SECTION EVB
EV BATTERY SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

Precaution for Technicians Using Medical Electric

INFOID:0000000009347448

OPERATION PROHIBITION

WARNING:

- **Parts with strong magnet is used in this vehicle.**
- **Technicians using a medical electric device such as pacemaker must never perform operation on the vehicle, as magnetic field can affect the device function by approaching to such parts.**

NORMAL CHARGE PRECAUTION

WARNING:

- **If a technician uses a medical electric device such as an implantable cardiac pacemaker or an implantable cardioverter defibrillator, the possible effects on the devices must be checked with the device manufacturer before starting the charge operation.**
- **As radiated electromagnetic wave generated by PDM (Power Delivery Module) at normal charge operation may affect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not approach motor room [PDM (Power Delivery Module)] at the hood-opened condition during normal charge operation.**

PRECAUTION AT TELEMATICS SYSTEM OPERATION

WARNING:

- **If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.**
- **The electromagnetic wave of TCU might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), when using the service, etc.**
- **If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of TCU might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before TCU use.**

PRECAUTION AT INTELLIGENT KEY SYSTEM OPERATION

WARNING:

- **If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.**
- **The electromagnetic wave of Intelligent Key might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), at door operation, at each request switch operation, or at engine starting.**
- **If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of Intelligent Key might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before Intelligent Key use.**

Point to Be Checked Before Starting Maintenance Work

INFOID:0000000009347449

The high voltage system may starts automatically. It is required to check that the timer air conditioner and timer charge (during EVSE connection) are not set before starting maintenance work.
NOTE:
If the timer air conditioner or timer charge (during EVSE connection) is set, the high voltage system starts automatically even when the power switch is in OFF state.

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

INFOID:0000000009347450

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 SR and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, 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 the SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

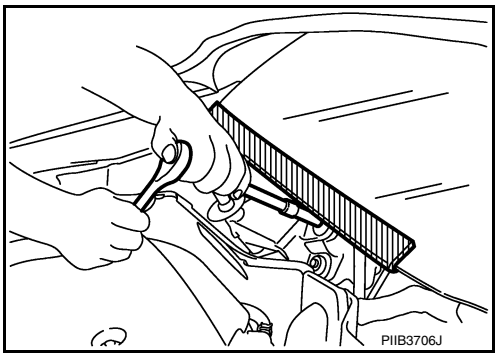
WARNING:

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

Precaution for Procedure without Cowl Top Cover

INFOID:0000000009347451

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



Precaution for Removing 12V Battery

INFOID:0000000009347453

CAUTION:

When the 12V battery is removed, plural DTC may be detected.
After installing 12V battery, always perform "All DTC" with CONSULT and delete DTC.

High Voltage Precautions

INFOID:0000000009347452

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:

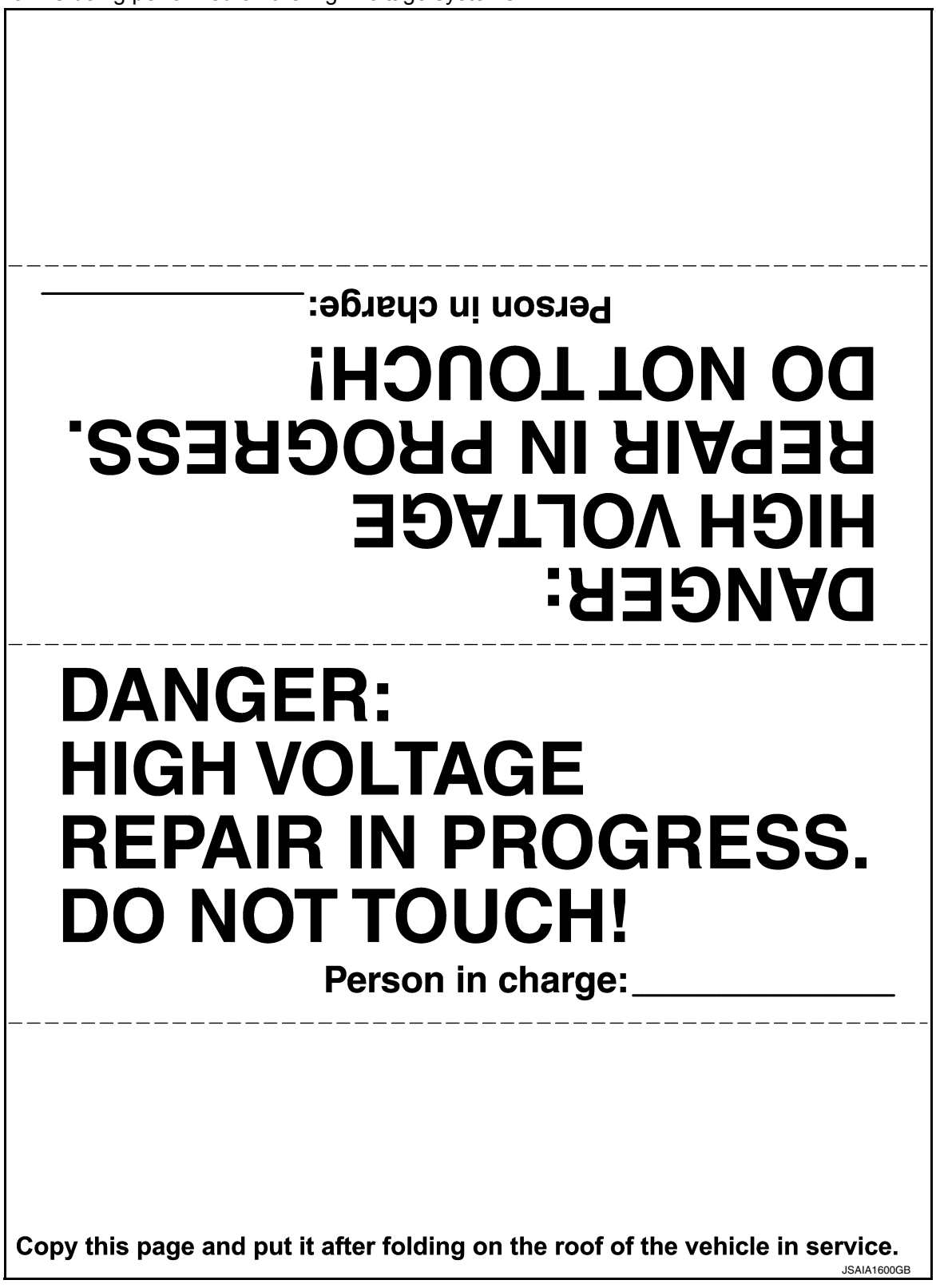
The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

PROHIBITED ITEMS TO CARRY DURING THE WORK

Because this vehicle uses components that contain high voltage and powerful magnetism, do 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”

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.



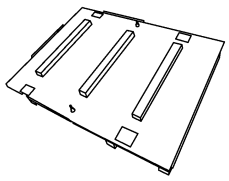
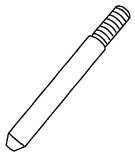
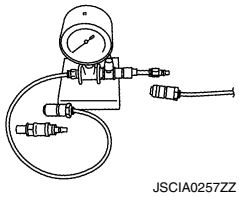
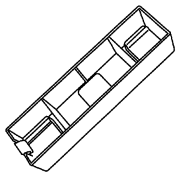
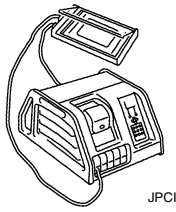
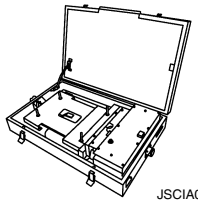
PREPARATION

PREPARATION

Special Service Tools

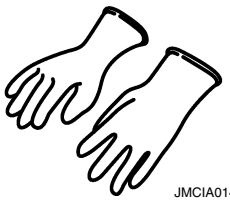
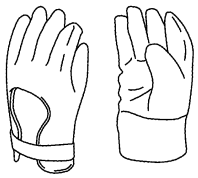
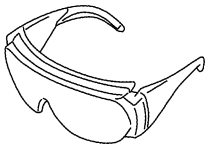
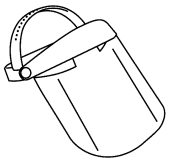
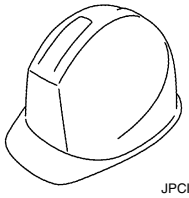
INFOID:0000000009298760

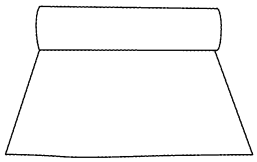
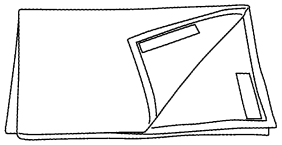
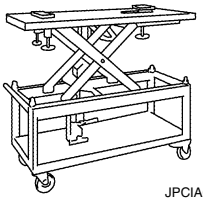
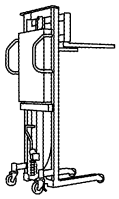
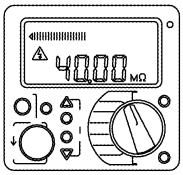
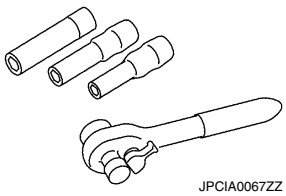
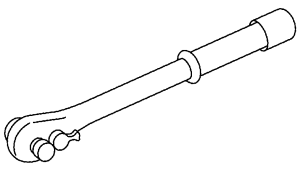
The actual shape of the tools may differ from those illustrated here.

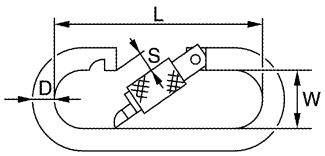
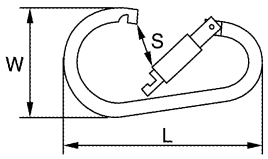
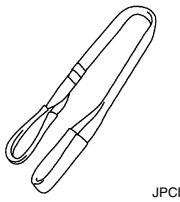
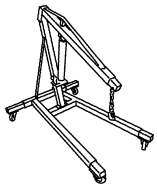
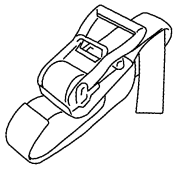
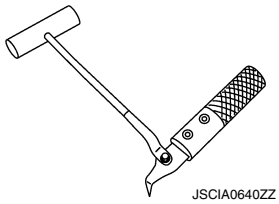
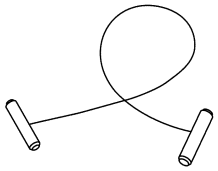
Tool number (TechMate No.) Tool name		Description
— (J-50583) Palette	 JPCIA0239ZZ	When removing/installing Li-ion battery.
KV99111300 (J-50306) Battery location guide pin	 JPCIA0023ZZ	When installing Li-ion battery. 2 piece/set
KV99111400 (—) Air leak tester	 JSCIA0257ZZ	When checking air leaks after disassembling/assembling Li-ion battery.
KV99111500 (—) Module terminal cover	 JPCIA0069ZZ	Protect module terminals (for LEAF) 24 pieces/set
— (J-50346) Module charge balancer	 JPCIA0070ZZ	Module voltage adjustment
— (J-51031) Module charge balancer module box	 JSCIA0726ZZ	Module voltage adjustment Use with the module charge balancer (J-50346).

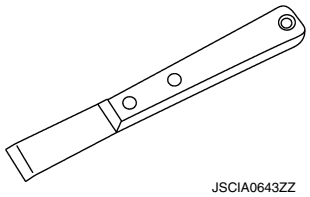
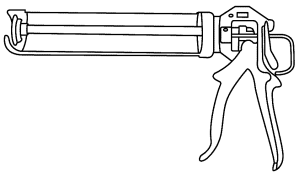
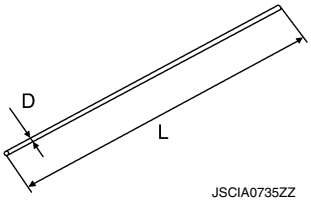
Commercial Service Tools

INFOID:0000000009325590

Tool name	Description
Insulated gloves  JMCIA0149ZZ	Removing and installing high voltage components [Guaranteed insulation performance for 1000V/ 300A]
Leather gloves  JPCIA0066ZZ	• Removing and installing high voltage components • Protect insulated gloves [Use leather gloves that can fasten the wrist tight]
Insulated safety shoes  JPCIA0011ZZ	Removing and installing high voltage components
Safety glasses  JPCIA0012ZZ	• Removing and installing high voltage components • To protect eye from the spatter on the work to electric line [ANSI Z87.1]
Face shield  JPCIA0167ZZ	• Removing and installing high voltage components • To protect face from the spatter on the work to electric line
Insulated helmet  JPCIA0013ZZ	Removing and installing high voltage components

Tool name		Description
Insulated rubber sheet	 JPCIA0019ZZ	Removing and installing high voltage components
Insulated cover sheet	 JPCIA0018ZZ	Removing and installing high voltage components
Battery lift table	 JPCIA0024ZZ	Removing and installing Li-ion battery
Stacker	 JPCIA0015ZZ	Removing and installing Li-ion battery
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

Tool name	Description
Carabineer [small]  JPCIA0016ZZ	• Removing and installing battery module stack • Installing battery pack upper case **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)
Carabineer [large]  JPCIA0017ZZ	Removing and installing battery module stack **NOTE:** • D: 14.0 mm (0.55 in) • L: 204.0 mm (8.03 in) • S: 47.0 mm (1.85 in) • W: 105.0 mm (4.13 in)
Belt slinger  JPCIA0021ZZ	Removing and installing battery module stack **NOTE:** Length: 2.0 m (6.562 ft)
Mobile floor crane  JPCIA0020ZZ	Removing and installing battery module stack
Lashing belt  JPCIA0022ZZ	Removing and installing battery rear module stack
Windshield cutter [Gasket cutter]  JSCIA0640ZZ	Removing battery pack upper case (Cut the adhesive)
Piano wire with handles  JSCIA0641ZZ	Installing battery pack upper case (Cut the adhesive) **NOTE:** Wire size: ϕ 0.5 mm (0.02 in)

Tool name	Description
Scraper  JSCIA0643ZZ	Installing battery pack upper case (Smooth the adhesive)
Tube presser [Gasket material applicator]  JSCIA0639ZZ	Installing battery pack upper case (Apply the adhesive)
Metal bar  JSCIA0735ZZ	Assembling battery module stack **NOTE:** • D: ϕ 7 mm (0.28 in) • L: 1 m (3.28 ft)

Sealant or/and Lubricant

INFOID:0000000009298743

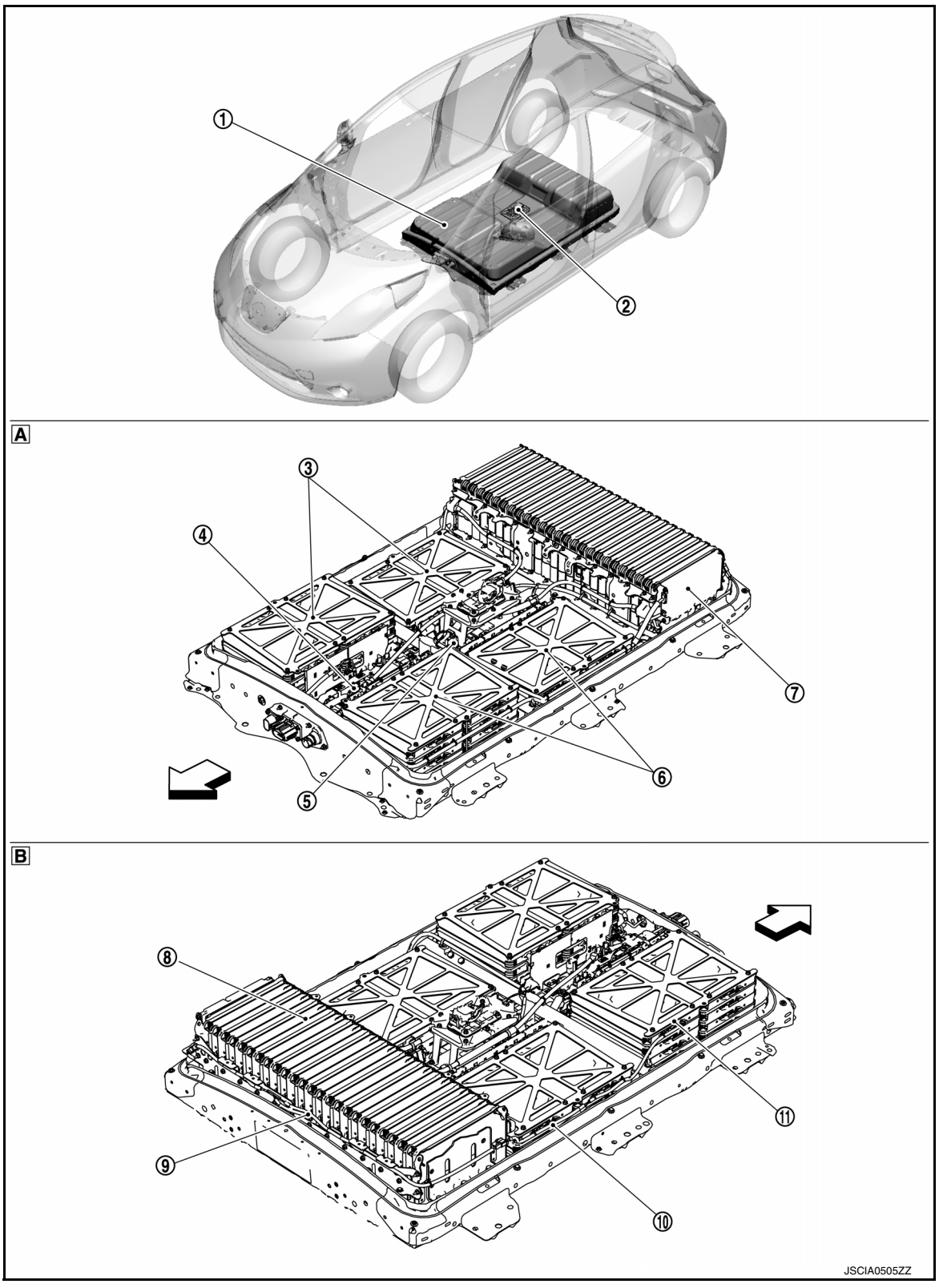
Tool name Tool number	Description
Adhesive 999MP-57302NP	Installing battery pack upper case
Dam rubber KA390-0059U	
Primer (Adhesive primer) 999MP-43533PP	
Primer sufacer (anti-corrosion praimer) —	

SYSTEM DESCRIPTION

COMPONENT PARTS

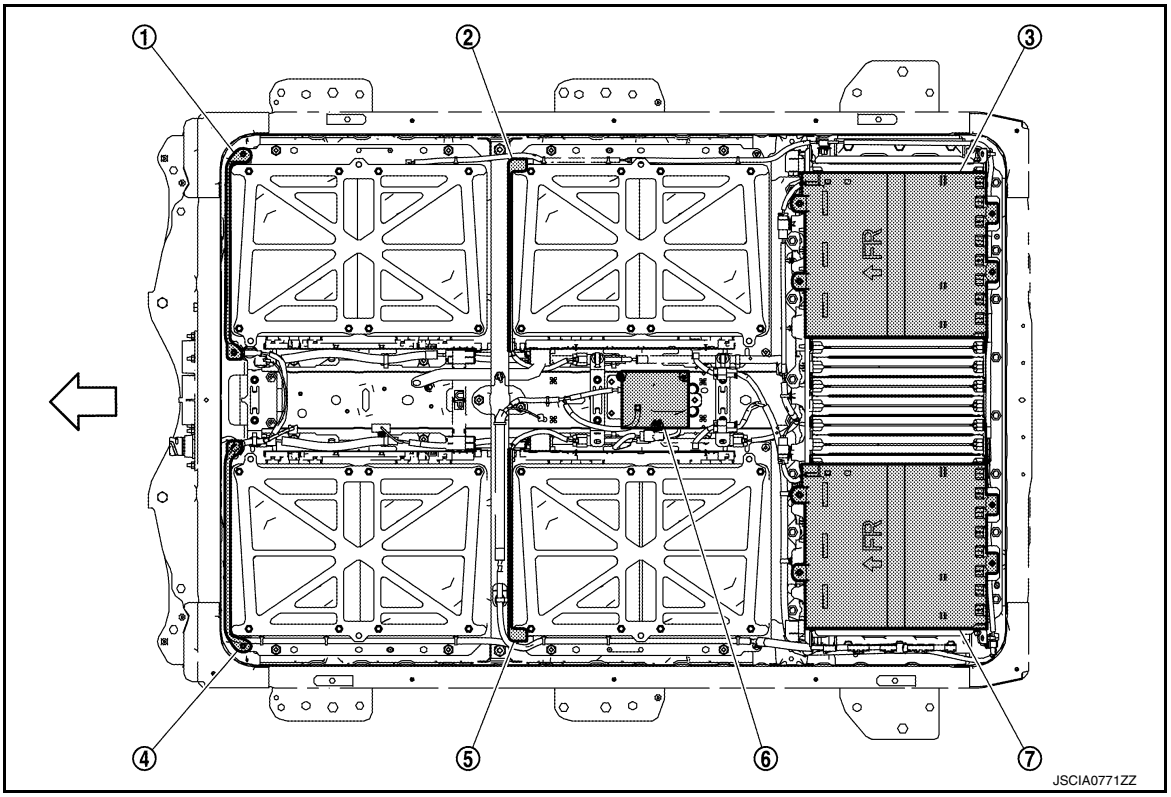
Component Parts Location

INFOID:0000000008745906



Ⓐ Front of battery pack
Ⓑ Back of battery pack
⇦ : Vehicle front

No.	Component	Function
①	Li-ion battery	EVB-16, "Li-ion Battery"
②	Service plug	EVB-20, "Service Plug"
③	Front module stack RH	EVB-17, "Module"
④	Battery junction box	EVB-20, "Battery Junction Box"
⑤	Battery current sensor	EVB-19, "Battery Current Sensor"
⑥	Front module stack LH	EVB-17, "Module"
⑦	Li-ion battery controller	EVB-16, "Li-ion Battery Controller"
⑧	Rear module stack	EVB-17, "Module"
⑨	Battery temperature sensor 1	EVB-19, "Battery Temperature Sensor"
⑩	Battery temperature sensor 4	EVB-19, "Battery Temperature Sensor"
⑪	Battery temperature sensor 2	EVB-19, "Battery Temperature Sensor"



⇦ : Vehicle front

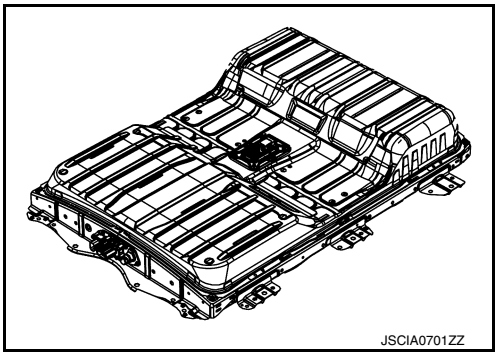
No.	Component	Function
①	Li-ion battery heater RH 1	EVB-18, "Li-ion Battery Heater"
②	Li-ion battery heater RH 2	EVB-18, "Li-ion Battery Heater"
③	Li-ion battery heater RR 2	EVB-18, "Li-ion Battery Heater"
④	Li-ion battery heater LH 1	EVB-18, "Li-ion Battery Heater"

No.	Component	Function
⑤	Li-ion battery heater LH 2	EVB-18, "Li-ion Battery Heater"
⑥	Heater relay unit	EVB-18, "Heater Relay Unit"
⑦	Li-ion battery heater RR 1	EVB-18, "Li-ion Battery Heater"

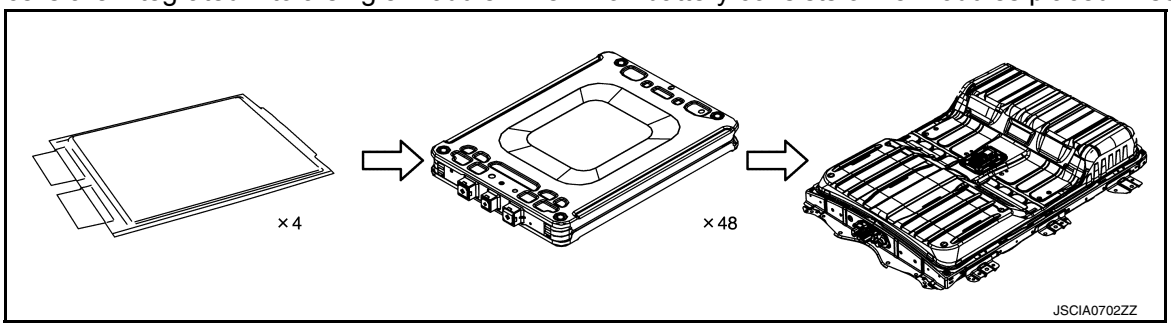
Li-ion Battery

INFOID:0000000008745907

- A Li-ion battery with flat construction is placed under floor.
- The battery pack is equipped with necessary devices, such as Li-ion battery controller, battery junction box, and service plug in addition to a battery storing electricity.



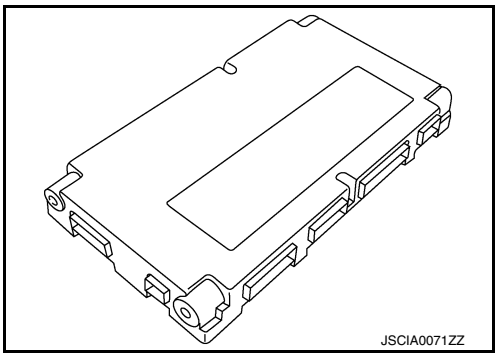
- Four cells are integrated into a single module. The Li-ion battery consists of 48 modules placed in series.



Li-ion Battery Controller

INFOID:0000000008745908

- Li-ion battery controller (LBC) is included in the battery pack and installed on the left surface of the rear module stack.



- The LBC is the core of battery control. Li-ion battery controller detects the voltage and current of the assembled battery, the temperature of each module, and the voltage of each cell to judge state of charge. LBC also calculates possible input/output values, meter indication values, and chargeable values, and send this data to VCM (Vehicle control module). VCM controls the vehicle, according to the battery state.

Main Role of Li-ion Battery Controller

1. Li-ion battery state check
   - State of charge
   - Possible output value
   - Possible input value
   - Temperature
2. Optimization of Li-ion battery voltage

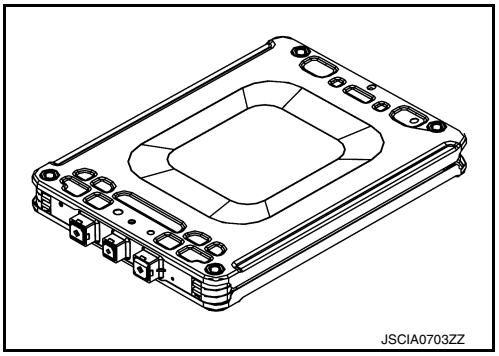
3. Prevention of overvoltage and overcurrent
4. Prevention of overheat
5. Detection of decrease in insulation resistance of high-voltage circuit
6. Detection of a fit of high voltage harness connector and service plug

Module

INFOID:0000000008745909

- Four laminated cells are integrated into one module.
- The Li-ion battery is equipped with 48 modules.
- There are two kinds of modules, according to the location of positive and negative terminals.

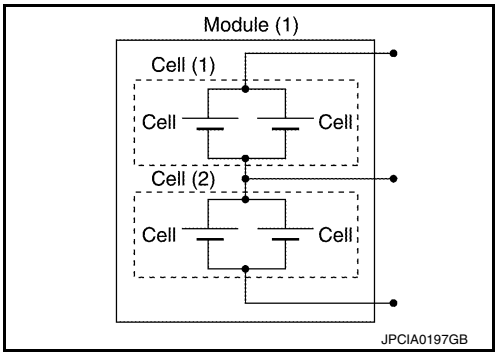
Positive terminal : Red
Negative terminal : Black



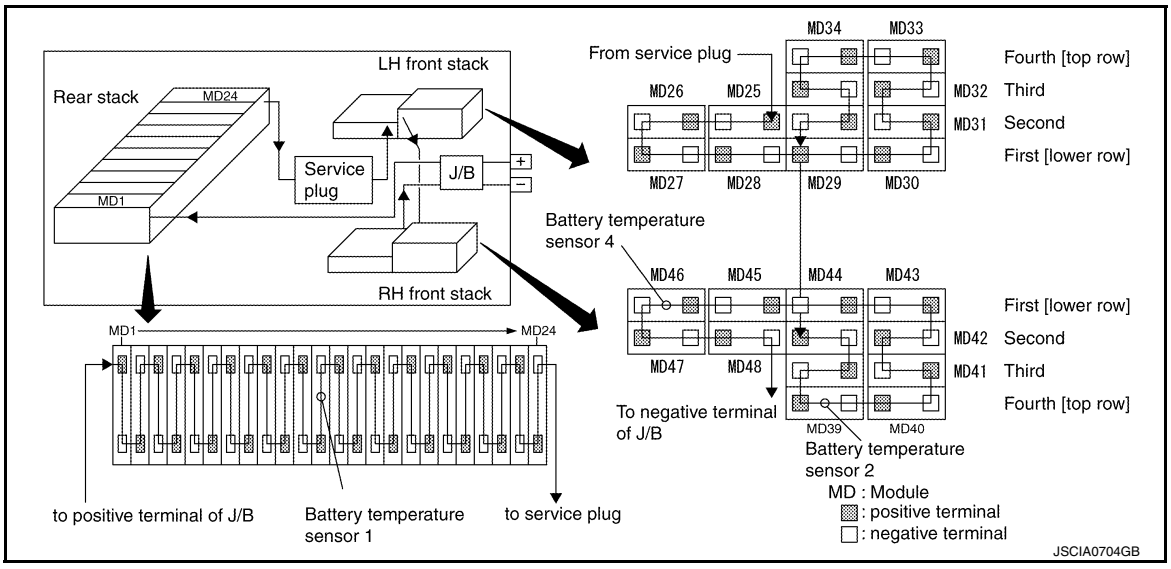
MODULE INTERNAL CIRCUIT

A module consists of two parallel-connected cells placed in series. The Li-ion battery has 48 modules placed in series in total. Ninety-six parallel-connected cell pairs are connected in series.

NOTE:
Cell voltage displayed on the data monitor of CONSULT means the potential difference between the upstream and the downstream of the parallel circuit.



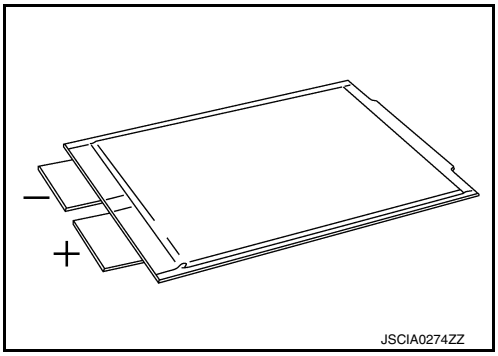
MODULE LAYOUT



NOTE:
The highest potential is module (MD) 1 and the lowest is module (MD) 48.

CELL

These are thin laminated cells with excellent cooling performance.



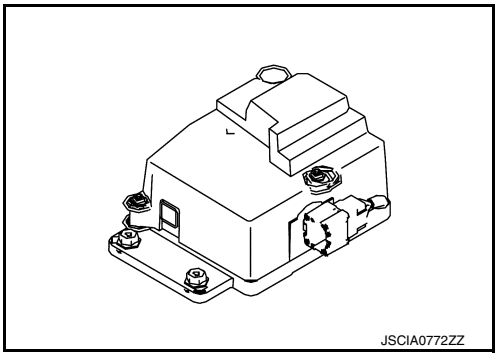
The Features of Laminated Cell

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

Heater Relay Unit

INFOID:0000000008745910

- The heater relay unit is installed in the battery pack (under the service plug).
- When receiving a relay control signal from LBC (Li-ion battery controller), the heater relay unit turns ON the built-in relay and supplies high-voltage power to each Li-ion battery heater.



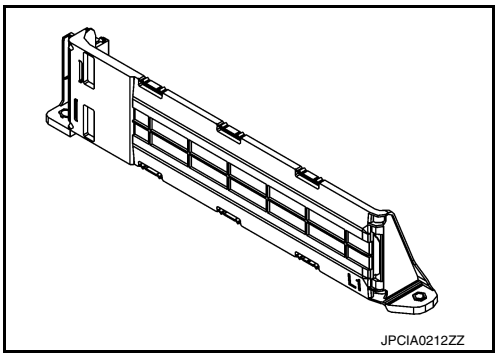
Li-ion Battery Heater

INFOID:0000000008745911

- Li-ion battery heater is installed in the battery pack.
- High voltage power is supplied from the heater relay unit.
- Each Li-ion battery heater is connected in parallel.

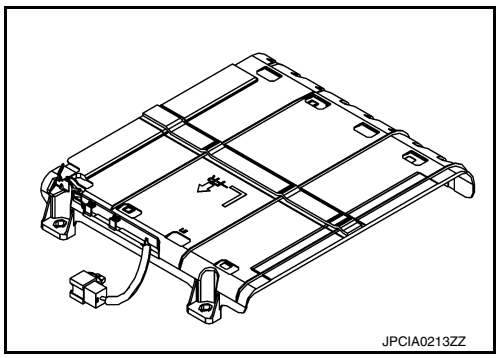
FRONT LI-ION BATTERY HEATER

- Two front Li-ion battery heaters are installed to each front module stack.



REAR LI-ION BATTERY HEATER

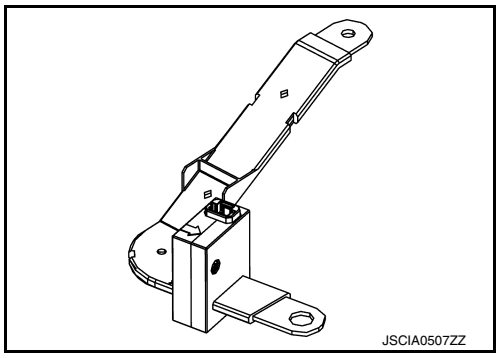
- Two rear Li-ion battery heaters are installed to the rear module stack.


JPCIA0213ZZ

Battery Current Sensor

INFOID:0000000009346493

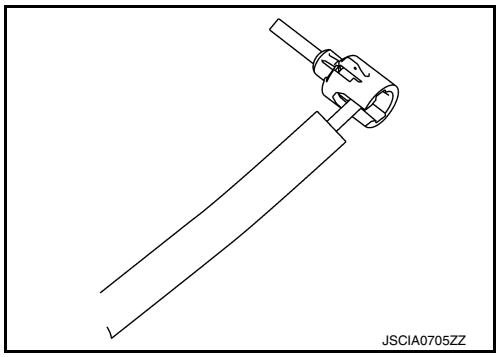
- The battery current sensor is installed to bus bar between battery junction box and rear module stack.
- This sensor measures charge/discharge current sent to Li-ion battery and transmits a current signal to Li-ion battery controller (LBC).
- Li-ion Battery controller (LBC) measures remaining battery level according to charge/discharge current and sends the data to VCM.


JSCIA0507ZZ

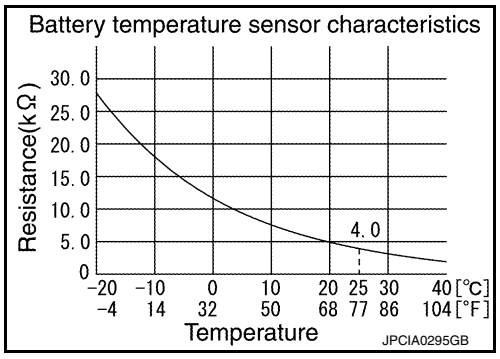
Battery Temperature Sensor

INFOID:0000000008745912

- Three battery temperature sensors mounted in the battery pack measure the temperature.
- The installation position of the sensors are;
- Front module stack RH: Two for front and rear
- Rear module stack: One


JSCIA0705ZZ

- 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.

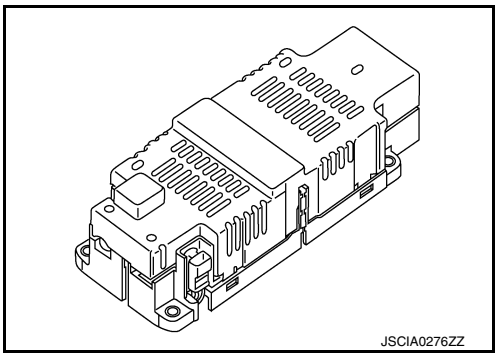


JPCIA0295GB

Battery Junction Box

INFOID:0000000008745913

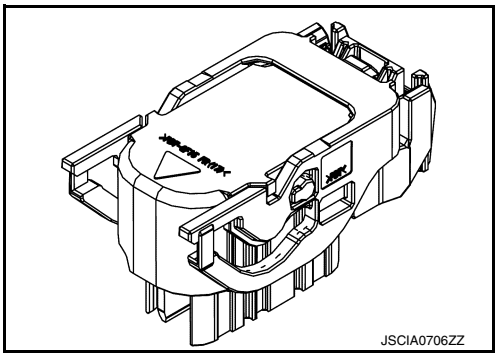
- The battery junction box is installed to the front side in the battery pack.
- The battery junction box includes:
- System main relay to provide/interrupt DC current sent from Li-ion battery.
- Pre-charge relay to protect the high voltage circuit from a high current immediately after power switch ON.
- Installed to both positive side and negative side, the system main relay provides DC current to each high voltage part. In addition, the system main relay provides DC current to the Li-ion battery during motor regeneration or charge.
- When an error occurs in the system, the system main relay is turned OFF and the Li-ion battery is interrupted for ensuring safety, based on a command from VCM (Vehicle control module).


JSCIA0276ZZ

Service Plug

INFOID:0000000008745914

- The service plug is included in the Li-ion battery to securely disconnect the high voltage during high voltage part inspection and maintenance.
- The service plug is installed on the upper surface of the battery pack. The plug can be removed when the leg-room mounted service plug cover is removed.
- Always use insulating protective equipment when removing and installing service plug.


JSCIA0706ZZ

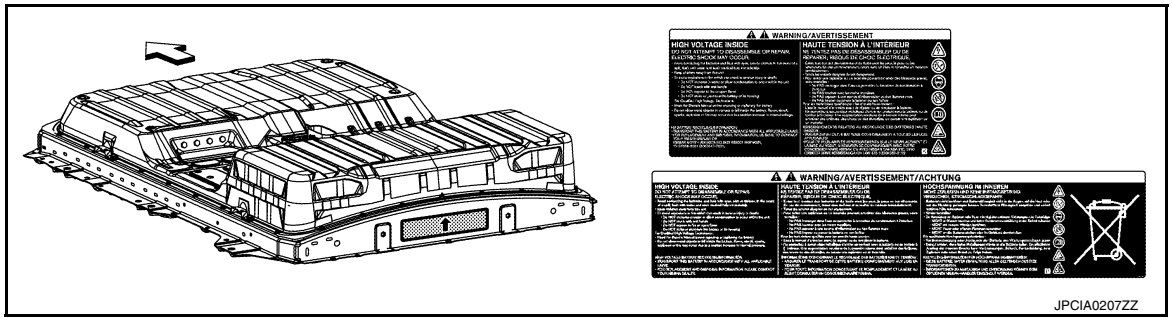
High Voltage Warning Label

INFOID:0000000008745915

High voltage warning label is affixed to each of the following component parts.
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 in the original position.

Li-ion Battery

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



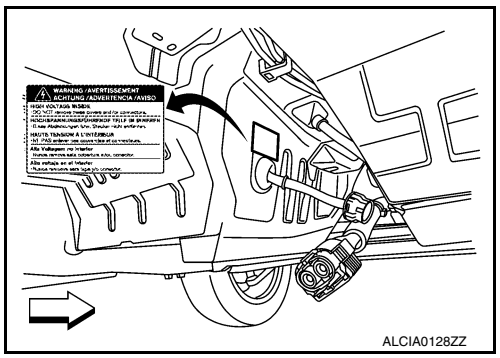
JPCIA0207ZZ

⇦ : Vehicle front

⬅ : Direction of the label

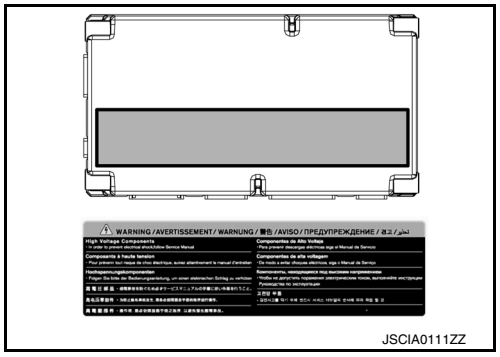
- The label is affixed to the body panel near the high voltage harness connector.

⇦ : Vehicle front



Li-ion Battery Controller

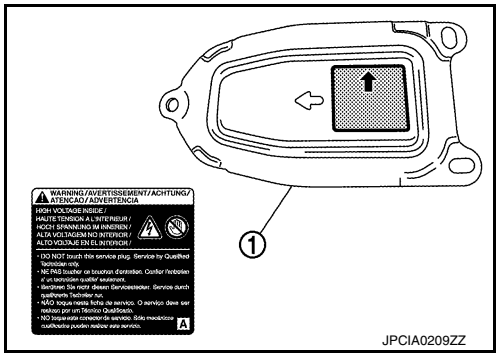
The label is affixed to the main body of controller.



Service Plug

The label is affixed to the inspection hole cover ①.

