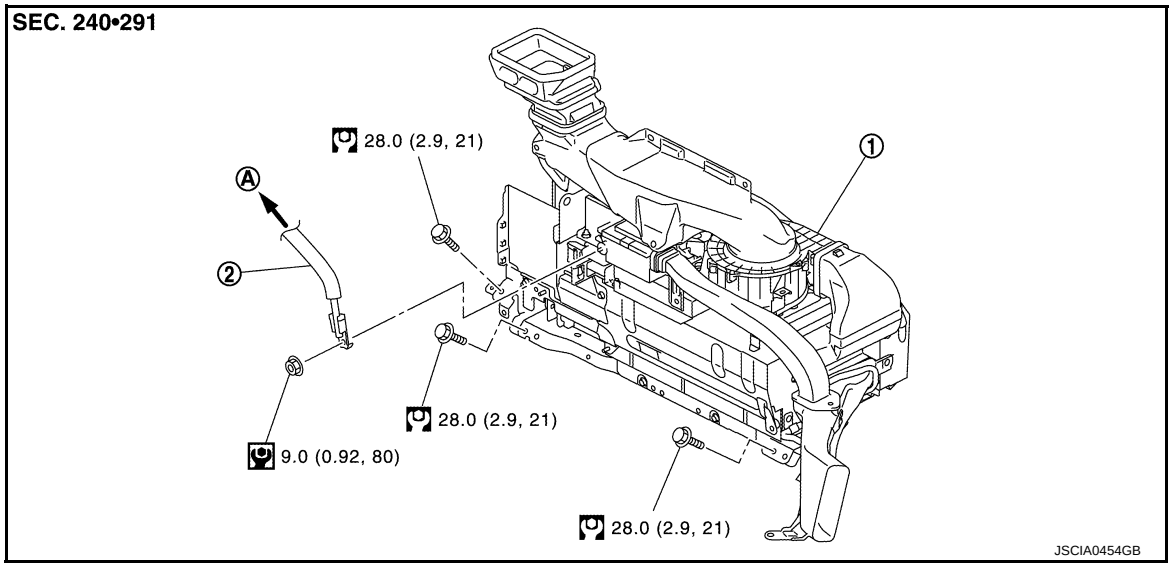
Install in the reverse order of removal.

UNIT REMOVAL AND INSTALLATION

LI-ION BATTERY

Exploded View

INFOID:0000000008141056



1. Li-ion battery assembly
2. DC/DC harness

A. To 12V battery

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000008141057

WARNING:

- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

REMOVAL

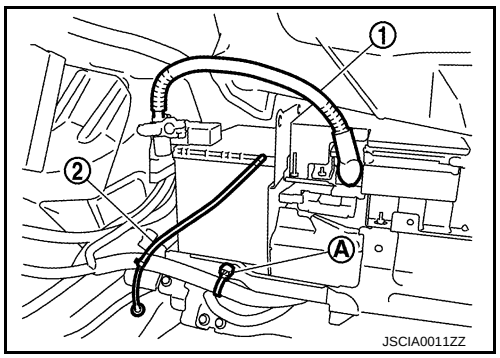
WARNING:

Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

1. Remove the trunk finisher front. Refer to INT-52, "TRUNK FINISHER FRONT : Removal and Installation".
2. Remove battery inlet duct A, DC/DC outlet duct, and battery outlet duct B. Refer to HBB-186, "Exploded View".

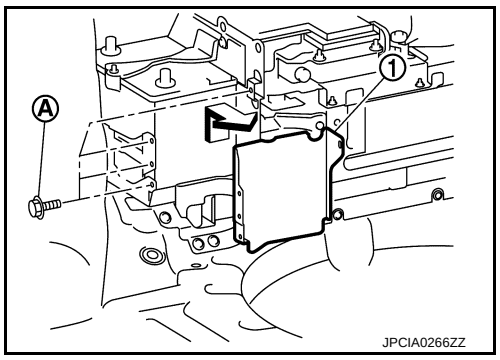
3. Remove the DC/DC harness (1), the battery vent tube (2), and the high voltage harness clip (A).

CAUTION:
Hold the tip of tube to remove the battery vent tube.



4. Remove cover of 12V battery positive terminal.
5. Remove the mounting bolts (A) and then remove the 12V battery cover A (1).

⇦ : Removal direction

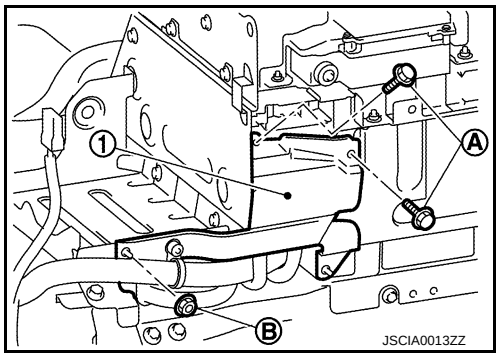


6. Remove the 12V battery. Refer to PG-141, "Removal and Installation".
7. Remove the terminal cover (1).

A : Mounting bolt
B : Mounting nut

WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

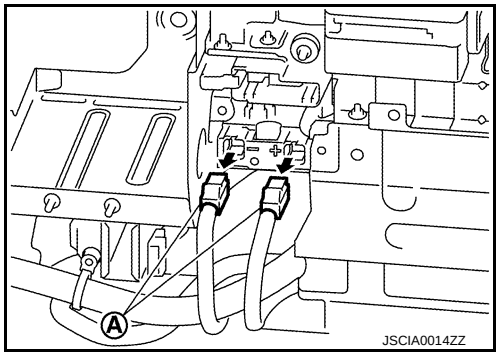


8. Disconnect the high voltage harness connectors (A).

⇦ : Removal direction

DANGER:

- **Touching high voltage components without using the appropriate protective equipment will cause electrocution.**

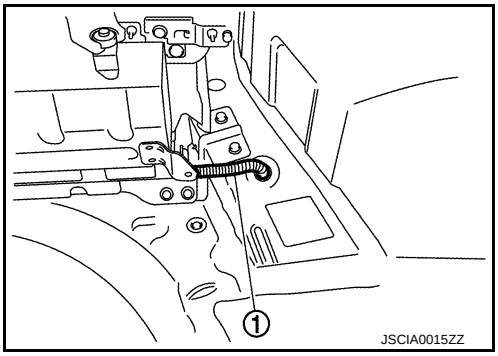


- **Immediately protect the terminals of the disconnected high voltage harness connector using insulating tape so that they are not exposed.**
- **Immediately protect the terminals of the disconnected battery junction box using insulating tape so that they are not exposed.**

9. Grasp the rubber base of the gas discharge tube (1) and remove the tube from the vehicle-side discharge port (body member).

WARNING:

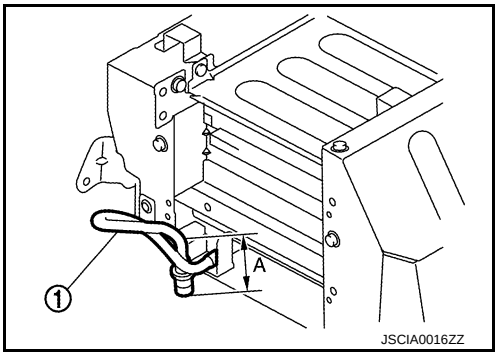
To prevent electric shock hazards, be sure to wear protective gear.



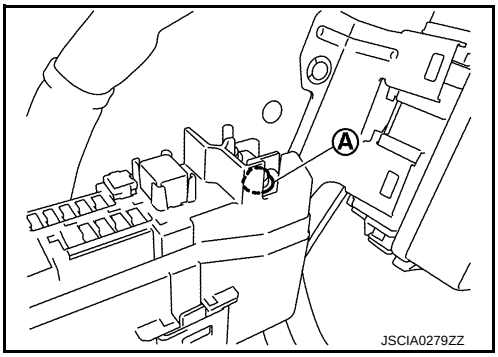
10. Hook approximately 15 mm (A) from the end of the gas discharge tube (1) onto the tube base on the battery and check that the flange on the end of the tube does not come off from the tube base.

WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

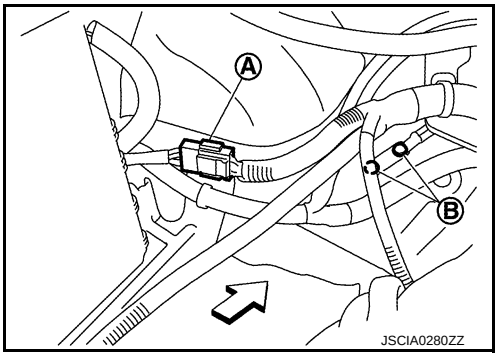


11. Remove the mounting nut (A), then disconnect the harness from the fuse box on the left side of the trunk room.



12. Disconnect the capacitor harness connector (A) and remove the ground cable mounting bolts (B).

⇦ : Vehicle front

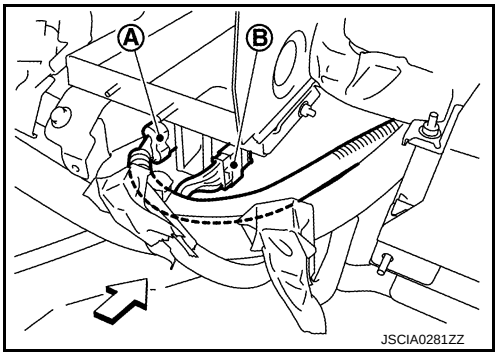


13. Disconnect the high voltage harness connector (A) and harness connector (B).

⇦ : Vehicle front

DANGER:

- **Touching high voltage components without using the appropriate protective equipment will cause electrocution.**

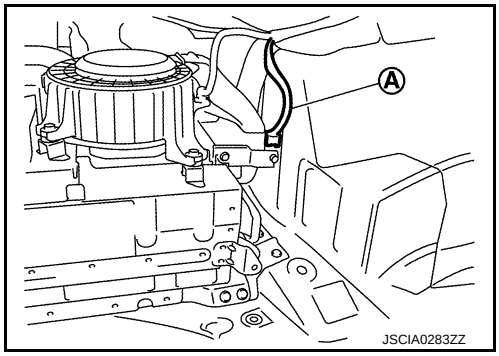


- **Immediately protect the terminals of the disconnected high voltage harness connector using insulating tape so that they are not exposed.**

14. Disconnect the fusible link connector that is integrated with the battery. Refer to PG-142, "Exploded View".
15. Disconnect the atmospheric pressure sensor harness connector (A).
16. Disconnect the harness clip that is installed on the Li-ion battery.

WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

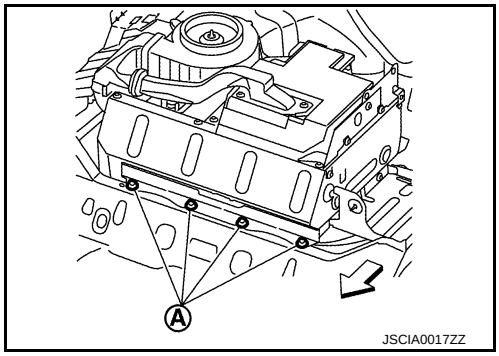


17. Remove the rear seat. Refer to SE-93, "Removal and Installation".
18. Remove the HPCM. Refer to HBC-339, "Removal and Installation".
19. Remove the battery pack mounting bolts (A) from the passenger compartment side.

⇦ : Vehicle front

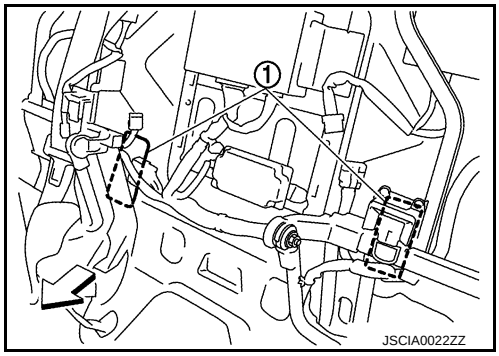
WARNING:

To prevent electric shock hazards, be sure to wear protective gear.



- When the noise insulation sheet (1) that is attached to the body panel on the rear seat back is removed, it is possible to check the mounting bolts.

⇦ : Vehicle front

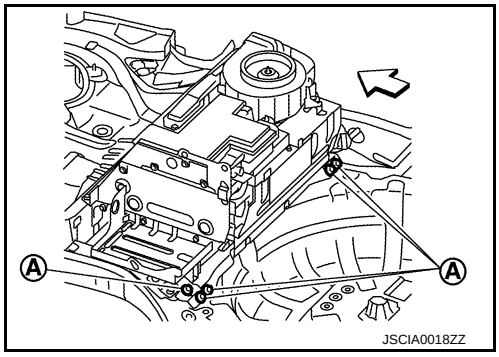


20. Remove the battery pack mounting bolts (A) from the trunk side.

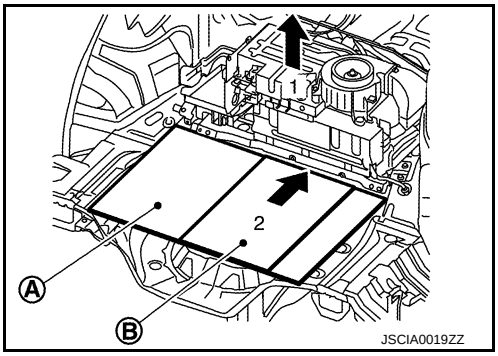
⇦ : Vehicle front

WARNING:

To prevent electric shock hazards, be sure to wear protective gear.



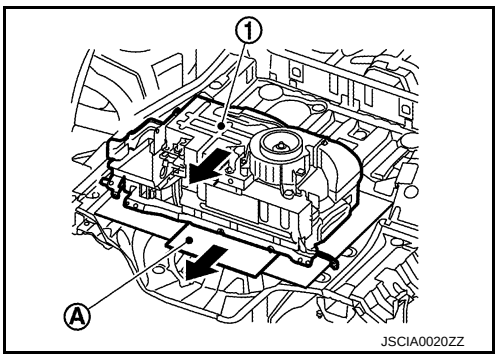
21. Place a veneer board (A) on top of the spare tire, then lift the battery pack upwards (1) and slide the cardboard (B) underneath the battery pack.



WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

22. Pull the cardboard (A) together with the battery pack (1) toward the rear of the vehicle.

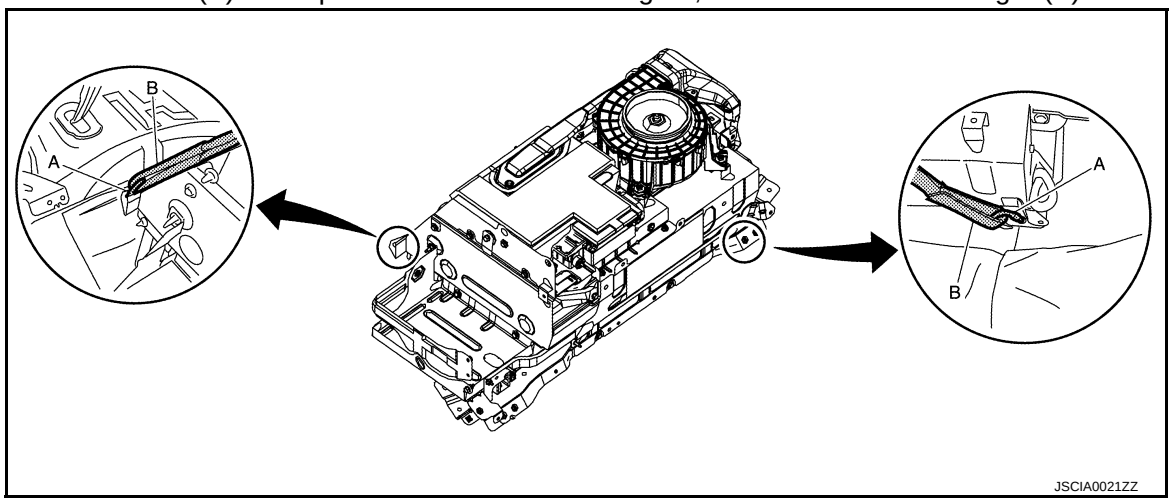


WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

23. Follow the procedure below to remove the battery pack from inside the trunk room.

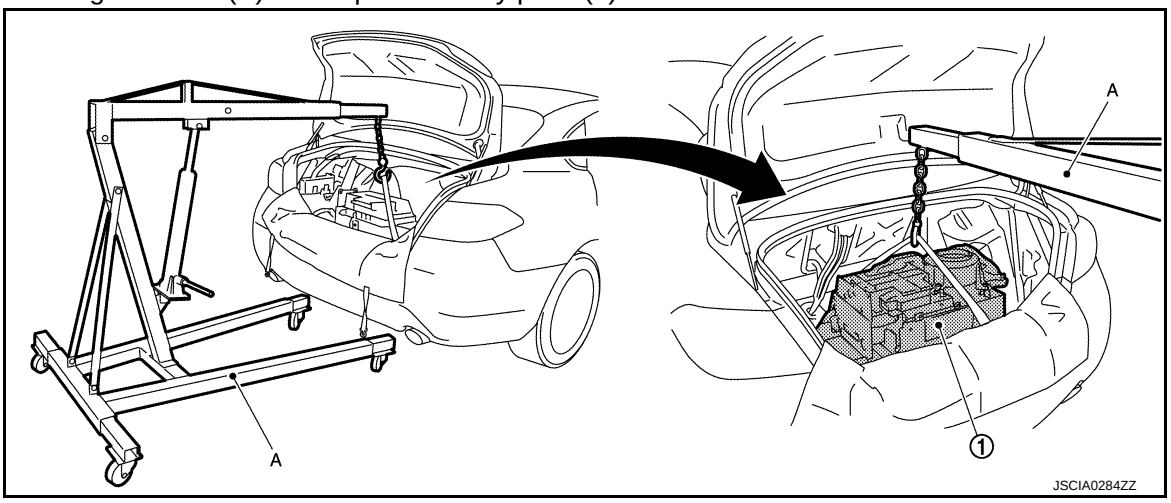
a. Attach a carabiner (A) in the position as shown in the figure, then connect a belt slinger (B) to it.



WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

b. Use an engine crane (A) to lift up the battery pack (1) and remove it from the trunk room.

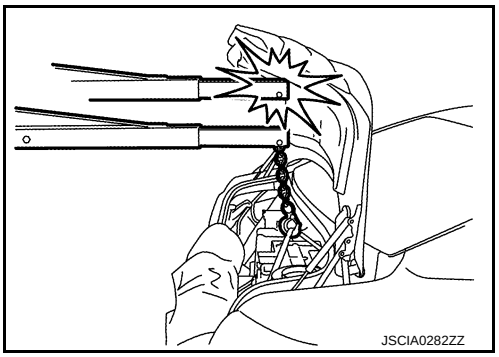


WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

CAUTION:

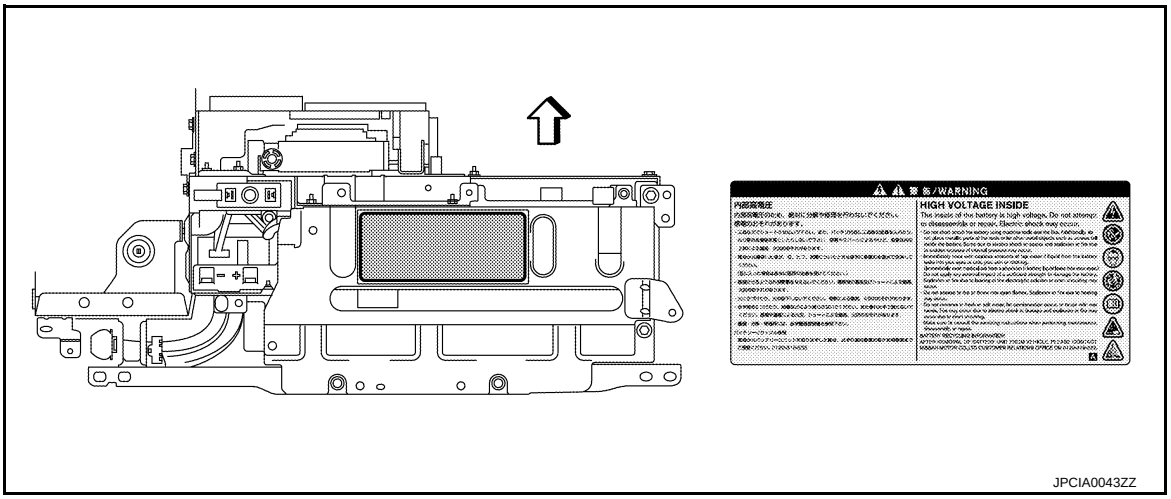
- **Be careful that the engine crane does not contact the trunk lid.**
- **Apply protection so that no scratches or other damage occurs on the body or trunk lid.**



INSTALLATION

Note the following, and install in the reverse order of removal.

- Be sure to reinstall high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.
- After battery pack installed, be sure to check equipotential. Refer to HBB-194, "Inspection".
- When replacing the battery pack, apply the high voltage warning label as shown in the figure.



⇦ : Up side of vehicle

NOTE:
Before applying the label, check that there is no dust or dirt on the surface of the battery pack.

SERVICE PART

- Since the battery pack assembly is provided as a service part under the following conditions, the controller cover must be removed to connect the harness connector of the Li-ion battery controller before installing to the vehicle.
- Observe the instructions in “How to Install Battery Pack Assembly”. For tightening torque, refer to HBB-188, "Exploded View".

Battery pack assembly (service part) is provided with:

- Harness connector of Li-ion battery controller not connected
- No DC/DC converter
- No DC/DC converter cover

How to Install Battery Pack Assembly

1. Remove controller cover. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
2. Connect harness connector of li-ion battery controller.
3. Install controller cover.
4. Install DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
5. Install DC/DC converter cover. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".

Inspection

INFOID:0000000008141058

INSPECTION AFTER INSTALLATION

EQUIPOTENTIAL TEST

After installing Li-ion battery, measure resistance below.

- Between the Li-ion battery (metal part) and the body (ground bolt).
- Between the Li-ion battery (metal part) and traction motor inverter (aluminum part).

WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

Standard : Less than 0.1 Ω

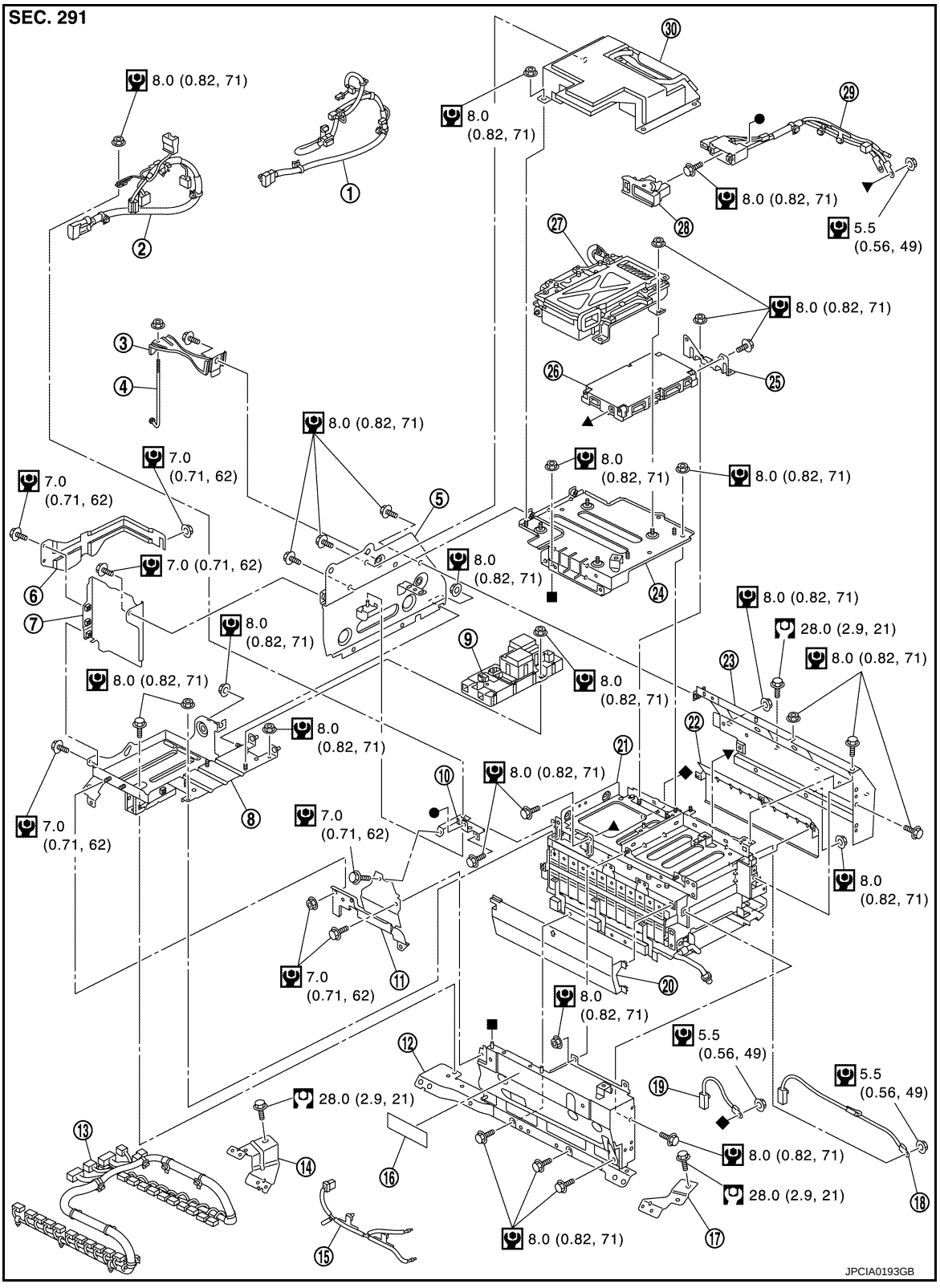
If the result deviates from the standard value, check for paint, oil, dirt, or other substance adhering to the bolts or conductive mounting parts. If such substances are found, clean the surrounding area and remove the foreign substances.