⬅ : Direction of the label



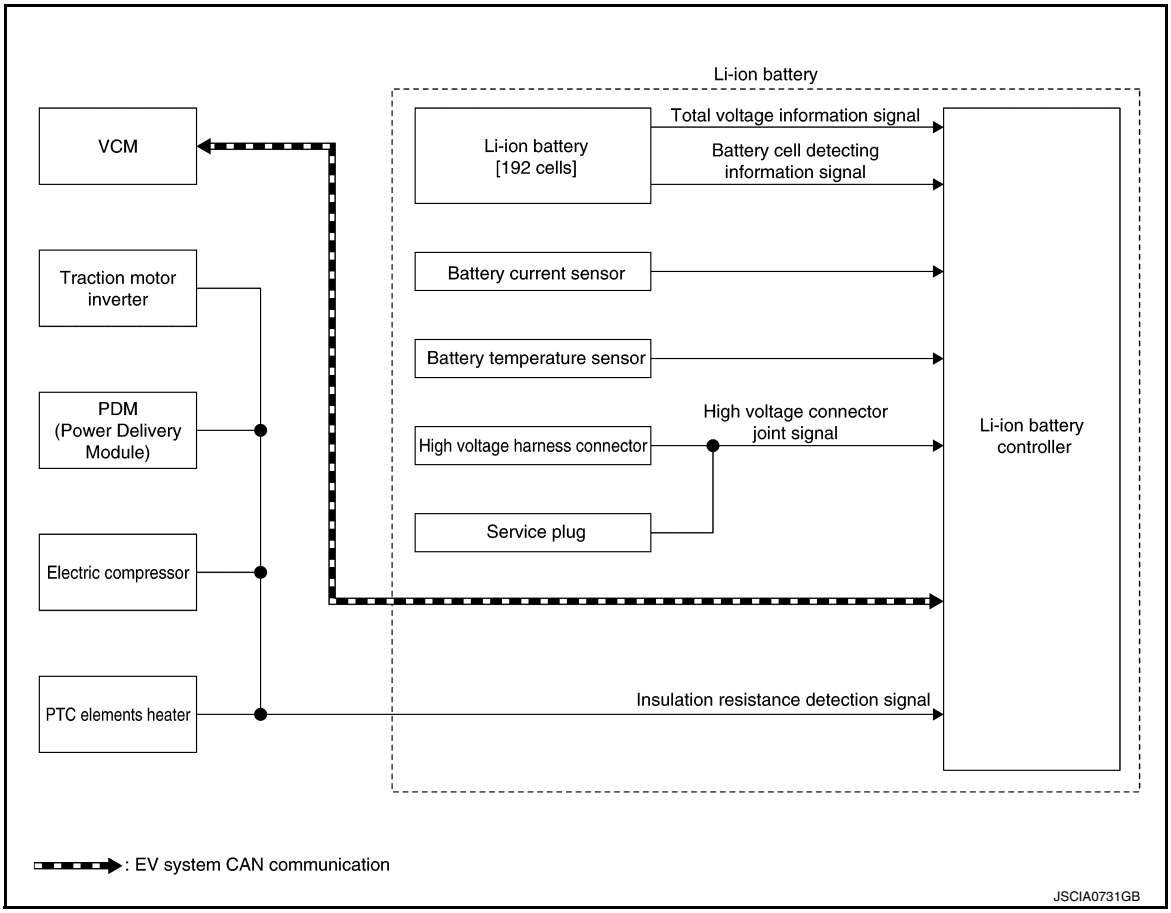
SYSTEM

LI-ION BATTERY CONTROL SYSTEM

LI-ION BATTERY CONTROL SYSTEM : System Description

INFOID:0000000008745916

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL ITEM

Input Signal Item

Transmit unit	Signal name	
VCM	EV system CAN	Target Li-ion battery remained energy signal

Output Signal Item

Received unit	Signal name	
VCM	EV system CAN	High voltage discharge permit signal
		Li-ion battery main relay cut request signal
		Li-ion battery connector interlock signal
		Li-ion battery voltage signal
		Li-ion battery current signal
		Li-ion battery chargeable power signal
		Li-ion battery dischargeable power signal
		Li-ion battery chargeable completion signal
		Li-ion battery available charge signal
		Li-ion battery capacity signal
		Li-ion battery gradual capacity loss signal
		Insulation resistance signal

DESCRIPTION

The Li-ion battery controller (LBC) monitors the status of the inside of the Li-ion battery at all times and sends information, such as the charging status of Li-ion battery and possible power, to VCM (vehicle control module) via EV system CAN communication.

The Li-ion battery controller performs control as per the following.

- Monitors the battery state and transfers chargeable/dischargeable power to VCM to prevent an error, such as overvoltage, over discharge or excessive temperature rise in the battery.
- Detects an error (overvoltage, over discharge, overcurrent, or excessive temperature rise) immediately at the time of error occurrence and requests VCM to disconnect the system main relay to interrupt the discharge/charge line.
- Maintains the optimum battery state constantly with a cell capacity adjustment function to prevent a reduction in charging/discharging capacity caused by cell capacity variations.
- Detects the connector fit state with the function to detect the fit of the high voltage harness connector and transfers the detected state to VCM so that the vehicle does not start with an unsteady state.
- Detects the insulation resistance state with the function to detect the insulation resistance between high and low voltage and transfers the detected state to VCM so that the vehicle does not start with an unusual state.
- Estimates a battery charge state and low battery state, based on the data obtained with the battery state detection function, and reflects on the battery capacity meter.

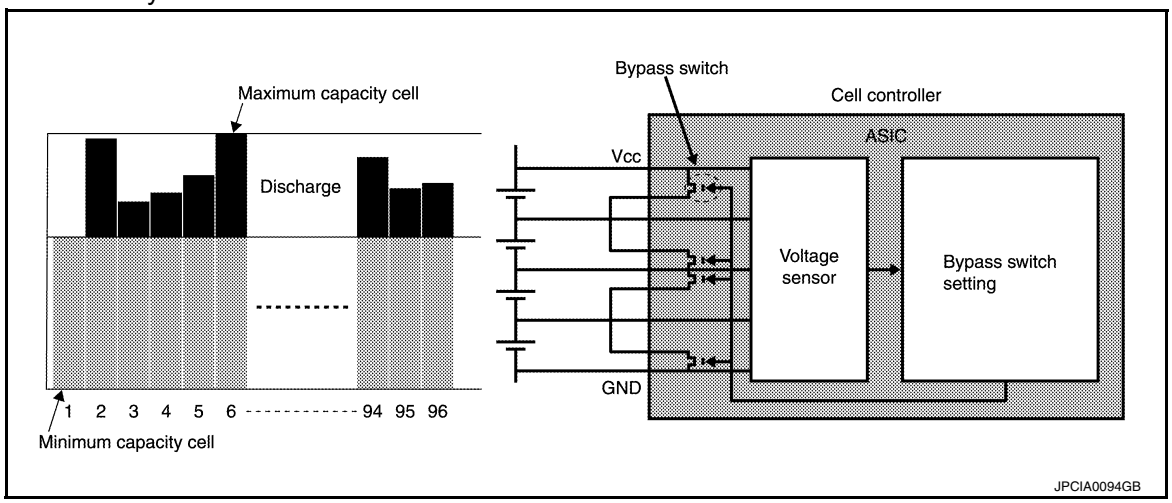
BATTERY PROTECTION

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 VCM 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 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.

HOW TO ADJUST CELL CAPACITY

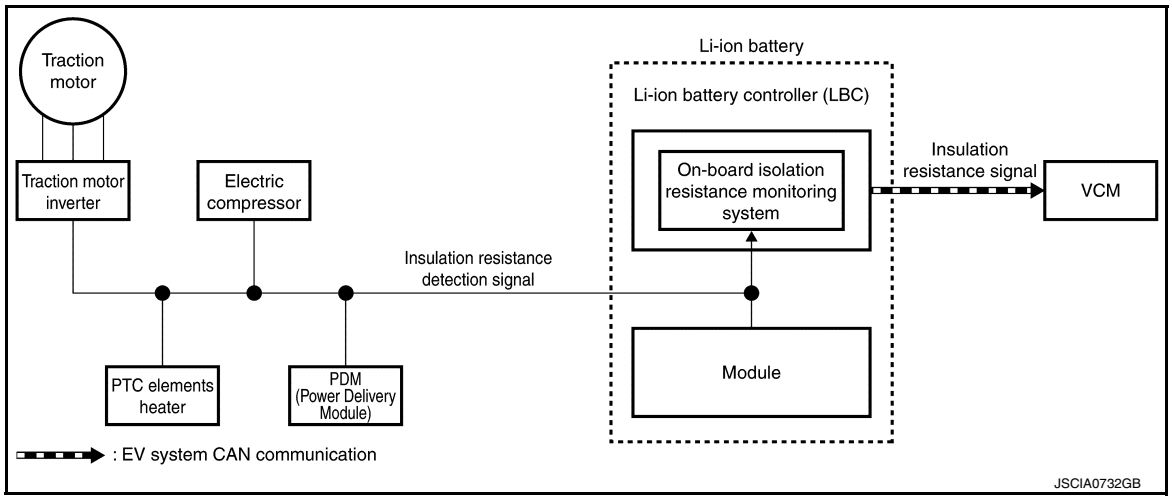
During cell capacity adjustment, the capacity of each cell is estimated based on the no-load voltage when the system starts, and the capacities are adjusted so that they are all at the target level. The voltage of each cell is detected inside the Li-ion battery controller. The bypass switches are then 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.



INSULATION RESISTANCE LOSS DETECTION FUNCTION

The insulation resistance detection circuit mounted inside the Li-ion battery controller measures the insulation resistance of each high voltage part and sends the measurement results to VCM via EV system CAN communication.

VCM judges abnormal insulation resistance in each high voltage part, based on the received insulation resistance value.

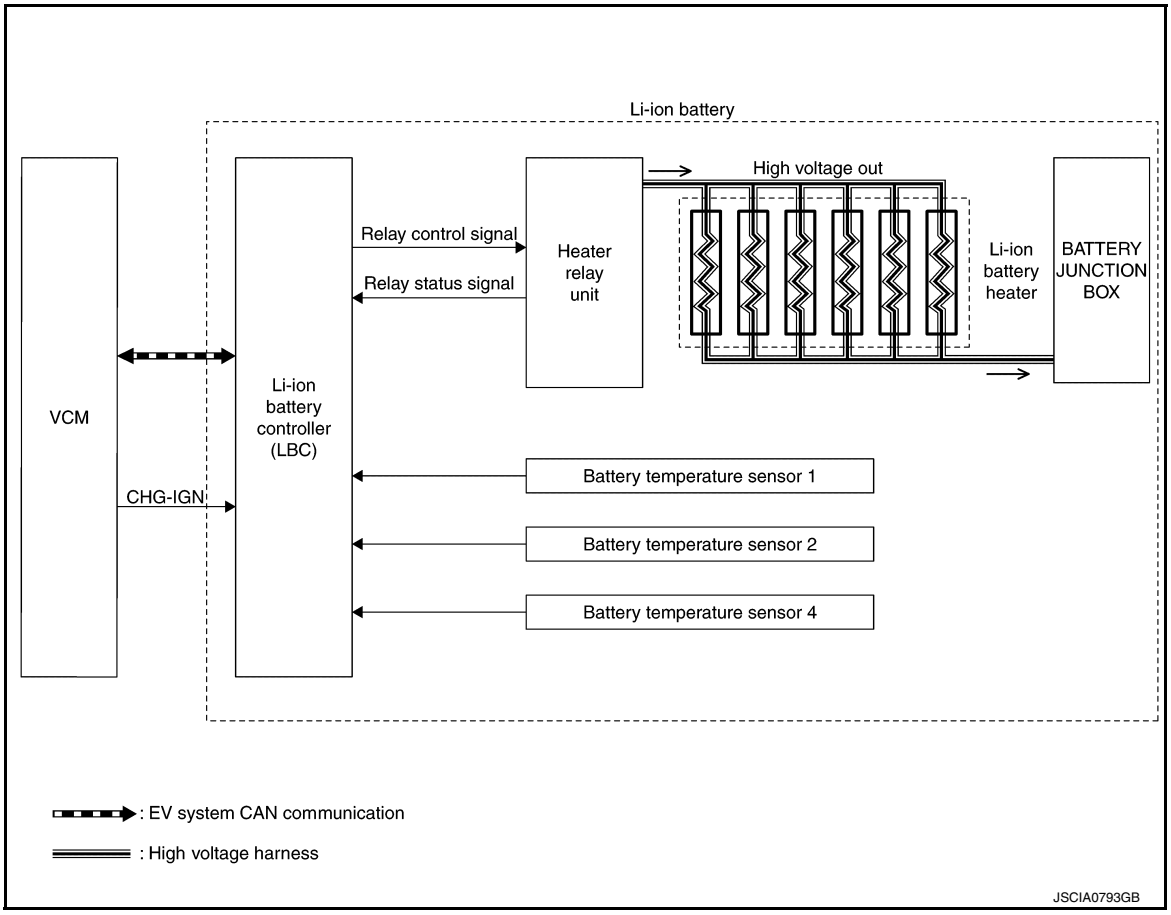


LI-ION BATTERY HEATER CONTROL SYSTEM

LI-ION BATTERY HEATER CONTROL SYSTEM : System Description

INFOID:0000000008745917

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL ITEM

Input Signal Item

Transmit unit	Signal name	
VCM	EV system CAN communication	Keep SOC request signal

Output Signal Item

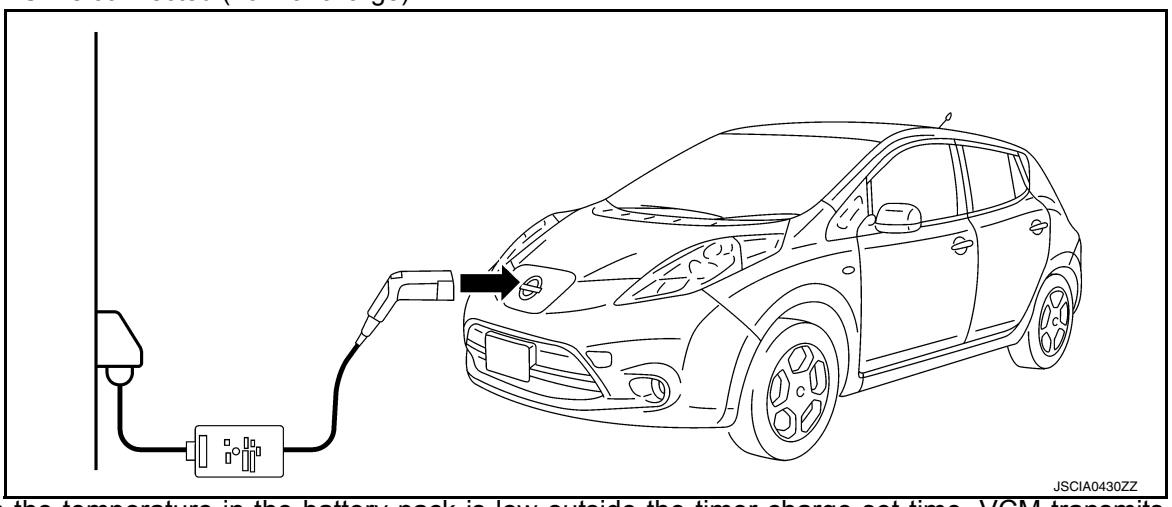
Receive unit	Signal name	
VCM	EV system CAN communication	Next start time signal

DESCRIPTION

- When the temperature decreases [approximately −20°C (−4°F)] extremely in the battery pack, the Li-ion battery heater control system automatically activates the Li-ion battery heater to warm the inside of the battery pack for protecting Li-ion battery from freezing and preventing the decline in battery output. In addition, when the temperature in the battery pack is restored [approximately −10°C (14°F)], the Li-ion battery heater stops.
- The Li-ion battery controller (LBC) detects a temperature in the battery pack, according to a signal transmitted from the battery temperature sensor installed to the battery pack and judges the activation of the Li-ion battery heater.
- When the relay built in the heater relay unit turns ON, high voltage power is supplied to each Li-ion battery heater.
- LBC detects the ON/OFF status of the relay built in to heater relay unit.
- Even when the power switch is OFF, VCM periodically activates LBC to protect Li-ion battery from freezing.

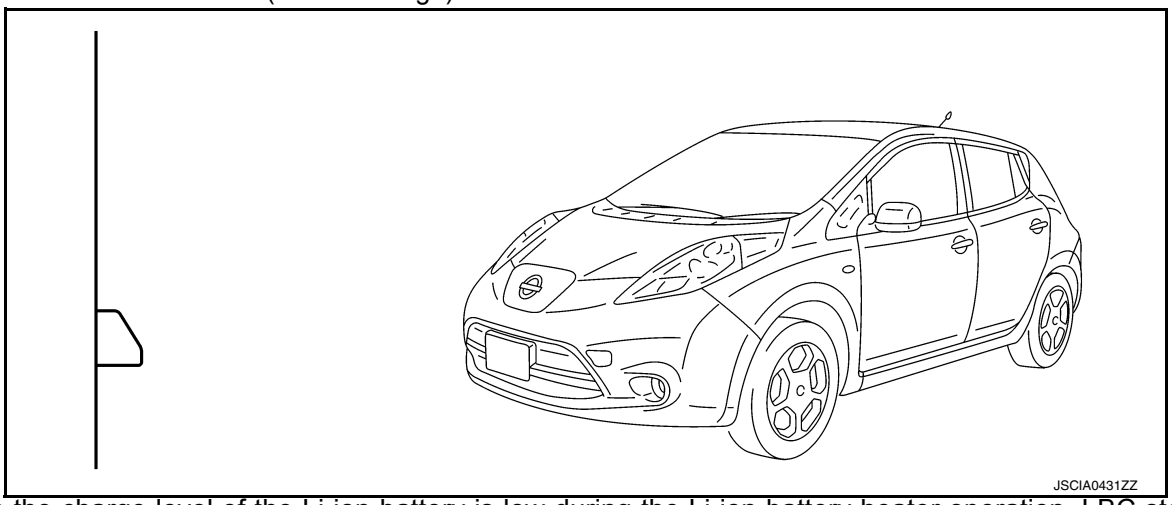
- When the temperature in Li-ion battery pack is low with no necessity of Li-ion battery heater operation, LBC estimates the time that Li-ion battery may freeze and transmits a next start time signal to VCM via EV system CAN communication to prepare for starting the Li-ion battery heater next time.
- When receiving a next start time signal via EV system CAN communication, VCM transmits a start request signal (CHG-IGN) to LBC after a lapse of the set time. When receiving a start request signal (CHG-IGN), LBC activates the Li-ion battery heater.

When EVSE is connected (normal charge)



- When the temperature in the battery pack is low outside the timer charge set time, VCM transmits a keep SOC request signal to LBC via EV system CAN communication. In this case Li-ion battery is not charged, and only Li-ion battery heater is activated.
- When timer charge starts at the set time, Li-ion batter is charged, and the Li-ion battery heater is activated.

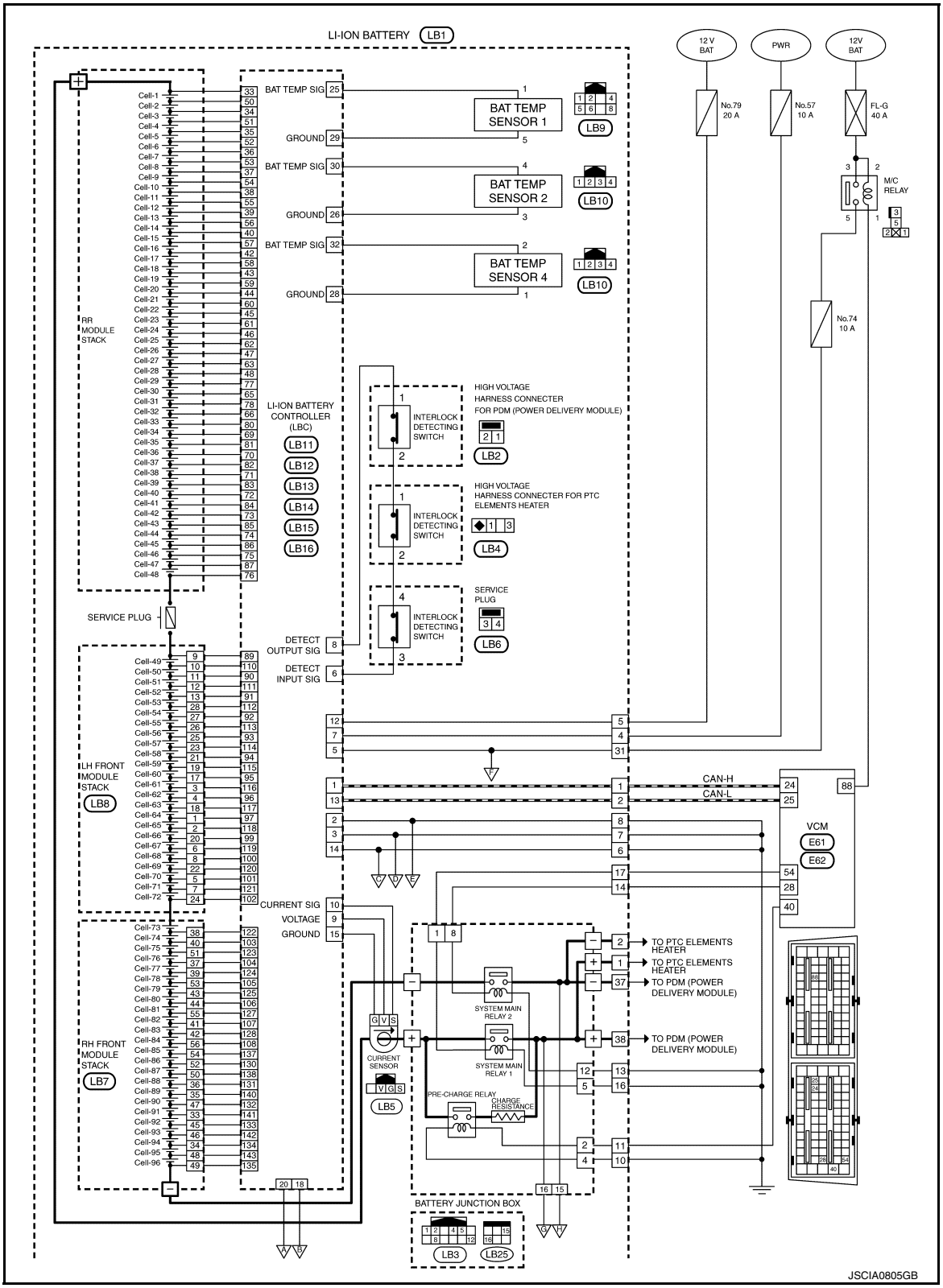
When EVSE is not connected (normal charge)

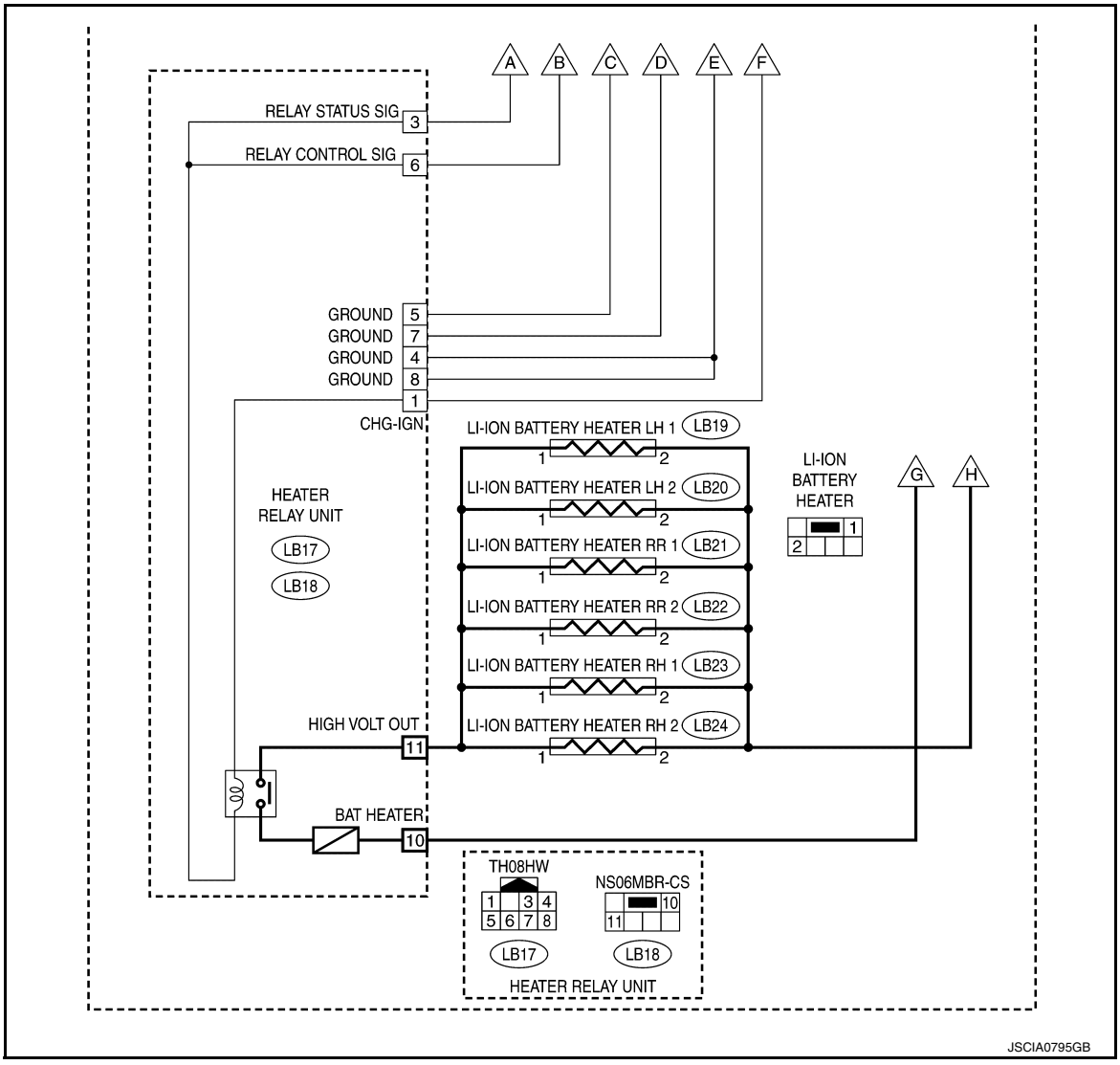


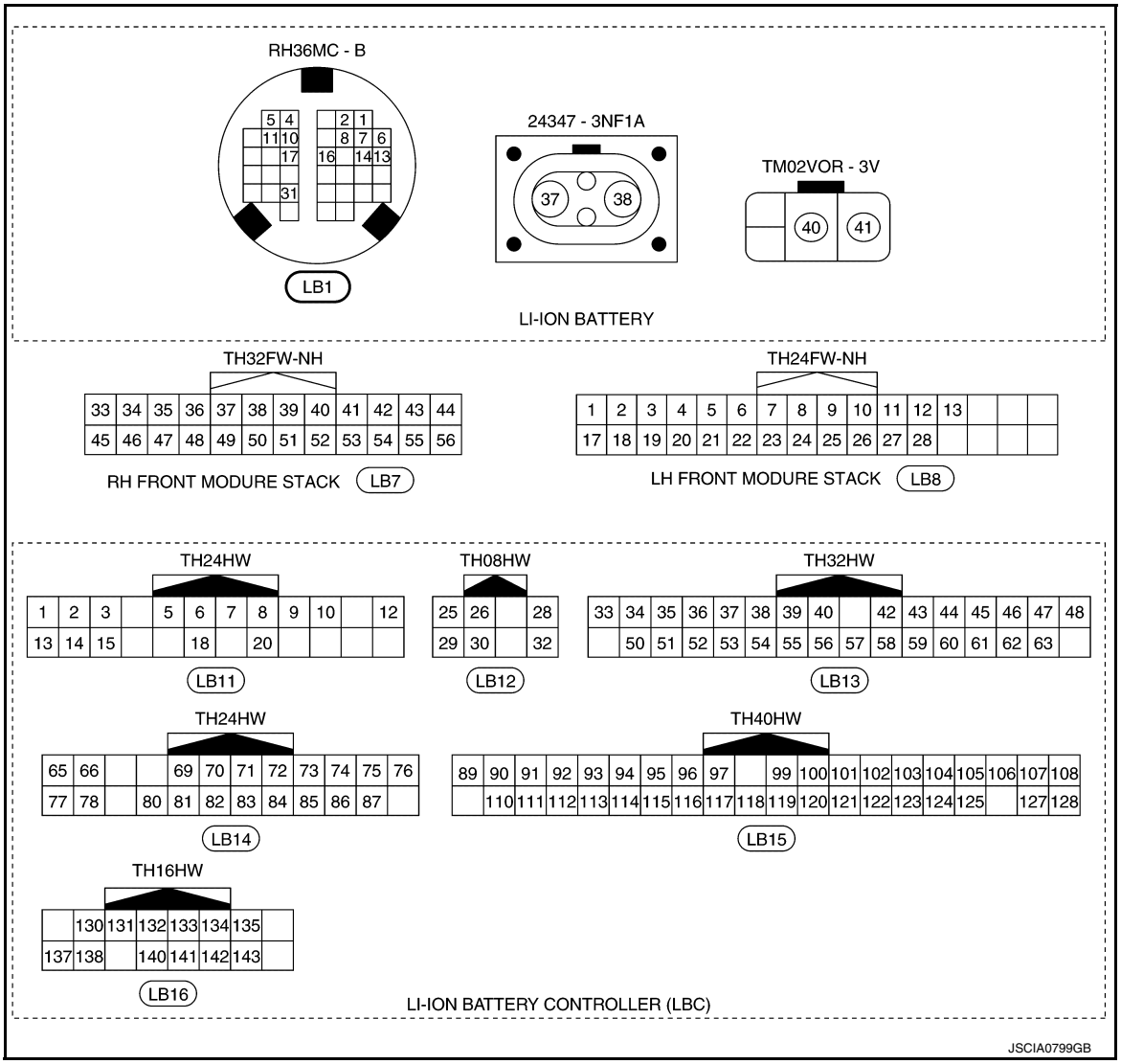
- When the charge level of the Li-ion battery is low during the Li-ion battery heater operation, LBC stops the Li-ion battery heater operation even if the temperature in the battery pack is insufficient.

Circuit Diagram

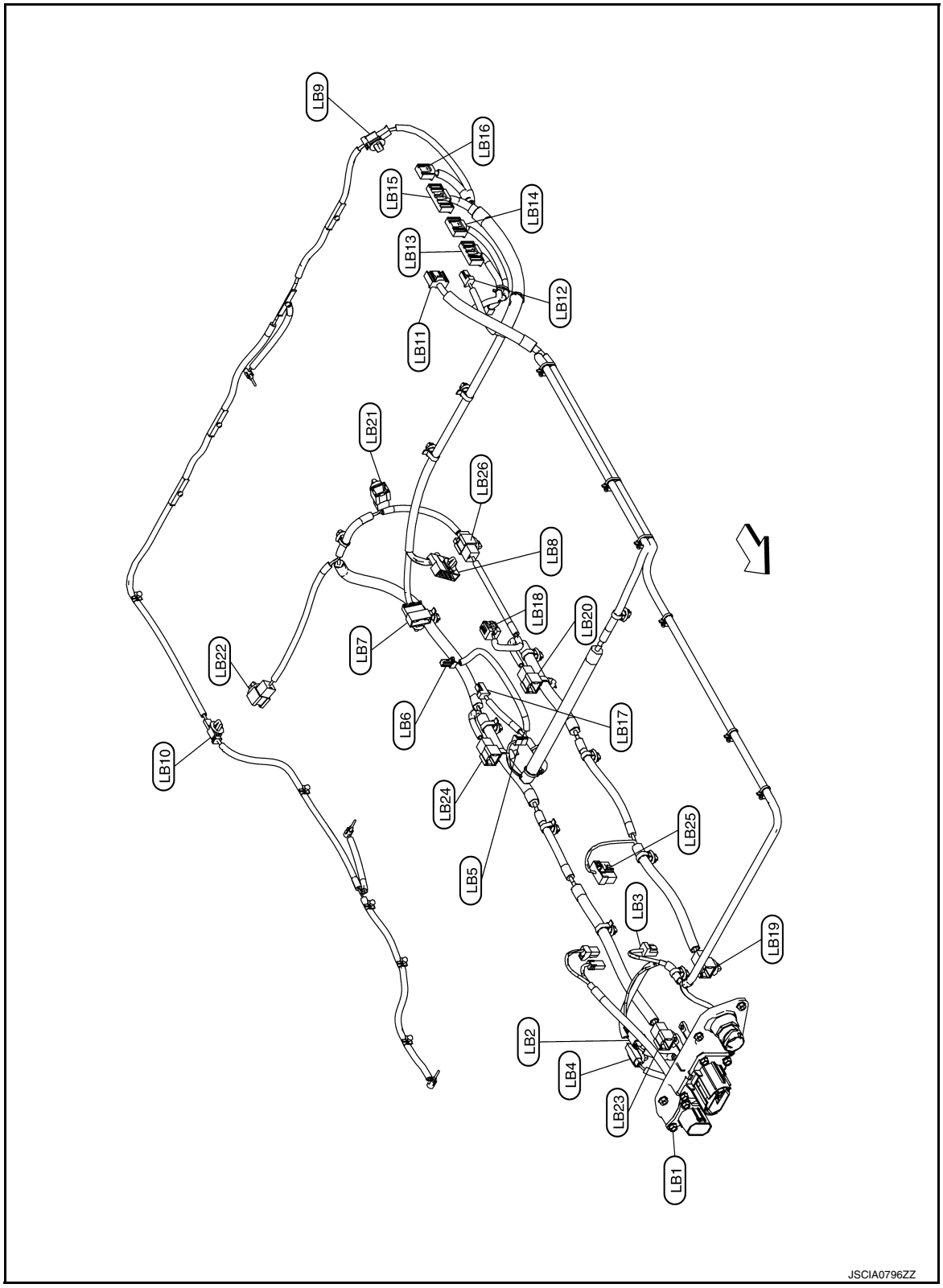
INFOID:0000000008745918



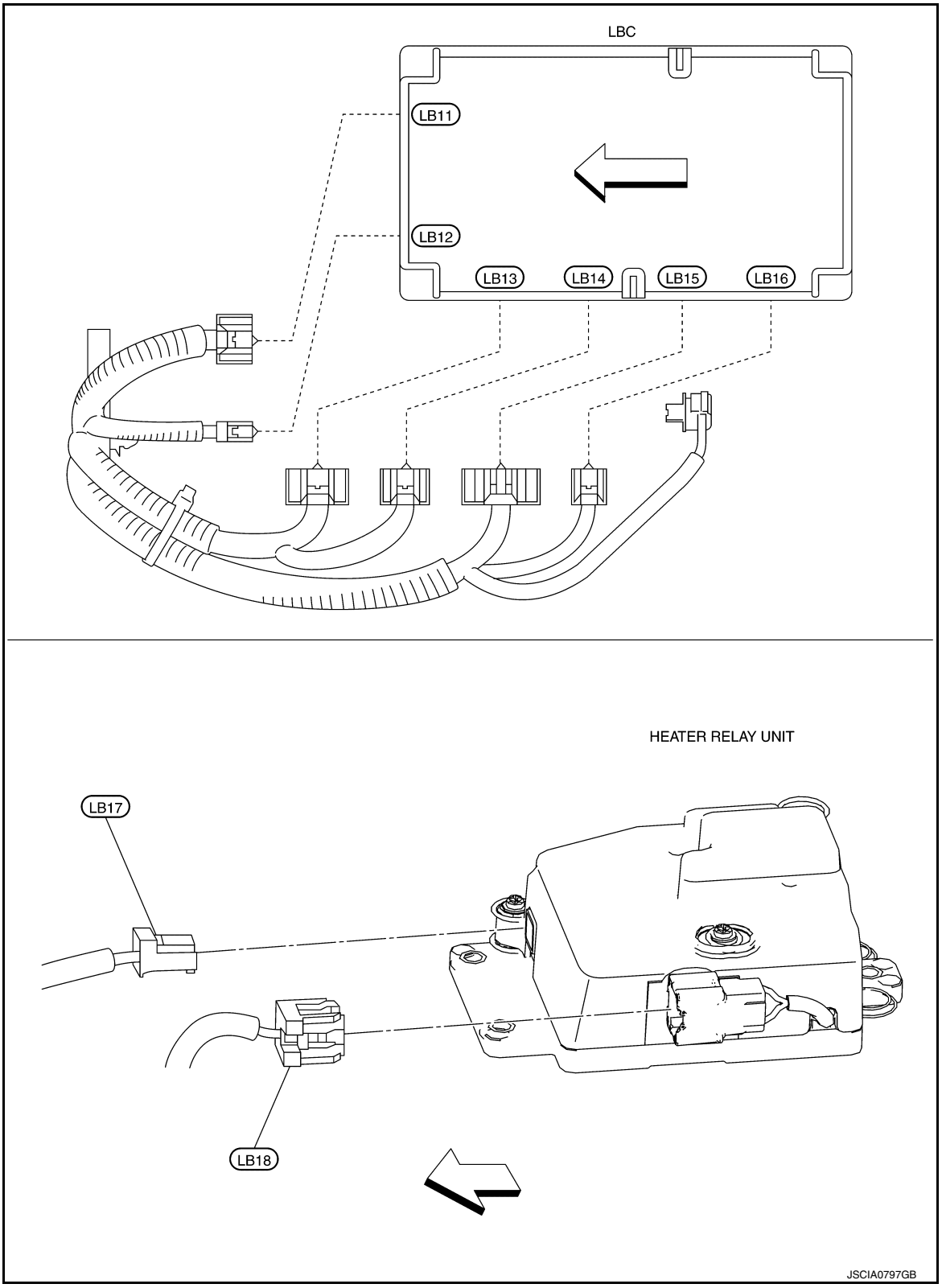

A
B
C
D
E
F
RELAY STATUS SIG
3
RELAY CONTROL SIG
6
GROUND
5
GROUND
7
GROUND
4
GROUND
8
1
CHG-IGN
HEATER
RELAY UNIT
LB17
LB18
LI-ION BATTERY HEATER LH 1
LB19
LI-ION BATTERY HEATER LH 2
LB20
LI-ION BATTERY HEATER RR 1
LB21
LI-ION BATTERY HEATER RR 2
LB22
LI-ION BATTERY HEATER RH 1
LB23
LI-ION BATTERY HEATER RH 2
LB24
LI-ION
BATTERY
HEATER
G
H
HIGH VOLT OUT
11
BAT HEATER
10
TH08HW
1 3 4
5 6 7 8
NS06MBR-CS
10
11
LB17
LB18
HEATER RELAY UNIT
JSCIA0795GB



HARNESS LAYOUT



⇦ : Vehicle front



⇦ : Vehicle front

HANDLING PRECAUTION

EV Battery System

INFOID:0000000008745919

- To improve the Li-ion battery life, never perform quick charge heavily.
- Use the method of nighttime normal charge or timer-controlled charge.
- Never perform rapid acceleration/deceleration.
- Never place EV battery in an area exposed to direct sunlight or under high temperature conditions.

PRECAUTIONS FOR STORAGE OF THE LI-ION BATTERY

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

DIAGNOSIS SYSTEM (LBC)

CONSULT Function

INFOID:0000000008745920

APPLICATION ITEM

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

Item	Function
ECU Identification	LBC parts number can be read.
Self-diagnostic results	Self-diagnostic results and freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in LBC can be read.
Active Test	Activates the actuator via LBC.
Work Support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT.
CAN Diagnosis	Displays the CAN diagnosis results.
CAN Diagnosis Support Monitor	Displays the CAN communication status.

*: The following diagnosis information is cleared when the VCM memory is erased.

- Diagnostic trouble codes
- Freeze frame data

ECU IDENTIFICATION

Part number of LBC can be checked.

SELF-DIAGNOSTIC RESULTS

Self Diagnostic Item

Regarding items of DTC, refer to EVB-45, "DTC Index".

How to Erase DTC

1. Select “HV BAT”with CONSULT.
2. “SELF-DIAGNOSTIC 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)		Remarks
DTC		Displays the DTC which caused FFD memory
BATT ELECTRIC CURRENT	A	Displays the Li-ion battery current value
12V BATTERY VOLTAGE	mV	Displays 12V battery power supply voltage
IR SEN SHORT PULSE	mV	Displays the maximum to minimum difference of voltage magnitude of the on-board isolation resistance monitoring system
SERVICE PLUG INTERLOCK	OPEN / CLOSE	Displays the OPEN/CLOSE state of the service plug
CELL VOLTAGE 01 - 96	mV	Displays each cell voltage
TOTAL BATTERY VOLTAGE	V	Displays the total voltage of the Li-ion battery
BATTERY TEMPERATURE 1	°C	Displays the temperature calculated with a signal voltage from battery temperature 1
BATTERY TEMPERATURE 2	°C	Displays the temperature calculated with a signal voltage from battery temperature 2
BATTERY TEMPERATURE 4	°C	Displays the temperature calculated with a signal voltage from battery temperature 4

DATA MONITOR

NOTE:

< SYSTEM DESCRIPTION >

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	Remark
BATT ELECTRIC CURRENT	A	Displays the Li-ion battery current value
12V BATTERY VOLTAGE	mV	Displays 12V battery power supply voltage
IR SEN SHORT PULSE	mV	Displays the maximum to minimum difference of voltage magnitude of the on-board isolation resistance monitoring system
SERVICE PLUG INTERLOCK	OPEN / CLOSE	Displays the OPEN/CLOSE state of the service plug
CELL VOLTAGE 01 - 96	mV	Displays each cell voltage
TOTAL BATTERY VOLTAGE	V	Displays the total voltage of the Li-ion battery
MAXIMUM CELL VOLTAGE	mV	Displays the maximum cell voltage value
MINIMUM CELL VOLTAGE	mV	Displays the minimum cell voltage value
BATTERY TEMPERATURE 1	°C	Displays the temperature calculated with a signal voltage from battery temperature 1
BATTERY TEMPERATURE 2	°C	Displays the temperature calculated with a signal voltage from battery temperature 2
BATTERY TEMPERATURE 4	°C	Displays the temperature calculated with a signal voltage from battery temperature 4

ACTIVE TEST

Test item	Operation item	Operation status
HEATER RELAY UNIT	On	Turns ON the relay built into the heater relay unit to supply high voltage power to the Li-ion battery heater.
	Off	Turns OFF the relay built into the heater relay unit to stop high voltage power supply to the Li-ion battery heater.

WORK SUPPORT

Work item	Description	Usage
SAVE BATTERY INFORMATION DATA	Data saved in LBC is stored in CONSULT.	When Li-ion battery and LBC are replaced.
WRITE BATTERY INFORMATION DATA	The CONSULT-stored data can be written in LBC.	When Li-ion battery and LBC are replaced.
CELL VOLTAGE LOSS INSPECTION	This inspection identifies a cell of which cell voltage is on the decrease. If identified, this type of cell may be judged as an abnormal cell, unless it is replaced.	When checking voltage of all cells.

ECU DIAGNOSIS INFORMATION

EV BATTERY SYSTEM

Reference Value

INFOID:0000000008745921

VALUE 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.

Monitor item	Condition		Values / Status
BATT ELECTRIC CURRENT	READY	Stop the vehicle	Approx. (−10) - (+20) A
12V BATTERY VOLTAGE	READY		Approx. 1,100 – 1,400 mV
IR SEN SHORT PULSE	READY		Approx. 4,100 – 4,300 mV
SERVICE PLUG INTERLOCK	READY	Connect service plug	REQ
	READY	Disconnect service plug	NOT REQ
CELL VOLTAGE 01	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 02	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 03	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 04	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 05	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 06	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 07	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 08	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 09	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 10	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 11	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 12	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 13	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 14	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 15	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV

Monitor item	Condition		Values / Status
CELL VOLTAGE 16	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 17	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 18	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 19	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 20	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 21	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 22	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 23	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 24	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 25	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 26	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 27	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 28	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 29	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 30	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 31	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 32	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 33	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 34	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 35	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 36	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 37	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV

Monitor item	Condition		Values / Status
CELL VOLTAGE 38	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 39	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 40	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 41	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 42	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 43	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 44	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 45	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 46	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 47	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 48	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 49	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 50	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 51	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 52	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 53	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 54	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 55	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 56	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 57	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 58	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 59	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV

Monitor item	Condition		Values / Status
CELL VOLTAGE 60	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 61	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 62	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 63	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 64	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 65	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 66	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 67	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 68	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 69	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 70	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 71	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 72	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 73	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 74	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 75	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 76	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 77	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 78	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 79	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 80	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 81	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV

Monitor item	Condition		Values / Status
CELL VOLTAGE 82	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 83	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 84	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 85	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 86	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 87	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 88	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 89	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 90	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 91	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 92	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 93	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 94	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 95	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
CELL VOLTAGE 96	READY	Total battery voltage 317 V	Approx. 3,200 - 3,400 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
TOTAL BATTERY VOLTAGE	READY		Approx. 240 - 420 V
MAXIMUM CELL VOLTAGE	READY	Total battery voltage 317 V	Approx. 3,300 - 3,500 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
MINIMUM CELL VOLTAGE	READY	Total battery voltage 317 V	Approx. 3,300 - 3,500 mV
		Total battery voltage 393 V	Approx. 4,000 - 4,200 mV
BATTERY TEMPERATURE 1	READY (Stop the vehicle)	Ambient temperature: 25°C (77°F)	20°C - 30°C (68°F - 86°F) [Equivalent to air temperature around rear module stack]
BATTERY TEMPERATURE 2	READY (Stop the vehicle)	Ambient temperature: 25°C (77°F)	20°C - 30°C (68°F - 86°F) [Equivalent to air temperature around front RH module stack (front side)]
BATTERY TEMPERATURE 4	READY (Stop the vehicle)	Ambient temperature: 25°C (77°F)	20°C - 30°C (68°F - 86°F) [Equivalent to air temperature around front RH module stack (rear side)]

Fail-safe

INFOID:0000000008745922

When Li-ion Battery Controller (LBC) detects a malfunction of the Li-ion battery, it enters the control mode that protects the battery by stopping or restricting the output/charging from/to the battery.
The fail-safe mode differs depending on the contents of the detected malfunction.

FAIL-SAFE PATTERN

- Pattern A: No driving, Charge stop, and EV system warning lamp illuminate
- Pattern B: Driving output power limit, Charge stop, and EV system warning lamp illuminate
- Pattern C: Driving output power limit, Charge limit, and EV system warning lamp illuminate
- Pattern D: EV system warning lamp illuminate

FAIL-SAFE LIST

DTC	CONSULT screen items	Pattern			
		A	B	C	D
P0A0D	HV SYSTEM INTERLOCK ERROR				×
P0A1F	BATTERY ENERGY CONTROL MODULE	×	×		×
P3030	CELL CONT LIN		×		
P3031	CELL CONT ASIC1		×		
P3032	CELL CONT ASIC2		×		
P3033	CELL CONT ASIC3		×		
P3034	CELL CONT ASIC4		×		
P3035	CELL CONT ASIC5		×		
P3036	CELL CONT ASIC6		×		
P3037	CELL CONT ASIC7		×		
P3038	CELL CONT ASIC8		×		
P3039	CELL CONT ASIC9		×		
P303A	CELL CONT ASIC10		×		
P303B	CELL CONT ASIC11		×		
P303C	CELL CONT ASIC12		×		
P303D	CELL CONT ASIC13		×		
P303E	CELL CONT ASIC14		×		
P303F	CELL CONT ASIC15		×		
P3040	CELL CONT ASIC16		×		
P3041	CELL CONT ASIC17		×		
P3042	CELL CONT ASIC18		×		
P3043	CELL CONT ASIC19		×		
P3044	CELL CONT ASIC20		×		
P3045	CELL CONT ASIC21		×		
P3046	CELL CONT ASIC22		×		
P3047	CELL CONT ASIC23		×		
P3048	CELL CONT ASIC24		×		
P3049	CELL CONT ASIC1 VOLT		×		
P304A	CELL CONT ASIC2 VOLT		×		
P304B	CELL CONT ASIC3 VOLT		×		
P304C	CELL CONT ASIC4 VOLT		×		
P304D	CELL CONT ASIC5 VOLT		×		
P304E	CELL CONT ASIC6 VOLT		×		

DTC	CONSULT screen items	Pattern			
		A	B	C	D
P304F	CELL CONT ASIC7 VOLT		×		
P3050	CELL CONT ASIC8 VOLT		×		
P3051	CELL CONT ASIC9 VOLT		×		
P3052	CELL CONT ASIC10 VOLT		×		
P3053	CELL CONT ASIC11 VOLT		×		
P3054	CELL CONT ASIC12 VOLT		×		
P3055	CELL CONT ASIC13 VOLT		×		
P3056	CELL CONT ASIC14 VOLT		×		
P3057	CELL CONT ASIC15 VOLT		×		
P3058	CELL CONT ASIC16 VOLT		×		
P3059	CELL CONT ASIC17 VOLT		×		
P305A	CELL CONT ASIC18 VOLT		×		
P305B	CELL CONT ASIC19 VOLT		×		
P305C	CELL CONT ASIC20 VOLT		×		
P305D	CELL CONT ASIC21 VOLT		×		
P305E	CELL CONT ASIC22 VOLT		×		
P305F	CELL CONT ASIC23 VOLT		×		
P3060	CELL CONT ASIC24 VOLT		×		
P3061	CELL BATTERY VOLT				×
P3062	BYPASS SW				×
P3064	CELL CONT ASIC				×
P308B	CELL CONT ASIC1 OPEN		×		
P308C	CELL CONT ASIC2 OPEN		×		
P308D	CELL CONT ASIC3 OPEN		×		
P308E	CELL CONT ASIC4 OPEN		×		
P308F	CELL CONT ASIC5 OPEN		×		
P3090	CELL CONT ASIC6 OPEN		×		
P3091	CELL CONT ASIC7 OPEN		×		
P3092	CELL CONT ASIC8 OPEN		×		
P3093	CELL CONT ASIC9 OPEN		×		
P3094	CELL CONT ASIC10 OPEN		×		
P3095	CELL CONT ASIC11 OPEN		×		
P3096	CELL CONT ASIC12 OPEN		×		
P3097	CELL CONT ASIC13 OPEN		×		
P3098	CELL CONT ASIC14 OPEN		×		
P3099	CELL CONT ASIC15 OPEN		×		
P309A	CELL CONT ASIC16 OPEN		×		
P309B	CELL CONT ASIC17 OPEN		×		
P309C	CELL CONT ASIC18 OPEN		×		
P309D	CELL CONT ASIC19 OPEN		×		
P309E	CELL CONT ASIC20 OPEN		×		
P309F	CELL CONT ASIC21 OPEN		×		
P30A0	CELL CONT ASIC22 OPEN		×		

DTC	CONSULT screen items	Pattern			
		A	B	C	D
P30A1	CELL CONT ASIC23 OPEN		×		
P30A2	CELL CONT ASIC24 OPEN		×		
P30E0	DLC DIAGNOSIS VCM				×
P30E2	DLC DIAGNOSIS HVAC	No fail-safe			
P30E3	DLC DIAGNOSIS MC	No fail-safe			
P30E4	DLC DIAGNOSIS PDM (POWER DELIVERY MODULE)	No fail-safe			
P30FC	OVER CURRENT	×			
P318D	COMMUNICATION ERROR				×
P318E	COMMUNICATION ERROR				×
P3191	COMMUNICATION ERROR	No fail-safe			
P3196	COMMUNICATION ERROR	No fail-safe			
P3198	COMMUNICATION ERROR	No fail-safe			
P3199	COMMUNICATION ERROR				×
P319C	COMMUNICATION ERROR	No fail-safe			
P31A4	CAN ERROR VCM				×
P31A7	CAN ERROR INV/MC	No fail-safe			
P3302	CELL OVER VOLTAGE MODULE1	×			
P3303	CELL OVER VOLTAGE MODULE2	×			
P3304	CELL OVER VOLTAGE MODULE3	×			
P3305	CELL OVER VOLTAGE MODULE4	×			
P3306	CELL OVER VOLTAGE MODULE5	×			
P3307	CELL OVER VOLTAGE MODULE6	×			
P3308	CELL OVER VOLTAGE MODULE7	×			
P3309	CELL OVER VOLTAGE MODULE8	×			
P330A	CELL OVER VOLTAGE MODULE9	×			
P330B	CELL OVER VOLTAGE MODULE10	×			
P330C	CELL OVER VOLTAGE MODULE11	×			
P330D	CELL OVER VOLTAGE MODULE12	×			
P330E	CELL OVER VOLTAGE MODULE13	×			
P330F	CELL OVER VOLTAGE MODULE14	×			
P3310	CELL OVER VOLTAGE MODULE15	×			
P3311	CELL OVER VOLTAGE MODULE16	×			
P3312	CELL OVER VOLTAGE MODULE17	×			
P3313	CELL OVER VOLTAGE MODULE18	×			
P3314	CELL OVER VOLTAGE MODULE19	×			
P3315	CELL OVER VOLTAGE MODULE20	×			
P3316	CELL OVER VOLTAGE MODULE21	×			
P3317	CELL OVER VOLTAGE MODULE22	×			
P3318	CELL OVER VOLTAGE MODULE23	×			
P3319	CELL OVER VOLTAGE MODULE24	×			
P331A	CELL OVER VOLTAGE MODULE25	×			
P331B	CELL OVER VOLTAGE MODULE26	×			
P331C	CELL OVER VOLTAGE MODULE27	×			

DTC	CONSULT screen items	Pattern			
		A	B	C	D
P331D	CELL OVER VOLTAGE MODULE28	×			
P331E	CELL OVER VOLTAGE MODULE29	×			
P331F	CELL OVER VOLTAGE MODULE30	×			
P3320	CELL OVER VOLTAGE MODULE31	×			
P3321	CELL OVER VOLTAGE MODULE32	×			
P3322	CELL OVER VOLTAGE MODULE33	×			
P3323	CELL OVER VOLTAGE MODULE34	×			
P3324	CELL OVER VOLTAGE MODULE35	×			
P3325	CELL OVER VOLTAGE MODULE36	×			
P3326	CELL OVER VOLTAGE MODULE37	×			
P3327	CELL OVER VOLTAGE MODULE38	×			
P3328	CELL OVER VOLTAGE MODULE39	×			
P3329	CELL OVER VOLTAGE MODULE40	×			
P332A	CELL OVER VOLTAGE MODULE41	×			
P332B	CELL OVER VOLTAGE MODULE42	×			
P332C	CELL OVER VOLTAGE MODULE43	×			
P332D	CELL OVER VOLTAGE MODULE44	×			
P332E	CELL OVER VOLTAGE MODULE45	×			
P332F	CELL OVER VOLTAGE MODULE46	×			
P3330	CELL OVER VOLTAGE MODULE47	×			
P3331	CELL OVER VOLTAGE MODULE48	×			
P3375	CELL OVER DISCHARGE MODULE1	×			
P3376	CELL OVER DISCHARGE MODULE2	×			
P3377	CELL OVER DISCHARGE MODULE3	×			
P3378	CELL OVER DISCHARGE MODULE4	×			
P3379	CELL OVER DISCHARGE MODULE5	×			
P337A	CELL OVER DISCHARGE MODULE6	×			
P337B	CELL OVER DISCHARGE MODULE7	×			
P337C	CELL OVER DISCHARGE MODULE8	×			
P337D	CELL OVER DISCHARGE MODULE9	×			
P337E	CELL OVER DISCHARGE MODULE10	×			
P337F	CELL OVER DISCHARGE MODULE11	×			
P3380	CELL OVER DISCHARGE MODULE12	×			
P3381	CELL OVER DISCHARGE MODULE13	×			
P3382	CELL OVER DISCHARGE MODULE14	×			
P3383	CELL OVER DISCHARGE MODULE15	×			
P3384	CELL OVER DISCHARGE MODULE16	×			
P3385	CELL OVER DISCHARGE MODULE17	×			
P3386	CELL OVER DISCHARGE MODULE18	×			
P3387	CELL OVER DISCHARGE MODULE19	×			
P3388	CELL OVER DISCHARGE MODULE20	×			
P3389	CELL OVER DISCHARGE MODULE21	×			
P338A	CELL OVER DISCHARGE MODULE22	×			

DTC	CONSULT screen items	Pattern			
		A	B	C	D
P338B	CELL OVER DISCHARGE MODULE23	×			
P338C	CELL OVER DISCHARGE MODULE24	×			
P338D	CELL OVER DISCHARGE MODULE25	×			
P338E	CELL OVER DISCHARGE MODULE26	×			
P338F	CELL OVER DISCHARGE MODULE27	×			
P3390	CELL OVER DISCHARGE MODULE28	×			
P3391	CELL OVER DISCHARGE MODULE29	×			
P3392	CELL OVER DISCHARGE MODULE30	×			
P3393	CELL OVER DISCHARGE MODULE31	×			
P3394	CELL OVER DISCHARGE MODULE32	×			
P3395	CELL OVER DISCHARGE MODULE33	×			
P3396	CELL OVER DISCHARGE MODULE34	×			
P3397	CELL OVER DISCHARGE MODULE35	×			
P3398	CELL OVER DISCHARGE MODULE36	×			
P3399	CELL OVER DISCHARGE MODULE37	×			
P339A	CELL OVER DISCHARGE MODULE38	×			
P339B	CELL OVER DISCHARGE MODULE39	×			
P339C	CELL OVER DISCHARGE MODULE40	×			
P339D	CELL OVER DISCHARGE MODULE41	×			
P339E	CELL OVER DISCHARGE MODULE42	×			
P339F	CELL OVER DISCHARGE MODULE43	×			
P33A0	CELL OVER DISCHARGE MODULE44	×			
P33A1	CELL OVER DISCHARGE MODULE45	×			
P33A2	CELL OVER DISCHARGE MODULE46	×			
P33A3	CELL OVER DISCHARGE MODULE47	×			
P33A4	CELL OVER DISCHARGE MODULE48	×			
P33D4	BATT GRADUAL CAPA LOSS DIAG				×
P33D5	CURRENT SENSOR		×		
P33D6	CURRENT SENSOR		×		
P33D7	TEMPERATURE SENSOR	No fail-safe			
P33D9	TEMPERATURE SENSOR	No fail-safe			
P33DD	TEMPERATURE SENSOR	No fail-safe			
P33DF	BATT VOLTAGE ISOLATION SEN				
P33E0	BATT VOLTAGE ISOLATION SEN				×
P33E1	BATT VOLTAGE ISOLATION SEN				×
P33E2	BATT PACK OVER TEMP	×			
P33E6	CELL VOLTAGE DEVIATION DIAG			×	
P33EA	BATTERY HEATER RELAY				×
P33EB	TEMPERATURE SENSOR	No fail-safe			
P33ED	BATTERY PARALLEL DIAGNOSIS			×	
P33EE	BATTERY HEATER CONTROL SYSTEM				×
U1000	CAN COMM CIRCUIT		×		×

DTC Index

INFOID:0000000008745923

×: Applicable —: Not applicable

DTC	CONSULT screen items	EV system warning lamp	Trip	Reference
P0A0D	HV SYSTEM INTERLOCK ERROR	×	1	EVB-88
P0A1F	BATTERY ENERGY CONTROL MODULE	×	1	EVB-90
P3030	CELL CONT LIN	×	1	EVB-91
P3031	CELL CONT ASIC1	×	1	EVB-92
P3032	CELL CONT ASIC2	×	1	EVB-92
P3033	CELL CONT ASIC3	×	1	EVB-92
P3034	CELL CONT ASIC4	×	1	EVB-92
P3035	CELL CONT ASIC5	×	1	EVB-92
P3036	CELL CONT ASIC6	×	1	EVB-92
P3037	CELL CONT ASIC7	×	1	EVB-92
P3038	CELL CONT ASIC8	×	1	EVB-92
P3039	CELL CONT ASIC9	×	1	EVB-92
P303A	CELL CONT ASIC10	×	1	EVB-92
P303B	CELL CONT ASIC11	×	1	EVB-92
P303C	CELL CONT ASIC12	×	1	EVB-92
P303D	CELL CONT ASIC13	×	1	EVB-93
P303E	CELL CONT ASIC14	×	1	EVB-93
P303F	CELL CONT ASIC15	×	1	EVB-93
P3040	CELL CONT ASIC16	×	1	EVB-93
P3041	CELL CONT ASIC17	×	1	EVB-93
P3042	CELL CONT ASIC18	×	1	EVB-93
P3043	CELL CONT ASIC19	×	1	EVB-93
P3044	CELL CONT ASIC20	×	1	EVB-93
P3045	CELL CONT ASIC21	×	1	EVB-93
P3046	CELL CONT ASIC22	×	1	EVB-93
P3047	CELL CONT ASIC23	×	1	EVB-93
P3048	CELL CONT ASIC24	×	1	EVB-93
P3049	CELL CONT ASIC1 VOLT	×	1	EVB-94
P304A	CELL CONT ASIC2 VOLT	×	1	EVB-94
P304B	CELL CONT ASIC3 VOLT	×	1	EVB-94
P304C	CELL CONT ASIC4 VOLT	×	1	EVB-94
P304D	CELL CONT ASIC5 VOLT	×	1	EVB-94
P304E	CELL CONT ASIC6 VOLT	×	1	EVB-94
P304F	CELL CONT ASIC7 VOLT	×	1	EVB-94
P3050	CELL CONT ASIC8 VOLT	×	1	EVB-94
P3051	CELL CONT ASIC9 VOLT	×	1	EVB-94
P3052	CELL CONT ASIC10 VOLT	×	1	EVB-94
P3053	CELL CONT ASIC11 VOLT	×	1	EVB-94
P3054	CELL CONT ASIC12 VOLT	×	1	EVB-94
P3055	CELL CONT ASIC13 VOLT	×	1	EVB-96

DTC	CONSULT screen items	EV system warning lamp	Trip	Reference
P3056	CELL CONT ASIC14 VOLT	×	1	EVB-96
P3057	CELL CONT ASIC15 VOLT	×	1	EVB-96
P3058	CELL CONT ASIC16 VOLT	×	1	EVB-96
P3059	CELL CONT ASIC17 VOLT	×	1	EVB-96
P305A	CELL CONT ASIC18 VOLT	×	1	EVB-96
P305B	CELL CONT ASIC19 VOLT	×	1	EVB-96
P305C	CELL CONT ASIC20 VOLT	×	1	EVB-96
P305D	CELL CONT ASIC21 VOLT	×	1	EVB-96
P305E	CELL CONT ASIC22 VOLT	×	1	EVB-96
P305F	CELL CONT ASIC23 VOLT	×	1	EVB-96
P3060	CELL CONT ASIC24 VOLT	×	1	EVB-96
P3061	CELL BATTERY VOLT	×	1	EVB-98
P3062	BYPASS SW	×	1	EVB-99
P3064	CELL CONT ASIC	×	1	EVB-100
P308B	CELL CONT ASIC1 OPEN	×	1	EVB-101
P308C	CELL CONT ASIC2 OPEN	×	1	EVB-101
P308D	CELL CONT ASIC3 OPEN	×	1	EVB-101
P308E	CELL CONT ASIC4 OPEN	×	1	EVB-101
P308F	CELL CONT ASIC5 OPEN	×	1	EVB-101
P3090	CELL CONT ASIC6 OPEN	×	1	EVB-101
P3091	CELL CONT ASIC7 OPEN	×	1	EVB-101
P3092	CELL CONT ASIC8 OPEN	×	1	EVB-101
P3093	CELL CONT ASIC9 OPEN	×	1	EVB-101
P3094	CELL CONT ASIC10 OPEN	×	1	EVB-101
P3095	CELL CONT ASIC11 OPEN	×	1	EVB-101
P3096	CELL CONT ASIC12 OPEN	×	1	EVB-101
P3097	CELL CONT ASIC13 OPEN	×	1	EVB-104
P3098	CELL CONT ASIC14 OPEN	×	1	EVB-104
P3099	CELL CONT ASIC15 OPEN	×	1	EVB-104
P309A	CELL CONT ASIC16 OPEN	×	1	EVB-104
P309B	CELL CONT ASIC17 OPEN	×	1	EVB-104
P309C	CELL CONT ASIC18 OPEN	×	1	EVB-104
P309D	CELL CONT ASIC19 OPEN	×	1	EVB-104
P309E	CELL CONT ASIC20 OPEN	×	1	EVB-104
P309F	CELL CONT ASIC21 OPEN	×	1	EVB-104
P30A0	CELL CONT ASIC22 OPEN	×	1	EVB-104
P30A1	CELL CONT ASIC23 OPEN	×	1	EVB-104
P30A2	CELL CONT ASIC24 OPEN	×	1	EVB-104
P30E0	DLC DIAGNOSIS VCM	×	1	EVB-107
P30E2	DLC DIAGNOSIS HVAC	—	1	EVB-108
P30E3	DLC DIAGNOSIS MC	—	1	EVB-109
P30E4	DLC DIAGNOSIS PDM (POWER DELIVERY MODULE)	—	1	EVB-110
P30FC	OVER CURRENT	×	1	EVB-111

DTC	CONSULT screen items	EV system warning lamp	Trip	Reference
P318D	COMMUNICATION ERROR	×	1	EVB-112
P318E	COMMUNICATION ERROR	×	1	EVB-113
P3191	COMMUNICATION ERROR	—	1	EVB-114
P3196	COMMUNICATION ERROR	—	1	EVB-115
P3198	COMMUNICATION ERROR	—	1	EVB-116
P3199	COMMUNICATION ERROR	×	1	EVB-117
P319C	COMMUNICATION ERROR	—	1	EVB-118
P31A4	CAN ERROR VCM	×	1	EVB-119
P31A7	CAN ERROR INV/MC	—	1	EVB-120
P3302	CELL OVER VOLTAGE MODULE1	×	1	EVB-121
P3303	CELL OVER VOLTAGE MODULE2	×	1	EVB-121
P3304	CELL OVER VOLTAGE MODULE3	×	1	EVB-121
P3305	CELL OVER VOLTAGE MODULE4	×	1	EVB-121
P3306	CELL OVER VOLTAGE MODULE5	×	1	EVB-121
P3307	CELL OVER VOLTAGE MODULE6	×	1	EVB-121
P3308	CELL OVER VOLTAGE MODULE7	×	1	EVB-121
P3309	CELL OVER VOLTAGE MODULE8	×	1	EVB-121
P330A	CELL OVER VOLTAGE MODULE9	×	1	EVB-121
P330B	CELL OVER VOLTAGE MODULE10	×	1	EVB-121
P330C	CELL OVER VOLTAGE MODULE11	×	1	EVB-121
P330D	CELL OVER VOLTAGE MODULE12	×	1	EVB-121
P330E	CELL OVER VOLTAGE MODULE13	×	1	EVB-125
P330F	CELL OVER VOLTAGE MODULE14	×	1	EVB-125
P3310	CELL OVER VOLTAGE MODULE15	×	1	EVB-125
P3311	CELL OVER VOLTAGE MODULE16	×	1	EVB-125
P3312	CELL OVER VOLTAGE MODULE17	×	1	EVB-125
P3313	CELL OVER VOLTAGE MODULE18	×	1	EVB-125
P3314	CELL OVER VOLTAGE MODULE19	×	1	EVB-125
P3315	CELL OVER VOLTAGE MODULE20	×	1	EVB-125
P3316	CELL OVER VOLTAGE MODULE21	×	1	EVB-125
P3317	CELL OVER VOLTAGE MODULE22	×	1	EVB-125
P3318	CELL OVER VOLTAGE MODULE23	×	1	EVB-125
P3319	CELL OVER VOLTAGE MODULE24	×	1	EVB-125
P331A	CELL OVER VOLTAGE MODULE25	×	1	EVB-129
P331B	CELL OVER VOLTAGE MODULE26	×	1	EVB-129
P331C	CELL OVER VOLTAGE MODULE27	×	1	EVB-129
P331D	CELL OVER VOLTAGE MODULE28	×	1	EVB-129
P331E	CELL OVER VOLTAGE MODULE29	×	1	EVB-129
P331F	CELL OVER VOLTAGE MODULE30	×	1	EVB-129
P3320	CELL OVER VOLTAGE MODULE31	×	1	EVB-129
P3321	CELL OVER VOLTAGE MODULE32	×	1	EVB-129
P3322	CELL OVER VOLTAGE MODULE33	×	1	EVB-129
P3323	CELL OVER VOLTAGE MODULE34	×	1	EVB-129

DTC	CONSULT screen items	EV system warning lamp	Trip	Reference
P3324	CELL OVER VOLTAGE MODULE35	×	1	EVB-129
P3325	CELL OVER VOLTAGE MODULE36	×	1	EVB-129
P3326	CELL OVER VOLTAGE MODULE37	×	1	EVB-132
P3327	CELL OVER VOLTAGE MODULE38	×	1	EVB-132
P3328	CELL OVER VOLTAGE MODULE39	×	1	EVB-132
P3329	CELL OVER VOLTAGE MODULE40	×	1	EVB-132
P332A	CELL OVER VOLTAGE MODULE41	×	1	EVB-132
P332B	CELL OVER VOLTAGE MODULE42	×	1	EVB-132
P332C	CELL OVER VOLTAGE MODULE43	×	1	EVB-132
P332D	CELL OVER VOLTAGE MODULE44	×	1	EVB-132
P332E	CELL OVER VOLTAGE MODULE45	×	1	EVB-132
P332F	CELL OVER VOLTAGE MODULE46	×	1	EVB-132
P3330	CELL OVER VOLTAGE MODULE47	×	1	EVB-132
P3331	CELL OVER VOLTAGE MODULE48	×	1	EVB-132
P3375	CELL OVER DISCHARGE MODULE1	×	1	EVB-135
P3376	CELL OVER DISCHARGE MODULE2	×	1	EVB-135
P3377	CELL OVER DISCHARGE MODULE3	×	1	EVB-135
P3378	CELL OVER DISCHARGE MODULE4	×	1	EVB-135
P3379	CELL OVER DISCHARGE MODULE5	×	1	EVB-135
P337A	CELL OVER DISCHARGE MODULE6	×	1	EVB-135
P337B	CELL OVER DISCHARGE MODULE7	×	1	EVB-135
P337C	CELL OVER DISCHARGE MODULE8	×	1	EVB-135
P337D	CELL OVER DISCHARGE MODULE9	×	1	EVB-135
P337E	CELL OVER DISCHARGE MODULE10	×	1	EVB-135
P337F	CELL OVER DISCHARGE MODULE11	×	1	EVB-135
P3380	CELL OVER DISCHARGE MODULE12	×	1	EVB-135
P3381	CELL OVER DISCHARGE MODULE13	×	1	EVB-139
P3382	CELL OVER DISCHARGE MODULE14	×	1	EVB-139
P3383	CELL OVER DISCHARGE MODULE15	×	1	EVB-139
P3384	CELL OVER DISCHARGE MODULE16	×	1	EVB-139
P3385	CELL OVER DISCHARGE MODULE17	×	1	EVB-139
P3386	CELL OVER DISCHARGE MODULE18	×	1	EVB-139
P3387	CELL OVER DISCHARGE MODULE19	×	1	EVB-139
P3388	CELL OVER DISCHARGE MODULE20	×	1	EVB-139
P3389	CELL OVER DISCHARGE MODULE21	×	1	EVB-139
P338A	CELL OVER DISCHARGE MODULE22	×	1	EVB-139
P338B	CELL OVER DISCHARGE MODULE23	×	1	EVB-139
P338C	CELL OVER DISCHARGE MODULE24	×	1	EVB-139
P338D	CELL OVER DISCHARGE MODULE25	×	1	EVB-143
P338E	CELL OVER DISCHARGE MODULE26	×	1	EVB-143
P338F	CELL OVER DISCHARGE MODULE27	×	1	EVB-143
P3390	CELL OVER DISCHARGE MODULE28	×	1	EVB-143
P3391	CELL OVER DISCHARGE MODULE29	×	1	EVB-143

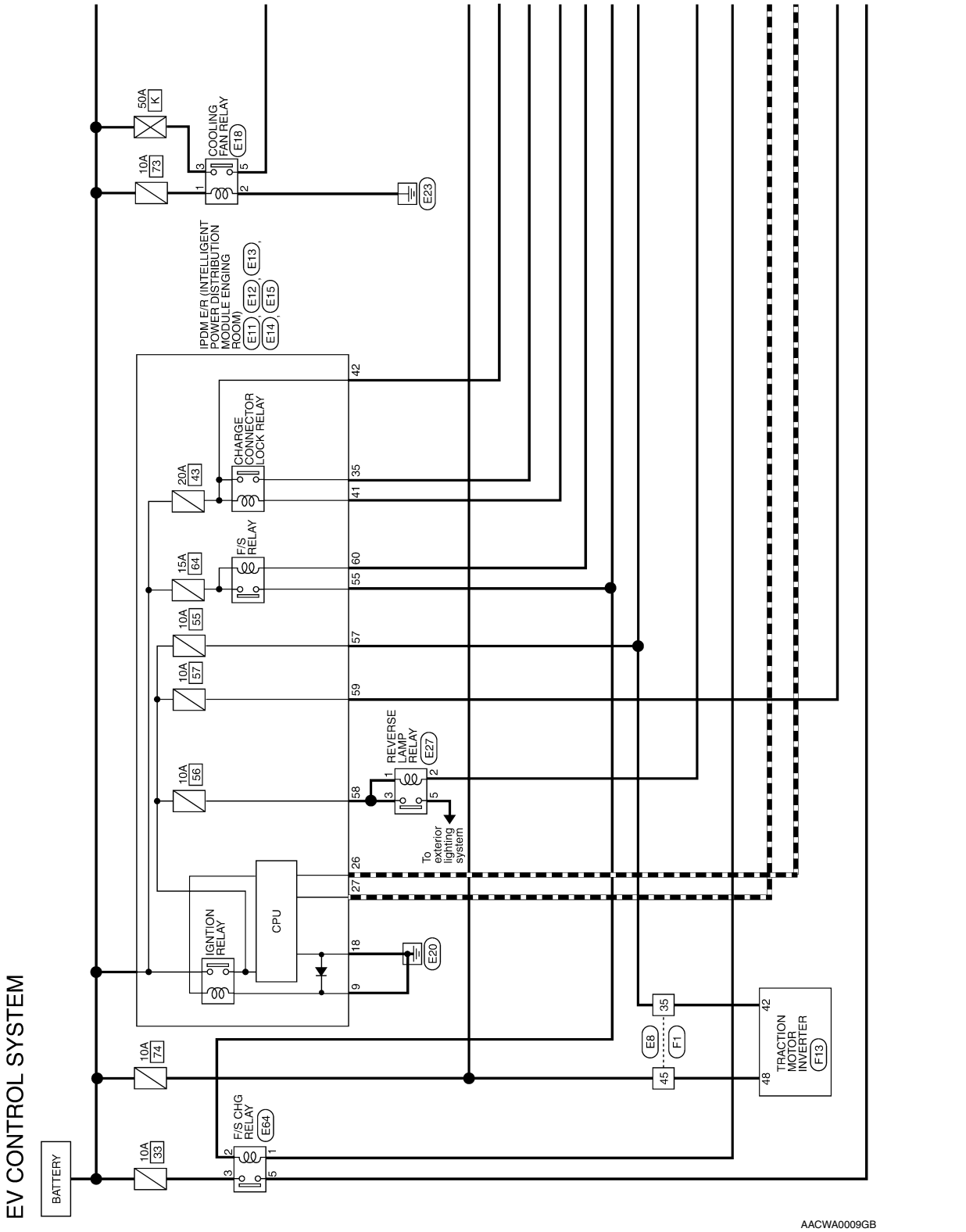
DTC	CONSULT screen items	EV system warning lamp	Trip	Reference
P3392	CELL OVER DISCHARGE MODULE30	×	1	EVB-143
P3393	CELL OVER DISCHARGE MODULE31	×	1	EVB-143
P3394	CELL OVER DISCHARGE MODULE32	×	1	EVB-143
P3395	CELL OVER DISCHARGE MODULE33	×	1	EVB-143
P3396	CELL OVER DISCHARGE MODULE34	×	1	EVB-143
P3397	CELL OVER DISCHARGE MODULE35	×	1	EVB-143
P3398	CELL OVER DISCHARGE MODULE36	×	1	EVB-143
P3399	CELL OVER DISCHARGE MODULE37	×	1	EVB-146
P339A	CELL OVER DISCHARGE MODULE38	×	1	EVB-146
P339B	CELL OVER DISCHARGE MODULE39	×	1	EVB-146
P339C	CELL OVER DISCHARGE MODULE40	×	1	EVB-146
P339D	CELL OVER DISCHARGE MODULE41	×	1	EVB-146
P339E	CELL OVER DISCHARGE MODULE42	×	1	EVB-146
P339F	CELL OVER DISCHARGE MODULE43	×	1	EVB-146
P33A0	CELL OVER DISCHARGE MODULE44	×	1	EVB-146
P33A1	CELL OVER DISCHARGE MODULE45	×	1	EVB-146
P33A2	CELL OVER DISCHARGE MODULE46	×	1	EVB-146
P33A3	CELL OVER DISCHARGE MODULE47	×	1	EVB-146
P33A4	CELL OVER DISCHARGE MODULE48	×	1	EVB-146
P33D4	BATTERY INTERNAL RESISTANCE DIAG	×	1	EVB-149
P33D5	CURRENT SENSOR	×	1	EVB-150
P33D6	CURRENT SENSOR	×	1	EVB-152
P33D7	TEMPERATURE SENSOR	—	1	EVB-154
P33D9	TEMPERATURE SENSOR	—	1	EVB-154
P33DD	TEMPERATURE SENSOR	—	1	EVB-154
P33DF	BATT VOLTAGE ISOLATION SEN	×	1	EVB-156
P33E0	BATT VOLTAGE ISOLATION SEN	×	1	EVB-157
P33E1	BATT VOLTAGE ISOLATION SEN	×	1	EVB-158
P33E2	BATT PACK OVER TEMP	×	1	EVB-159
P33E6	CELL CONTROLLER	×	2	EVB-160
P33EB	TEMPERATURE SENSOR	—	1	EVB-167
P33EA	BATTERY HEATER RELAY	×	1	EVB-165
P33ED	BATTERY PARALLEL DIAGNOSIS	×	1	EVB-169
P33EE	BATTERY HEATER CONTROL SYSTEM	×	1	EVB-171
U1000	CAN COMM CIRCUIT	×	1	EVB-173

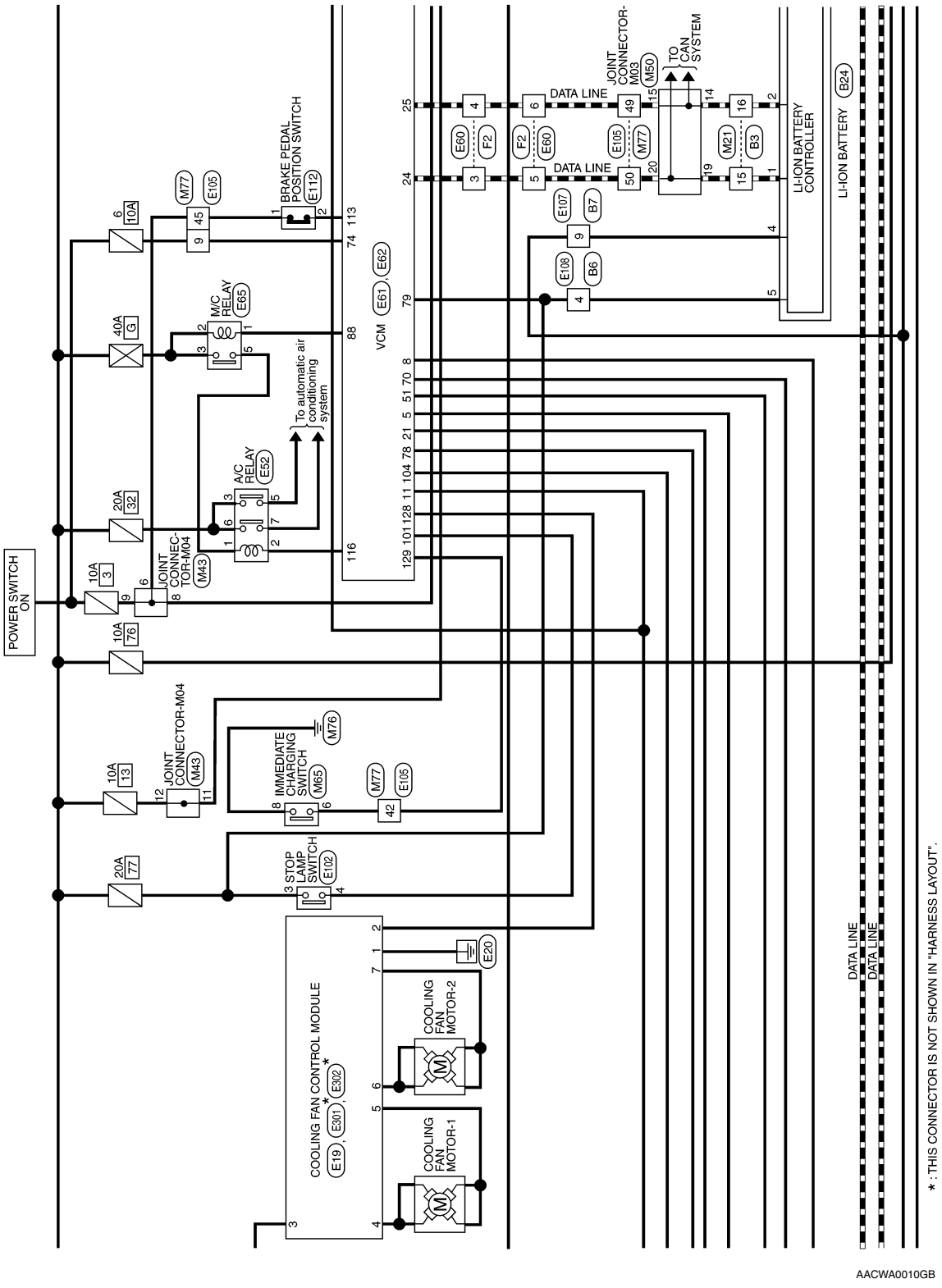
WIRING DIAGRAM

VCM

Wiring Diagram

INFOID:0000000009347900





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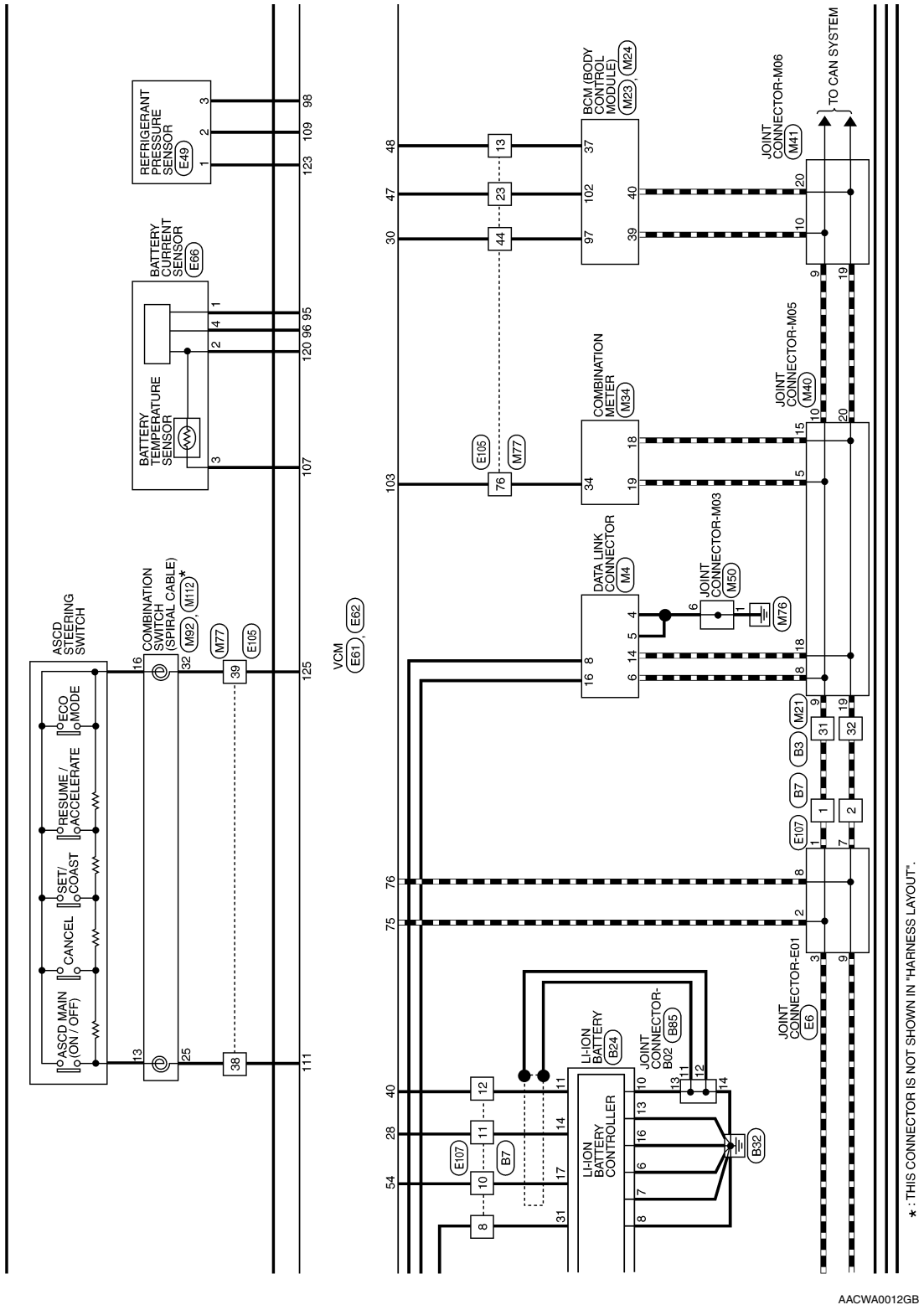