UNIT DISASSEMBLY AND ASSEMBLY

LI-ION BATTERY

Exploded View

INFOID:0000000008141059

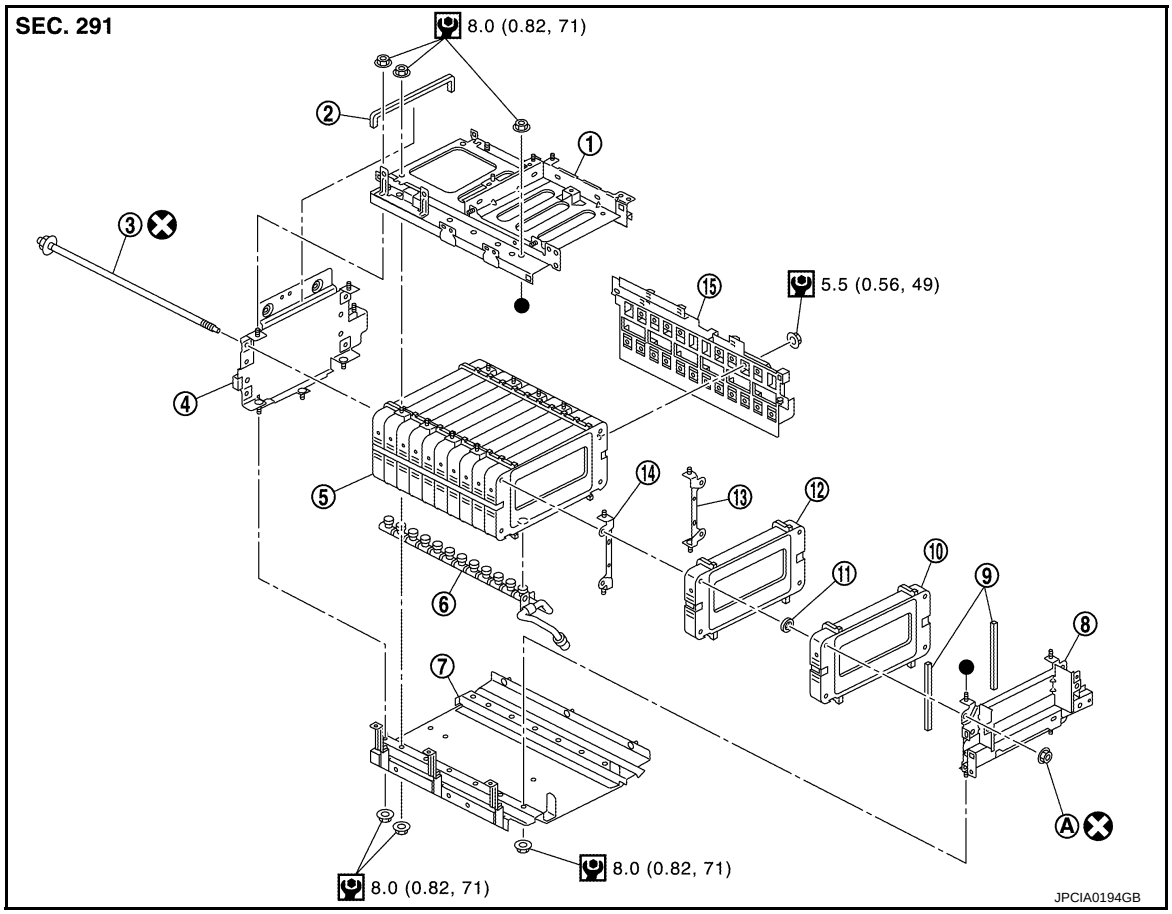


1. Vehicle communication harness
2. High voltage harness
3. Battery fix frame
4. Battery fix rod
5. Battery cover LH
6. 12V battery cover B
7. 12V battery cover A
8. Battery junction box bracket
9. Battery junction box bracket
10. Service plug bracket
11. Terminal cover
12. Rear battery cover
13. Cell voltage detection harness
14. Battery bracket
15. Battery temperature sensor
16. High voltage warning label
17. Battery bracket
18. High voltage harness
19. High voltage harness
20. Rear harness protector
21. Module stack assembly
22. Front harness protector
23. Front battery cover
24. Controller cover
25. Controller bracket
26. Li-ion battery controller
27. DC/DC converter
28. Service plug
29. Service plug harness
30. DC/DC converter cover

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

●, ▲, ■, ▼, ◆ : Indicates that the part is connected at points with same symbol in actual vehicle.



1. Upper battery cover
2. Seal
3. Through bolt
4. Battery mounting plate LH
5. Module stack
6. Gas discharge tube
7. Lower battery cover
8. Battery mounting plate RH
9. Seal
10. Module B
11. Washer
12. Module A
13. Rear battery mounting plate
14. Front battery mounting plate
15. Bus bar

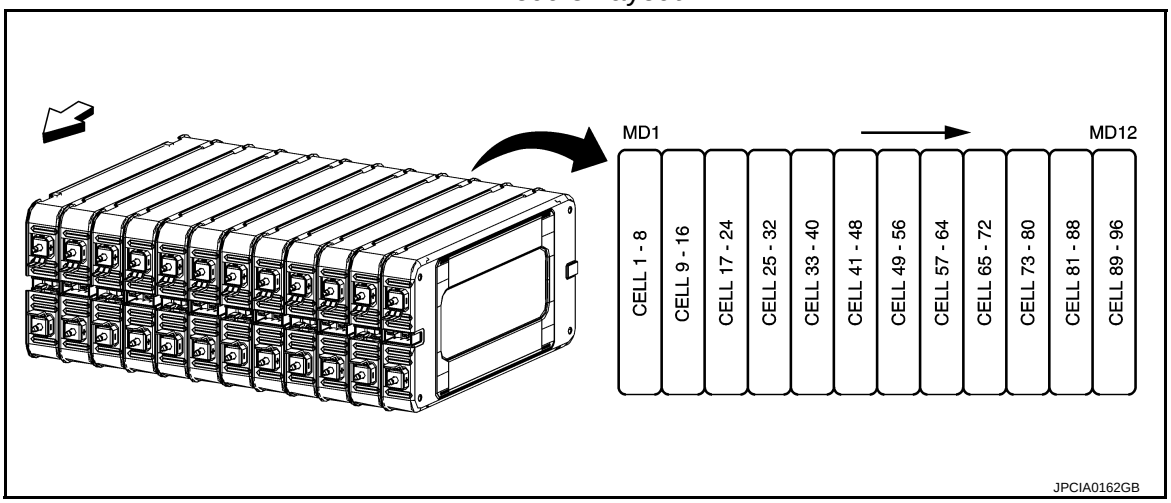
A. Comply with the assembly procedure when tightening. Refer to HBB-202, "MODULE STACK : Disassembly and Assembly".

: Always replace every disassembly

: N·m (kg-m, in-lb)

● : Indicates that the part is connected at points with same symbol in actual vehicle.

Module Layout



⇦ : Vehicle front MD : Module

DC/DC CONVERTER

DC/DC CONVERTER : Disassembly and Assembly

INFOID:0000000008141060

WARNING:

- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

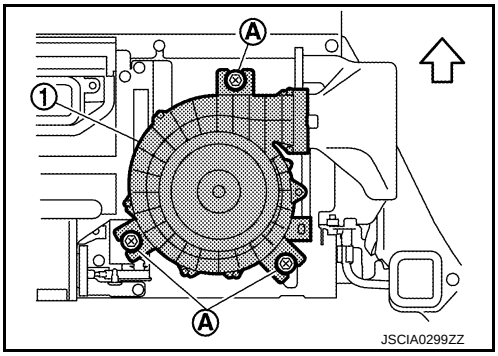
DISASSEMBLY

1. Remove battery outlet duct A, battery inlet duct B, and the DC/DC inlet duct from the battery pack.

   WARNING:

   To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

2. Remove the battery cooling fan (1).



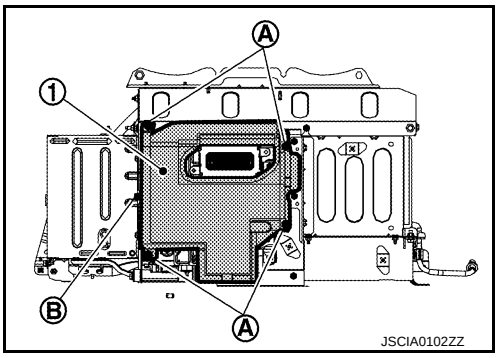
A. : Mounting bolt

⇦ : Vehicle front

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

3. Remove the DC/DC converter cover (1).



A. : Mounting nut

B. : Mounting bolt

WARNING:

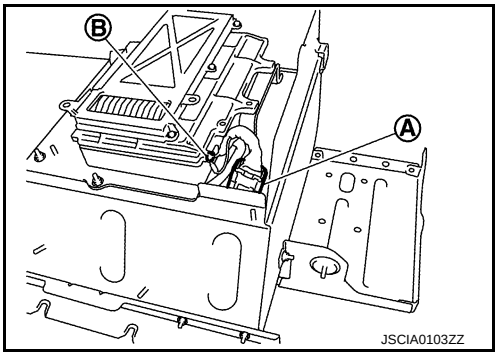
To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

4. Disconnect the DC/DC converter harness connectors (A) (B).

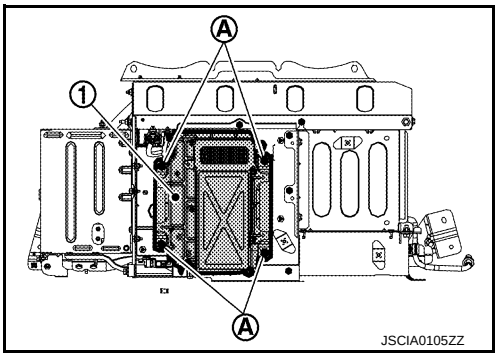
DANGER:

- **Touching high voltage components without using the appropriate protective equipment will cause electrocution.**

- **To prevent electric shock hazards, immediately wrap insulating tape around disconnected high voltage connector terminals.**



5. Remove the DC/DC converter (1).



A. : Mounting nut

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

ASSEMBLY

Assemble in the reverse order of disassembly.

BATTERY JUNCTION BOX

BATTERY JUNCTION BOX : Disassembly and Assembly

INFOID:0000000008141061

WARNING:

- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

DISASSEMBLY

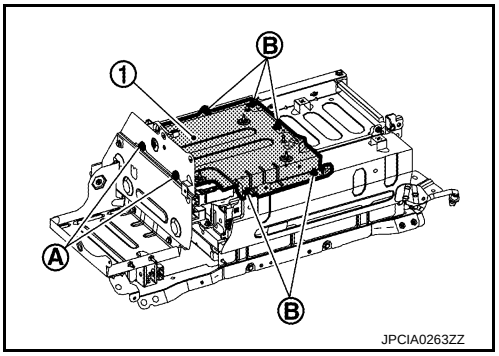
1. Remove the DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".

2. Remove the controller cover (1).

   A. : Mounting bolt
   B. : Mounting nut

   WARNING:

   To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

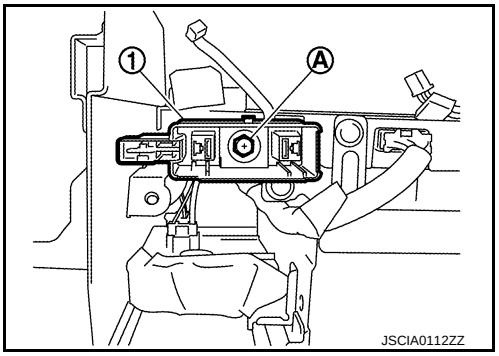


JPCIA0263ZZ

3. Remove the mounting bolt (A), and then disconnect the service plug harness (1) from the bracket.

   WARNING:

   To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

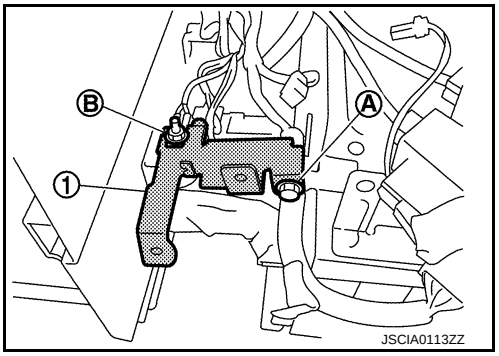


JSCIA0112ZZ

4. Remove the mounting bolt (A) and the ground cable mounting nut (B), then remove the service plug bracket (1).

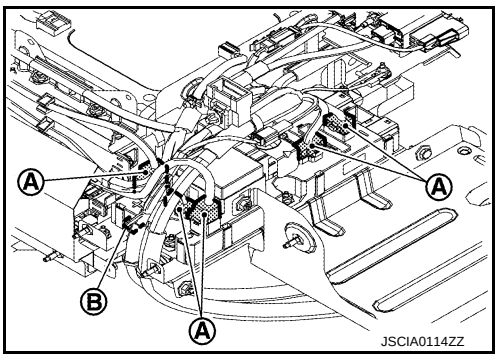
   WARNING:

   To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.



JSCIA0113ZZ

5. Disconnect the high voltage harness connectors (A) and vehicle communications harness connector (B) from the battery junction box.

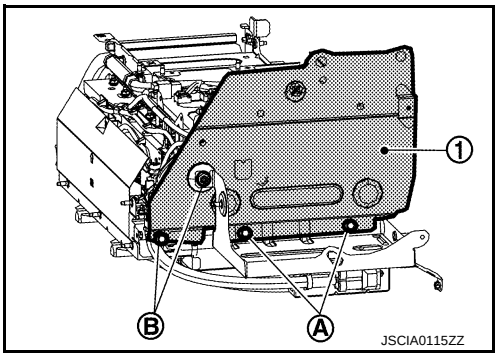


DANGER:

- **Touching high voltage components without using the appropriate protective equipment will cause electrocution.**

- **To prevent electric shock hazards, immediately wrap insulating tape around disconnected high voltage connector terminals.**

6. Remove the battery cover LH (1).

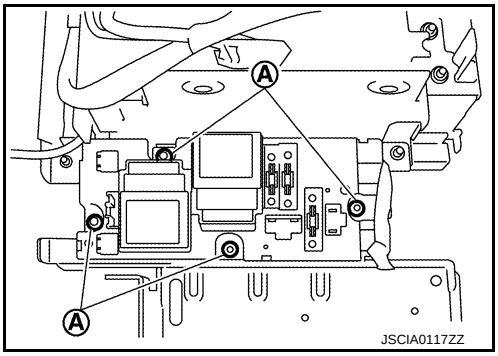


A. : Mounting bolt
B. : Mounting nut

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

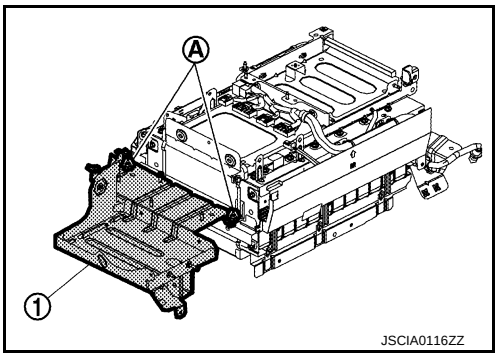
7. Remove the mounting nuts (A), then remove the battery junction box.



WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

8. Remove the mounting nuts (A), then remove the battery junction box bracket (1).



WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

ASSEMBLY

Assemble in the reverse order of disassembly.

LI-ION BATTERY CONTROLLER

LI-ION BATTERY CONTROLLER : Disassembly and Assembly

INFOID:0000000008141062

WARNING:

- **Because 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.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

DISASSEMBLY

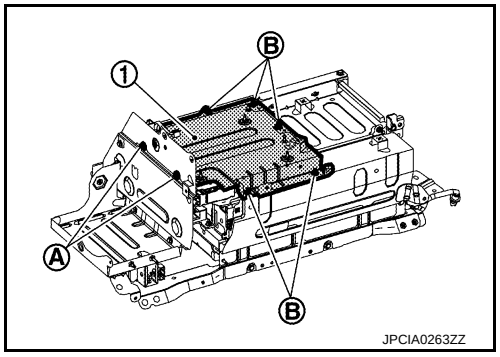
1. Remove the DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".

2. Remove the controller cover (1).

   A. : Mounting bolt
   B. : Mounting nut

   WARNING:

   To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.



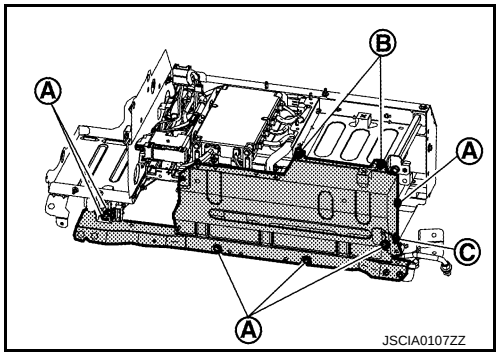
JPCIA0263ZZ

3. Remove the rear battery cover.

   A. : Mounting bolt
   B. : Mounting nut
   C: : Clips

   WARNING:

   To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.