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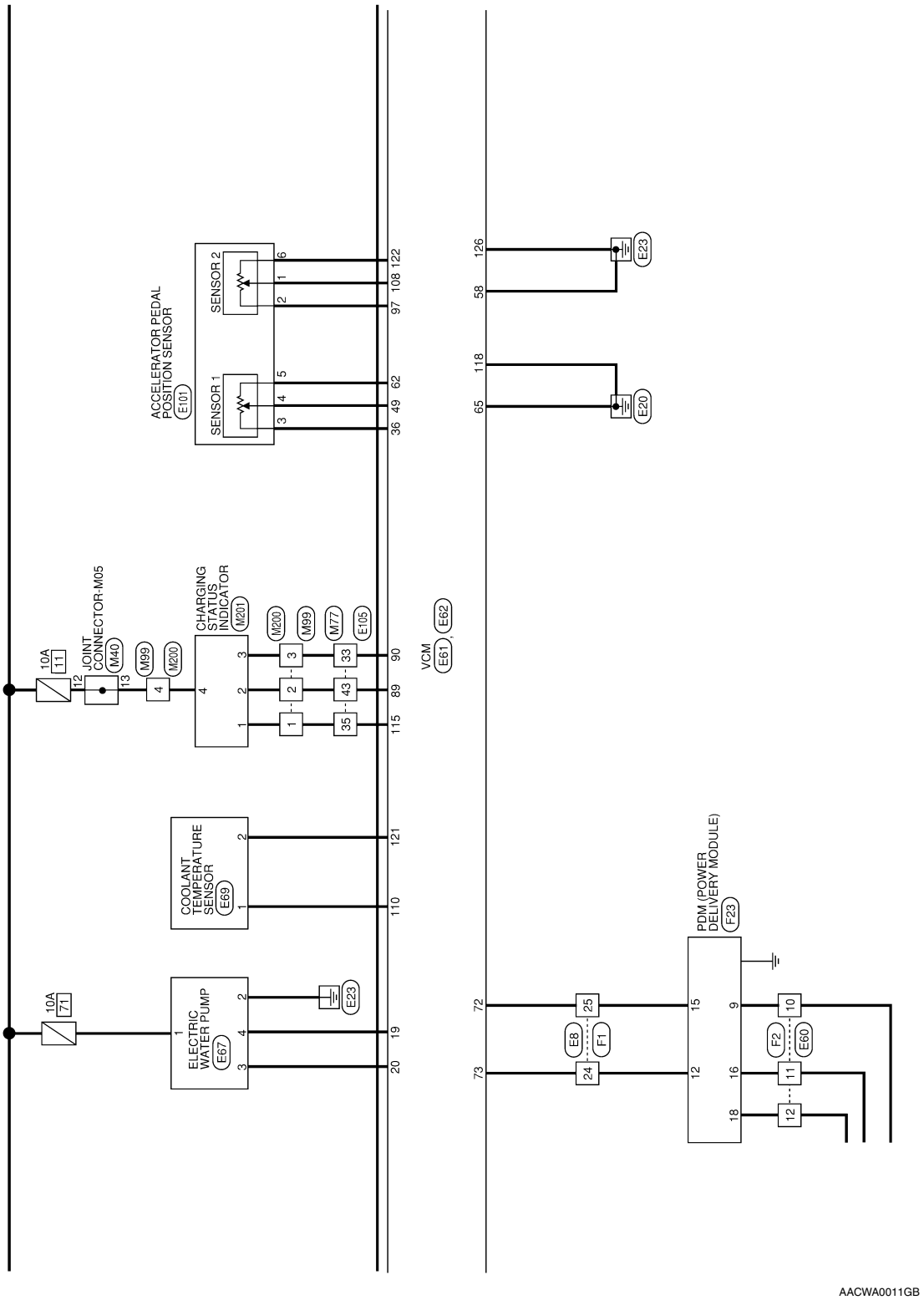
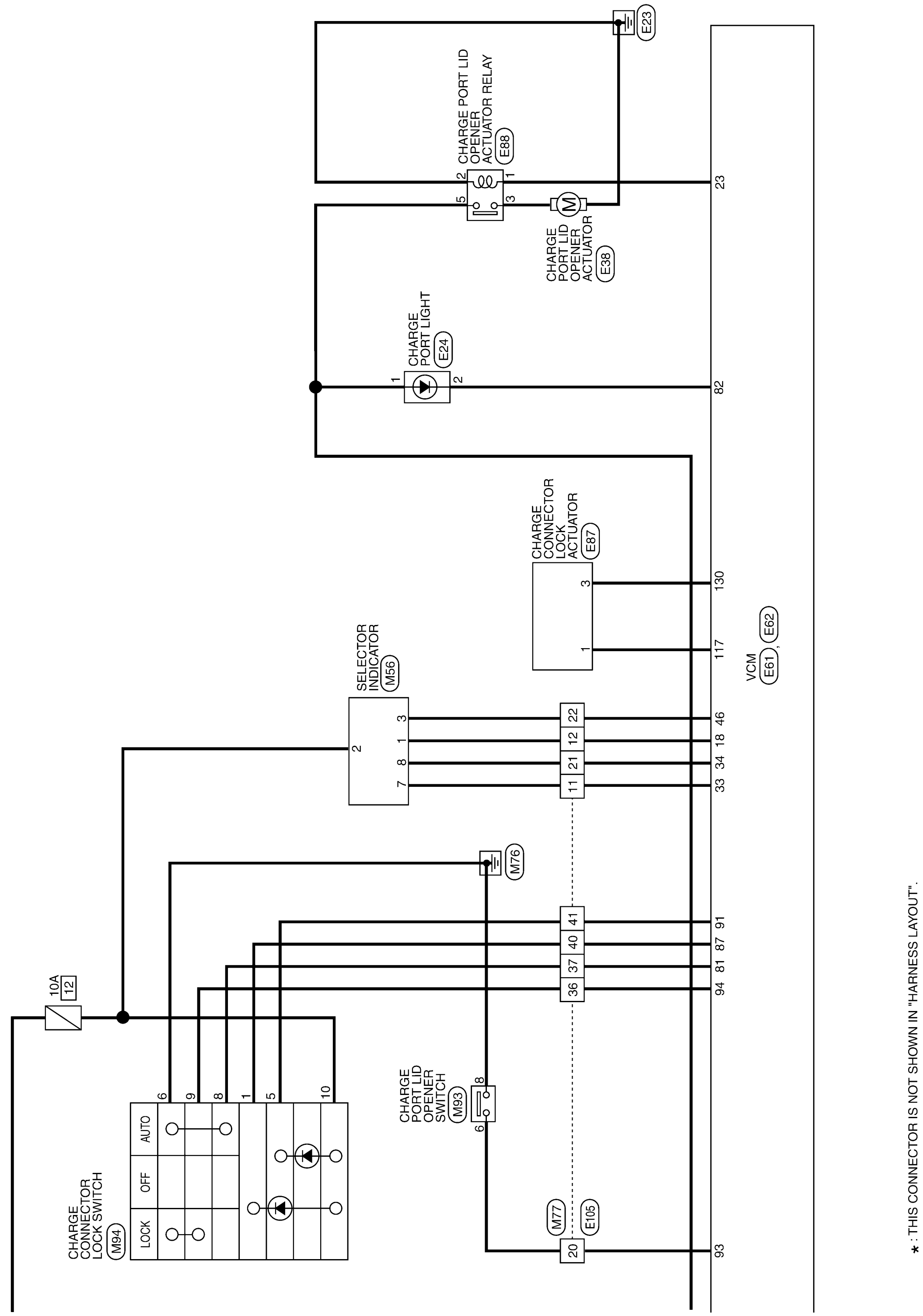

ACCELERATOR PEDAL POSITION SENSOR
E101
SENSOR 1
SENSOR 2
JOINT CONNECTOR-M05
M40
10A
11
71
CHARGING STATUS INDICATOR
M201
COOLANT TEMPERATURE SENSOR
E69
ELECTRIC WATER PUMP
E67
VCM
E61
E62
PDM (POWER DELIVERY MODULE)
F23
E23
E20
E8
F1
F2
E60
M200
M99
M77
E105
AACWA0011GB



AACWA0013GB

EV CONTROL SYSTEM - CONNECTORS

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE

H.S.

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

Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	LG	–
4	B	–
5	B	–
6	L	–
7	GR	–
8	G	–
9	–	–
10	–	–
11	SB	–
12	G	–
13	L	–
14	P	–
15	–	–
16	Y	–

Connector No.	M21
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

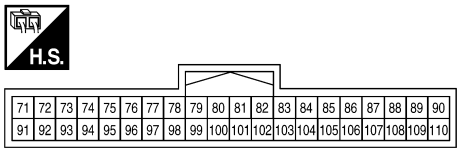
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	–	–
4	–	–
5	–	–
6	–	–
7	B	–
8	SHIELD	–
9	R	–
10	SB	–
11	P	–
12	V	–
13	GR	–
14	P	–
15	L	–
16	G	–
17	–	–
18	–	–
19	–	–
20	–	–
21	–	–
22	–	–

Terminal No.	Color of Wire	Signal Name
23	–	–
24	W	–
25	B	–
26	W	–
27	Y	–
28	–	–
29	W	–
30	L	–
31	L	–
32	P	–

AACIA0085GB

Connector No.	M23
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
71	–	–
72	–	–
73	V	PUSH SW SIGNAL OUTPUT
74	–	–
75	LG	REQUEST SW (DR)
76	SB	ENGINE START SW
77	–	–
78	P	DOOR ANTENNA (DR) +
79	V	DOOR ANTENNA (DR) –
80	LG	DOOR ANTENNA (AS) +
81	Y	DOOR ANTENNA (AS) –
82	W	BACK DOOR ANTENNA +
83	B	BACK DOOR ANTENNA –
84	BR	ROOM ANTENNA 1 +
85	Y	ROOM ANTENNA 1 –
86	G	ROOM ANTENNA 2 +
87	R	ROOM ANTENNA 2 –
88	G	ROOM ANTENNA 3 +
89	R	ROOM ANTENNA 3 –

Terminal No.	Color of Wire	Signal Name
90	W	HIGHSIDE ENGINE START SW ILLUMINATION LED
91	V	POWER POSITION LED (LOCK POSITION LED)
92	B	LOW SIDE ENGINE START SW ILLUMINATION LED OUTPUT
93	GR	SMART KEYLESS BUZZER OUTPUT
94	–	SMART KEYLESS BUZZER OUTPUT
95	–	–
96	BR	ACC RELAY OUTPUT
97	LG	STARTER RELAY OUTPUT
98	L	IGN RELAY OUTPUT1 (USM)
99	GR	IGN RELAY OUTPUT2 (ELEC)
100	P	REQUEST SW (AS)
101	–	–
102	BG	SHIFT N, P
103	–	–
104	–	–
105	W	BRAKE SW2
106	–	–
107	–	–
108	–	–
109	–	–
110	–	–

AACIA0086GB

Connector No.	M24
Connector Name	BCM (BODY CONTROL MODULE)
Connector Color	BLACK

H.S.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

Terminal No.	Color of Wire	Signal Name
1	–	–
2	L	COMBINATION SW INPUT 5
3	GR	COMBINATION SW INPUT 4
4	BR	COMBINATION SW INPUT 3
5	G	COMBINATION SW INPUT 2
6	V	COMBINATION SW INPUT 1
7	GR	KEY CYLINDER UNLOCK SW
8	R	KEY CYLINDER LOCK SW
9	BR	BRAKE SW1
10	–	–
11	–	–
12	Y	CENTRAL DOOR LOCK SW
13	BR	CENTRAL DOOR UNLOCK SW
14	G	AUTO LIGHT SENSOR INPUT
15	W	REAR DEFOGGER SW
16	R	MR OUTPUT
17	Y	AUTO LIGHT SENSOR POWER SUPPLY OUTPUT
18	L	KEYLESS TUNER, AUTO LIGHT SENSOR GND
19	–	–
20	–	–
21	P	IMMOBILIZER ONE WAY COMMUNICATION (CLOCK)
22	–	–
23	R	SECURITY INDICATOR OUTPUT
24	SB	DONGLE LINK
25	LG	IMMOBILIZER TWO WAY COMMUNICATION
26	–	–
27	–	–
28	–	–
29	G	HAZARD SW
30	V	TRUNK/BACK DOOR OPENER SW
31	W	DOOR LOCK STATUS SW (DR)
32	GR	COMBINATION SW OUTPUT 5
33	Y	COMBINATION SW OUTPUT 4
34	W	COMBINATION SW OUTPUT 3
35	BG	COMBINATION SW OUTPUT 2
36	P	COMBINATION SW OUTPUT 1
37	V	SHIFT P POSITION, PARKING POSITION SW
38	SB	INTELLIGENT TUNER
39	L	CAN–H
40	P	CAN–L

AACIA0087GB

Connector No.	M34
Connector Name	COMBINATION METER
Connector Color	WHITE

H.S.

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21

Terminal No.	Color of Wire	Signal Name
1	LG	BAT
2	Y	BAT (FOR UPPER)
3	GR	IGN
4	BG	IGN (FOR UPPER)
5	B	GND1 (ILL)
6	B	GND2 (POWER)
7	–	–
8	Y	WASHER SW
9	BR	CHARGE CONNECT
10	–	–
11	–	–
12	V	SW GND
13	G	MODE B SW
14	Y	MODE A SW
15	BR	TRIP RESET SW
16	P	ILL CONT UP
17	G	UPPER ILL CONT
18	P	CAN–H
19	L	CAN–L
20	LG	AS SEATBELT W/L
21	–	–
22	GR	GND (FOR UPPER)
23	–	–
24	BG	PKB SW
25	SB	BRAKE OIL
26	B	ILL CONT OUT
27	R	A/BAG WARN
28	R	SECURITY
29	–	–
30	GR	8 P/R O/P
31	–	–
32	W	SDA (12C)
33	G	SCL (12C)
34	L	CHARGE LAMP
35	–	–
36	–	–
37	–	–
38	V	LED H LAMP R
39	LG	LED H LAMP L
40	W	BUCKLE SW FR DR

AACIA0088GB

Connector No.	M40
Connector Name	JOINT CONNECTOR-M05
Connector Color	BLUE

Terminal No.	Color of Wire	Signal Name
1	L	–
2	L	–
3	BR	–
4	GR	–
5	L	–
6	L	–
7	L	–
8	L	–
9	L	–
10	L	–
11	LG	–
12	LG	–
13	L	–
14	R	–
15	P	–
16	P	–
17	P	–
18	P	–
19	P	–
20	P	–

Connector No.	M41
Connector Name	JOINT CONNECTOR-M06
Connector Color	BLUE

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

Connector No.	M43
Connector Name	JOINT CONNECTOR-M04
Connector Color	GRAY

Terminal No.	Color of Wire	Signal Name
1	G	–
2	Y	–
3	W	–
4	W	–
5	W	–
6	Y	–
7	Y	–
8	G	–
9	W	–
10	W	–
11	Y	–
12	Y	–
13	–	–
14	–	–
15	–	–
16	–	–
17	–	–
18	B	–
19	B	–
20	B	–

AACIA0089GB

Connector No.	M65
Connector Name	IMMEDIATE CHARGING SWITCH
Connector Color	GRAY

H.S.

4	3	2	1
8	7	6	5

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

Connector No.	M56
Connector Name	SELECTOR INDICATOR
Connector Color	WHITE

H.S.

1	2	3	4
5	6	7	8

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	R	–
3	B	–
4	B	–
5	W	–
6	–	–
7	L	–
8	P	–

Connector No.	M50
Connector Name	JOINT CONNECTOR-CM03
Connector Color	PINK

H.S.

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

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

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Terminal No.	Color of Wire	Signal Name
60	Y	–
61	GR	–
62	W	–
63	BR	–
64	SHIELD	–
65	W	–
66	LG	–
67	R	–
68	G	–
69	BG	–
70	GR	–
71	R	–
72	R	–
73	B	–
74	W	–
76	L	–
80	W	–
81	LG	–
83	GR	–
84	L	–
85	Y	–
86	SB	–
88	R	–
89	G	–
90	SHIELD	–
91	Y	–
92	BR	–
93	W	–
94	P	–
95	L	–
96	P	–
97	G	–
98	V	–
99	LG	–
100	R	–

Terminal No.	Color of Wire	Signal Name
22	B	–
23	BG	–
24	B	–
26	G	–
27	B	–
28	B	–
25	W	–
29	R	–
31	R	–
32	W	–
33	GR	–
34	BR	–
35	BR	–
36	W	–
37	L	–
38	LG	–
39	SB	–
40	V	–
41	P	–
42	SB	–
43	G	–
44	LG	–
45	Y	–
46	R	–
47	W	–
48	L	–
49	G	–
50	L	–
51	SB	–
52	L	–
54	B	–
55	R	–
56	V	–
57	Y	–
58	L	–

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	L	–
3	V	–
4	LG	–
6	P	–
7	GR	–
9	G	–
10	L	–
11	L	–
12	Y	–
13	V	–
14	R	–
15	G	–
16	W	–
17	R	–
18	G	–
19	W	–
20	GR	–
21	P	–

AACIA0091GB

Connector No.	M92
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
21	–	–
22	–	–
24	R	–
25	LG	–
27	–	–
31	W	–
32	SB	–
33	B	–

Connector No.	M93
Connector Name	CHARGE PORT LID OPENER SWITCH
Connector Color	GREEN

H.S.

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

Connector No.	M94
Connector Name	CHARGE CONNECTOR LOCK SWITCH
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	–
2	G	–
3	–	–
4	GR	–
5	P	–
6	BR	–
7	–	–
8	L	–
9	W	–
10	Y	–

Connector No.	M99
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	G	–
3	GR	–
4	LG	–

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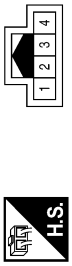
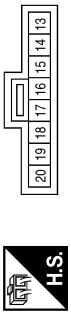
Connector No.	M200
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	V	–
2	P	–
3	SB	–
4	L	–

Connector No.	M112
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
13	R	–
14	W	–
15	L	–
16	B	–
17	BR	–
18	B	–
19	Y	–
20	Y	–

AACIA0093GB

Connector No.	M201
Connector Name	CHARGING STATUS INDICATOR
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	–
2	P	–
3	SB	–
4	L	–

Connector No.	E6
Connector Name	JOINT CONNECTOR-E01
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	–
2	L	–
3	L	–
4	L	–
5	–	–
6	L	–
7	P	–
8	P	–
9	P	–
10	P	–
11	–	–
12	P	–

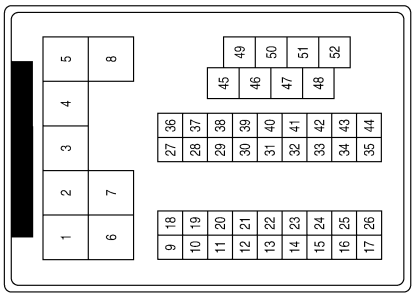
AACIA0094GB

Terminal No.	Color of Wire	Signal Name
49	B/R	–
50	W	–
51	R	–
52	B	–

Terminal No.	Color of Wire	Signal Name
16	W	–
17	L	–
18	–	–
19	LG	–
20	W	–
21		–
22	–	–
23	–	–
24	O	–
25	P	–
26	–	–
27	–	–
28	–	–
29	–	–
30	–	–
31	–	–
32	–	–
33	–	–
34	–	–
35	R	–
36	G	–
37	V	–
38	P	–
39	B	–
40	O	–
41	L	–
42	–	–
43	–	–
44	B/W	–
45	P	–
46	B/R	–
47	G	–
48	SB	–

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	–	–
4	–	–
5	–	–
6	–	–
7	–	–
8	–	–
9	V	–
10	SB	–
11	Y	–
12	G	–
13	BR	–
14	L	–
15	–	–

AACIA0095GB

Connector No.	E11
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

H.S.

11	10	9
14	13	12

Terminal No.	Color of Wire	Signal Name
9	B	GND (POWER)
10	–	–
11	–	–
12	–	–
13	–	–
14	R	RR DEF

Connector No.	E12
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN

H.S.

17		16	15
22	21	20	19	18

Terminal No.	Color of Wire	Signal Name
15	–	–
16	–	–
17	–	–
18	B/W	GND (SIGNAL)
19	W	FR FOG/L RH

Terminal No.	Color of Wire	Signal Name
20	V	FR FOG/L LH
21	–	–
22	–	–

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

28	27	26	25	24	23
34	33	32	31	30	29

Terminal No.	Color of Wire	Signal Name
23	–	–
24	–	–
25	R	AUTO STOP SW
26	P	CAN-CL
27	L	CAN-CH
28	G	DTRL RLY
29	–	–
30	–	–

Terminal No.	Color of Wire	Signal Name
31	–	–
32	SB	HOOD SW
33	–	–
34	W	HORN RLY CONT

AACIA0096GB

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN

H.S.

39	38		37	36	35
46	45	44	43	42	41	40

Terminal No.	Color of Wire	Signal Name
35	R	VCM VB
36	–	–
37	–	–
38	LG	TAIL 1 (WITHOUT SOLAR CELL)
38	R	TAIL 1 (WITH SOLAR CELL)
39	L	FR WIPER HI
40	–	–
41	SB	VCM RLY CONT
42	BR	VCM BAT
43	O	CLEARANCE/L LH
44	B	TAIL 2
45	Y	FR WIPER LO
46	–	–

Connector No.	E15
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

53	52	51	50		49	48	47
62	61	60	59	58	57	56	55	54

Terminal No.	Color of Wire	Signal Name
47	–	–
48	–	–
49	Y	H/LAMP HI RH
50	G	H/LAMP HI LH
51	L	H/LAMP LO LH
52	P	H/LAMP LO RH
53	–	–
54	–	–
55	LG	FAST CHARGE
56	–	–
57	R	VCM IGN
58	O	REVERSE LAMP IGN
59	BR	ABS ECU IGN
60	GR	F/S RLY CONT
61	–	–
62	V	E–ACT/HAS IGN

Connector No.	E18
Connector Name	COOLING FAN RELAY
Connector Color	BLACK

H.S.

3		2
1		5

Terminal No.	Color of Wire	Signal Name
1	G	–
2	B/Y	–
3	BR	–
5	R	–

AACIA0124GB

Connector No.	E19
Connector Name	COOLING FAN CONTROL MODULE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	GND
2	G	PWM_SIG
3	R	PWM_POWER

Connector No.	E24
Connector Name	CHARGING PORT LID ILLUMINATION
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	GR	–

Connector No.	E27
Connector Name	REVERSE LAMP RELAY
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	SB	–
3	O	–
4	G	–

Connector No.	E38
Connector Name	CHARGE PORT LID OPENER ACTUATOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	B/Y	–
2	–	–
3	P	–
4	–	–

Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	B	–
3	SB	–

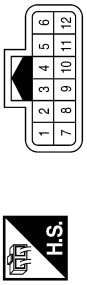
Connector No.	E52
Connector Name	A/C RELAY
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	BR	–
3	R	–
5	W	–
6	R	–
7	O	–

AACIA0125GB

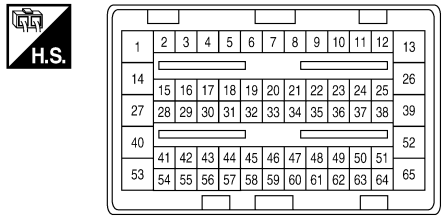
Connector No.	E60
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	L	–
4	G	–
5	L	–
6	G	–
7	–	–
8	–	–
9	–	–
10	GR	–
11	BR	–
12	Y	–

AACIA0126GB

Connector No.	E61
Connector Name	VCM
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	B	MOTOR COIL A U-PHASE
2	–	–
3	W	ELECTRIC SHIFT SENSOR NO.5
4	–	–
5	LG	F/S RELAY POWER SUPPLY
6	–	–
7	O/L	ELECTRIC SHIFT SENSOR POWER SUPPLY 1
8	W	F/S CHG RELAY
9	SB	PARKING ACTUATOR RELAY A
10	–	–
11	BR	12V BATTERY POWER SUPPLY
12	–	–
13	SB	MOTOR COIL A V-PHASE
14	–	–
15	–	–
16	R	ELECTRIC SHIFT SENSOR NO.3
17	B	ELECTRIC SHIFT SENSOR NO.1
18	Y	R POSITION OUTPUT (SELECT INDICATOR)
19	W	WATER PUMP SIGNAL
20	G	WATER PUMP SIGNAL
21	GR	F/S RELAY
22	–	–
23	R	CHARGE PORT LID OPENER ACTUATOR RELAY
24	L	EV SYSTEM CAN-H
25	G	EV SYSTEM CAN-L
26	–	–
27	–	–
28	R	SYSTEM MAIN RELAY 2
29	–	–
30	W	READY SIGNAL
31	–	–
32	B	VENC
33	L	N POSITION OUTPUT (SELECT INDICATOR)
34	R	D POSITION OUTPUT (SELECT INDICATOR)
35	–	–
36	W	SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 1)
37	–	–
38	–	–
39	R	MOTOR COIL A W-PHASE
40	B	PRE-CHARGE RELAY
41	–	–
42	–	–
43	–	–
44	P	ENCODER SIGNAL B
45	V	ENCODER SIGNAL A
46	B	P POSITION OUTPUT (SELECT INDICATOR)
47	LG	P/N POSITION SIGNAL
48	W	P POSITION SIGNAL
49	R	ACCELERATOR PEDAL POSITION SENSOR 1
50	–	–
51	R	POWER ON POWER SUPPLY
52	–	–
53	–	–
54	W	SYSTEM MAIN RELAY 1
55	–	–
56	G	ENCODER GROUND
57	O	ELECTRIC SHIFT SENSOR GND 1
58	B/R	VCM GROUND
59	–	–
60	–	–
61	–	–
62	B	SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 1)
63	–	–
64	–	–
65	B	VCM GROUND

AACIA0127GB

Connector No.	E62
Connector Name	VCM
Connector Color	BROWN

Terminal No.	Color of Wire	Signal Name
70	SB	REVERSE LAMP RELAY
71	–	–
72	P	CONNECTION DETECTING CIRCUIT SIGNAL
73	O	CONNECTION DETECTING CIRCUIT POWER SUPPLY
74	G	POWER ON POWER SUPPLY
75	L	CAN-H
76	P	CAN-L
78	SB	CHARGE CONNECTOR LOCK RELAY
79	R	12V BATTERY POWER SUPPLY
81	L	CHARGE CONNECTOR LOCK SWITCH (AUTO)
82	GR	CHARGE PORT LIGHT
83	W	ELECTRIC SHIFT SENSOR POWER SUPPLY 2
84	W	ELECTRIC SHIFT SENSOR NO.2
85	G	ELECTRIC SHIFT SENSOR NO.4
86	G	ELECTRIC SHIFT SENSOR NO.6
87	V	CHARGE CONNECTOR LOCK SWITCH INDICATOR (LOCK)
88	SB	M/C RELAY
89	BR	CHARGING STATUS INDICATOR 2
90	G	CHARGING STATUS INDICATOR 3
91	O	CHARGE CONNECTOR LOCK SWITCH INDICATOR (AUTO)
92	–	–
93	BR	CHARGE PORT LID OPENER SWITCH
94	O	CHARGE CONNECTOR LOCK SWITCH (LOCK)
95	Y	BATTERY CURRENT SENSOR
96	R	SENSOR POWER SUPPLY (BATTERY CURRENT SENSOR)
97	W	SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 2)
98	L	SENSOR POWER SUPPLY (REFRIGERANT PRESSURE SENSOR)
99	R	P POSITION SW NO.1
101	P	STOP LAMP SWITCH
103	L	PLUG IN INDICATOR LAMP
104	R	CHARGE CONNECTOR LOCK RELAY POWER SUPPLY
107	L	BATTERY TEMPERATURE SENSOR
108	R	ACCELERATOR PEDAL POSITION SENSOR 2
109	B	REFRIGERANT PRESSURE SENSOR
110	Y	COOLANT TEMPERATURE SENSOR
111	SB	ASCD STEERING SWITCH
112	B	P POSITION SW NO.2
113	O	BRAKE PEDAL POSITION SWITCH
115	V	CHARGING STATUS INDICATOR 1
116	SB	A/C RELAY
117	LG	CHARGE CONNECTOR LOCK ACTUATOR (+)
118	B	VCM GROUND
120	L	SENSOR GROUND (BATTERY CURRENT SENSOR)
121	W	SENSOR GROUND (COOLANT TEMPERATURE SENSOR)
122	B	SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 2)
123	BR	SENSOR GROUND (REFRIGERANT PRESSURE SENSOR)
124	W/L	ELECTRIC SHIFT SENSOR GND 2
125	BR	ASCD STEERING SWITCH GROUND
126	B/R	VCM GROUND
128	V	COOLING FAN CONTROL SIGNAL
129	Y	IMMEDIATE CHARGING SWITCH
130	W	CHARGE CONNECTOR LOCK ACTUATOR (-)

AACIA0128GB

Connector No.	E64
Connector Name	F/S CHG RELAY
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	LG	–
3	W	–
5	GR	–

Connector No.	E65
Connector Name	M/C RELAY
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	R	–
3	R	–
5	W	–

Connector No.	E66
Connector Name	BATTERY CURRENT SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	L	–
3	L	–
4	R	–

Connector No.	E67
Connector Name	ELECTRIC WATER PUMP
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	W	–
3	B/Y	–
4	G	–

Connector No.	E69
Connector Name	COOLANT TEMPERATURE SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	W	–

Connector No.	E87
Connector Name	CHARGE PORT LOCK ACTUATOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	–	–
3	LG	–
4	–	–

AACIA0129GB

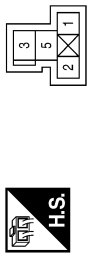
Connector No.	E102
Connector Name	STOP LAMP SWITCH
Connector Color	WHITE

Terminal No.	Color of Wire	Signal Name
1	W	–
2	SB	–
3	R	–
5	P	–

Connector No.	E101
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	R	–
2	W	–
3	W	–
4	R	–
5	B	–
6	B	–

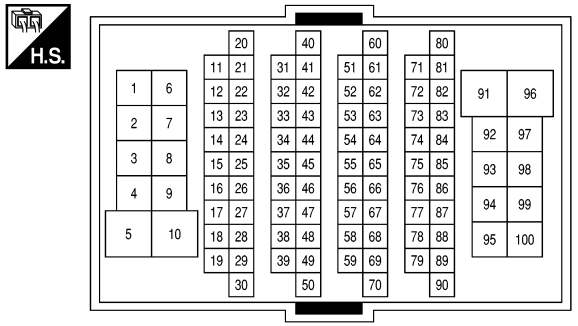
Connector No.	E88
Connector Name	CHARGE PORT LID OPENER ACTUATOR RELAY
Connector Color	BLUE



Terminal No.	Color of Wire	Signal Name
1	R	–
2	B/Y	–
3	P	–
5	BR	–

AACIA0130GB

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	R	–
2	L	–
3	BW	– (WITHOUT FRONT FOG LAMPS)
3	R	– (WITH LED HEADLAMPS)
4	LG	– (WITH LED HEADLAMPS)
4	B/W	– (WITHOUT FRONT FOG LAMPS)
6	B/R	–
7	W	–
9	G	–
10	R	–
11	L	–
12	Y	–
13	W	–
14	R	–
15	G	–
16	G	–
17	R	–
18	O	–
19	W/L	–
20	BR	–
21	R	–
22	B	–
23	LG	–
24	B	–
25	W	–
26	W	–
27	B	–
28	O/L	–
29	W	–
31	R	–
32	W	–
33	G	–
34	BR	–
35	V	–
36	O	–
37	L	–
38	SB	–
39	P	–
40	V	–
41	O	–
42	Y	–
43	BR	–
44	W	–
45	G	–
46	P	–
47	LG	–
47	R	–
48	B	–
49	L	–
50	G	–
51	W	–
52	O	–
54	B	–
55	R	–
56	Y	–
57	Y	–
58	L	–
60	LG	–
61	GR	–
62	W	–
63	SB	–
64	SHIELD	–
65	W	–
66	G	–
67	V	–
68	R	–
69	B	–
70	BR	–
71	LG	–
72	R	–
73	B	–
74	O	–
76	L	–
77	Y	–
80	P	–
81	SB	–
83	GR	–
84	L	–
85	O	–
86	BR	–
88	B	–
89	W	–
90	SHIELD	–
91	Y	–
92	BR	–
93	O	–
94	R	–
95	V	–
96	P	–
97	G	–
98	W	–
99	O	–
100	SB	–

AACIA0131GB

Connector No.	E107
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

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

Terminal No.	Color of Wire	Signal Name
1	L	–
2	P	–
3	SB	–
4	–	–
5	–	–
6	GR	–
7	–	–
8	P	–

Terminal No.	Color of Wire	Signal Name
9	BR	–
10	W	–
11	R	–
12	B	–
13	G	–
14	B	–
15	LG	–
16	BR	–
17	G	–
18	B	–
19	Y	–
20	R	–
21	O	–
22	W	–
23	SHIELD	–
24	–	–

Connector No.	E108
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	Y	–
3	SB	–
4	R	–

Connector No.	E301
Connector Name	COOLING FAN CONTROL MODULE (COOLING FAN-1)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
4	L	–
5	B	–

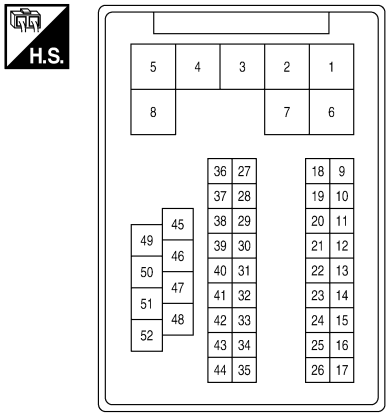
Connector No.	E302
Connector Name	COOLING FAN CONTROL MODULE (COOLING FAN-2)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
6	B	–
7	L	–

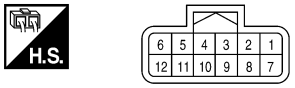
AACIA0132GB

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	–	–
4	–	–
5	–	–
6	–	–
7	–	–
8	–	–
9	V	–
10	SB	–
11	Y	–
12	G	–
13	BR	–
14	R	–
15	–	–
16	W	–
17	L	–
18	–	–
19	BR	–
20	W	–
21	LG	–
22	–	–
23	–	–
24	O	–
25	P	–
26	–	–
27	–	–
28	–	–
29	–	–
30	–	–
31	–	–
32	–	–
33	–	–
34	–	–
35	LG	–
36	G	–
37	O	–
38	W	–
39	R	–
40	Y	–
41	L	–
42	–	–
43	–	–
44	SHIELD	–
45	G	–
46	B	–
47	G	–
48	SB	–
49	P	–
49	B	–
50	W	–
51	LG	–
52	B	–

Connector No.	F2
Connector Name	WIRE TO WIRE
Connector Color	BLACK

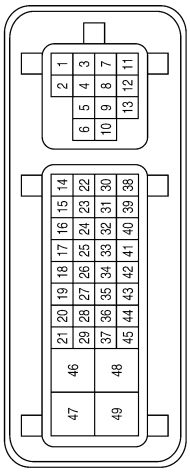


Terminal No.	Color of Wire	Signal Name
1	-	–
2	-	–
3	L	–
4	G	–
5	L	–
6	G	–
7	-	–
8	-	–
9	-	–
10	GR	–
11	V	–
12	R	–

AACIA0133GB

Connector No.	F13
Connector Name	TRACTION MOTOR INVERTER
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	–	–
4	–	–
5	–	–
6	–	–
7	–	–
8	–	–
9	–	–
10	–	–
11	–	–
12	–	–
13	–	–
14	L	EV SYSTEM CAN- H
15	G	EV SYSTEM CAN-L
16	–	–
17	P	REZ_S2
18	L	REZ_S4
19	R	REZ_R1
20	B	REZ_S1

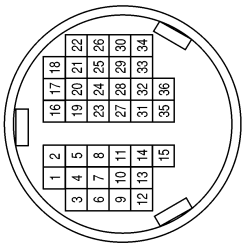
Terminal No.	Color of Wire	Signal Name
21	W	REZ_S3
22	–	–
23	–	–
24	–	–
25	–	–
26	–	–
27	G	REZ_R2
28	–	–
29	–	–
30	–	–
31	–	–
32	–	–
33	–	–
34	–	–
35	–	–
36	–	–
37	–	–
38	–	–
39	–	–
40	–	–
41	–	–
42	LG	IGN_SW
43	–	–
44	O	TMGND
45	Y	TM
46	G	VB1
47	B	VBGND1
48	G	VB2
49	B	VBGND2

AACIA0134GB

Terminal No.	Color of Wire	Signal Name
21	G	CHSSI2
22	Y	CHSSI1
23	–	–
24	–	–
25	SB	QCPTMP2
26	V	QCPTMP1
27	L	EV CAN-H
28	–	–
29	W	CONDETI
30	BR	CNTRL
31	–	–
32	–	–
33	–	–
34	–	–
35	–	–
36	–	–

Connector No.	F23
Connector Name	PDM (POWER DELIVERY MODULE)
Connector Color	GREEN

H.S.



Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	–	–
4	–	–
5	–	–
6	L	Q-CAN-L
7	W	Q-CAN-H
8	–	–
9	GR	QCRLY
10	LG	CSTATE
11	G	EV CAN-L
12	O	INTERLOCK_IN
13	–	–
14	–	–
15	P	INTERLOCK OUT
16	V	IGN
17	–	–
18	R	BAT
19	R	CHOKO
20	BR	CHILI

AACIA0135GB

Connector No.	B3
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

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

Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	–	–
4	–	–
5	–	–
6	–	–
7	B	–
8	SHIELD	–
9	B	–
10	SB	–
11	P	–
12	BR	–
13	GR	–
14	P	–
15	L	–
16	G	–
17	–	–
18	–	–
19	–	–
20	–	–
21	–	–
22	–	–
23	–	–

Terminal No.	Color of Wire	Signal Name
24	R	–
25	W	–
26	LG	–
27	Y	–
28	–	–
29	R	–
30	GR	–
31	L	–
32	P	–

Connector No.	B6
Connector Name	WIRE TO WIRE
Connector Color	WHITE

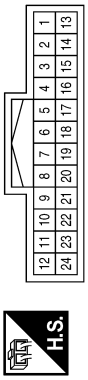
H.S.

1
2

Terminal No.	Color of Wire	Signal Name
1	R	–
2	–	–

AACIA0136GB

Connector No.	B7
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	L	–
2	P	–
3	Y	–
4	-	–
5	-	–
6	SB	–
7	-	–
8	P	–
9	V	–
10	Y	–
11	L	–
12	G	–
13	G	–
14	B	–
15	LG	–
16	BR	–
17	G	–
18	B	–
19	Y	–
20	R	–
21	Y	–
22	W	–
23	SHIELD	–
24	-	–

AACIA0137GB

Connector No.	B85
Connector Name	JOINT CONNECTOR-B02
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	B	–
2	–	–
3	B	–
4	B	–
5	–	–
6	–	–
7	L	–
8	W	–
9	V	–
10	V	–
11	SHIELD	–
12	SHIELD	–
13	B	–
14	B	–
15	G	–
16	G	–
17	G	–
18	LG	–
19	R	–
20	R	–

Terminal No.	Color of Wire	Signal Name
21	–	–
22	–	–
23	–	–
24	–	–
25	–	–
26	–	–
27	–	–
28	–	–
29	–	–
30	–	–
31	P	CHG IGN
32	–	–
33	–	–
34	–	–
35	–	–
36	–	–

Connector No.	B24
Connector Name	LI-ION BATTERY
Connector Color	GREEN

Terminal No.	Color of Wire	Signal Name
1	L	EV CAN-H
2	G	EV CAN-L
3	–	–
4	V	IGN
5	R	BAT
6	B	GND3
7	B	GND2
8	B	GND1
9	–	–
10	B	PRE CHG GND
11	G	PRE CHG V
12	–	–
13	B	RLY N GND
14	L	RLY N V
15	–	–
16	B	RLY P GND
17	Y	RLY P V
18	–	–
19	–	–
20	–	–

AACIA0147GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000008745925

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Question sheet”. (Refer to EVB-83, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC IN VCM

1. Check DTC in VCM.
2. Check related service bulletins for information.

Are any DTCs detected?

YES >> Check the DTC. Refer to EVC-102, "DTC Index".
NO >> GO TO 3.

3.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.

- Record DTC and freeze frame data. (Print them out with CONSULT.)
- Erase DTC.
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EVC-412, "Symptom Index".)

3. Check related service bulletins for information.

Are any symptoms described and any DTCs detected?

Symptom is described, DTC is detected>>GO TO 4.
Symptom is described, DTC is not detected>>GO TO 5.
Symptom is not described, DTC is detected>>GO TO 6.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail-safe related to the symptom. Refer to EVC-412, "Symptom Index" and EVB-40, "Fail-safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail-safe related to the symptom. Refer to EVC-412, "Symptom Index" and EVB-40, "Fail-safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 7.

6.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then check that DTC is detected again.

NOTE:

- Freeze frame data is useful if the DTC is not detected.

- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 8.
NO >> Check according to GI-53, "Intermittent Incident".

7. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EVC-412, "Symptom Index" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

Is the symptom described?

YES >> GO TO 8.
NO >> Monitor input data from related sensors using CONSULT.

8. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

Is a malfunctioning part detected?

YES >> GO TO 9.
NO >> Monitor input data from related sensors using CONSULT.

9. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it.

>> GO TO 10.

10. FINAL CHECK

When DTC was detected in step 3, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then check that the malfunction have been completely repaired.
When symptom was described from the customer, refer to confirmed symptom in step 4 or 5, and check that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 8.
YES-2 >> Symptom remains: GO TO 5.
NO >> Before returning the vehicle to the customer, always erase DTC.

Diagnostic Work Sheet

INFOID:0000000008745926

DESCRIPTION

There are many operating conditions that lead to the malfunction of “EV battery system” components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about symptoms. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize the diagnostic worksheet in order to organize all the information for troubleshooting.
NOTE:
Some conditions may cause a DTC to be detected.

KEY POINTS

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

JSCIA0412GB

WORKSHEET SAMPLE

Question Sheet						
Customer name MR/MS		Incident Date			VIN	
		Model & Year			In Service Date	
		Trans.			Mileage	km/mile
Symptoms		☐ Does not to READY		☐ EV system warning lamp is on		☐ Power limitation indicator lamp is on
		☐ Water leak*	☐ Noise*	☐ Vibration*	☐ Shock*	☐ Gear noise*
		☐ Non driving*	☐ Poor acceleration*		☐ Poor torque*	☐ Radio noise*
		☐ Does not charge		☐ Other*		*: If applied, enter in detail
		Detailed symptom				
		Onomatopoeia				
Frequency		☐ All the time	☐ Once	☐ Sometimes (times a day)		☐ Other
Charging condition		☐ Full	☐ Medium	☐ Low		
Weather conditions		☐ Not affected				
	Weather	☐ Fine	☐ Clouding	☐ Raining	☐ Snowing	☐ Other ( )
	Temp.	☐ Hot	☐ Warm	☐ Cool	☐ Cold	☐ Temp. [Approx. °C (°F)]
	Humidity	☐ High	☐ Middle	☐ Low	☐ Humidity (Approx. %)	
Road conditions		☐ Not affected	☐ In town	☐ Freeway	☐ Off road (Up / Down)	☐ Deplorable road
		☐ Flat road	☐ While turning (Right / Left)		☐ Bump	
		☐ Other				
Shift position		☐ Not affected				
		☐ P position	☐ R position	☐ N position	☐ D position	☐ ECO mode
Driving conditions		☐ Not affected				
		☐ Power switch ON → OFF		☐ Power switch OFF → ON		☐ READY (stop the vehicle)
		☐ While cruising	☐ While decelerating	☐ Just before stopping	☐ Just after stopping	☐ D position (stop the vehicle)
		☐ While recharging		☐ Other		
		☐ Vehicle speed [km/h (MPH)]			☐ Accelerator pedal (/ 8)	
		☐ Battery level (Low / Middle / High)				
Moments when malfunction disappears		☐ Disappears while driving		☐ Disappears when stopped		☐ Disappears with select operation
		☐ Disappears when power switch is pushed OFF		☐ Disappears when battery charge is stopped		☐ Does not disappear
		☐ Other				
Other						

ADDITIONAL SERVICE WHEN REPLACING LI-ION BATTERY CONTROLLER

Description

INFOID:0000000008745927

When a Li-ion Battery Controller (LBC) or Li-ion battery (battery pack) is replaced, it is necessary to save the battery information stored in LBC to the new LBC.

Whenever any of the following work is performed, make sure to perform the above operation.
- Replace LBC
- Replace Li-ion battery (Battery pack: Module, LBC, Battery junction box)

Work Procedure

INFOID:0000000008745928

1.SAVE THE LI-ION BATTERY CONTROLLER (LBC) INTERNAL INFORMATION

With CONSULT
1. Select “SAVE BATTERY INFORMATION DATA” in “WORK SUPPOTRT” mode.
2. Save the LBC internal information.

>> GO TO 2.

2.REPLACE LI-ION BATTERY OR LBC

Replace Li-ion battery or LBC. Refer to EVB-194, "Removal and Installation" (Li-ion battery) or EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation" (LBC).

>> GO TO 3.

3.WRITE THE LBC INTERNAL INFORMATION

With CONSULT
1. Select “WRITE BATTERY INFORMATION DATA” in “WORK SUPPOTRT” mode.
2. Write the information that has been read out before LBC replacement.

>> GO TO 4.

4.WRITE THE LBC INTERNAL INFORMATION TO VCM

Refer to “Li-ion Battery Registration Operation Manual.

>> END

MODULE CHARGE BALANCE

Description

INFOID:0000000008745929

If a malfunction (e.g. abnormal voltage) occurs in a Li-ion battery cell, the module which includes the malfunctioning cell must be replaced. When replacing a module with a new one, its voltage is required to be adjusted to the adjusting voltage calculated from the maximum cell voltage of normal cells.

Work Procedure

INFOID:0000000008745930

NOTE:
Voltage adjustment under low temperature conditions may require a long time. To prevent this from occurring, it is advisable to adjust voltage under room temperature conditions [20°C ± 10°C (68°F ±18°F)].

1.CHECK ADJUSTMENT VOLTAGE VALUE

With CONSULT
1. Power switch ON.
2. Select “DATA MONITOR”of “HV BAT”.
3. Check “MAXIMUM CELL VOLTAGE”.
4. Double the “MAXIMUM CELL VOLTAGE” and use that value as the module adjustment value.

Adjustment voltage value : MAXIMUM CELL VOLTAGE× 2

Example: 3.925 V (MAXIMUM CELL VOLTAGE) × 2 = 7.850 V (Adjustment voltage value)

>> GO TO 2.

2.CHECK MODULE VOLTAGE

CAUTION:
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.DISCAHRGE OF MODULE VOLTAGE

CAUTION:
For details on the module charge balancer operation, refer to the adjuster operation manual.
Discharge the module to 5.0 V using module charge balancer.

Discharge voltage : 5.0 V

>> GO TO 4.

4.ADJUST VOLTAGE WITH A MODULE CHARGE BALANCER

CAUTION:
For details on the module charge balancer operation, refer to the adjuster operation manual.
1. Enter “adjustment voltage value” into module charge balancer.

Adjustment voltage value : MAXIMUM CELL VOLTAGE× 2

2. Start the voltage adjustment.

>> After module voltage adjustment, GO TO 5.

5.CHECK MODULE VOLTAGE

1. Remove the module from the module charge balancer.
2. Using a circuit tester, check that the module voltage is within the specified range.

Standard : Adjustment voltage value ± 10 mV

>> GO TO 6.

6.CHECK CELL VOLTAGE

With CONSULT

1. After adjusting the voltage, install the module to the vehicle.
2. Select “DATA MONITOR” of “HV BAT”.
3. Check “CELL VOLTAGE” of install module.
4. Check that the difference from the “MAXIMUM CELL VOLTAGE” confirmed in Step1 is within the specified range.

Standard : MAXIMUM CELL VOLTAGE ± 33 mV

>> WORK END

DTC/CIRCUIT DIAGNOSIS

P0A0D HV SYSTEM INTERLOCK ERROR

DTC Logic

INFOID:0000000008745933

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A0D	HV SYSTEM INTERLOCK ERROR	Self diagnosis program of Li-ion battery controller detects a malfunction in the CPU.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P0A1F detected?

YES >> Refer to EVB-88, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009346499

DANGER:

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

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

CAUTION:

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

1.PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 2.

2.CHECK LI-ION BATTERY INTERLOCK DETECTIONG CIRCUIT FOR SHORT-1

1. Disconnect Li-ion battery controller (LBC) harness connector.
2. Disconnect interlock detecting switch (high voltage harness connector) harness connector.
3. Check the continuity between Li-ion battery controller harness connector and ground.

LBC		—	Continuity
Connector	Terminal		
LB11	8	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace Li-ion battery vehicle communication harness.

3.CHECK LI-ION BATTERY INTERLOCK DETECTIONG CIRCUIT FOR SHORT-2

1. Disconnect interlock detecting switch (service plug) harness connector.
2. Check the continuity between Li-ion battery controller harness connector and ground.

LBC		—	Continuity
Connector	Terminal		
LB11	6	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace Li-ion battery vehicle communication harness.

4.CHECK INTERLOCK DETECTIONG SWITCH (SERVICE PLUG)

Refer to EVB-89, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Replace service plug.

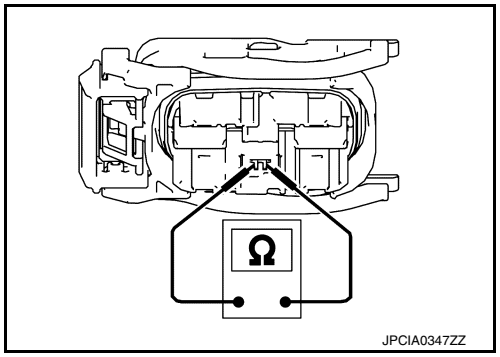
Component Inspection

INFOID:0000000009346500

1.CHECK INTERLOCK DETECTIONG SWITCH (SERVICE PLUG)

Check the continuity between terminals in the figure.

Value: Approx. 0 Ω



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace service plug.

P0A1F BATTERY ENERGY CONTROL MODULE

DTC Logic

INFOID:0000000008745935

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P0A1F	BATTERY ENERGY CONTROL MODULE	Self diagnosis program of Li-ion battery controller detects a malfunction in the CPU.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P0A1F detected?

YES >> Refer to EVB-90, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745936

When this DTC is detected, replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P3030 CELL CONTROLLER LIN

DTC Logic

INFOID:0000000008745937

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3030	CELL CONT LIN	A malfunction occurs with the communication function in Li-ion battery controller.	• Li-ion battery controller • Module • Harness or connector

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P3030 detected?

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

Diagnosis Procedure

INFOID:0000000008745938

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

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “P3375 - P33A4” is detected simultaneously with “P3030”.

Is P30F3 detected?

YES >>
- When “P3375” - “P3380” are detected simultaneously, perform the diagnosis procedure of “P3375” - “P3380”. Refer to EVB-135, "Diagnosis Procedure".
- When “P3381” - “P338C” are detected simultaneously, perform the diagnosis procedure of “P3381” - “P338C”. Refer to EVB-139, "Diagnosis Procedure".
- When “P338D” - “P3398” are detected simultaneously, perform the diagnosis procedure of “P338D” - “P3398”. Refer to EVB-143, "Diagnosis Procedure".
- When “P3399” - “P33A4” are detected simultaneously, perform the diagnosis procedure of “P3399” - “P33A4”. Refer to EVB-146, "Diagnosis Procedure".

NO >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P3031-P303C CELL CONTROLLER ASIC

DTC Logic

INFOID:0000000008745939

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3031	CELL CONT ASIC1	A malfunction occurs with the communication function in Li-ion battery controller.	Li-ion battery controller
P3032	CELL CONT ASIC2		
P3033	CELL CONT ASIC3		
P3034	CELL CONT ASIC4		
P3035	CELL CONT ASIC5		
P3036	CELL CONT ASIC6		
P3037	CELL CONT ASIC7		
P3038	CELL CONT ASIC8		
P3039	CELL CONT ASIC9		
P303A	CELL CONT ASIC10		
P303B	CELL CONT ASIC11		
P303C	CELL CONT ASIC12		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-92, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745940

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

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “P3030” is detected simultaneously with “P3031 -P303C”.

Is P3030 detected?

YES >> Perform diagnosis on the detected P3030. Refer to EVB-91, "Diagnosis Procedure".
NO >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P303D-P3048 CELL CONTROLLER ASIC

DTC Logic

INFOID:0000000008745941

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P303D	CELL CONT ASIC13	A malfunction occurs with the communication function in Li-ion battery controller.	Li-ion battery controller
P303E	CELL CONT ASIC14		
P303F	CELL CONT ASIC15		
P3040	CELL CONT ASIC16		
P3041	CELL CONT ASIC17		
P3042	CELL CONT ASIC18		
P3043	CELL CONT ASIC19		
P3044	CELL CONT ASIC20		
P3045	CELL CONT ASIC21		
P3046	CELL CONT ASIC22		
P3047	CELL CONT ASIC23		
P3048	CELL CONT ASIC24		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

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

Diagnosis Procedure

INFOID:0000000008745942

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

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “P3030” is detected simultaneously with “P303D” -“P3048”.

Is P3030 detected?

YES >> Perform diagnosis on the detected P3030. Refer to EVB-91, "Diagnosis Procedure".
NO >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P3049-P3054 CELL CONTROLLER ASIC VOLTAGE

DTC Logic

INFOID:0000000008745943

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3049	CELL CONT ASIC1 VOLT	The A/D converter in Li-ion battery controller is malfunctioning.	• Li-ion battery controller • Module • Harness or connector
P304A	CELL CONT ASIC2 VOLT		
P304B	CELL CONT ASIC3 VOLT		
P304C	CELL CONT ASIC4 VOLT		
P304D	CELL CONT ASIC5 VOLT		
P304E	CELL CONT ASIC6 VOLT		
P304F	CELL CONT ASIC7 VOLT		
P3050	CELL CONT ASIC8 VOLT		
P3051	CELL CONT ASIC9 VOLT		
P3052	CELL CONT ASIC10 VOLT		
P3053	CELL CONT ASIC11 VOLT		
P3054	CELL CONT ASIC12 VOLT		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-94, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745944

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

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check DTC.

Is any DTC detected?

YES-1 >> “P3302” - “P3331” are detected simultaneously.
- When “P3302” - “P330D” are detected simultaneously, perform the diagnosis procedure of “P3302” - “P330D”. Refer to EVB-121, "Diagnosis Procedure".
- When “P330E” - “P3319” are detected simultaneously, perform the diagnosis procedure of “P330E” - “P3319”. Refer to EVB-125, "Diagnosis Procedure".
- When “P331A” - “P3325” are detected simultaneously, perform the diagnosis procedure of “P331A” - “P3325”. Refer to EVB-129, "Diagnosis Procedure".
- When “P3326” - “P3331” are detected simultaneously, perform the diagnosis procedure of “P3326” - “P3331”. Refer to EVB-132, "Diagnosis Procedure".

YES-2 >> “P3375” - “P33A4” are detected simultaneously.
- When “P3375” - “P3380” are detected simultaneously, perform the diagnosis procedure of “P3375” - “P3380”. Refer to EVB-135, "Diagnosis Procedure".
- When “P3381” - “P338C” are detected simultaneously, perform the diagnosis procedure of “P3381” - “P338C”. Refer to EVB-139, "Diagnosis Procedure".
- When “P338D” - “P3398” are detected simultaneously, perform the diagnosis procedure of “P338D” - “P3398”. Refer to EVB-143, "Diagnosis Procedure".

- When “P3399” - “P33A4” are detected simultaneously, perform the diagnosis procedure of “P3399” - “P33A4”. Refer to EVB-146, "Diagnosis Procedure".

NO >> When only “P3049” - “P3054” are detected, replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P3055-P3060 CELL CONTROLLER ASIC VOLTAGE

DTC Logic

INFOID:0000000008745945

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3055	CELL CONT ASIC13 VOLT	The A/D converter in Li-ion battery controller is malfunctioning.	• Li-ion battery controller • Module • Harness or connector
P3056	CELL CONT ASIC14 VOLT		
P3057	CELL CONT ASIC15 VOLT		
P3058	CELL CONT ASIC16 VOLT		
P3059	CELL CONT ASIC17 VOLT		
P305A	CELL CONT ASIC18 VOLT		
P305B	CELL CONT ASIC19 VOLT		
P305C	CELL CONT ASIC20 VOLT		
P305D	CELL CONT ASIC21 VOLT		
P305E	CELL CONT ASIC22 VOLT		
P305F	CELL CONT ASIC23 VOLT		
P3060	CELL CONT ASIC24 VOLT		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-96, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745946

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

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check DTC.

Is any DTC detected?

YES-1 >> “P3302” - “P3331” are detected simultaneously.
- When “P3302” - “P330D” are detected simultaneously, perform the diagnosis procedure of “P3302” - “P330D”. Refer to EVB-121, "Diagnosis Procedure".
- When “P330E” - “P3319” are detected simultaneously, perform the diagnosis procedure of “P330E” - “P3319”. Refer to EVB-125, "Diagnosis Procedure".
- When “P331A” - “P3325” are detected simultaneously, perform the diagnosis procedure of “P331A” - “P3325”. Refer to EVB-129, "Diagnosis Procedure".
- When “P3326” - “P3331” are detected simultaneously, perform the diagnosis procedure of “P3326” - “P3331”. Refer to EVB-132, "Diagnosis Procedure".

YES-2 >> “P3375” - “P33A4” are detected simultaneously.
- When “P3375” - “P3380” are detected simultaneously, perform the diagnosis procedure of “P3375” - “P3380”. Refer to EVB-135, "Diagnosis Procedure".
- When “P3381” - “P338C” are detected simultaneously, perform the diagnosis procedure of “P3381” - “P338C”. Refer to EVB-139, "Diagnosis Procedure".
- When “P338D” - “P3398” are detected simultaneously, perform the diagnosis procedure of “P338D” - “P3398”. Refer to EVB-143, "Diagnosis Procedure".

- When “P3399” - “P33A4” are detected simultaneously, perform the diagnosis procedure of “P3399” - “P33A4”. Refer to EVB-146, "Diagnosis Procedure".

NO >> When only “P3055” - “P3060” are detected, replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P3061 CELL BATTERY VOLTAGE

DTC Logic

INFOID:0000000008745947

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3061	CELL BATTERY VOLT	An open circuit diagnosis detection circuit in Li-ion battery controller is malfunctioning.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P3061 detected?

YES >> Refer to EVB-98, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745948

When this DTC is detected, replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P3062 BYPASS SWITCH

DTC Logic

INFOID:0000000008745949

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3062	BYPASS SW	A malfunction of the bypass switch in Li-ion battery controller is detected.	• Li-ion battery controller • Module • Harness or connector

DTC DETECTION LOGIC

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P3062 detected?

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

Diagnosis Procedure

INFOID:0000000008745950

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

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “P3375”-“P33A4” is detected simultaneously with “P3062”.

Is P3375-P33A4 detected?

YES >>
- When “P3375” - “P3380” are detected simultaneously, perform the diagnosis procedure of “P3375” - “P3380”. Refer to EVB-135, "Diagnosis Procedure".
- When “P3381” - “P338C” are detected simultaneously, perform the diagnosis procedure of “P3381” - “P338C”. Refer to EVB-139, "Diagnosis Procedure".
- When “P338D” - “P3398” are detected simultaneously, perform the diagnosis procedure of “P338D” - “P3398”. Refer to EVB-143, "Diagnosis Procedure".
- When “P3399” - “P33A4” are detected simultaneously, perform the diagnosis procedure of “P3399” - “P33A4”. Refer to EVB-146, "Diagnosis Procedure".

NO >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P3064 CELL CONT ASIC

DTC Logic

INFOID:0000000009346501

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3064	CELL CONTROLLER ASIC	A malfunction occurs with the communication function in Li-ion battery controller.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P3064 detected?

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

Diagnosis Procedure

INFOID:0000000009346502

When this DTC is detected, replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P308B-P3096 CELL CONTROLLER ASIC OPEN

DTC Logic

INFOID:0000000008745951

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P308B	CELL CONT ASIC1 OPEN	Self diagnosis program of Li-ion battery controller detects an open circuit in the cell voltage detection line.	• Li-ion battery controller • Harness or connector
P308C	CELL CONT ASIC2 OPEN		
P308D	CELL CONT ASIC3 OPEN		
P308E	CELL CONT ASIC4 OPEN		
P308F	CELL CONT ASIC5 OPEN		
P3090	CELL CONT ASIC6 OPEN		
P3091	CELL CONT ASIC7 OPEN		
P3092	CELL CONT ASIC8 OPEN		
P3093	CELL CONT ASIC9 OPEN		
P3094	CELL CONT ASIC10 OPEN		
P3095	CELL CONT ASIC11 OPEN		
P3096	CELL CONT ASIC12 OPEN		

DTC DETECTION LOGIC

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P308B-P3096 detected?

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

Diagnosis Procedure

INFOID:0000000008745952

DANGER:

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

WARNING:

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

CAUTION:

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

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

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “P3049”-“P3060” (CELL CONT ASIC VOLT related codes) or “P3375”-“P33A4” (CELL OVER DISCHARGE related codes) is detected simultaneously with “P308B”-“P3096”.

Is P3049-P3060 or P3375-P33A4 detected?

YES-1 >> “P3049”-“P3060” are detected simultaneously.
- When “P3049”-“P3054” are detected simultaneously, perform the diagnosis procedure of “P3049”-“P3054”. Refer to EVB-94, "Diagnosis Procedure".
- When “P3055”-“P3060” are detected simultaneously, perform the diagnosis procedure of “P3055”-“P3060”. Refer to EVB-96, "Diagnosis Procedure".

YES-2 >> “P3375”-“P33A4” are detected simultaneously.
- When “P3375”-“P3380” are detected simultaneously, perform the diagnosis procedure of “P3375”-“P3380”. Refer to EVB-135, "Diagnosis Procedure".
- When “P3381”-“P338C” are detected simultaneously, perform the diagnosis procedure of “P3381”-“P338C”. Refer to EVB-139, "Diagnosis Procedure".
- When “P338D”-“P3398” are detected simultaneously, perform the diagnosis procedure of “P338D”-“P3398”. Refer to EVB-143, "Diagnosis Procedure"
- When “P3399”-“P33A4” are detected simultaneously, perform the diagnosis procedure of “P3399”-“P33A4”. Refer to EVB-146, "Diagnosis Procedure".

NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".
1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 3.

3.CHECK CONNECTION STATUS

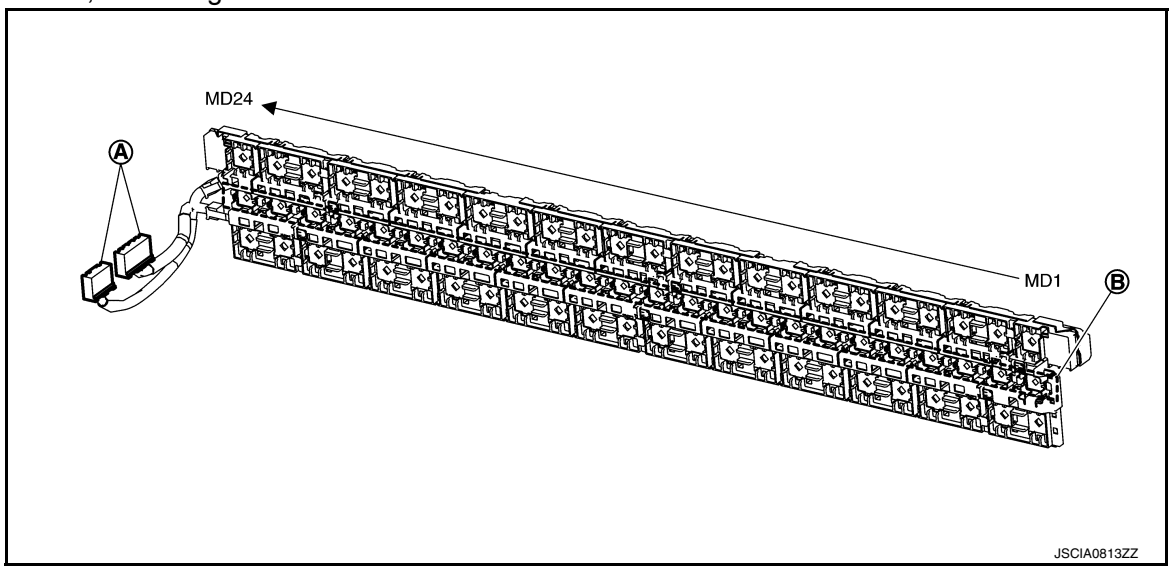
1. Power switch OFF.
2. Check connection status of Li-ion battery controller harness connector and module harness connector.

Is the inspection result normal?

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

4.CHECK HARNESS BETWEEN LI-ION BATTERY CONTROLLER AND MODULE

1. Disconnect Li-ion battery controller harness connector and voltage detection terminal of bus bar.
2. Refer to below table and continuity between Li-ion battery controller Ⓐ and voltage detection terminal Ⓑ of bus bar, according to detected DTC.



DTC	Module No.		Li-ion battery controller		Continuity
			Connector	Terminal	
P308B	1	Voltage detection terminal of bus bar	LB13	50	Existed
	2			51	
P308C	3		LB13	52	Existed
	4			53	
P308D	5		LB13	54	Existed
	6			55	
P308E	7		LB13	56	Existed
	8			57	
P308F	9		LB13	58	Existed
	10			59	
P3090	11		LB13	60	Existed
	12			61	
P3091	13		LB13	62	Existed
	14			63	
P3092	15		LB14	77	Existed
	16			78	
P3093	17		LB14	80	Existed
	18			81	
P3094	19		LB14	82	Existed
	20			83	
P3095	21		LB14	84	Existed
	22			85	
P3096	23		LB14	86	Existed
	24			87	

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

NO >> Repair harness or connector.

P3097-P30A2 CELL CONTROLLER ASIC OPEN

DTC Logic

INFOID:0000000008745953

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3097	CELL CONT ASIC13 OPEN	Self diagnosis program of Li-ion battery controller detects an open circuit in the cell voltage detection line.	• Li-ion battery controller • Harness or connector
P3098	CELL CONT ASIC14 OPEN		
P3099	CELL CONT ASIC15 OPEN		
P309A	CELL CONT ASIC16 OPEN		
P309B	CELL CONT ASIC17 OPEN		
P309C	CELL CONT ASIC18 OPEN		
P309D	CELL CONT ASIC19 OPEN		
P309E	CELL CONT ASIC20 OPEN		
P309F	CELL CONT ASIC21 OPEN		
P30A0	CELL CONT ASIC22 OPEN		
P30A1	CELL CONT ASIC23 OPEN		
P30A2	CELL CONT ASIC24 OPEN		

DTC DETECTION LOGIC

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P308B-P30A2 detected?

YES >> Refer to EVB-104, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745954

DANGER:

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

WARNING:

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

CAUTION:

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

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

With CONSULT
1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Check to see if “P3049”-“P3060” (CELL CONT ASIC VOLT related codes) or “P3375”-“P33A4” (CELL OVER DISCHARGE related codes) is detected simultaneously with “P3097”-“P30A2”.

Is P3049-P3060 or P3375-P33A4 detected?

YES-1 >> “P3049”-“P3060” are detected simultaneously.
- When “P3049”-“P3054” are detected simultaneously, perform the diagnosis procedure of “P3049”-“P3054”. Refer to EVB-94, "Diagnosis Procedure"
- When “P3055”-“P3060” are detected simultaneously, perform the diagnosis procedure of “P3055”-“P3060”. Refer to EVB-96, "Diagnosis Procedure"

YES-2 >> “P3375”-“P33A4” are detected simultaneously.
- When “P3375”-“P3380” are detected simultaneously, perform the diagnosis procedure of “P3375”-“P3380”. Refer to EVB-135, "Diagnosis Procedure".
- When “P3381”-“P338C” are detected simultaneously, perform the diagnosis procedure of “P3381”-“P338C”. Refer to EVB-139, "Diagnosis Procedure".
- When “P338D”-“P3398” are detected simultaneously, perform the diagnosis procedure of “P338D”-“P3398”. Refer to EVB-143, "Diagnosis Procedure".
- When “P3399”-“P33A4” are detected simultaneously, perform the diagnosis procedure of “P3399”-“P33A4”. Refer to EVB-146, "Diagnosis Procedure"

NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".
1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 3.

3.CHECK CONNECTION STATUS

1. Power switch OFF.
2. Check connection status of Li-ion battery controller harness connector and module harness connector.

Is the inspection result normal?

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

4.CHECK HARNESS BETWEEN LI-ION BATTERY CONTROLLER AND MODULE

1. Disconnect Li-ion battery controller harness connector and Module harness connector.
2. Refer to below table and continuity between Li-ion battery controller and Module, according to detected DTC.

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P3097	25	LB8	10	LB15	110	Existed
	26		12		111	
P3098	27	LB8	28	LB15	112	Existed
	28		26		113	
P3099	29	LB8	23	LB15	114	Existed
	30		19		115	
P309A	31	LB8	3	LB15	116	Existed
	32		18		117	
P309B	33	LB8	2	LB15	118	Existed
	34		6		119	

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P309C	35	LB8	22	LB15	120	Existed
	36		7		121	
P309D	37	LB7	38	LB15	122	Existed
	38		51		123	
P309E	39	LB7	39	LB15	124	Existed
	40		43		125	
P309F	41	LB7	55	LB15	127	Existed
	42		42		128	
P30A0	43	LB7	52	LB15	130	Existed
	44		50		138	
P30A1	45	LB7	35	LB15	140	Existed
	46		33		141	
P30A2	47	LB7	46	LB15	142	Existed
	48		48		143	

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

NO >> Repair harness or connector.

P30E0 DLC DIAGNOSIS VCM

DTC Logic

INFOID:0000000009346503

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30E0	DLC DIAGNOSIS VCM	When no CAN communication signal is received from VCM continuously for 2 seconds or more.	• CAN communication line • Li-ion battery controller • VCM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P30E0 detected?

YES >> Refer to EVB-107, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009346504

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform "All DTC Reading".
2. Check “Self diagnostic result” of systems other than “HV BAT” to see if “P30E0” is detected.

Is P30E0 detected?

YES >> Replace VCM. Refer to EVC-426, "Removal and Installation".
NO >> GO TO 2.

2.PERFORM THE SELF-DIAGNOSIS OF LI-ION BATTERY CONTROLLER

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “U1000” is detected simultaneously with “P30E0”.

Is U1000 detected?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> INSPECTION END

P30E2 DLC DIAGNOSIS HVAC

DTC Logic

INFOID:0000000009346505

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30E2	DLC DIAGNOSIS HVAC	When no CAN communication signal is received from A/C auto amp. continuously for 2 seconds or more.	• CAN communication line • Li-ion battery controller • A/C auto amp.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P30E2 detected?

YES >> Refer to EVB-108, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009346506

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform "All DTC Reading".
2. Check “Self diagnostic result” of systems other than “HV BAT” to see if “P30E2” is detected.

Is P30E2 detected?

YES >> Replace A/C auto amp.. Refer to HAC-194, "Removal and Installation" (With heat pump) or HAC-362, "Removal and Installation" (Without heat pump).
NO >> GO TO 2.

2.PREFORM THE SELF-DIAGNOSIS OF LI-ION BATTERY CONTROLLER

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “U1000” is detected simultaneously with “P30E2”.

Is U1000 detected?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> INSPECTION END

P30E3 DLC DIAGNOSIS MC

DTC Logic

INFOID:0000000009346507

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30E3	DLC DIAGNOSIS MC	When no CAN communication signal is received from traction motor inverter continuously for 2 seconds or more.	• CAN communication line • Li-ion battery controller • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P30E3 detected?

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

Diagnosis Procedure

INFOID:0000000009346508

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform "All DTC Reading".
2. Check “Self diagnostic result” of systems other than “HV BAT” to see if “P30E3” is detected.

Is P30E3 detected?

YES >> Replace traction motor inverter. Refer to TMS-108, "Removal and Installation".
NO >> GO TO 2.

2.PERFORM THE SELF-DIAGNOSIS OF LI-ION BATTERY CONTROLLER

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “U1000” is detected simultaneously with “P30E3”.

Is U1000 detected?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> INSPECTION END

P30E4 DLC DIAGNOSIS PDM(POWER DELIVERY MODULE)

DTC Logic

INFOID:0000000009346509

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30E4	DLC DIAGNOSIS PDM (Power Delivery Module)	When no CAN communication signal is received from PDM (Power Delivery Module) continuously for 2 seconds or more.	• CAN communication line • Li-ion battery controller • PDM (Power Delivery Module)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P30E4 detected?

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

Diagnosis Procedure

INFOID:0000000009346510

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform "All DTC Reading".
2. Check “Self diagnostic result” of systems other than “HV BAT” to see if “P30E4” is detected.

Is P30E4 detected?

YES >> Replace PDM (Power Delivery Module). Refer to VC-119, "Removal and Installation".
NO >> GO TO 2.

2.PERFORM THE SELF-DIAGNOSIS OF LI-ION BATTERY CONTROLLER

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “U1000” is detected simultaneously with “P30E4”.

Is U1000 detected?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> INSPECTION END

P30FC OVER CURRENT

DTC Logic

INFOID:0000000008745962

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P30FC	OVER CURRENT	When the temperature of the entire battery pack estimated from the current value is excessively high.	• Battery current sensor • Other systems malfunction

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P30FC detected?

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

Diagnosis Procedure

INFOID:0000000008745963

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform "All DTC Reading".
2. Check “Self diagnostic result” of systems other than “HV BAT” to see if any DTC is detected.

Is any DTC detected?

YES >> After performing trouble diagnosis of detected DTC, GO TO 2.
NO >> GO TO 2.

2.CHECK BATTERY TEMPERATURE SENSOR

With CONSULT
Using FFD, check the values of three temperature sensors when DTC is detected.

Monitor item	Condition	Limit
Battery temperature sensor 1	Power switch ON	55°C (131°F) or less
Battery temperature sensor 2		
Battery temperature sensor 4		

Is there temperature increase?

Temperature increase is seen>>Replace Li-ion battery. Refer to EVB-194, "Removal and Installation".
Temperature increase is not seen>>Replace battery junction box. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P318D COMMUNICATION ERROR

DTC Logic

INFOID:0000000008745968

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P318D	COMMUNICATION ERROR	When no CAN communication signal is received continuously.	• CAN communication line • Li-ion battery controller • VCM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P318D detected?

YES >> Refer to EVB-112, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745969

For the diagnosis procedure, refer to LAN-16, "Trouble Diagnosis Flow Chart".

P318E COMMUNICATION ERROR

DTC Logic

INFOID:0000000008745970

DTC DETECTION LOGIC

NOTE:
When the 12 V battery is removed within 5 minutes after turning the power switch OFF, “P318E”, “P3191”, and “P3196” may be simultaneously detected. This is not a malfunction.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P318E	COMMUNICATION ERROR	When no CAN communication signal is received from VCM continuously.	• VCM • Li-ion battery controller • CAN communication line

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch OFF.
2. After turning the power switch OFF, get out of the vehicle and close all doors (including back door).
3. After turning the power switch OFF, wait for 5 minutes or more to remove the 12 V battery negative terminal. Refer to EVB-6, "Precaution for Removing 12V Battery".
4. Connect 12 V battery negative terminal.
5. Power switch ON and wait for 10 seconds or more.
6. Select “Self Diagnostic Result” of “HV BAT”.
7. Check DTC.

Is P318E detected?

YES >> Refer to EVB-113, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745971

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform "All DTC Reading".
2. Check “Self diagnostic result” of systems other than “HV BAT” to see if “P318E” is detected.

Is P318E detected?

YES >> Replace VCM. Refer to EVC-426, "Removal and Installation".
NO >> GO TO 2.

2.PREFORM THE SELF-DIAGNOSIS OF LI-ION BATTERY CONTROLLER

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “U1000” is detected simultaneously with “P318E”.

Is U1000 detected?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> INSPECTION END

P3191 COMMUNICATION ERROR

DTC Logic

INFOID:0000000008745972

DTC DETECTION LOGIC

NOTE:
When the 12 V battery is removed within 5 minutes after turning the power switch OFF, “P318E”, “P3191” and “P3196” may be simultaneously detected. This is not a malfunction.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3191	COMMUNICATION ERROR	When no CAN communication signal is received from traction motor inverter continuously.	• Traction motor inverter • Li-ion battery controller • CAN communication line

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch OFF.
2. After turning the power switch OFF, get out of the vehicle and close all doors (including back door).
3. After turning the power switch OFF, wait for 5 minutes or more to remove the 12 V battery negative terminal. Refer to EVB-6, "Precaution for Removing 12V Battery".
4. Connect 12 V battery negative terminal.
5. Power switch ON and wait for 10 seconds or more.
6. Select “Self Diagnostic Result” of “HV BAT”.
7. Check DTC.

Is P3191 detected?

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

Diagnosis Procedure

INFOID:0000000008745973

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform "All DTC Reading".
2. Check “Self diagnostic result” of systems other than “HV BAT” to see if “P3191” is detected.

Is P3191 detected?

YES >> Replace traction motor inverter. Refer to TMS-108, "Removal and Installation"
NO >> GO TO 2.

2.PREFORM THE SELF-DIAGNOSIS OF LI-ION BATTERY CONTROLLER

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “U1000” is detected simultaneously with “P3191”.

Is U1000 detected?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> INSPECTION END

P3196 COMMUNICATION ERROR

DTC Logic

INFOID:0000000008745974

DTC DETECTION LOGIC

NOTE:
When the 12 V battery is removed within 5 minutes after turning the power switch OFF, “P318E”, “P3191” and “P3196” may be simultaneously detected. This is not a malfunction.

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3196	COMMUNICATION ERROR	When no CAN communication signal is received from on-board charger continuously.	• PDM (Power Delivery Module) • Li-ion battery controller • CAN communication line

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch OFF.
2. After turning the power switch OFF, get out of the vehicle and close all doors (including back door).
3. After turning the power switch OFF, wait for 5 minutes or more to remove the 12 V battery negative terminal. Refer to EVB-6, "Precaution for Removing 12V Battery".
4. Connect 12 V battery negative terminal.
5. Power switch ON and wait for 10 seconds or more.
6. Select “Self Diagnostic Result” of “HV BAT”.
7. Check DTC.

Is P3196 detected?

YES >> Refer to EVB-115, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745975

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform "All DTC Reading".
2. Check “Self diagnostic result” of systems other than “HV BAT” to see if “P3196” is detected.

Is P3196 detected?

YES >> Replace PDM (Power Delivery Module). Refer to VC-119, "Removal and Installation"
NO >> GO TO 2.

2.PREFORM THE SELF-DIAGNOSIS OF LI-ION BATTERY CONTROLLER

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “U1000” is detected simultaneously with “P3196”.

Is U1000 detected?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> INSPECTION END

P3198 COMMUNICATION ERROR

DTC Logic

INFOID:0000000009346511

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3198	COMMUNICATION ERROR	When no CAN communication signal is received from A/C auto amp. continuously for 2 seconds or more.	• CAN communication line • Li-ion battery controller • A/C auto amp.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P3198 detected?

YES >> Refer to EVB-116, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009346512

1.PERFORM THE SELF-DIAGNOSIS

With CONSULT
1. Perform "All DTC Reading".
2. Check “Self diagnostic result” of systems other than “HV BAT” to see if “P3198” is detected.

Is P3198 detected?

YES >> Replace A/C auto amp.. Refer to HAC-194, "Removal and Installation" (With heat pump) or HAC-362, "Removal and Installation" (Without heat pump).
NO >> GO TO 2.

2.PREFORM THE SELF-DIAGNOSIS OF LI-ION BATTERY CONTROLLER

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “U1000” is detected simultaneously with “P3198”.

Is U1000 detected?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> INSPECTION END

P3199 COMMUNICATION ERROR

DTC Logic

INFOID:0000000008745976

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3199	COMMUNICATION ERROR	When a CRC error from VCM is detected.	• VCM • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P3199 detected?

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

Diagnosis Procedure

INFOID:0000000008745977

When this DTC is detected, replace VCM. Refer to EVC-426, "Removal and Installation".

P319C COMMUNICATION ERROR

DTC Logic

INFOID:0000000008745978

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P319C	COMMUNICATION ER-ROR	When a CRC error from traction motor inverter is detected.	• Traction motor inverter • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P319C detected?

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

Diagnosis Procedure

INFOID:0000000008745979

When this DTC is detected, replace traction motor inverter. Refer to TMS-108, "Exploded View".

P31A4 CAN ERROR VCM

DTC Logic

INFOID:0000000008745980

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P31A4	CAN ERROR VCM	If the CAN data from VCM has not change from the value which was previously received.	VCM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P31A4 detected?

YES >> Refer to EVB-119, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745981

When this DTC is detected, replace VCM. Refer to EVC-426, "Removal and Installation".

P31A7 CAN ERROR INV/MC

DTC Logic

INFOID:0000000008745982

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P31A7	CAN ERROR INV/MC	If the CAN data from traction motor inverter has not change from the value which was previously received.	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P31A7 detected?

YES >> Refer to EVB-120, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745983

When this DTC is detected, replace traction motor inverter. Refer to TMS-108, "Exploded View".

P3302-P330D CELL OVER VOLTAGE

DTC Logic

INFOID:0000000008745986

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3302	CELL OVER VOLTAGE MODULE1	When cell voltage exceeds the allowable working voltage range.	• Overcharge caused by traction motor inverter/VCM malfunction • Module • Li-ion battery controller • Bus bar • Harness or connector
P3303	CELL OVER VOLTAGE MODULE2		
P3304	CELL OVER VOLTAGE MODULE3		
P3305	CELL OVER VOLTAGE MODULE4		
P3306	CELL OVER VOLTAGE MODULE5		
P3307	CELL OVER VOLTAGE MODULE6		
P3308	CELL OVER VOLTAGE MODULE7		
P3309	CELL OVER VOLTAGE MODULE8		
P330A	CELL OVER VOLTAGE MODULE9		
P330B	CELL OVER VOLTAGE MODULE10		
P330C	CELL OVER VOLTAGE MODULE11		
P330D	CELL OVER VOLTAGE MODULE12		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-121, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745987

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS

With CONSULT

1. Perform “All DTC Reading” with CONSULT.
2. Check systems other than “HV BAT” if any DTC is detected.

Is any DTC detected?

YES >> After performing trouble diagnosis of detected DTC, GO TO 2.
NO >> GO TO 2.

2.PRECONDITIONING

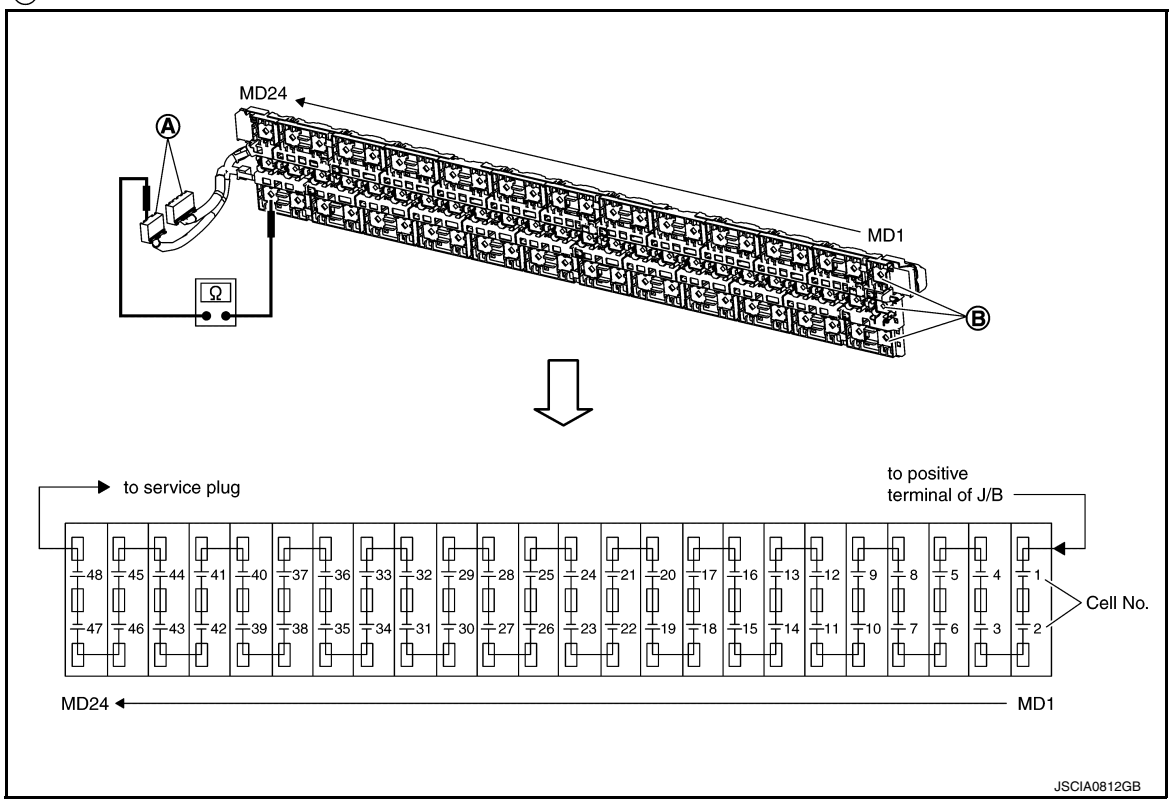
WARNING:
Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 3.

3.CHECK HARNESS BETWEEN MODULE AND LI-ION BATTERY CONTROLLER

1. Disconnect voltage detection terminal of bus bar and Li-ion battery controller harness connector.
2. Refer to below table and check the continuity between Li-ion battery controller Ⓐ and corresponding bus bar Ⓑ.



DTC	Module No.		Li-ion battery controller		Continuity
			Connector	Terminal	
P3302	1	Bus bar	LB13	33	Existed
				50	
				34	
P3303	2		LB13	34	Existed
				51	
				35	
P3304	3		LB13	35	Existed
				52	
				36	
P3305	4		LB13	36	Existed
				53	
				37	
P3306	5		LB13	37	Existed
				54	
				38	
P3307	6		LB13	38	Existed
				55	
				39	
P3308	7		LB13	39	Existed
				56	
				40	
P3309	8		LB13	40	Existed
				57	
				42	
P330A	9		LB13	42	Existed
				58	
				43	
P330B	10		LB13	43	Existed
				59	
				44	
P330C	11		LB13	44	Existed
				60	
				45	
P330D	12		LB13	45	Existed
				61	
				46	

Is the inspection result normal?

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

4. CHECK MODULE VOLTAGE

Check voltage of corresponding module. Refer to EVB-124, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Replace corresponding module. Refer to EVB-261, "REAR MODULE STACK : Disassembly and Assembly".

Component Inspection

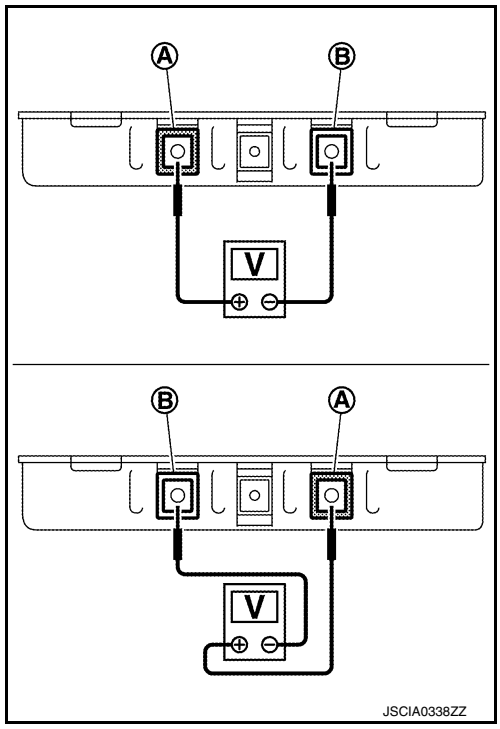
INFOID:0000000008745988

1.CHECK MODULE VOLTAGE

Check voltage of module.

Ⓐ **: Positive terminal (Red)**
Ⓑ **: Negative terminal (Black)**

Terminals		Voltage (Approx.)
(+)	(-)	
Module		
Positive terminal (Red)	Negative terminal (Black)	5.0 - 8.5 V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace module. Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly" (Front module) or EVB-261, "REAR MODULE STACK : Disassembly and Assembly" (Rear module).

P330E-P3319 CELL OVER VOLTAGE

DTC Logic

INFOID:0000000008745989

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P330E	CELL OVER VOLTAGE MODULE13	When cell voltage exceeds the allowable working voltage range.	• Overcharge caused by traction motor inverter/VCM malfunction • Module • Li-ion battery controller • Bus bar • Harness or connector
P330F	CELL OVER VOLTAGE MODULE14		
P3310	CELL OVER VOLTAGE MODULE15		
P3311	CELL OVER VOLTAGE MODULE16		
P3312	CELL OVER VOLTAGE MODULE17		
P3313	CELL OVER VOLTAGE MODULE18		
P3314	CELL OVER VOLTAGE MODULE19		
P3315	CELL OVER VOLTAGE MODULE20		
P3316	CELL OVER VOLTAGE MODULE21		
P3317	CELL OVER VOLTAGE MODULE22		
P3318	CELL OVER VOLTAGE MODULE23		
P3319	CELL OVER VOLTAGE MODULE24		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-132, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745990

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS

With CONSULT

1. Perform “All DTC Reading” with CONSULT.
2. Check systems other than “HV BAT” if any DTC is detected.

Is any DTC detected?

YES >> After performing trouble diagnosis of detected DTC, GO TO 2.
NO >> GO TO 2.

2.PRECONDITIONING

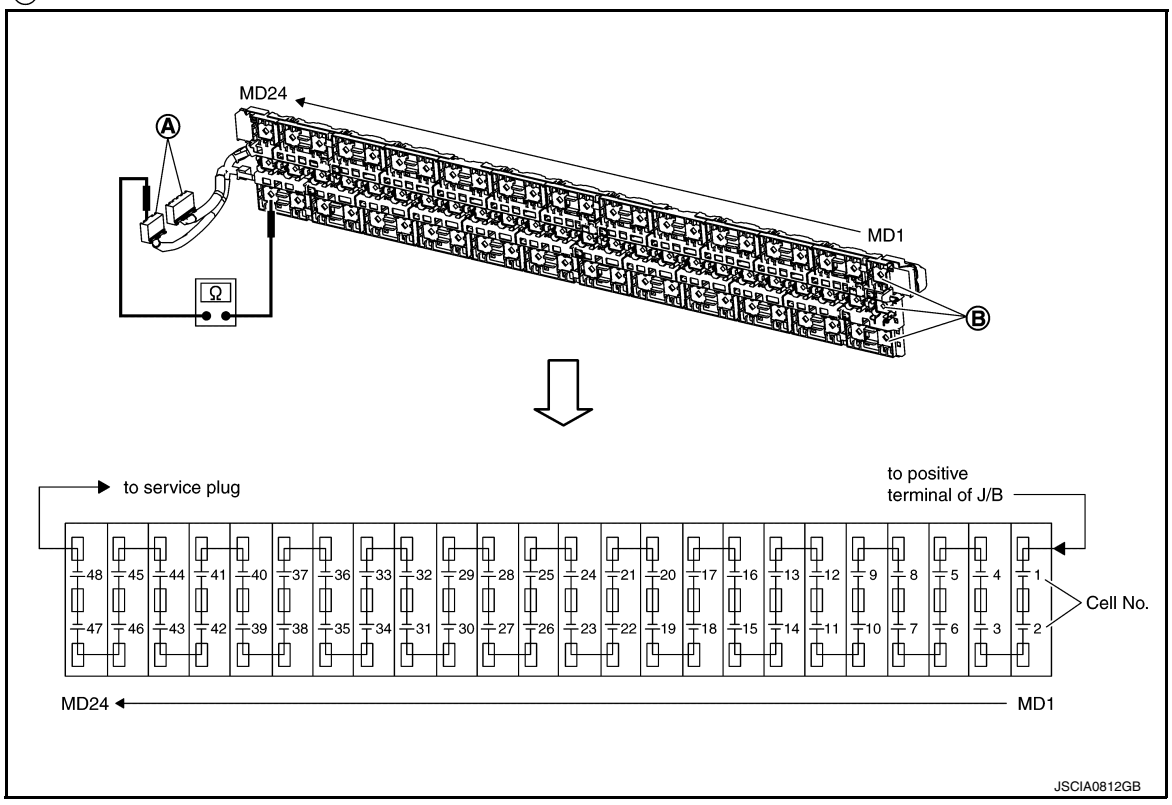
WARNING:
Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 3.

3.CHECK HARNESS BETWEEN MODULE AND LI-ION BATTERY CONTROLLER

1. Disconnect voltage detection terminal of bus bar and Li-ion battery controller harness connector.
2. Refer to below table and check the continuity between Li-ion battery controller Ⓐ and corresponding bus bar Ⓑ.



DTC	Module No.		Li-ion battery controller		Continuity
			Connector	Terminal	
P330E	13	Bus bar	LB13	46	Existed
				62	
				47	
P330F	14		LB13	47	Existed
				63	
				48	
P3310	15		LB13	48	Existed
			LB14	77	
				65	
P3311	16		LB14	65	Existed
				78	
				66	
P3312	17		LB14	66	Existed
				80	
				69	
P3313	18		LB14	69	Existed
				81	
				70	
P3314	19		LB14	70	Existed
				82	
				71	
P3315	20		LB14	71	Existed
				83	
				72	
P3316	21		LB14	72	Existed
				84	
				73	
P3317	22		LB14	73	Existed
				85	
				74	
P3318	23		LB14	74	Existed
				86	
				75	
P3319	24		LB14	75	Existed
				87	
				76	

Is the inspection result normal?

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

4. CHECK MODULE VOLTAGE

Check voltage of corresponding module. Refer to EVB-128, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Replace corresponding module. Refer to EVB-239, "FRONT MODULE STACK : Removal and Installation".

Component Inspection

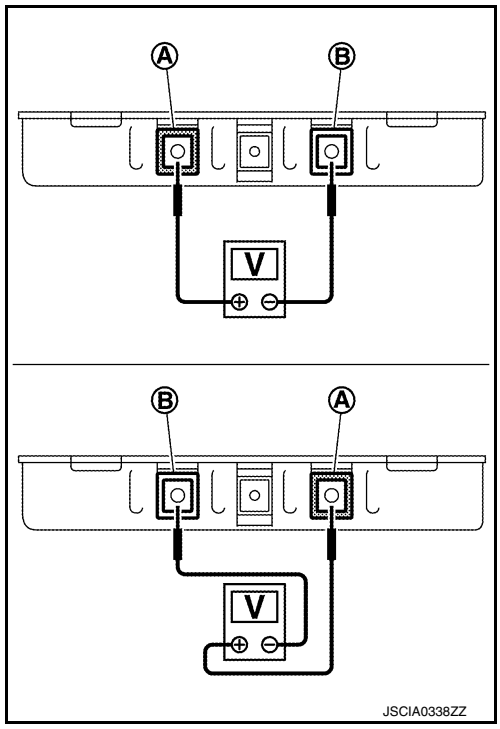
INFOID:0000000008745991

1.CHECK MODULE VOLTAGE

Check voltage of module.

Ⓐ **: Positive terminal (Red)**
Ⓑ **: Negative terminal (Black)**

Terminals		Voltage (Approx.)
(+)	(-)	
Module		
Positive terminal (Red)	Negative terminal (Black)	5.0 - 8.5 V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace module. Refer to EVB-261, "REAR MODULE STACK : Disassembly and Assembly".

P331A-P3325 CELL OVER VOLTAGE

DTC Logic

INFOID:0000000008745992

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P331A	CELL OVER VOLTAGE MODULE25	When cell voltage exceeds the allowable working voltage range.	• Overcharge caused by traction motor inverter/VCM malfunction • Module • Li-ion battery controller • Bus bar • Harness or connector
P331B	CELL OVER VOLTAGE MODULE26		
P331C	CELL OVER VOLTAGE MODULE27		
P331D	CELL OVER VOLTAGE MODULE28		
P331E	CELL OVER VOLTAGE MODULE29		
P331F	CELL OVER VOLTAGE MODULE30		
P3320	CELL OVER VOLTAGE MODULE31		
P3321	CELL OVER VOLTAGE MODULE32		
P3322	CELL OVER VOLTAGE MODULE33		
P3323	CELL OVER VOLTAGE MODULE34		
P3324	CELL OVER VOLTAGE MODULE35		
P3325	CELL OVER VOLTAGE MODULE36		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-132, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745993

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS

With CONSULT

1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result” of systems other than “HV BAT” if any DTC is detected.

Is any DTC detected?

YES >> After performing trouble diagnosis of detected DTC, GO TO 2.
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 3.

3.CHECK HARNESS BETWEEN MODULE AND LI-ION BATTERY CONTROLLER

With CONSULT

1. Power switch OFF.
2. Identify the malfunctioning module based on detected DTC.
3. Disconnect module harness connector and Li-ion battery controller harness connector.
4. Refer to below table and check the continuity between corresponding module and Li-ion battery controller.

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P331A	25	LB8	9	LB15	89	Existed
			10		110	
			11		90	
P331B	26	LB8	11	LB15	90	Existed
			12		111	
			13		91	
P331C	27	LB8	13	LB15	91	Existed
			28		112	
			27		92	
P331D	28	LB8	27	LB15	92	Existed
			26		113	
			25		93	
P331E	29	LB8	25	LB15	93	Existed
			23		114	
			21		94	
P331F	30	LB8	21	LB15	94	Existed
			19		115	
			17		95	
P3320	31	LB8	17	LB15	95	Existed
			3		116	
			4		96	
P3321	32	LB8	4	LB15	96	Existed
			18		117	
			1		97	

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P3322	33	LB8	1	LB15	97	Existed
			2		118	
			20		99	
P3323	34	LB8	20	LB15	99	Existed
			6		119	
			8		100	
P3324	35	LB8	8	LB15	100	Existed
			22		120	
			5		101	
P3325	36	LB8	5	LB15	101	Existed
			7		121	
			24		102	

Is the inspection result normal?

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

4.CHECK MODULE VOLTAGE

Check voltage of corresponding module. Refer to EVB-131, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Replace corresponding module. Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".

Component Inspection

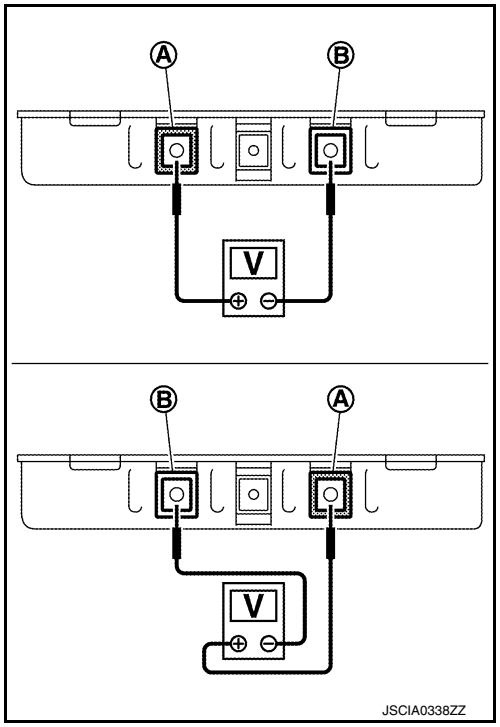
INFOID:0000000008745994

1.CHECK MODULE VOLTAGE

Check voltage of module.

Ⓐ **: Positive terminal (Red)**
Ⓑ **: Negative terminal (Black)**

Terminals		Voltage (Approx.)
(+)	(-)	
Module		
Positive terminal (Red)	Negative terminal (Black)	5.0 - 8.5 V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace module. Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".

P3326-P3331 CELL OVER VOLTAGE

DTC Logic

INFOID:0000000008745995

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3326	CELL OVER VOLTAGE MODULE37	When cell voltage exceeds the allowable working voltage range.	• Overcharge caused by traction motor inverter/VCM malfunction • Module • Li-ion battery controller • Bus bar • Harness or connector
P3327	CELL OVER VOLTAGE MODULE38		
P3328	CELL OVER VOLTAGE MODULE39		
P3329	CELL OVER VOLTAGE MODULE40		
P332A	CELL OVER VOLTAGE MODULE41		
P332B	CELL OVER VOLTAGE MODULE42		
P332C	CELL OVER VOLTAGE MODULE43		
P332D	CELL OVER VOLTAGE MODULE44		
P332E	CELL OVER VOLTAGE MODULE45		
P332F	CELL OVER VOLTAGE MODULE46		
P3330	CELL OVER VOLTAGE MODULE47		
P3331	CELL OVER VOLTAGE MODULE48		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-132, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008745996

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS

With CONSULT

1. Perform “All DTC Reading” with CONSULT.
2. Check “Self Diagnostic Result” of systems other than “HV BAT” if any DTC is detected.

Is any DTC detected?

YES >> After performing trouble diagnosis of detected DTC, GO TO 2.
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 3.

3.CHECK HARNESS BETWEEN MODULE AND LI-ION BATTERY CONTROLLER

With CONSULT

1. Power switch OFF.
2. Identify the malfunctioning module based on detected DTC.
3. Disconnect module harness connector and Li-ion battery controller harness connector.
4. Refer to below table and check the continuity between corresponding module and Li-ion battery controller.

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P3326	37	LB8	24	LB15	102	Existed
		LB7	38		122	
			40		103	
P3327	38	LB7	40	LB15	103	Existed
			51		123	
			37		104	
P3328	39	LB7	37	LB15	104	Existed
			39		124	
			53		105	
P3329	40	LB7	53	LB15	105	Existed
			43		125	
			44		106	
P332A	41	LB7	44	LB15	106	Existed
			55		127	
			41		107	
P332B	42	LB7	41	LB15	107	Existed
			42		128	
			56		108	
P332C	43	LB7	56	LB15	108	Existed
			54	LB16	137	
			52		130	
P332D	44	LB7	52	LB16	130	Existed
			50		138	
			36		131	

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P332E	45	LB7	36	LB16	131	Existed
			35		140	
			47		132	
P332F	46	LB7	47	LB16	132	Existed
			33		141	
			45		133	
P3330	47	LB7	45	LB16	133	Existed
			46		142	
			34		134	
P3331	48	LB7	34	LB16	134	Existed
			48		143	
			49		135	

Is the inspection result normal?

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

4.CHECK MODULE VOLTAGE

Check voltage of corresponding module. Refer to EVB-134, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Replace corresponding module. Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".

Component Inspection

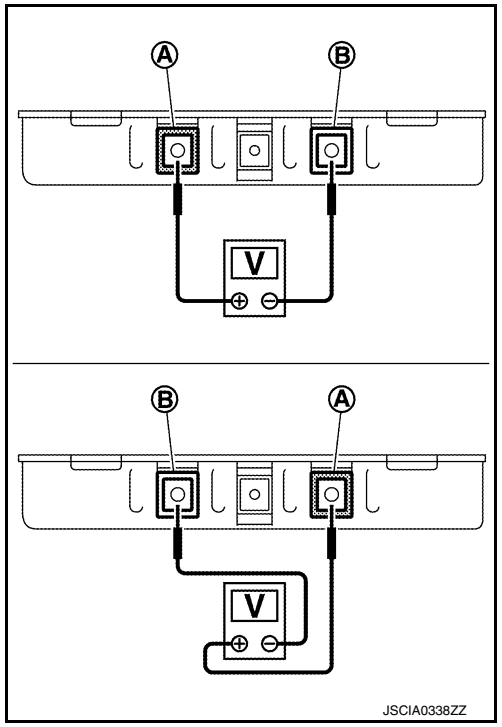
INFOID:0000000008745997

1.CHECK MODULE VOLTAGE

Check voltage of module.

Ⓐ **: Positive terminal (Red)**
Ⓑ **: Negative terminal (Black)**

Terminals		Voltage (Approx.)
(+)	(-)	
Module		
Positive terminal (Red)	Negative terminal (Black)	5.0 - 8.5 V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace module. Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".

P3375-P3380 CELL OVER DISCHARGE

DTC Logic

INFOID:0000000008746000

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3375	CELL OVER DISCHARGE MODULE1	When cell voltage lowers below the allowable working voltage range.	• Overcharge caused by traction motor inverter/VCM malfunction • Module • Li-ion battery controller • Bus bar • Harness or connector
P3376	CELL OVER DISCHARGE MODULE2		
P3377	CELL OVER DISCHARGE MODULE3		
P3378	CELL OVER DISCHARGE MODULE4		
P3379	CELL OVER DISCHARGE MODULE5		
P337A	CELL OVER DISCHARGE MODULE6		
P337B	CELL OVER DISCHARGE MODULE7		
P337C	CELL OVER DISCHARGE MODULE8		
P337D	CELL OVER DISCHARGE MODULE9		
P337E	CELL OVER DISCHARGE MODULE10		
P337F	CELL OVER DISCHARGE MODULE11		
P3380	CELL OVER DISCHARGE MODULE12		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

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

Diagnosis Procedure

INFOID:0000000008746001

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS

With CONSULT

1. Perform “All DTC Reading” with CONSULT.
2. Check systems other than “HV BAT” if any DTC is detected.

Is any DTC detected?

YES >> After performing trouble diagnosis of detected DTC, GO TO 2.
NO >> GO TO 2.

2.PRECONDITIONING

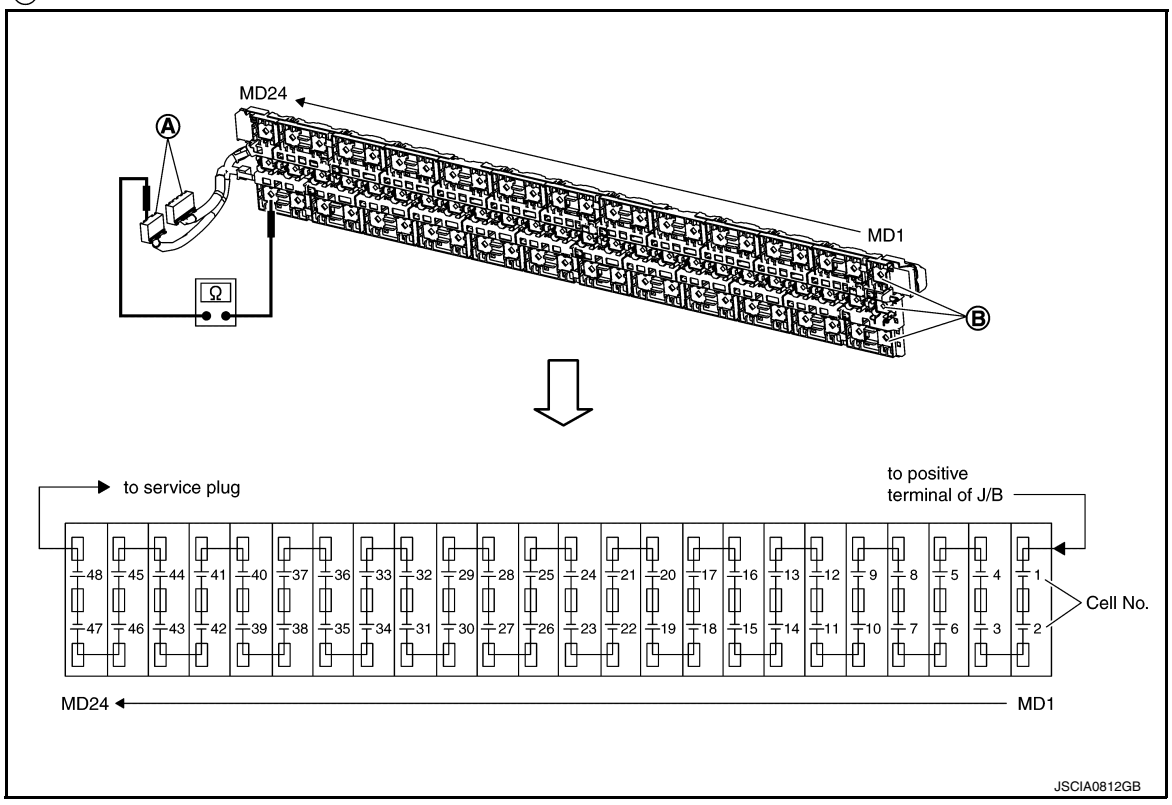
WARNING:
Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 3.

3.CHECK HARNESS BETWEEN MODULE AND LI-ION BATTERY CONTROLLER

1. Disconnect voltage detection terminal of bus bar and Li-ion battery controller harness connector.
2. Refer to below table and check the continuity between Li-ion battery controller Ⓐ and corresponding bus bar Ⓑ.



DTC	Module No.		Li-ion battery controller		Continuity
			Connector	Terminal	
P3375	1	Bus bar	LB13	33	Existed
				50	
				34	
P3376	2		LB13	34	Existed
				51	
				35	
P3377	3		LB13	35	Existed
				52	
				36	
P3378	4		LB13	36	Existed
				53	
				37	
P3379	5		LB13	37	Existed
				54	
				38	
P337A	6		LB13	38	Existed
				55	
				39	
P337B	7		LB13	39	Existed
				56	
				40	
P337C	8		LB13	40	Existed
				57	
				42	
P337D	9		LB13	42	Existed
				58	
				43	
P337E	10		LB13	43	Existed
				59	
				44	
P330F	11		LB13	44	Existed
				60	
				45	
P3380	12		LB13	45	Existed
				61	
				46	

Is the inspection result normal?

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

4. CHECK MODULE VOLTAGE

Check voltage of corresponding module. Refer to EVB-138, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Replace corresponding module. Refer to EVB-261, "REAR MODULE STACK : Disassembly and Assembly".

Component Inspection

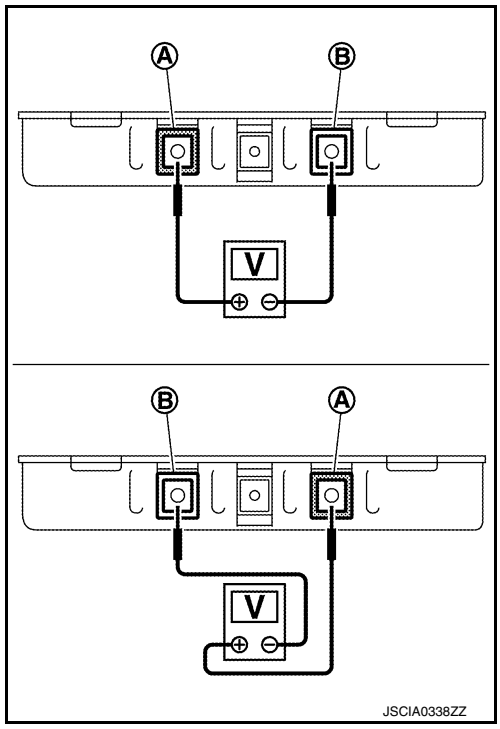
INFOID:0000000008746002

1.CHECK MODULE VOLTAGE

Check voltage of module.

Ⓐ **: Positive terminal (Red)**
Ⓑ **: Negative terminal (Black)**

Terminals		Voltage (Approx.)
(+)	(-)	
Module		
Positive terminal (Red)	Negative terminal (Black)	5.0 - 8.5 V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace module. Refer to EVB-261, "REAR MODULE STACK : Disassembly and Assembly".

P3381-P338C CELL OVER DISCHARGE

DTC Logic

INFOID:0000000008746003

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3381	CELL OVER DISCHARGE MODULE13	When cell voltage lowers below the allowable working voltage range.	• Overcharge caused by traction motor inverter/VCM malfunction • Module • Li-ion battery controller • Bus bar • Harness or connector
P3382	CELL OVER DISCHARGE MODULE14		
P3383	CELL OVER DISCHARGE MODULE15		
P3384	CELL OVER DISCHARGE MODULE16		
P3385	CELL OVER DISCHARGE MODULE17		
P3386	CELL OVER DISCHARGE MODULE18		
P3387	CELL OVER DISCHARGE MODULE19		
P3388	CELL OVER DISCHARGE MODULE20		
P3389	CELL OVER DISCHARGE MODULE21		
P338A	CELL OVER DISCHARGE MODULE22		
P338B	CELL OVER DISCHARGE MODULE23		
P338C	CELL OVER DISCHARGE MODULE24		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-146, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746004

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS

With CONSULT

1. Perform “All DTC Reading” with CONSULT.
2. Check systems other than “HV BAT” if any DTC is detected.

Is any DTC detected?

YES >> After performing trouble diagnosis of detected DTC, GO TO 2.
NO >> GO TO 2.

2.PRECONDITIONING

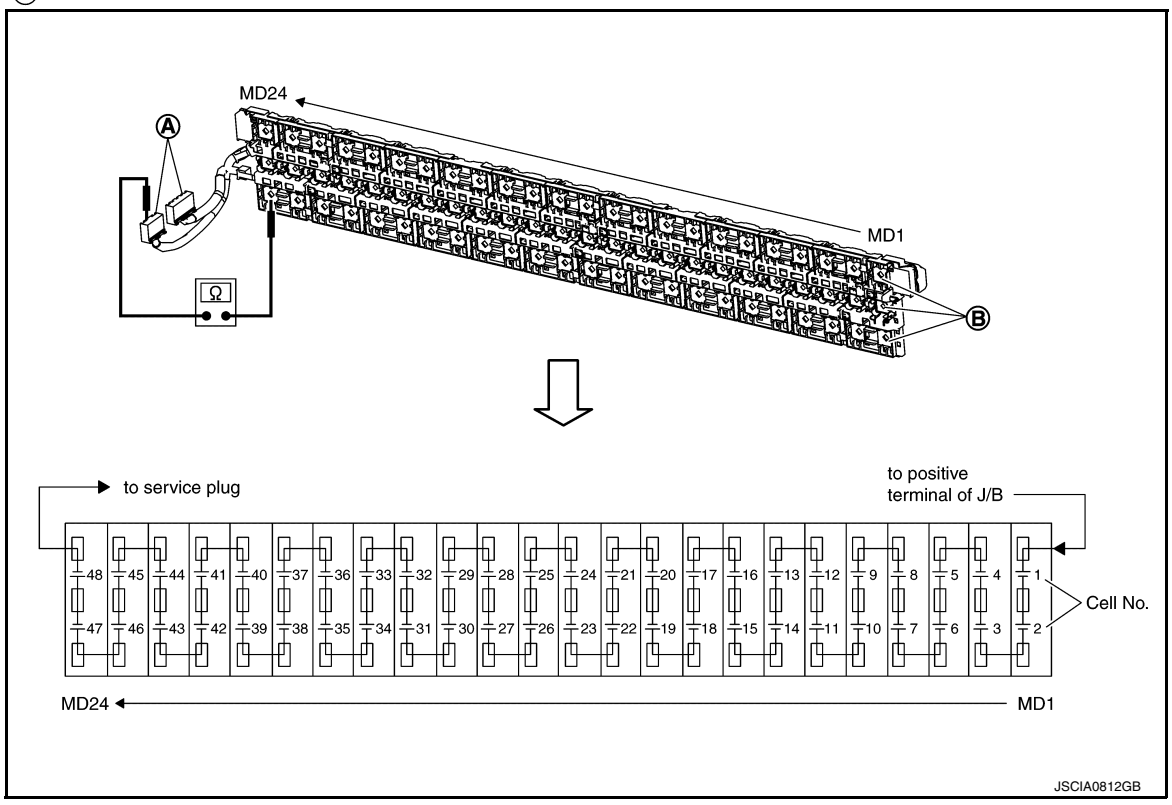
WARNING:
Disconnect high voltage circuit. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation",

>> GO TO 3.

3.CHECK HARNESS BETWEEN MODULE AND LI-ION BATTERY CONTROLLER

1. Disconnect voltage detection terminal of bus bar and Li-ion battery controller harness connector.
2. Refer to below table and check the continuity between Li-ion battery controller Ⓐ and corresponding bus bar Ⓑ.



DTC	Module No.		Li-ion battery controller		Continuity
			Connector	Terminal	
P3381	13	Bus bar	LB13	46	Existed
				62	
				47	
P3382	14		LB13	47	Existed
				63	
				48	
P3383	15		LB13	48	Existed
			LB14	77	
				65	
P3384	16		LB14	65	Existed
				78	
				66	
P3385	17		LB14	66	Existed
				80	
				69	
P3386	18		LB14	69	Existed
				81	
				70	
P3387	19		LB14	70	Existed
				82	
				71	
P3388	20		LB14	71	Existed
				83	
				72	
P3389	21		LB14	72	Existed
				84	
				73	
P338A	22		LB14	73	Existed
				85	
				74	
P338B	23		LB14	74	Existed
				86	
				75	
P338C	24		LB14	75	Existed
				87	
				76	

Is the inspection result normal?

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

4. CHECK MODULE VOLTAGE

Check voltage of corresponding module. Refer to EVB-142, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Replace corresponding module. Refer to EVB-261, "REAR MODULE STACK : Disassembly and Assembly".

Component Inspection

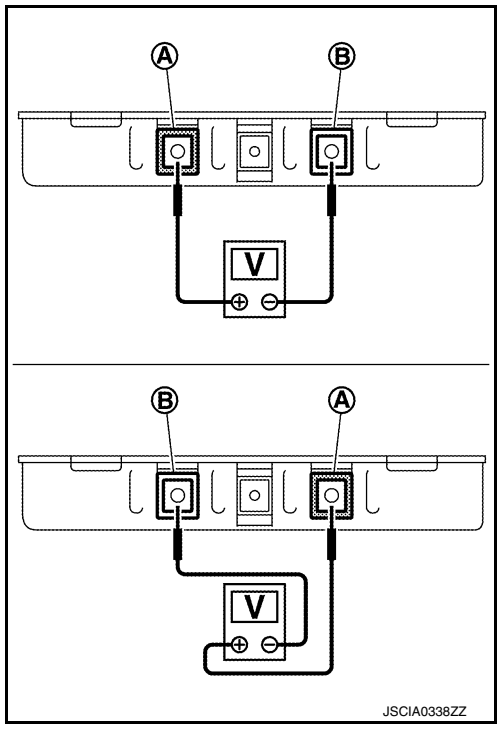
INFOID:0000000008746005

1.CHECK MODULE VOLTAGE

Check voltage of module.

Ⓐ **: Positive terminal (Red)**
Ⓑ **: Negative terminal (Black)**

Terminals		Voltage (Approx.)
(+)	(-)	
Module		
Positive terminal (Red)	Negative terminal (Black)	5.0 - 8.5 V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace module. Refer to EVB-261, "REAR MODULE STACK : Disassembly and Assembly".

P338D-P3398 CELL OVER DISCHARGE

DTC Logic

INFOID:0000000008746006

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P338D	CELL OVER DISCHARGE MODULE25	When cell voltage lowers below the allowable working voltage range.	• Overcharge caused by traction motor inverter/VCM malfunction • Module • Li-ion battery controller • Bus bar • Harness or connector
P338E	CELL OVER DISCHARGE MODULE26		
P338F	CELL OVER DISCHARGE MODULE27		
P3390	CELL OVER DISCHARGE MODULE28		
P3391	CELL OVER DISCHARGE MODULE29		
P3392	CELL OVER DISCHARGE MODULE30		
P3393	CELL OVER DISCHARGE MODULE31		
P3394	CELL OVER DISCHARGE MODULE32		
P3395	CELL OVER DISCHARGE MODULE33		
P3396	CELL OVER DISCHARGE MODULE34		
P3397	CELL OVER DISCHARGE MODULE35		
P3398	CELL OVER DISCHARGE MODULE36		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-146, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746007

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS

With CONSULT

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

Is any DTC detected?

YES >> After performing trouble diagnosis of detected DTC, GO TO 2.
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation",

>> GO TO 3.

3.CHECK HARNESS BETWEEN MODULE AND LI-ION BATTERY CONTROLLER

With CONSULT

1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Identify the malfunctioning module based on detected DTC.
3. Disconnect module harness connector and Li-ion battery controller harness connector.
4. Refer to below table and check the continuity between corresponding module and Li-ion battery controller.

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P338D	25	LB8	9	LB15	89	Existed
			10		110	
			11		90	
P338E	26	LB8	11	LB15	90	Existed
			12		111	
			13		91	
P338F	27	LB8	13	LB15	91	Existed
			28		112	
			27		92	
P3390	28	LB8	27	LB15	92	Existed
			26		113	
			25		93	
P3391	29	LB8	25	LB15	93	Existed
			23		114	
			21		94	
P3392	30	LB8	21	LB15	94	Existed
			19		115	
			17		95	
P3393	31	LB8	17	LB15	95	Existed
			3		116	
			4		96	
P3394	32	LB8	4	LB15	96	Existed
			18		117	
			1		97	

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P3395	33	LB8	1	LB15	97	Existed
			2		118	
			20		99	
P3396	34	LB8	20	LB15	99	Existed
			6		119	
			8		100	
P3397	35	LB8	8	LB15	100	Existed
			22		120	
			5		101	
P3398	36	LB8	5	LB15	101	Existed
			7		121	
			24		102	

Is the inspection result normal?

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

4. CHECK MODULE VOLTAGE

Check voltage of corresponding module. Refer to EVB-145, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Replace corresponding module. Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".

Component Inspection

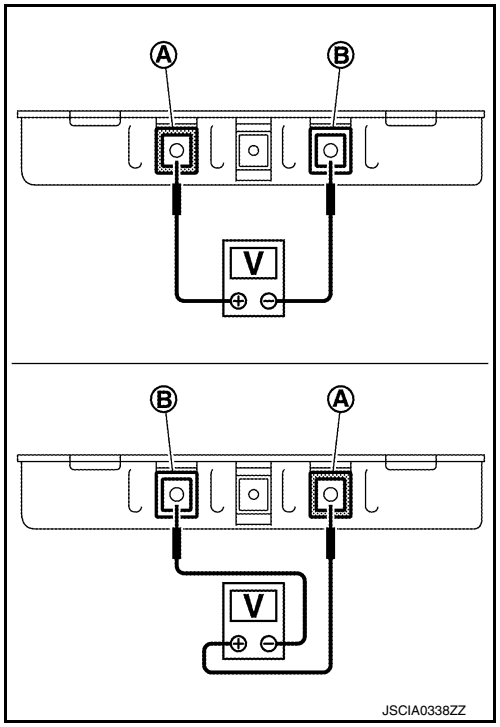
INFOID:0000000008746008

1. CHECK MODULE VOLTAGE

Check voltage of module.

Ⓐ **: Positive terminal (Red)**
Ⓑ **: Negative terminal (Black)**

Terminals		Voltage (Approx.)
(+)	(-)	
Module		
Positive terminal (Red)	Negative terminal (Black)	5.0 - 8.5 V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace module. Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".

P3399-P33A4 CELL OVER DISCHARGE

DTC Logic

INFOID:0000000008746009

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P3399	CELL OVER DISCHARGE MODULE37	When cell voltage lowers below the allowable working voltage range.	• Overcharge caused by traction motor inverter/VCM malfunction • Module • Li-ion battery controller • Bus bar • Harness or connector
P339A	CELL OVER DISCHARGE MODULE38		
P339B	CELL OVER DISCHARGE MODULE39		
P339C	CELL OVER DISCHARGE MODULE40		
P339D	CELL OVER DISCHARGE MODULE41		
P339E	CELL OVER DISCHARGE MODULE42		
P339F	CELL OVER DISCHARGE MODULE43		
P33A0	CELL OVER DISCHARGE MODULE44		
P33A1	CELL OVER DISCHARGE MODULE45		
P33A2	CELL OVER DISCHARGE MODULE46		
P33A3	CELL OVER DISCHARGE MODULE47		
P33A4	CELL OVER DISCHARGE MODULE48		

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Refer to EVB-146, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746010

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS

With CONSULT

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

Is any DTC detected?

YES >> After performing trouble diagnosis of detected DTC, GO TO 2.
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation",

>> GO TO 3.

3.CHECK HARNESS BETWEEN MODULE AND LI-ION BATTERY CONTROLLER

With CONSULT

1. Select “Self Diagnostic Result” mode of “HV BAT” using CONSULT.
2. Identify the malfunctioning module based on detected DTC.
3. Disconnect module harness connector and Li-ion battery controller harness connector.
4. Refer to below table and check the continuity between corresponding module and Li-ion battery controller.

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P3399	37	LB8	24	LB15	102	Existed
		LB7	38		122	
			40		103	
P339A	38	LB7	40	LB15	103	Existed
			51		123	
			37		104	
P339B	39	LB7	37	LB15	104	Existed
			39		124	
			53		105	
P339C	40	LB7	53	LB15	105	Existed
			43		125	
			44		106	
P339D	41	LB7	44	LB15	106	Existed
			55		127	
			41		107	
P339E	42	LB7	41	LB15	107	Existed
			42		128	
			56		108	
P339F	43	LB7	56	LB15	108	Existed
			54	LB16	137	
			52		130	
P33A0	44	LB7	52	LB16	130	Existed
			50		138	
			36		131	

DTC	Module No.	Module		Li-ion battery controller		Continuity
		Connector	Terminal	Connector	Terminal	
P33A1	45	LB7	36	LB16	131	Existed
			35		140	
			47		132	
P33A2	46	LB7	47	LB16	132	Existed
			33		141	
			45		133	
P33A3	47	LB7	45	LB16	133	Existed
			46		142	
			34		134	
P33A4	48	LB7	34	LB16	134	Existed
			48		143	
			49		135	

Is the inspection result normal?