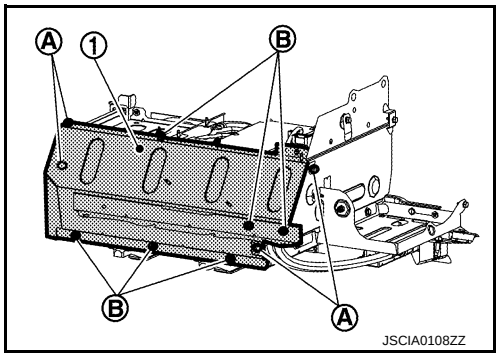
JSCIA0107ZZ

4. Remove the front battery cover (1).

   A. : Mounting bolt
   B. : Mounting nut

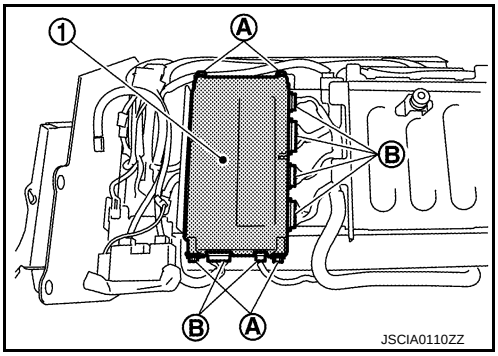
   WARNING:

   To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.



JSCIA0108ZZ

5. Remove the mounting bolts (A) and harness connectors (B), then remove the Li-ion battery controller (1).



WARNING:

- **To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.**

- **To prevent electric shock hazards, immediately wrap insulating tape around disconnected high voltage connector terminals.**

ASSEMBLY

Assemble in the reverse order of disassembly.

MODULE STACK

MODULE STACK : Disassembly and Assembly

INFOID:0000000008141063

WARNING:

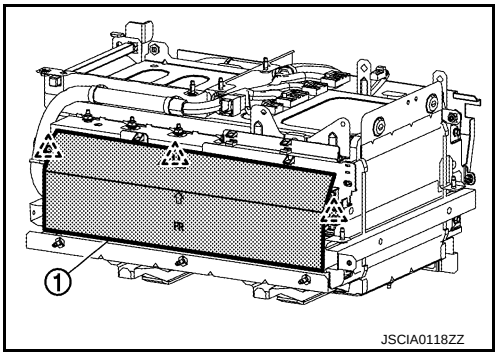
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBB-6, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

DISASSEMBLY

1. Remove the DC/DC converter (1). Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
2. Remove the battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".
3. Remove Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
4. Remove the front harness protector (1).

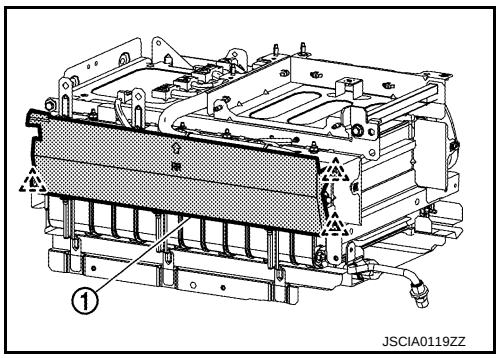


: Pawls

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear.

5. Remove the rear harness protector (1).



: Pawls

WARNING:

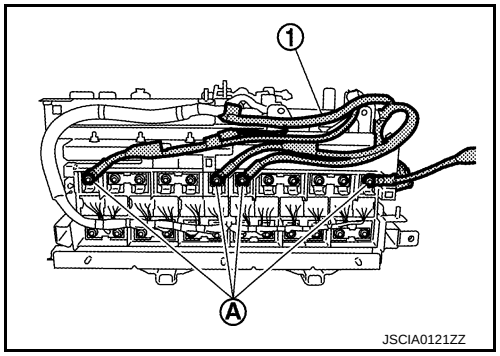
To prevent electric shock hazards, be sure to put on insulated protective gear.

6. Remove the mounting nuts (A), then disconnect the high-voltage harness (1).

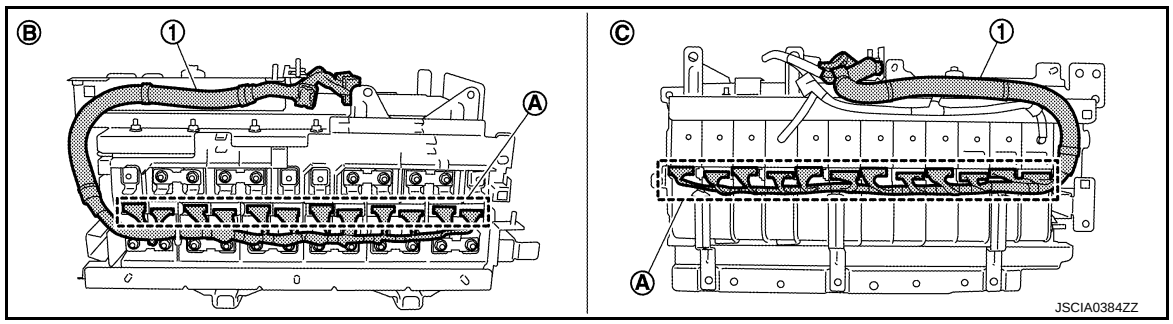
DANGER:

- **Touching high voltage components without using the appropriate protective equipment will cause electrocution.**

- **To prevent electric shock hazards, immediately wrap insulating tape around disconnected high voltage connector terminals.**



7. Disconnect the harness connectors (A), then remove the cell voltage detection harness (1).



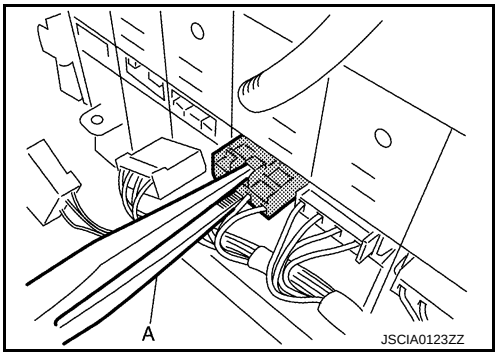
B. : Front side C. : Rear side

WARNING:

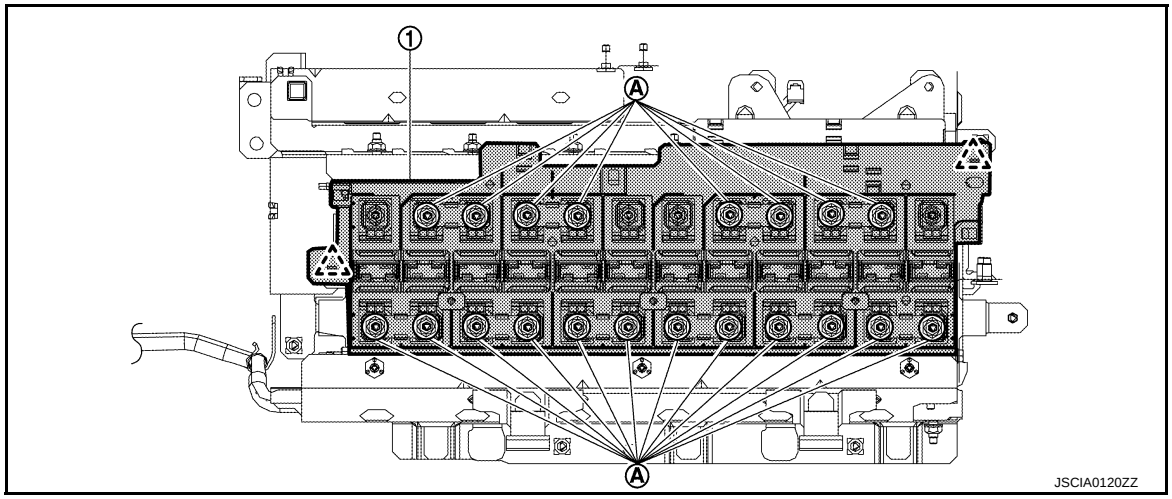
- **To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.**

- **To prevent electric shock hazards, immediately wrap insulating tape around disconnected high voltage connector terminals.**

- Disconnect the harness connectors using insulated long-nose pliers (A). Be careful not to pinch the harness.



8. Remove the mounting nuts (A), and then remove the bus bar (1).



: Pawls

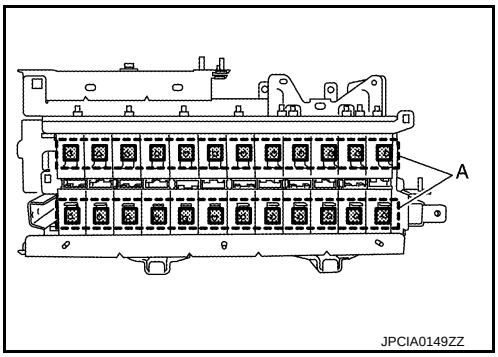
DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

9. Protect all module terminals (A) using insulating tape so that they are not exposed.

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear.

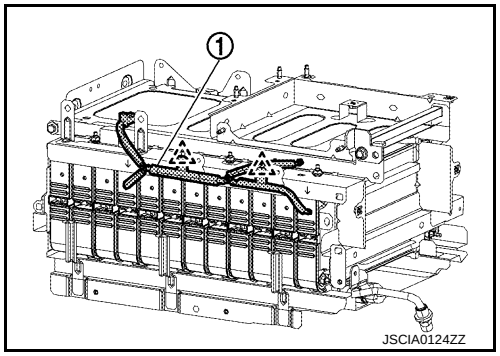


10. Remove the battery temperature sensor (1).

: Pawls

WARNING:

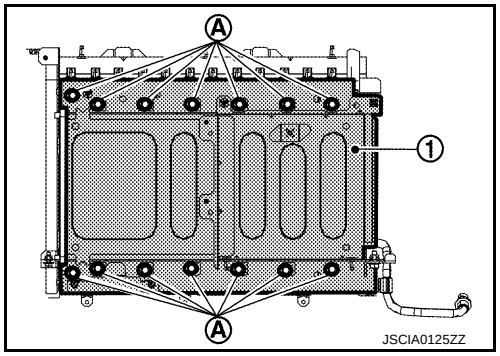
To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.



11. Remove the mounting nuts (A), and then remove the upper battery cover (1).

WARNING:

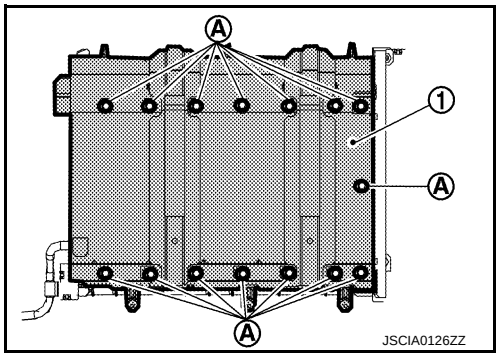
To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.



12. Turn the module stack so that the bottom faces up, then remove the mounting nuts (A), and then the lower battery cover (1).

WARNING:

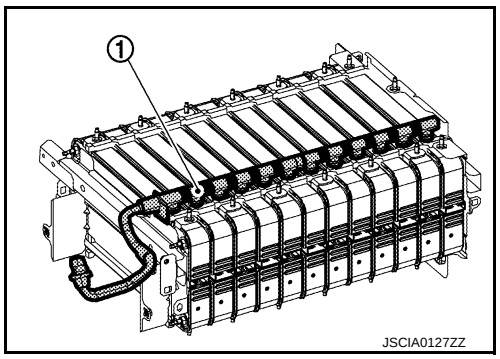
To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.



13. Remove the gas discharge tube (1).

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear.

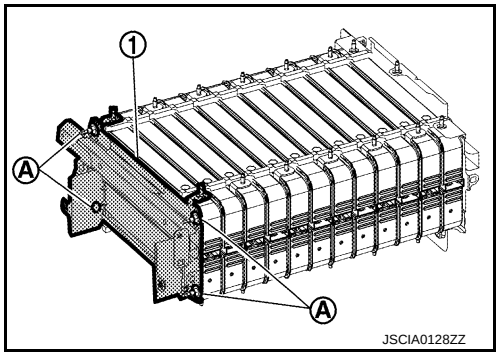


14. Loosen the through-bolt mounting nuts (A).

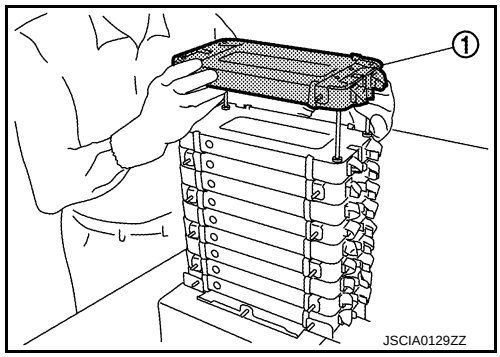
1. : Battery mounting plate RH

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.



15. Stand the module stack as shown in the figure, then remove the module (1).



WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

ASSEMBLY

Note the following items, and assemble in the reverse order of disassembly.

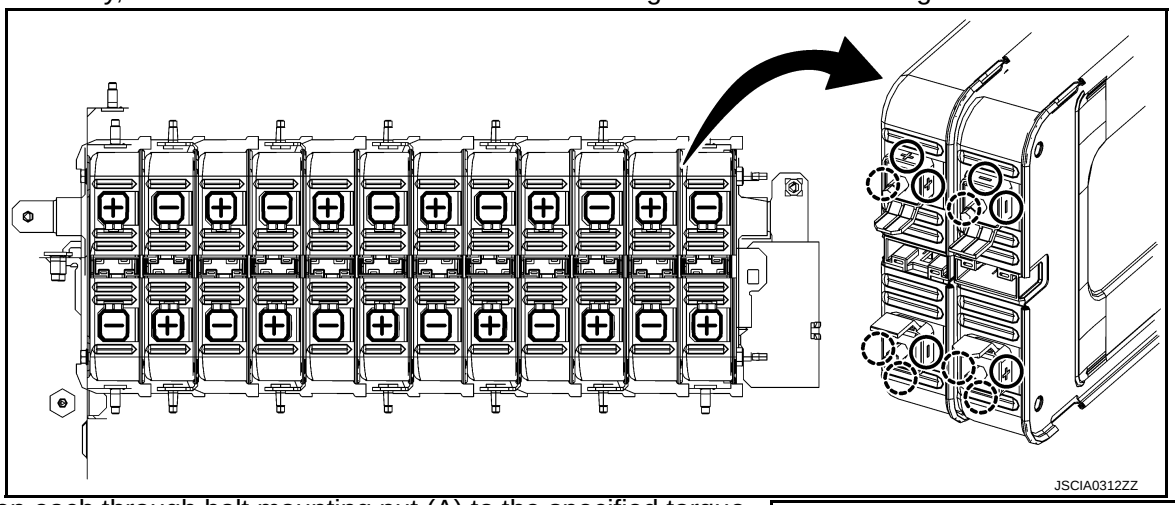
Module

- After replacing with a new module, be sure to record the date of replacement.
  NOTE:
  The manufacturing date is stamped on the side of module.

YY. MM. DD	Y = Year
	M = Month
	D = Date

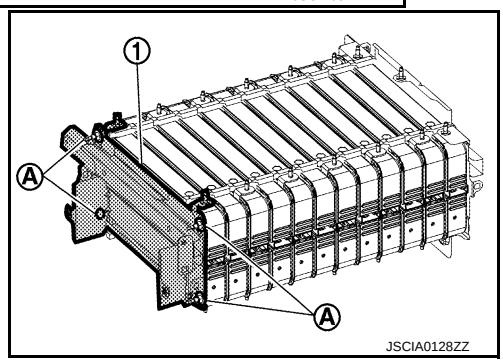
Example: 10. 11. 02 = November 2, 2010

- When replacing a module with a new module, it is necessary to adjust the voltage of the other modules before installing the new module. For the voltage adjustment procedure, refer to HBB-50, "Work Procedure".
- After assembly, check that the module terminals are arranged as shown in the figure.



- Tighten each through bolt mounting nut (A) to the specified torque.

1. : Battery mounting plate RH



WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

First tightening torque : 3.0 N·m (0.31 kg-m, 27 in-lb)

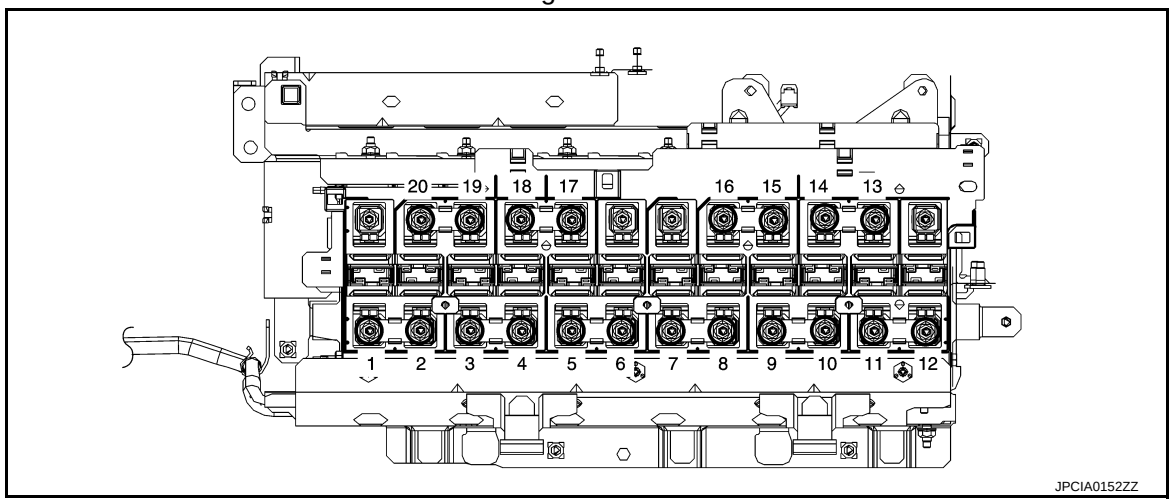
Second tightening torque : **4.0 N·m (0.41 kg-m, 35 in-lb)**

Third tightening torque : **6.7 N·m (0.68 kg-m, 59 in-lb)**

NOTE:
When installing, fix the end of the through bolt and tighten the mounting nut.