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

4.CHECK MODULE VOLTAGE

Check voltage of corresponding module. Refer to EVB-148, "Component Inspection".

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Replace corresponding module. Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".

Component Inspection

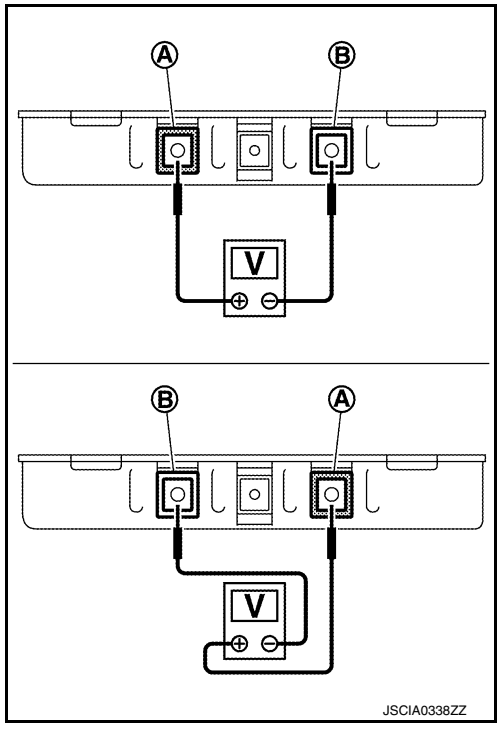
INFOID:0000000008746011

1.CHECK MODULE VOLTAGE

Check voltage of module.

Ⓐ **: Positive terminal (Red)**
Ⓑ **: Negative terminal (Black)**

Terminals		Voltage (Approx.)
(+)	(-)	
Module		
Positive terminal (Red)	Negative terminal (Black)	5.0 - 8.5 V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace module. Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".

P33D4 BATTERY DETERIORATION DIAGNOSIS

DTC Logic

INFOID:0000000008746012

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33D4	BATTERY INTERNAL RESISTANCE DIAG	When the battery charge lowers. (The internal resistance of the battery increases.)	Li-ion battery

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33D4 detected?

YES >> Refer to EVB-149, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746013

When this DTC is detected, replace Li-ion battery. Refer to EVB-194, "Removal and Installation".

P33D5 CURRENT SENSOR

DTC Logic

INFOID:0000000008746014

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33D5	CURRENT SENSOR	Deviation in characteristics of battery current sensor signal voltage. (Battery current sensor signal voltage is too high or too low.)	• Li-ion battery controller • Current sensor • System main relay • Harness or connector

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33D5 detected?

YES >> Refer to EVB-150, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746015

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS OF VCM

With CONSULT
1. Select “Self Diagnostic Result” mode of “EV/HEV” using CONSULT.
2. Check to see if “P0AA0”, “P0AA1” or “P0AA4” is detected.

Is any DTC detected?

YES >> Perform diagnosis on the detected DTC. Refer to EVB-45, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".

2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 3.

3.CHECK CONNECTION STATUS

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

Is the inspection result normal?

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

4.CHECK HARNESS BETWEEN CURRENT SENSOR AND LI-ION BATTERY CONTROLLER

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

Current sensor		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB5	S	LB11	10	Exited
	V		9	
	G		15	

Is the inspection result normal?

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

5.CHECK CURRENT SENSOR

Check resistance of current sensor.

Current sensor			Resistance value
Connector	Terminal	Terminal	
LB5	S	G	1 kΩ–10 MΩ
	V	G	

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace current sensor.

6.CHECK LI-ION BATTERY CONTROLLER

Check resistance of Li-ion battery controller.

Li-ion battery controller			Resistance value
Connector	Terminal	Terminal	
LB11	10	15	Approx. 4.7 kΩ

Is the inspection result normal?

YES >> Replace current sensor. Refer to EVB-219, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly".
NO >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P33D6 CURRENT SENSOR

DTC Logic

INFOID:0000000008746016

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33D6	CURRENT SENSOR	Deviation from the specified voltage characteristics of battery current sensor.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33D6 detected?

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

Diagnosis Procedure

INFOID:0000000008746017

DANGER:

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

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

CAUTION:

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

1.PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".
1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 2.

2.CHECK CURRENT SENSOR

1. Disconnect Li-ion battery controller harness connector.
2. Check the resistance of current sensor from Li-ion battery controller side.

Li-ion battery controller			Resistance value
Connector	Terminal		
LB11	10	9	1 kΩ–10 MΩ
	9	15	

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

NO >> GO TO 3.

3. CHECK HARNESS BETWEEN LI-ION BATTERY CONTROLLER AND BATTERY JUNCTION BOX (CURRENT SENSOR)

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

Li-ion battery controller		Current sensor		Continuity
Connector	Terminal	Connector	Terminal	
LB11	10	LB5	S	Existed
	9		V	
	15		G	

Is the inspection result normal?

YES >> Replace current sensor. Refer to EVB-219, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly".

NO >> Repair harness or connector.

P33D7, P33D9, P33DD TEMPERATURE SENSOR

DTC Logic

INFOID:0000000008746018

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33D7	TEMPERATURE SENSOR	Battery temperature sensor 1 center signal voltage is too high or too low.	• Battery temperature sensor • Li-ion battery controller • Harness or connector
P33D9		Battery temperature sensor 2 signal voltage is too high or too low.	
P33DD		Battery temperature sensor 4 signal voltage is too high or too low.	

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

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

Diagnosis Procedure

INFOID:0000000008746019

DANGER:

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

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

CAUTION:

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

1.PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 2.

2.CHECK HARNESS

1. Power switch OFF.
2. Check a connection state of harness connector of Li-ion battery controller.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Recover the connection status.

3.CHECK BATTERY TEMPERATURE SENSOR

Refer to EVB-155, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace battery temperature sensor.

4.CHECK HARNESS BETWEEN BATTERY TEMPERATURE SENSOR AND GROUND

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

Battery temperature sensor	Connector	Terminal	—	Continuity
1	LB9	1	Ground	No existed
2	LB10	4		
4	LB10	2		

Is the inspection result normal?

YES >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
NO >> Repair harness or connector.

Component Inspection

INFOID:0000000008746020

1.CHECK BATTERY TEMPERATURE SENSOR

1. Remove battery temperature sensor. Refer to EVB-203, "BATTERY PACK UPPER CASE : Exploded View".
2. Check resistance between battery temperature sensor terminals.

Battery temperature sensor	Terminals		Condition		Resistance (kΩ)
1	1	5	Temperature °C (°F)	10 (50)	Approx. 7.4
2	4	3		25 (77)	Approx. 4.0
4	2	1		40 (104)	Approx. 2.3

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery temperature sensor.

P33DF BAT VOLTAGE ISOLATION SEN

DTC Logic

INFOID:0000000008746021

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33DF	BAT VOLTAGE ISOLATION SEN	Signal voltage of the on-board isolation resistance monitoring system is too high.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33DF detected?

YES >> Refer to EVB-156, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746022

When this DTC is detected, replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P33E0 BAT VOLTAGE ISOLATION SEN

DTC Logic

INFOID:0000000008746023

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33E0	BATTERY VOLTAGE ISOLATION SENSOR	Signal Voltage of the on-board isolation resistance monitoring system is too low.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33E0 detected?

YES >> Refer to EVB-157, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746024

When this DTC is detected, replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

P33E1 BAT VOLTAGE ISOLATION SEN

DTC Logic

INFOID:0000000008746025

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33E1	BATTERY VOLTAGE ISOLATION SENSOR	Signal voltage of the on-board isolation resistance monitoring system exhibits no amplitude variation.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33E1 detected?

YES >> Refer to EVB-158, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746026

When this DTC is detected, perform Li-ion battery insulation resistance loss check. Refer to EVB-176, "Component Inspection".

P33E2 BATT PACK OVER TEMP

DTC Logic

INFOID:0000000008746027

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33E2	BATTERY PACK OVER TEMPERATURE	When the battery (battery pack) temperature is excessively high.	Overcharge caused by traction motor inverter/VCM malfunction

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33E2 detected?

YES >> Refer to EVB-159, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746028

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

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “P33EB” is detected simultaneously with “P33E2”.

Is P33EB detected?

YES >> Perform diagnosis on the detected “P33EB”. Refer to EVB-167, "Diagnosis Procedure".
NO >> GO TO 2.

2.CHECK BATTERY TEMPERATURE SENSOR

With CONSULT
Using FREEZE FRAME DATA (FFD), check the values of three temperature sensors when DTC is detected.

Monitor item	Condition	Limit
Battery temperature sensor 1	Power switch ON	55°C (131°F) or less
Battery temperature sensor 2		
Battery temperature sensor 4		

Is there temperature increase?

Temperature increase is seen>>Replace Li-ion battery. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
Temperature increase is not seen>>Replace battery temperature sensors. Refer to EVB-203, "BATTERY PACK UPPER CASE : Exploded View".

P33E6 CELL CONTROLLER

DTC Logic

INFOID:0000000008746032

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33E6	CELL CONTROLLER	With the power switch ON and no load condition, the difference between the maximum voltage and minimum voltage exceeds the allowable range.	• Li-ion battery controller • Module

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33E6 detected?

YES >> Refer to EVB-160, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746033

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK SELF-DIAGNOSIS RESULTS OF LI-ION BATTERY CONTROLLER

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check to see if “P0A1F”, “P3062” or “P33ED” is detected simultaneously with “P33E6”.

Is P0A1F, P3062 or P33ED detected?

YES-1 >> When “P0A1F” or “P3062” are detected simultaneously, Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
YES-2 >> When “P33ED” is detected simultaneously, perform the diagnosis procedure of “P33ED”. Refer to EVB-169, "Diagnosis Procedure".
NO >> GO TO 2.

2.CHECK FREEZE FRAME DATA (FFD)

With CONSULT
1. Check “FFD” when DTC is detected.

2. Calculate the average value of cell voltage by dividing “TOTAL BATTERY VOLTAGE” by 96 (the number of cells).

Average cell voltage = “TOTAL BETTER VOLTAGE” ÷ 96 (the number of cells)

3. Identify the minimum cell voltage and the maximum cell voltage from 96 cells.
4. Calculate voltage according to the following expressions to compare voltage between A and B.

A = Maximum cell voltage – Average cell voltage

B = Average cell voltage – Minimum cell voltage

Which voltage is larger, A or B?

A >> Replace module including a cell of the maximum cell voltage. Refer to EVB-235, "FRONT MODULE STACK : Exploded View" (Front module stack) or EVB-251, "REAR MODULE STACK : Exploded View" (Rear module stack). After replacing module, GO TO 3.

B >> Replace module including a cell of the minimum cell voltage. Refer to EVB-235, "FRONT MODULE STACK : Exploded View" (Front module stack) or EVB-251, "REAR MODULE STACK : Exploded View" (Rear module stack). After replacing module, GO TO 3.

3. PERFORM CELL VOLTAGE LOSS INSPECTION

With CONSULT
1. Select “WORK SUPPORT” of “HV BAT.”
2. Select “CELL VOLTAGE LOSS INSPECTION.” Touch “START.”
3. Check “MINIMUM CELL VOLTAGE.”

Is “MINIMUM CELL VOLTAGE” 3,712 mV or less?

YES >> GO TO 5.
NO >> GO TO 4.

4. DISCHARGE OF LI-ION BATTERY

With CONSULT
1. Set the vehicle to READY.
2. Set the vehicle, according to the following conditions.

A/C set temperature	: Full hot
A/C fan speed	: Maximum speed
A/C air outlet	: Defroster
Headlamp	: High beam ON
Door glass	: Full open

3. Check “DATA MONITOR” and let the Li-ion battery discharge until the “MINIMUM CELL VOLTAGE” reaches 3,712 mV or less.
NOTE:
The guide line is to discharge until the Li-ion battery available charge gauge indicates 2 segments or less. For discharge time, refer to the following table.

Guideline for discharge time

The number of lighting segments of Li-ion battery available charge gauge	Time to 2 segments
12	Approx. 230 minute
11	Approx. 200 minute
10	Approx. 180 minute
9	Approx. 160 minute
8	Approx. 130 minute
7	Approx. 110 minute
6	Approx. 90 minute

The number of lighting segments of Li-ion battery available charge gauge	Time to 2 segments
5	Approx. 70 minute
4	Approx. 40 minute
3	Approx. 20 minute

>> GO TO 5.

5.CHECK CELL OF VOLTAGE LOSS

With CONSULT
1. Check that “MINIMUM CELL VOLTAGE” is 3,712 mV or less. Touch “START.”
2. Check to see if a cell of which voltage is less than or equal to “CELL VOLTAGE LOSS JUDGMENT VALUE” is displayed.

Is a cell displayed?

YES >> Record applicable cell No. and then GO TO 6.
NO >> Check the minimum cell voltage on the data monitor and replace a module which includes the minimum cell voltage. Refer to EVB-235, "FRONT MODULE STACK : Exploded View" (Front module stack) or EVB-251, "REAR MODULE STACK : Exploded View" (Rear module stack).

6.PRECONDITIONING

WARNING:
Disconnect high voltage circuit. Refer to GI-33, "How to Disconnect High Voltage".
1. Remove Li-ion battery. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-203, "BATTERY PACK UPPER CASE : Exploded View".

>> GO TO 7.

7.CHECK CONDENSATION

Check condensation in battery pack.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace Li-ion battery. Refer to EVB-194, "Removal and Installation".

8.CHECK CONNECTORS AND FIXING BOLTS

Check connection state, damage and dust of following;
- Li-ion battery controller (LBC) harness connector
- Module harness connector
- Module terminal fixing bolt

Is the inspection result normal?

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

9.CHECK MODULE VOLTAGE

Check module voltage within determined cell at step 3 and check the divergence of the voltage and cell voltage with “DATA MONITOR”.

DANGER:
When check module voltage, be careful not to short.

Is Divergence within 40mV?

YES-1 >> When the determined cell at step 3 is in front module stack.: GO TO 10.
YES-2 >> When the determined cell at step 3 is in rear module stack.: GO TO 12.
NO >> Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

10.CHECK HARNESS BETWEEN LI-ION BATTERY CONTROLLER AND MODULE HARNESS CONNEC-

1. Disconnect Li-ion battery controller harness connector and module harness connector.
2. Check the resistance Li-ion battery controller harness connector and module harness connector of the determined cell at step 3.

Terminal		Resistance value
Li-ion battery controller harness connector	Module harness connector	Approx. 0 Ω

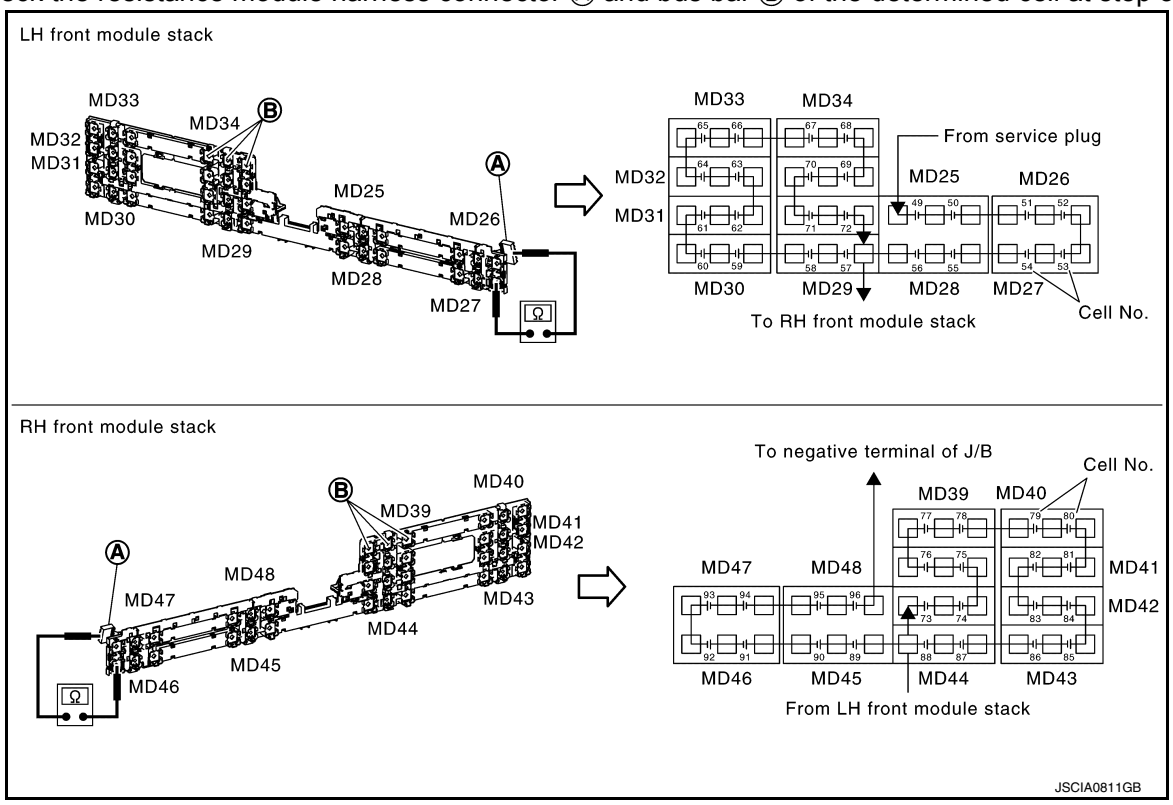
3. Check the divergence of the resistance and the resistance of other cell harness.

Is the inspection result normal?

YES >> GO TO 11
NO >> Repair or replace harness or connectors.

11. CHECK HARNESS BETWEEN MODULE HARNESS CONNECTOR AND BUS BAR

1. Check the resistance module harness connector Ⓐ and bus bar Ⓑ of the determined cell at step 3.



Terminal		Resistance value
Module harness connector	Bus bar	Approx. 0 Ω

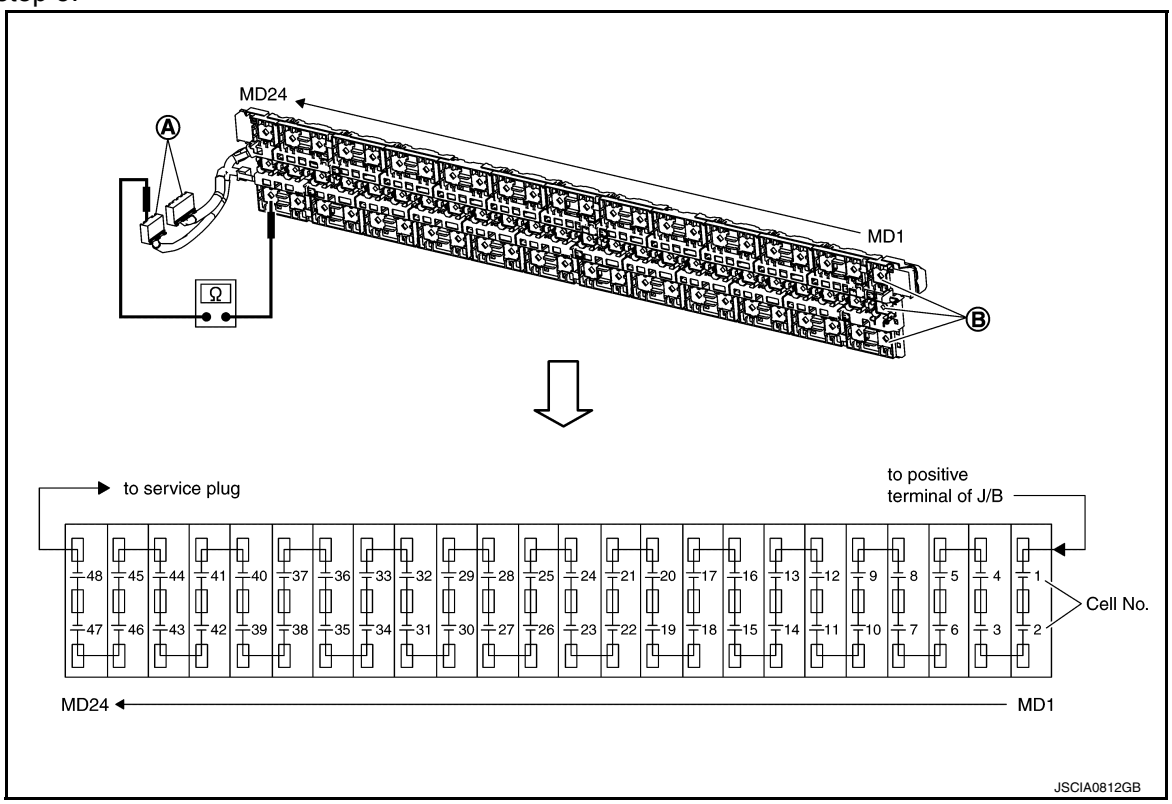
2. Check the divergence of the resistance and the resistance of other cell harness.

Is the inspection result normal?

YES >> Replace module within the determined cell at step 5.
NO >> Repair or replace harness or connectors.

12. CHECK HARNESS BETWEEN LI-ION BATTERY CONTROLLER AND BUS BAR

1. Check the resistance Li-ion battery controller harness connector Ⓐ and bus bar Ⓑ of the determined cell at step 5.



Terminal		Resistance value
Li-ion battery controller harness connector	Bus bar	Approx. 0 Ω

2. Check the divergence of the resistance and the resistance of other cell harness.

Is the inspection result normal?

YES >> Replace module within the determined cell at step 5.
NO >> Repair or replace harness or connectors.

P33EA BATTERY HEATER RELAY

DTC Logic

INFOID:0000000008746036

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33EA	BATTERY HEATER RELAY	Li-ion battery controller judges that the status of a relay control signal transmitted from Li-ion battery controller and that of a relay status signal transmitted from heater relay unit do not match.	• Li-ion battery controller • Heater relay unit • Harness or connector

NOTE:
- The Li-ion battery controller transmits a relay control signal to the heater relay unit and turns ON/OFF the relay built-in the heater relay unit.
- The heater relay unit turns ON/OFF the built-in relay, according to a relay control signal transmitted from the Li-ion battery controller, and transmits a relay status signal (the ON/OFF status of the built-in relay) to the Li-ion battery controller.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT
1. Select “ACTIVE TEST” of “HV BAT.”
2. Select “HEATER RELAY UNIT.” Touch “START.”

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT
1. Select “Self Diagnostic Result” of “HV BAT”.
2. Check DTC.

Is P33EE detected?

YES >> Refer to EVB-165, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746037

DANGER:

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

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

CAUTION:

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

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 2.

2.CHECK CONTINUITY LI-ION BATTERY CONTROLLER AND HEATER RELAY UNIT

1. Remove service plug switch bracket. Refer to EVB-217, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View".
2. Disconnect Li-ion battery controller harness connector and heater relay unit harness connector.
3. Check continuity Li-ion battery controller harness connector and heater relay unit harness connector.

Lli-ion battery controller		Heater relay unit		Continuity
Connector	Terminal	Connector	Terminal	
LB11	20	LB17	3	Existed
	18		6	

Is the inspection result normal?

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

3.CHECK CONTINUITY LI-ION BATTERY AND HEATER RELAY UNIT

Check continuity Li-ion battery harness connector and heater relay unit harness connector.

Lli-ion battery		Heater relay unit		Continuity
Connector	Terminal	Connector	Terminal	
LB1	31	LB17	1	Existed

Is the inspection result normal?

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

4.CHECK CONTINUITY HEATER RELAY UNIT AND LI-ION BATTERY CONTROLLER

Check continuity heater relay unit harness connector and Li-ion battery controller harness connector.

Heater relay unit		Li-ion battery controller		Continuity
Connector	Terminal	Connector	Terminal	
LB17	4	LB11	8	Existed
	8			
	7		7	
	5		6	

Is the inspection result normal?

YES >> Replace to shown in the below.
- Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
- Heater relay unit. Refer to EVB-234, "LI-ION BATTERY HEATER RELAY UNIT : Disassembly and Assembly".

NO >> Repair harness or connector.

P33EB TEMPERATURE SENSOR

DTC Logic

INFOID:0000000009346513

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33EB	TEMPERATURE SENSOR	Deviation in characteristics of battery temperature sensor 1, 2 or 4.	Battery temperature sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33EB detected?

YES >> Refer to EVB-167, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000009346514

DANGER:

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

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

CAUTION:

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

1.PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 2.

2.CHECK BATTERY TEMPERATURE SENSOR

Refer to EVB-168, "Component Inspection".

Is the inspection result normal?

YES >> Replace all battery temperature sensor.
NO >> Replace applicable battery temperature sensor.

Component Inspection

INFOID:0000000009346515

1. CHECK BATTERY TEMPERATURE SENSOR

1. Remove battery temperature sensor. Refer to EVB-235, "FRONT MODULE STACK : Exploded View" (Front module stack) or EVB-251, "REAR MODULE STACK : Exploded View" (Rear module stack).
2. Check resistance between battery temperature sensor terminals.

Battery temperature sensor	Terminals		Condition		Resistance (kΩ)
1	1	5	Temperature °C (°F)	10 (50)	Approx. 7.4
2	4	3		25 (77)	Approx. 4.0
4	2	1		40 (104)	Approx. 2.3

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery temperature sensor.

P33ED BATTERY PARALLEL DIAGNOSIS

DTC Logic

INFOID:0000000008746038

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33ED	BATTERY PARALLEL DIAGNOSIS	When a sudden voltage fluctuation is detected in module.	Module

DTC CONFIRMATION PROCEDURE

1.CHECK LI-ION BATTERY AVAILABLE CHARGE GAUGE

Check the indication of the Li-ion battery available charge gauge.

NOTE:

Check 12 segments for lighting status.

Is the lighting status 1 Segment or none?

YES >> GO TO 3.
NO >> GO TO 2.

2.DISCHARGE OF LI-ION BATTERY

1. Set the vehicle to READY.
2. Set the vehicle, according to the following conditions.

A/C set temperature	: Full hot
A/C fan speed	: Maximum speed
A/C air outlet	: Defroster
Headlamp	: High beam ON
Door glass	: Full open

3. Let the Li-ion battery discharge until the Li-ion battery available charge gauge shows segment 1 or below.

>> GO TO 3.

3.CHARGE OF LI-ION BATTERY

1. Charge the Li-ion battery by normal charge until the level reaches full charge.
2. After the completion of normal charge, check that the indication of the Li-ion battery available charge gauge shows 12 segments.

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is P33ED detected?

YES >> Refer to EVB-169, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008746039

1.CHECK DATA MONITOR OR FREEZE FRAME DATA (FFD)

With CONSULT

1. Select “DATA MONITOR” or “FFD”.
2. Check to see if there is a cell voltage which largely differ from the others.

Is there any abnormal cell?

YES >> Replace corresponding Module. Refer to EVB-235, "FRONT MODULE STACK : Exploded View".
NO >> GO TO 2.

2. DTC CONFIRMATION PROCEDURE OPERATION

1. If abnormal cell is not identified, perform DTC confirmation procedure. Refer to EVB-169, "DTC Logic".
2. Check cell voltage again using “DATA MONITOR” or “FFD” to identify malfunctioning cell.

>> Replace corresponding Module. Refer to EVB-235, "FRONT MODULE STACK : Exploded View".

P33EE BATTERY HEATER CONTROL SYSTEM

DTC Logic

INFOID:0000000008746040

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
P33EE	BATTERY HEATER CONTROL SYSTEM	Under extremely low temperatures that Li-ion battery heater activates, Li-ion battery controller judges that the temperature of Li-ion battery is still low after a lapse of specified time.	• Li-ion battery controller • Heater relay unit • Li-ion battery heater • Harness or connector

Diagnosis Procedure

INFOID:0000000008746041

DANGER:

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

WARNING:

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

CAUTION:

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

1.PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

>> GO TO 2.

2.CHECK INSTALLATION CONDITION OF LI-ION BATTERY HEATER

Check the main body of Li-ion battery heater for installation condition.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Tighten the mounting nut of the Li-ion battery heater to the specified torque. Refer to EVB-227, "LI-ION BATTERY HEATER : Exploded view".

3.CHECK CONNECTION STATUS OF LI-ION BATTERY HEATER CONNECTOR

Check the connection status of the Li-ion battery heater connector.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Restore the connection status of the Li-ion battery heater connector.

4.CHECK RESISTANCE OF LI-ION BATTERY HEATER

Check resistance of Li-ion battery heater.

Li-ion battery heater			Resistance
Item	Terminal		
LH 1	1	2	Less than 5,269 Ω
LH 2			
RH 1			
RH 2			
RR 1	1	2	Less than 1,265 Ω
RR 2			

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace applicable Li-ion battery heater. Refer to EVB-228, "LI-ION BATTERY HEATER : Disassembly and Assembly".

5. CHECK CONTINUITY OF LI-ION BATTERY HEATER AND BATTERY JUNCTION BOX

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

Li-ion battery heater			Battery junction box		Continuity
Item	Connector	Terminal	Connector	Terminal	
LH 1	LB19	2	LB25	15	Existed
LH 2	LB20	2			
RH 1	LB23	2			
RH 2	LB24	2			
RR 1	LB21	2			
RR 2	LB22	2			

Is the inspection result normal?

YES >> GO TO 6
NO >> Repair harness or connector.

6. CHECK CONTINUITY OF LI-ION BATTERY HEATER AND HEATER RELAY UNIT

1. Disconnect Li-ion battery heater and heater relay unit harness connector harness connector.
2. Check continuity Li-ion battery heater and heater relay unit harness connector harness connector.

Li-ion battery heater			Heater relay unit		Continuity
Item	Connector	Terminal	Connector	Terminal	
LH 1	LB19	1	LB18	11	Existed
LH 2	LB20	1			
RH 1	LB23	1			
RH 2	LB24	1			
RR 1	LB21	1			
RR 2	LB22	1			

Is the inspection result normal?

YES >> Replace heater relay unit. Refer to EVB-234, "LI-ION BATTERY HEATER RELAY UNIT : Disassembly and Assembly".
NO >> Repair harness or connector.

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000008746042

CAN (Controller Area Network) is a serial communication line for real time applications. It is an on-vehicle multiplexcommunication 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:0000000008746043

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible causes
U1000	CAN COMM CIRCUIT	When no CAN communication signal is received continuously for 2 seconds or more.	CAN communication system

Diagnosis Procedure

INFOID:0000000008746044

For the diagnosis procedure, refer to LAN-16, "Trouble Diagnosis Flow Chart".

HIGH VOLTAGE CIRCUIT

Diagnosis Procedure

INFOID:0000000009346516

DANGER:

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

WARNING:

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

CAUTION:

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

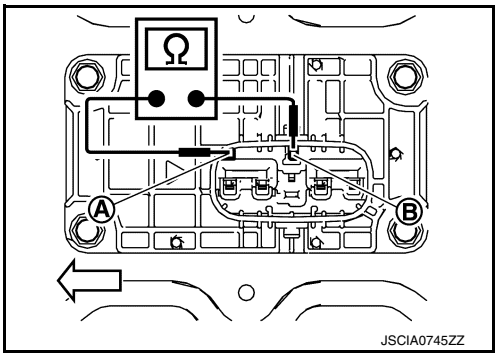
1.CHECK HIGH VOLTAGE FUSE

Check the continuity between Ⓐ and Ⓑ.

Is the inspection result normal?

YES >> GO TO 2

NO >> Replace the service plug (with high voltage fuse) after repairing the applicable circuit. Refer to EVB-219, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly".



2.PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 3.

3.CHECK CONNECTION STATUS

Check connection status of each bus bar in high voltage circuit

Is the inspection result normal?

YES >> GO TO 4

NO >> Recover the connection status.

4.CHECK HIGH VOLTAGE HARNESS

CAUTION:

Check that high voltage harness and harness shield have no scratches and cracks. If any damage is found, replace damaged parts.

1. Remove high voltage harness from battery junction box.
2. Disconnect Li-ion battery controller harness connector.

3. Check the continuity between battery junction box and rear module stack.

High voltage harness between battery junction box and rear module stack

High voltage harness	—	Continuity
Terminal	Battery pack ground	Existed

High voltage harness between front module stack RH and battery junction box

High voltage harness	—	Continuity
Terminal	Battery pack ground	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high voltage harness connector.

LI-ION BATTERY INSULATION RESISTANCE LOSS CHECK

Component Inspection

INFOID:0000000008746045

DANGER:

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

WARNING:

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

CAUTION:

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

The following diagnosis procedure must be performed when “P0AA6 or P33E1” are detected and Li-ion battery is judged that its insulation resistance is dropping.

1.CHECK MAXIMUM CELL VOLTAGE

With CONSULT

1. Power switch ON.
2. Select “DATA MONITOR” of “HV BAT”.
3. Record “MAXIMUM CELL VOLTAGE”.

NOTE:

It is used, when replace a malfunction module.

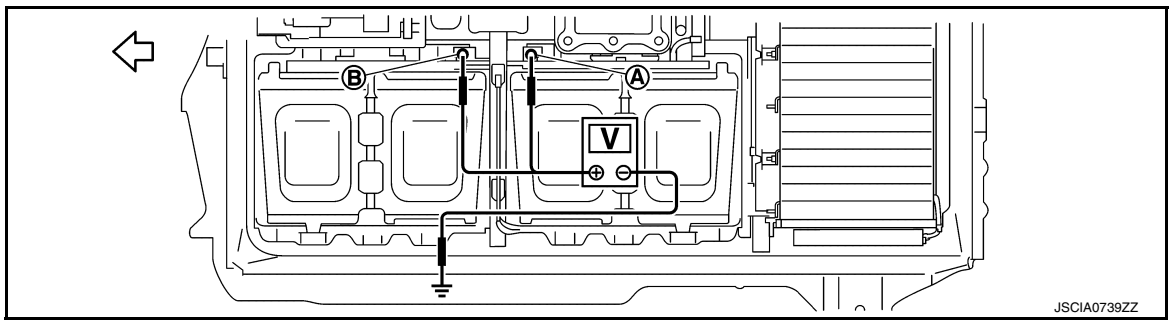
>> GO TO 2

2.CHECK INSULATION OF FRONT MODULE STACK LH-1

CAUTION:

Check that high voltage harness and harness shield have no scratches and cracks. If any damage is found, replace damaged parts.

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
3. Remove bus bar that connects front module stack LH and front module stack RH.
4. Measure voltages between positive terminal Ⓐ of front module stack LH and battery pack ground, and between positive terminal Ⓑ of front module stack LH and battery pack ground.



⇦ : Battery pack front

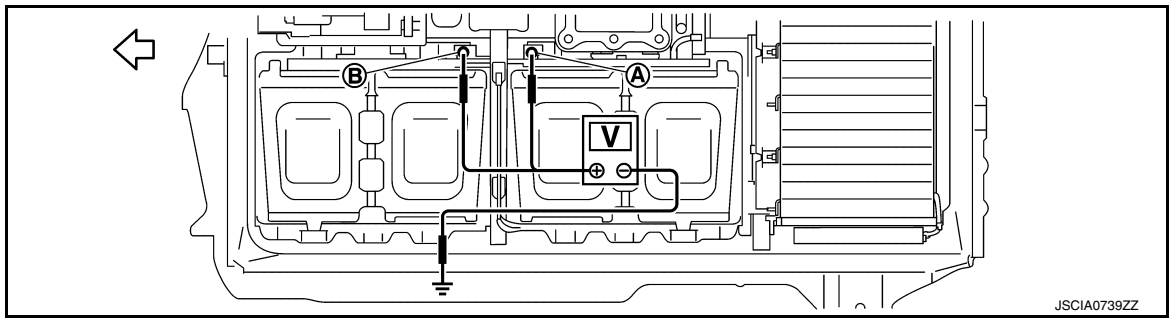
+		
Front module stack LH	–	Voltage
Terminal		
Ⓐ, Ⓑ	Battery pack ground	Approx. 0 V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3. CHECK INSULATION OF FRONT MODULE STACK LH-2

1. Disconnect vehicle communication harness connector of front module stack LH.
2. Measure voltages between positive terminal Ⓐ of front module stack LH and battery pack ground, and between positive terminal Ⓑ of front module stack LH and battery pack ground.



⇦ : Battery pack front

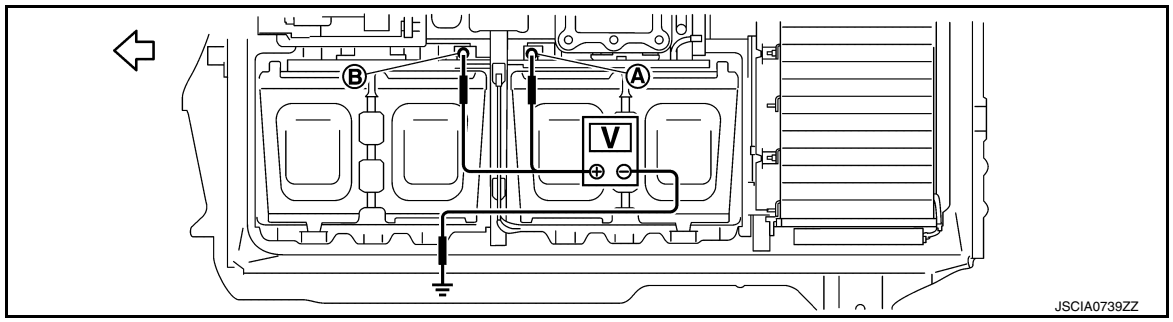
+		
Front module stack LH	–	Voltage
Terminal		
Ⓐ, Ⓑ	Battery pack ground	Approx. 0 V

Is the inspection result normal?

YES >> Replace vehicle communication harness of front module stack LH and GO TO 8.
NO >> GO TO 4.

4. CHECK INSULATION OF FRONT MODULE STACK LH-3

1. Remove bus bar that connects service plug and front module stack LH.
2. Measure voltages between positive terminal Ⓐ of front module stack LH and battery pack ground, and between positive terminal Ⓑ of front module stack LH and battery pack ground.



⇦ : Battery pack front

+		
Front module stack LH	–	Voltage
Terminal		
Ⓐ, Ⓑ	Battery pack ground	Approx. 0 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 6.

5.CHECK SERVICE PLUG SWITCH INSULATION RESISTANCE

1. Remove bus bar that connects service plug and front module stack LH from service plug switch bracket.
2. Using insulation resistance tester, measure insulation resistance between service plug switch terminal and service plug switch bracket.

WARNING:
Unlike the ordinary tester, the insulation resistance tester applies 500 V 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.
CAUTION:
Be sure to set the insulation resistance tester to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.
NOTE:
Check resistance without disassembling service plug switch and service plug switch bracket.

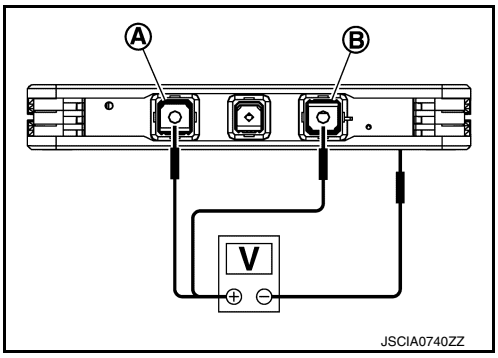
+	—	Resistance
Service plug switch terminal	Service plug switch bracket	1000 MΩ or more

Is the inspection result normal?

YES >> Replace bus bar that connects service plug and front module stack LH and GO TO 8.
NO >> Replace service plug switch (Refer to EVB-217, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View".) and GO TO 8.

6.CHECK MODULE-1

1. Remove front module stack LH. Refer to EVB-239, "FRONT MODULE STACK : Removal and Installation".
NOTE:
Do not disassemble module stack.
2. Measure voltages between terminal Ⓐ/Ⓑ of all modules in front module stack LH and module body.



+		
Module	–	Voltage
Terminal		
Ⓐ	Module body	Approx. 0 V
Ⓑ		

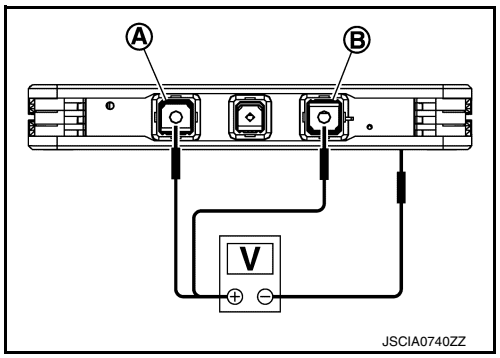
Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning module (Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".) and GO TO 8.

7. CHECK MODULE-2

Measure insulation resistance between terminal Ⓐ/Ⓑ of all modules in front module stack LH and module body.



WARNING:

Unlike the ordinary tester, the insulation resistance tester applies 500 V 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.

CAUTION:

Be sure to set the insulation resistance tester to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

+		
Module	–	resistance
Terminal		
Ⓐ	Module body	100 MΩ or more
Ⓑ		

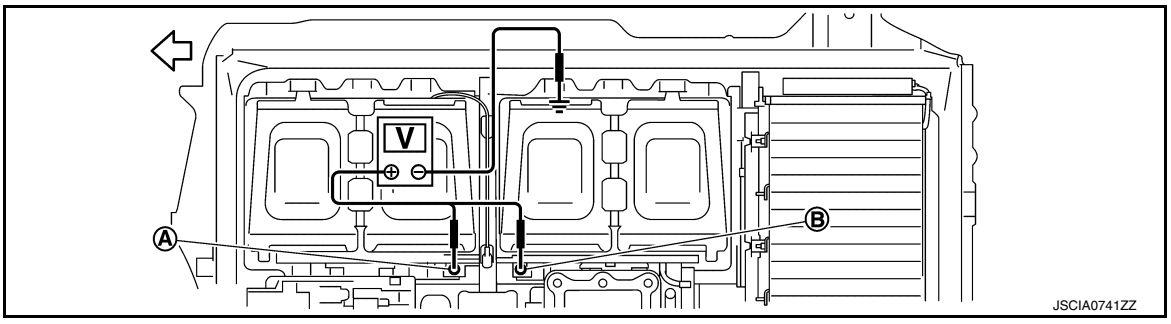
Is the inspection result normal?

YES >> Check insulation resistance of front module stack RH, because front module stack LH is normal. GO TO 8.

NO >> Replace malfunctioning module (Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".) and GO TO 8.

8. CHECK INSULATION OF FRONT MODULE STACK RH-1

1. Measure voltages between positive terminal Ⓐ of front module stack RH and battery pack ground, and between positive terminal Ⓑ of front module stack LH and battery pack ground.