Bus Bar

- Tighten nuts in numerical order as shown in the figure to install the bus bar onto the module stack.



WARNING:

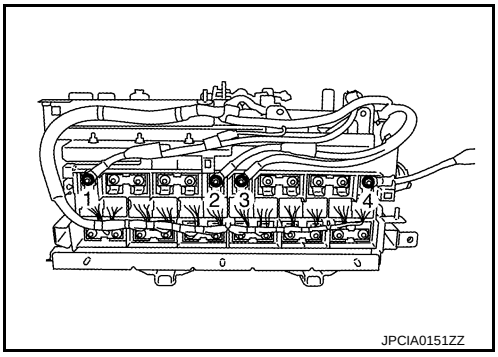
To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

High-voltage Harness

- Tighten nuts in the numerical order as shown in the figure to install the high-voltage harness onto the module stack.

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.



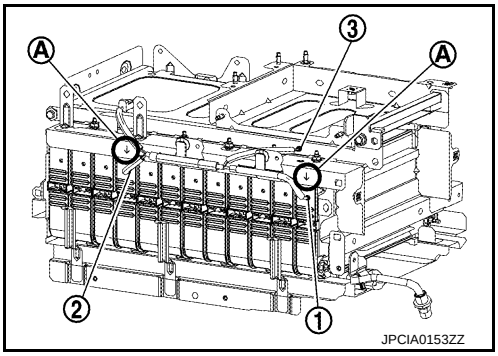
Battery Temperature Sensor

- Install the battery temperature sensor at the position (A) indicated by the arrow as shown in the figure.

1. : Battery temperature sensor 2 (Module 1)
2. : Battery temperature sensor 1 (Module 9)
3. : Battery temperature sensor 3 (Intake)

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear.

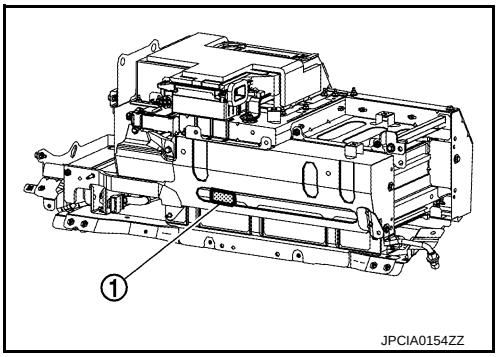


MODULE STACK : Inspection

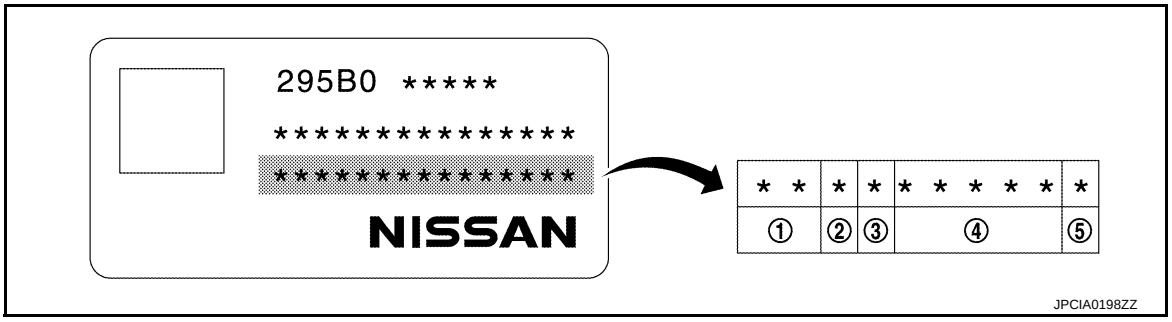
INFOID:0000000008141064

MODULE SERIAL NUMBER LABEL

- The module serial number label (1) for the Li-ion battery is affixed as shown in the figure.



- The module serial number label contains the date of manufacture of the Li-ion battery.



1. Year: The last two digits of year
2. Month
3. Date
4. Serial No.: 00001 – 99999
5. Spare

Month/Date

Label	Month	Date	Label	Month	Date	Label	Month	Date
1	1	1	D	—	13	P	—	23
2	2	2	E	—	14	Q	—	24
3	3	3	F	—	15	R	—	25
4	4	4	G	—	16	S	—	26
5	5	5	H	—	17	T	—	27
6	6	6	I	—	—	U	—	—
7	7	7	J	—	18	V	—	28
8	8	8	K	—	19	W	—	29
9	9	9	L	—	20	X	—	30
A	10	10	M	—	21	Y	—	31
B	11	11	N	—	22	Z	—	—
C	12	12	O	—	—			

- If a module must be replaced, check the module serial number label. If the date of manufacture is more than 17 months ago, replace all modules at the same time.

Method of judging whether or not to replace all modules

Time since manufacture	Action to take
17 months or less	Replace only the malfunctioning module.
More than 17 months	Replace all modules.

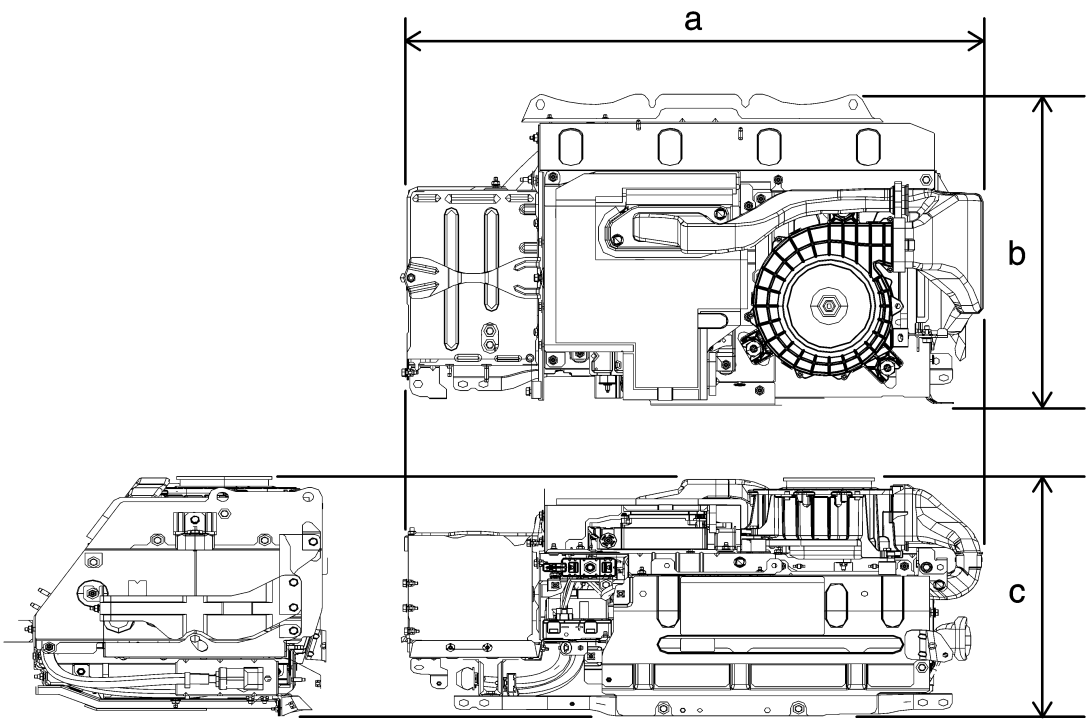
SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Li-ion Battery

INFOID:0000000008141065

Items	Specification
Type	Li-ion battery
Structure	12 modules (96 cells)
Rated voltage (V)	Approx. 346
Weight [kg (lb)]	Approx. 55.0 (121.28)



JSCIA0302ZZ

External dimension	"a"	[mm (in)]	847.0 (33.35)
	"b"	[mm (in)]	453.0 (17.83)
	"c"	[mm (in)]	392.0 (15.43)