⇦ : Battery pack front

+		
Front module stack RH	–	Voltage
Terminal		
Ⓐ, Ⓑ	Battery pack ground	Approx. 0 V

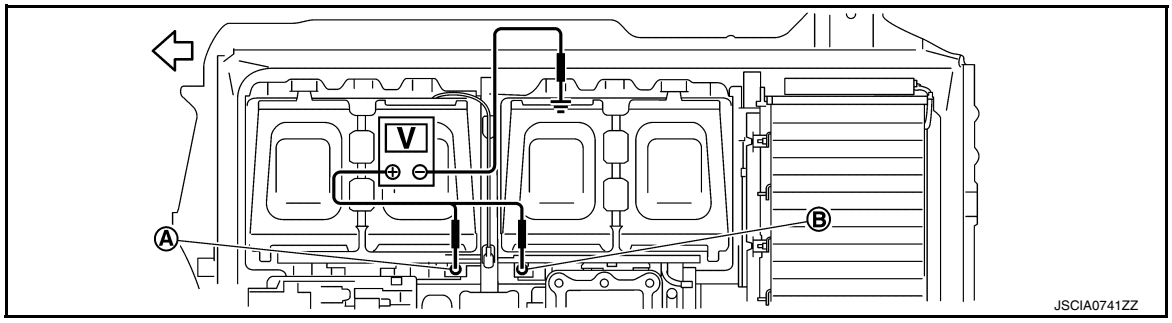
Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 9.

9. CHECK INSULATION OF FRONT MODULE STACK RH-2

1. Disconnect vehicle communication harness connector of front module stack RH.
2. Measure voltages between positive terminal Ⓐ of front module stack RH and battery pack ground, and between positive terminal Ⓑ of front module stack RH and battery pack ground.



⇦ : Battery pack front

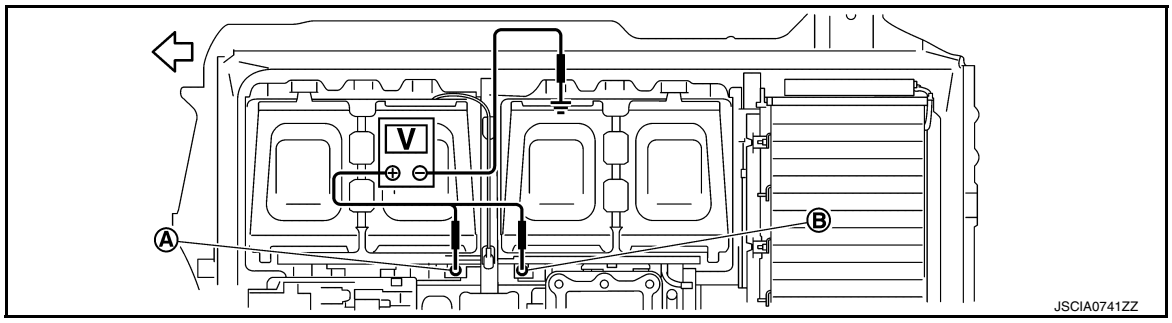
+		
Front module stack RH	−	Voltage
Terminal		
Ⓐ, Ⓑ	Battery pack ground	Approx. 0 V

Is the inspection result normal?

YES >> Replace vehicle communication harness of front module stack RH and GO TO 14.
NO >> GO TO 10.

10. CHECK INSULATION OF FRONT MODULE STACK RH-3

1. Remove bus bar that connects front module stack RH and battery junction box.
2. Measure voltages between positive terminal Ⓐ of front module stack RH and battery pack ground, and between positive terminal Ⓑ of front module stack RH and battery pack ground.



⇦ : Battery pack front

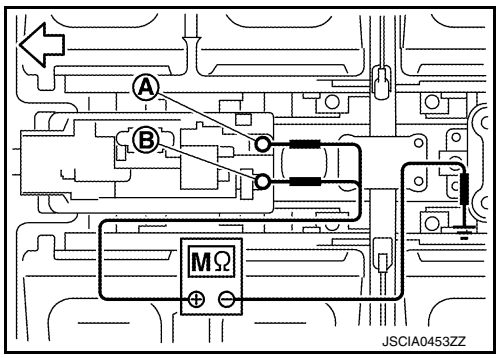
+		
Front module stack RH	−	Voltage
Terminal		
Ⓐ, Ⓑ	Battery pack ground	Approx. 0 V

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 12.

11. CHECK BATTERY JUNCTION BOX INSULATION RESISTANCE

1. Using insulation resistance tester, measure insulation resistance between high voltage terminal Ⓐ/Ⓑ of battery junction box and battery pack ground.



⇦ : Battery pack front

WARNING:
Unlike the ordinary tester, the insulation resistance tester applies 500 V 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.
CAUTION:
Be sure to set the insulation resistance tester to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

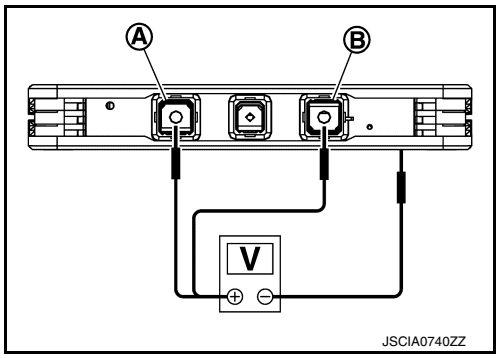
Battery junction box	—	Resistance
Terminal		
Ⓐ	Battery pack ground	1000 MΩ or more
Ⓑ		

Is the inspection result normal?

YES >> Replace bus bar that connects front module stack RH and battery junction box and GO TO 14.
NO >> Replace battery junction box (Refer to EVB-219, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly") and GO TO 14.

12. CHECK MODULE-3

1. Remove front module stack RH. Refer to EVB-239, "FRONT MODULE STACK : Removal and Installation".
NOTE:
Do not disassemble module stack.
2. Measure voltages between terminal Ⓐ/Ⓑ of all modules in front module stack RH and module body.



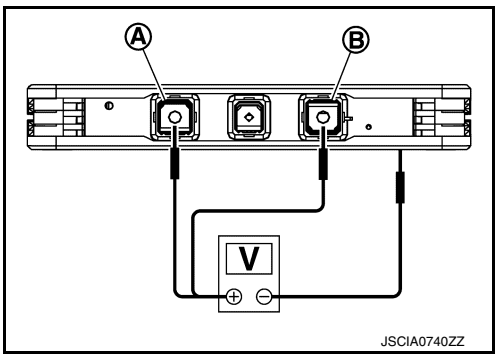
+	–	Voltage
Module		
Terminal		
Ⓐ	Module body	Approx. 0 V
Ⓑ		

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace malfunctioning module (Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".) and GO TO 14.

13. CHECK MODULE-4

Measure insulation resistance between terminal Ⓐ/Ⓑ of all modules in front module stack RH and module body.



WARNING:

Unlike the ordinary tester, the insulation resistance tester applies 500 V 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.

CAUTION:

Be sure to set the insulation resistance tester to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

+		
Module	–	resistance
Terminal		
Ⓐ	Module body	100 MΩ or more
Ⓑ		

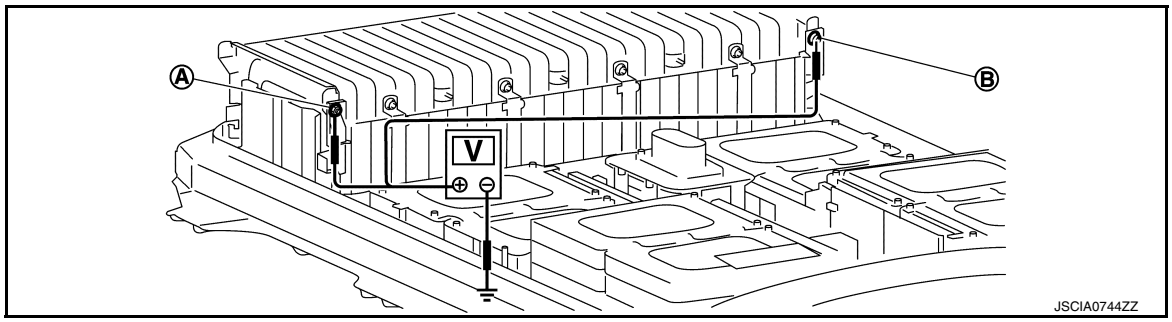
Is the inspection result normal?

YES >> Check insulation resistance of front module stack RH, because front module stack LH is normal. GO TO 14.

NO >> Replace malfunctioning module (Refer to EVB-246, "FRONT MODULE STACK : Disassembly and Assembly".) and GO TO 14.

14. CHECK INSULATION OF REAR MODULE STACK-1

1. Measure voltages between positive terminal Ⓐ of rear module stack and battery pack ground, and between positive terminal Ⓑ of rear module stack and battery pack ground.



+		
Rear module stack	–	Voltage
Terminal		
Ⓐ, Ⓑ	Battery pack ground	Approx. 0 V

Is the inspection result normal?

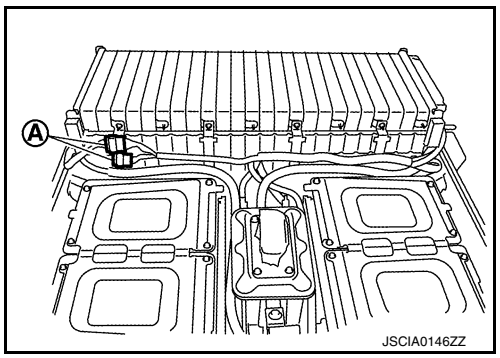
YES-1 >> Replace or repair of malfunctioning part is not-yet performed: Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

YES-2 >> Replace or repair of malfunctioning part is complete: INSPECTION END.

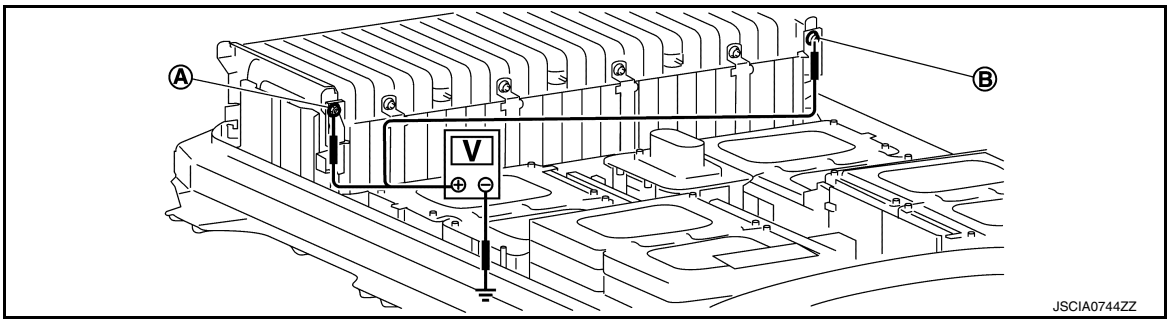
NO >> GO TO 15.

15. CHECK INSULATION OF REAR MODULE STACK-2

1. Disconnect vehicle communication harness connector Ⓐ of rear module stack.



2. Measure voltages between positive terminal Ⓐ of rear module stack and battery pack ground, and between positive terminal Ⓑ of rear module stack and battery pack ground.



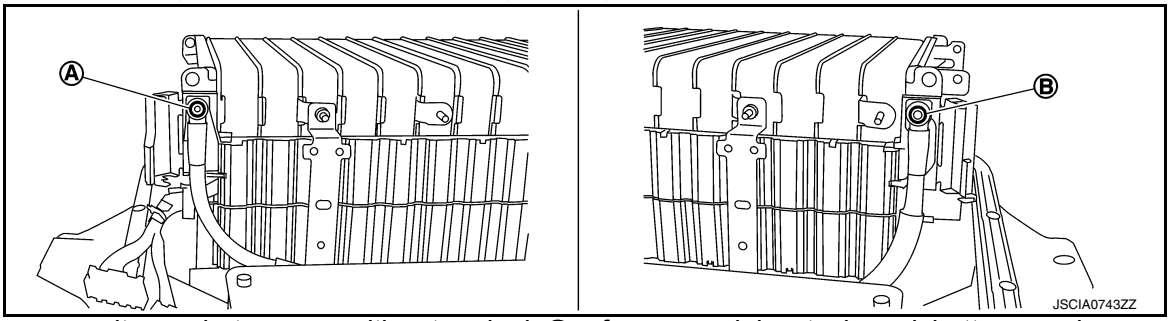
+		
Front module stack RH	–	Voltage
Terminal		
Ⓐ, Ⓑ	Battery pack ground	Approx. 0 V

Is the inspection result normal?

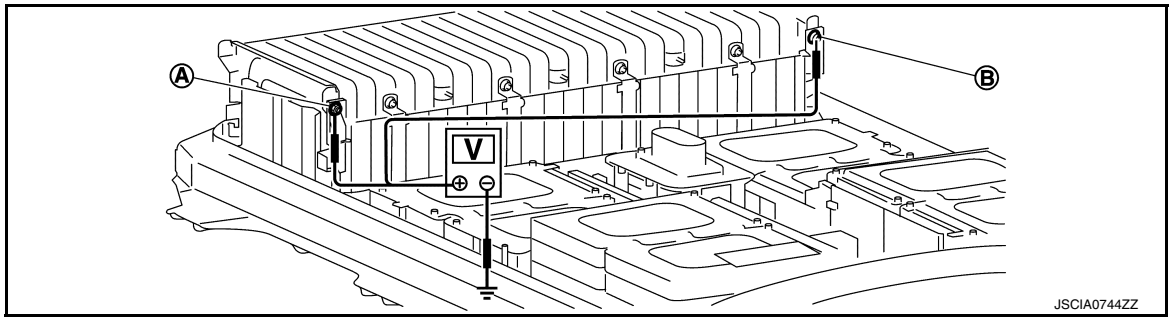
YES >> Replace vehicle communication harness of rear module stack.
NO >> GO TO 16.

16. CHECK INSULATION OF FRONT MODULE STACK RH-3

1. Remove mounting nuts Ⓐ/Ⓑ and remove high voltage harness from rear module stack.



2. Measure voltages between positive terminal Ⓐ of rear module stack and battery pack ground, and between positive terminal Ⓑ of rear module stack and battery pack ground.



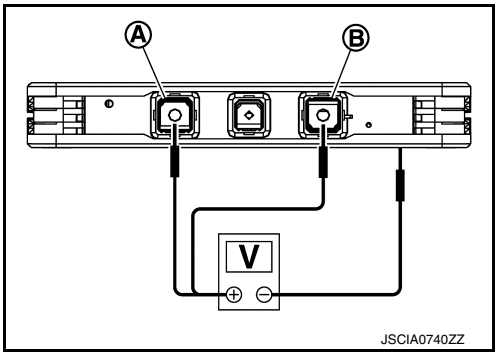
+		
Rear module stack	–	Voltage
Terminal		
Ⓐ, Ⓑ	Battery pack ground	Approx. 0 V

Is the inspection result normal?

YES >> .Replace high voltage harness.
NO >> GO TO 17.

17.CHECK MODULE-5

1. Remove rear module stack. Refer to EVB-261, "REAR MODULE STACK : Disassembly and Assembly".
   NOTE:
   Do not disassemble module stack.
2. Measure voltages between terminal Ⓐ/Ⓑ of all modules in rear module stack and module body.



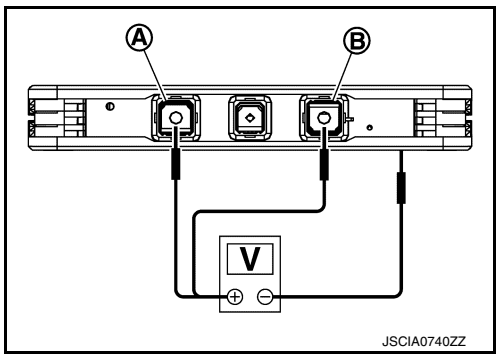
+		
Module	–	Voltage
Terminal		
Ⓐ	Module body	Approx. 0 V
Ⓑ		

Is the inspection result normal?

YES >> GO TO 18.
NO >> Replace malfunctioning module. Refer to EVB-261, "REAR MODULE STACK : Disassembly and Assembly".

18.CHECK MODULE-6

Measure insulation resistance between terminal Ⓐ/Ⓑ of all modules in rear module stack and module body.



WARNING:

Unlike the ordinary tester, the insulation resistance tester applies 500 V 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.

CAUTION:

Be sure to set the insulation resistance tester to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

+		
Module	–	resistance
Terminal		
Ⓐ	Module body	100 MΩ or more
Ⓑ		

Is the inspection result normal?

YES-1 >> Replace or repair of malfunctioning part is not-yet performed: Replace Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

YES-2 >> Replace or repair of malfunctioning part is complete: INSPECTION END.

NO >> Replace malfunctioning module. Refer to EVB-261, "REAR MODULE STACK : Disassembly and Assembly".

LI-ION BATTERY HEATER SYSTEM INSULATION RESISTANCE CHECK

Diagnosis Procedure

INFOID:0000000008746046

DANGER:

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

WARNING:

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

CAUTION:

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

1.PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 2.

2.CHECK HIGH VOLTAGE HARNESS

Check the harness shield between the heater relay unit and the Li-ion battery heater for scratches and cracks.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts and Li-ion battery controller.

3.CHECK HEATER RELAY UNIT INSULATION RESISTANCE

WARNING:

Unlike the ordinary tester, the insulation resistance tester applies 500 V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12 V 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 high voltage harness connector from heater relay unit.
   NOTE:
   Check the heater relay with it installed on the battery pack.
2. Use 500 V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.
   CAUTION:
   Be sure to set the insulation resistance tester to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Heater relay unit Terminal	Ground	Resistance
10	Battery pack lower case	1000 MΩ or more
11		

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace heater relay unit and Li-ion battery controller.

4. CHECK LI-ION BATTERY HEATER

WARNING:
Unlike the ordinary tester, the insulation resistance tester applies 500 V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12 V 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 high voltage harness connector from Li-ion battery heater.
   NOTE:
   Check the heater relay with it installed on the battery pack.
2. Use 500 V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.
   CAUTION:
   Be sure to set the insulation resistance tester to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Li-ion battery heater			Ground	Resistance
Item	Connector	Terminal		
LH1	LB19	1	Battery pack lower case	1000 MΩ or more
		2		
LH2	LB20	1		1000 MΩ or more
		2		
RH1	LB23	1		1000 MΩ or more
		2		
RH2	LB24	1		1000 MΩ or more
		2		
RR1	LB21	1		1000 MΩ or more
		2		
RR2	LB22	1		1000 MΩ or more
		2		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace corresponding Li-ion battery heater and Li-ion battery controller.

5. CHECK HIGH VOLTAGE HARNESS INSULATION RESISTANCE

WARNING:
Unlike the ordinary tester, the insulation resistance tester applies 500 V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12 V 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. Use 500 V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.
   CAUTION:
   Be sure to set the insulation resistance tester to 500V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

High voltage harness		Ground	Resistance
Connector	Terminal		
LB18	11	Battery pack lower case	1000 MΩ or more

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Replace high voltage harness.

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000008746047

DANGER:

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

WARNING:

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

CAUTION:

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

1.CHECK FUSE

Check that the following fuse is not fusing.

Power supply	Fuse No.
Battery	79
Power switch ON	57
	74

Is the fuse fusing?

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

2.CHECK LI-ION BATTERY CONTROLLER GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect Li-ion battery vehicle communication harness connector.
3. Check the continuity between Li-ion battery vehicle communication harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B24	6	Ground	Existed
	7		
	8		

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY POWER SUPPLY

Check the voltage between Li-ion battery vehicle communication harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B24	5	Ground	12V battery power supply

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. CHECK BATTERY POWER SUPPLY CIRCUIT

1. Check the continuity between Li-ion battery vehicle communication harness connector and fuse terminal.

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B24	5	No.79 fuse terminal	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check power supply circuit for battery power supply.
NO >> Repair or replace error-detected parts.

5. CHECK POWER SWITCH ON POWER SUPPLY

1. Turn power switch ON.
2. Check the voltage between Li-ion battery vehicle communication harness and ground.

+		–	Voltage (Approx.)
Li-ion battery			
Connector	Terminal		
B24	4	Ground	11 – 14 V
	31		

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6. CHECK POWER SWITCH ON POWER SUPPLY CIRCUIT-1

1. Turn power switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between Li-ion battery vehicle communication harness and IPDM E/R harness connector.

Li-ion battery		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
B24	4	E15	59	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

7. CHECK POWER SWITCH ON POWER SUPPLY CIRCUIT-2

1. Check the continuity between Li-ion battery vehicle communication harness and fuse terminal.

Li-ion battery		—	Continuity
Connector	Terminal		
B24	31	No.74 fuse terminal	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check power supply circuit for battery power supply.
NO >> Repair or replace error-detected parts.

8. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-33, "How to Disconnect High Voltage".

1. Remove Li-ion battery. Refer to EVB-194, "Removal and Installation".
2. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

>> GO TO 9.

9. CHECK HARNESS BETWEEN LI-ION BATTERY AND LI-ION BATTERY CONTROLLER

1. Check the continuity between Li-ion battery vehicle communication harness connector and Li-ion battery controller harness connector.

LBC		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
LB11	5	LB1	31	Existed
	7		4	
	12		5	
	2		8	
	3		7	
	14		6	

2. Also check harness for short to ground.

Is the inspection result normal?

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

SYMPTOM DIAGNOSIS

REDUCTION IN THE DRIVING RANGE

Description

INFOID:0000000008746048

- The driving range is shorter than before.
- Sudden change (decrease/increase) in possible travel distance indicated on the combination meter.

Diagnosis Procedure

INFOID:0000000008746049

1.CHECK LI-ION BATTERY AVAILABLE CHARGE GAUGE

Check the indication of the Li-ion battery available charge gauge.
NOTE:
Check 12 segments for lighting status.

Is the lighting status 1 Segment or none?

YES >> GO TO 3.
NO >> GO TO 2.

2.DISCHARGE OF LI-ION BATTERY

1. Set the vehicle to READY.
2. Set the vehicle, according to the following conditions.

A/C set temperature	: Full hot
A/C fan speed	: Maximum speed
A/C air outlet	: Defroster
Headlamp	: High beam ON
Door glass	: Full open

3. Let the Li-ion battery discharge until the Li-ion battery available charge gauge shows Segment 1 or below.

>> GO TO 3.

3.CHARGE OF LI-ION BATTERY

1. Charge the Li-ion battery by normal charge until the level reaches full charge.
2. After the completion of normal charge, check that the indication of the Li-ion battery available charge gauge shows 12 segments.

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Power switch ON and wait for 10 seconds or more.
2. Select “Self Diagnostic Result” of “HV BAT”.
3. Check DTC.

Is any DTC detected?

YES >> Perform diagnosis on the detected DTC. Refer to EVB-45, "DTC Index".
NO >> INSPECTION END

PERIODIC MAINTENANCE

EV BATTERY USAGE REPORT

Inspection

INFOID:0000000008746050

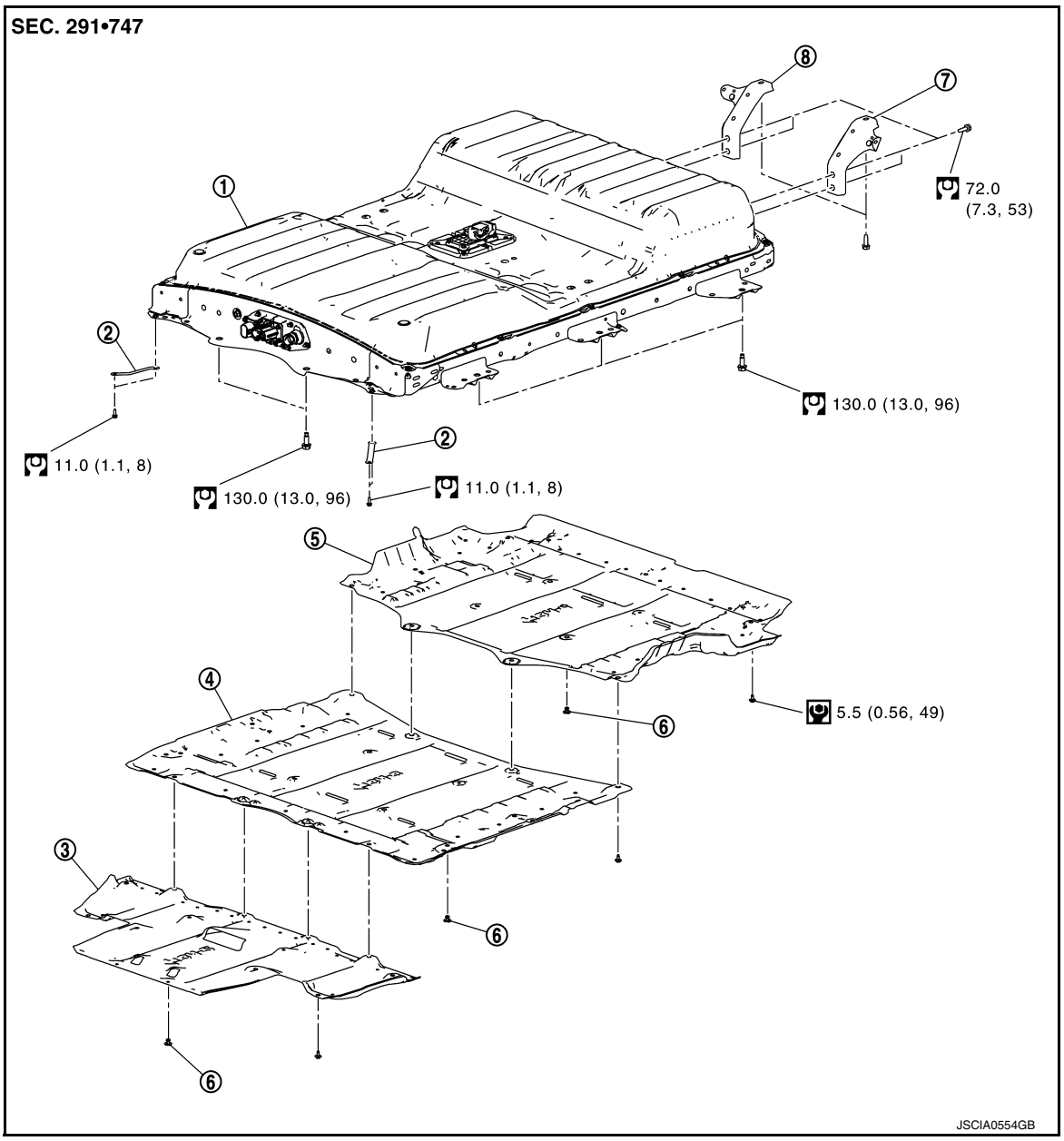
Generation of the EV battery usage report is one of the maintenance items.
This maintenance item generates a report that will help the customer understand the vehicle operating conditions needed to keep the Li-ion battery in the best possible condition.
For details about how to generate this report, please refer to EV battery usage report in the CONSULT operation manual.

UNIT REMOVAL AND INSTALLATION

LI-ION BATTERY

Exploded View

INFOID:0000000009298670



① Li-ion battery
② Bonding plate (stamped No. 4.)
③ Li-ion battery undercover (front)
④ Li-ion battery undercover (center)
⑤ Li-ion battery undercover (rear)
⑥ Clip
⑦ Battery mounting bracket (left)
⑧ Battery mounting bracket (right)

: N-m (kg-m ft-lb)

: N·m (kg-m, in-lb)

Removal and Installation

INFOID:0000000009298671

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to 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 pocket and carry it or store it in a tool box or other container so that another person does not accidentally connect it while work is in progress.**
- **Be sure to put on insulating protective gear 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 components with an anti-static cover sheet or similar item to prevent contact with other persons.**
- **Refer to EVB-6, "High Voltage Precautions".**

CAUTION:

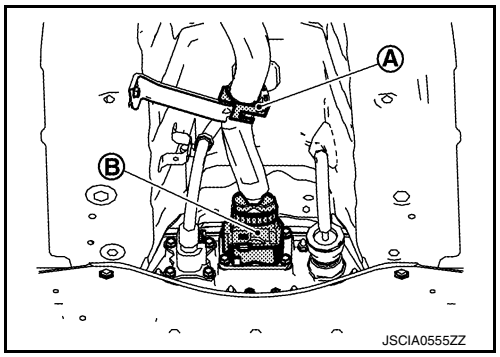
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

REMOVAL

WARNING:

Prepare for work on the high-voltage system. Refer to GI-33, "How to Disconnect High Voltage".

1. Lift up the vehicle and remove the Li-ion battery undercover. EVB-194, "Exploded View".
2. Remove the harness clamp Ⓐ and disconnect the Li-ion battery high-voltage harness connector Ⓑ.

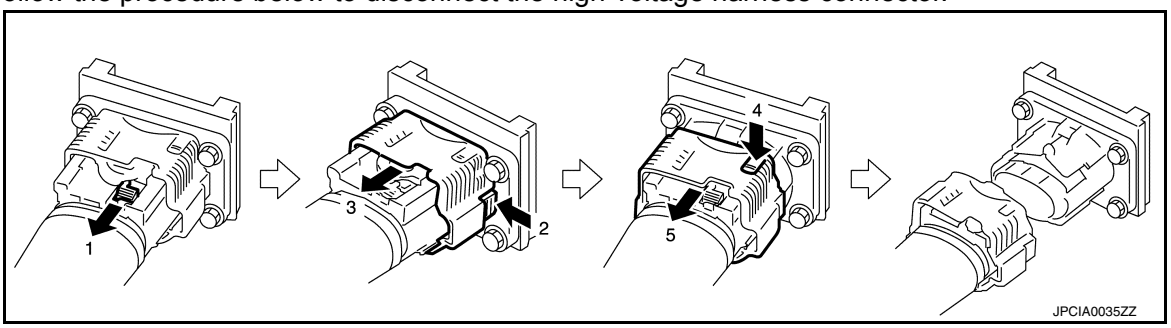


DANGER:

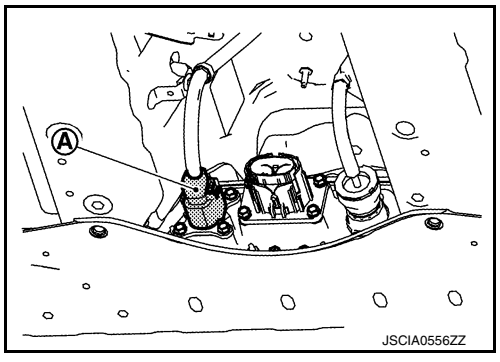
- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear.**

- **Because there is the danger of electric shock, immediately insulate disconnected high voltage connectors and terminals with insulating tape.**

- Follow the procedure below to disconnect the high-voltage harness connector.



3. Disconnect the Li-ion battery heater harness connector Ⓐ.

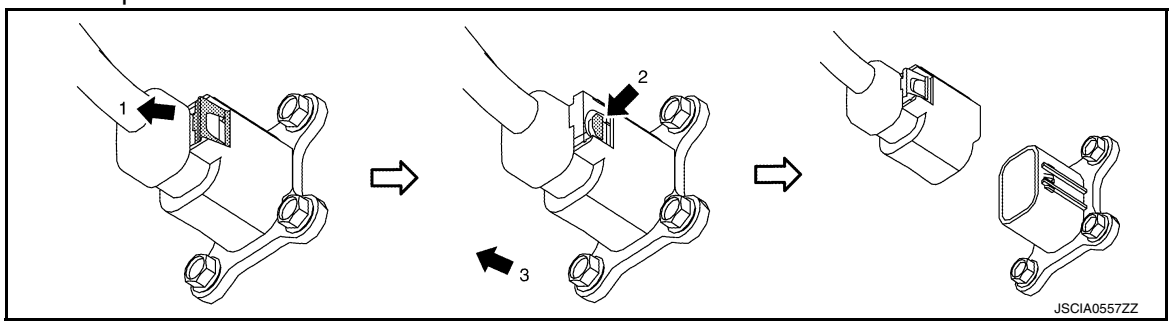


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear.**

- **Because there is the danger of electric shock, immediately insulate disconnected high voltage connectors and terminals with insulating tape.**

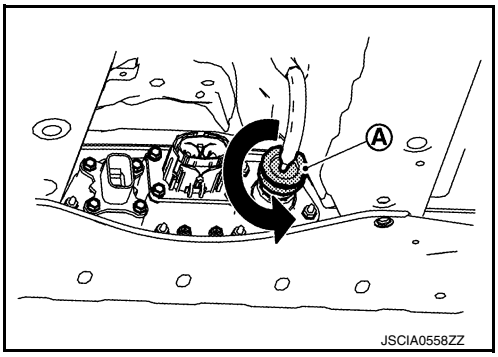
- Follow the procedure below to disconnect the PTC heater harness connector.



4. Disconnect the Li-ion battery vehicle communications connector Ⓐ while rotating it in the counterclockwise direction.

WARNING:

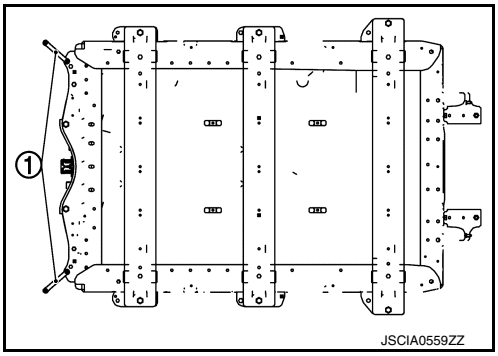
To prevent electric shock, wear insulated protective gear.



5. Remove bonding plate ①.

WARNING:

To prevent electric shock, wear insulated protective gear.



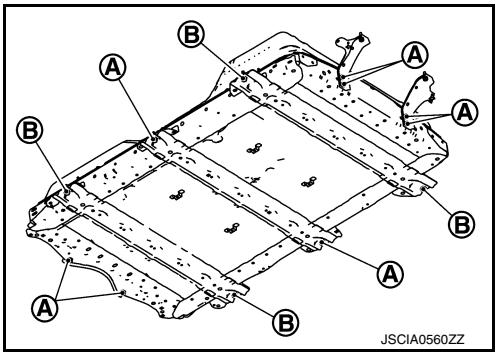
6. Remove Li-ion battery mounting bolts Ⓐ.

WARNING:

To prevent electric shock, wear insulated protective gear.

CAUTION:

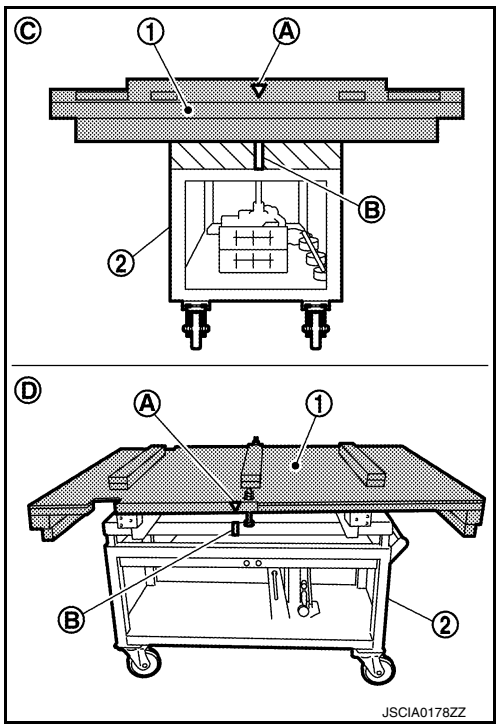
Do not remove the 4 bolts shown by Ⓑ in the figure.



7. Set the pallet [SST: — (J-50583)] onto the lift table.

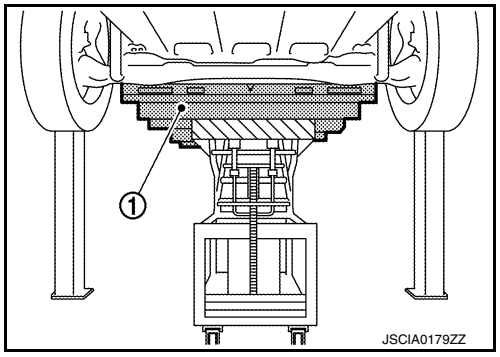
- Align the pallet ① center mark Ⓐ and the lift table ② center mark Ⓑ.

Ⓒ Front
Ⓓ Side

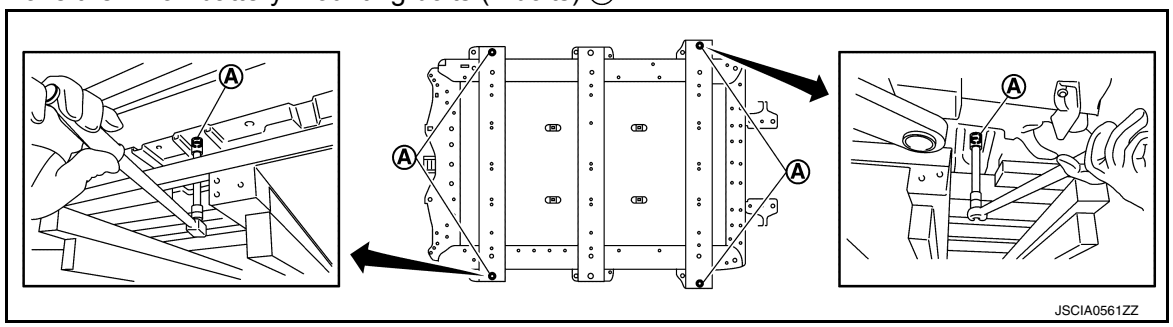


8. Set the pallet ① onto the Li-ion battery.

CAUTION:
For preventing the battery from falling, fasten the pallet and battery with transport fastening bolts.



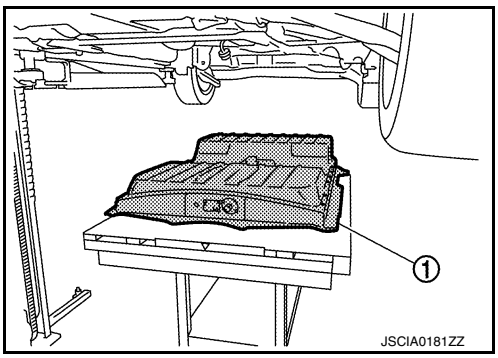
9. Remove the Li-ion battery mounting bolts (4 bolts) Ⓐ.



WARNING:

To prevent electric shock, wear insulated protective gear.

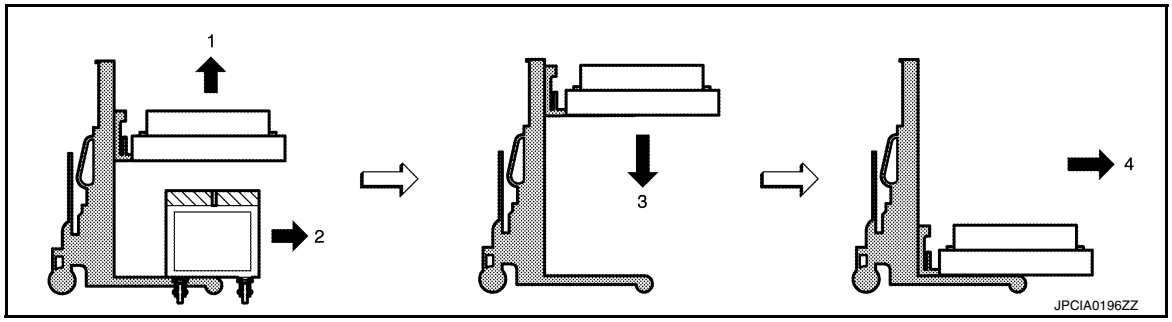
10. Lower the pallet, and remove the Li-ion battery ① from the vehicle.



WARNING:

To prevent electric shock, wear insulated protective gear.

11. Lower the Li-ion battery from the lift table together with the pallet.



1. Lift up the Li-ion battery.
2. Move the lift table.
3. Lower the Li-ion battery.
4. Operate the stacker and move the Li-ion battery.

CAUTION:

Because there is the danger of tipping over, do not move the stacker while the Li-ion battery is lifted up.

INSTALLATION

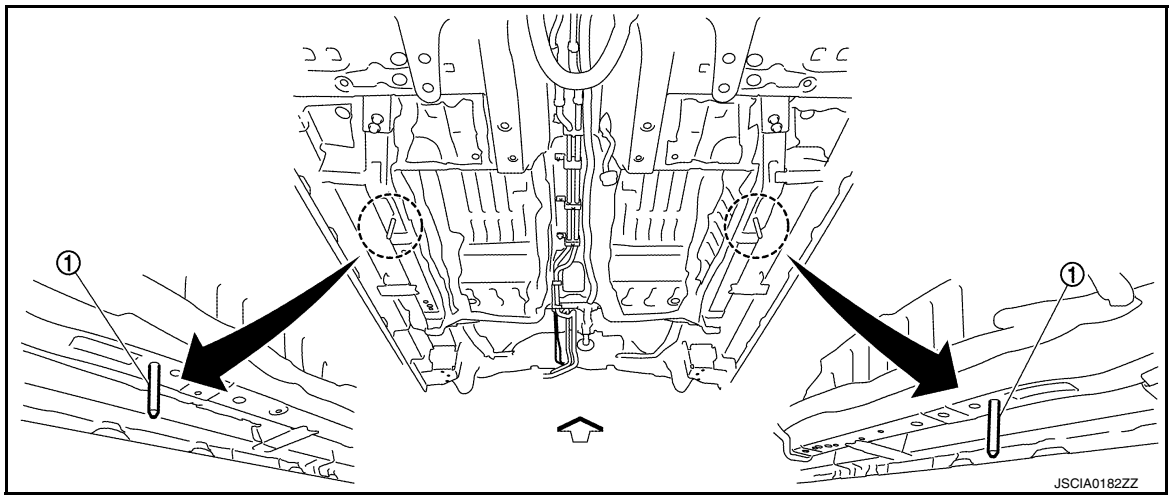
1. When replacing the Li-ion battery with a new battery, perform the work listed below.

a. Enter the date of the (replacement) work on the EV battery tracking identification seal that is packaged together with the new part.

b. Cut the EV battery tracking identification seal into 2 pieces and apply them to the body of the replaced (old) Li-ion battery and to the “Li-ion battery replacement history record”.

c. Enter the necessary information in the “Li-ion battery replacement history record”.

2. Install the locating pin ① [SST: KV99111300 (J-50306)] in the position on the body as shown in the figure.

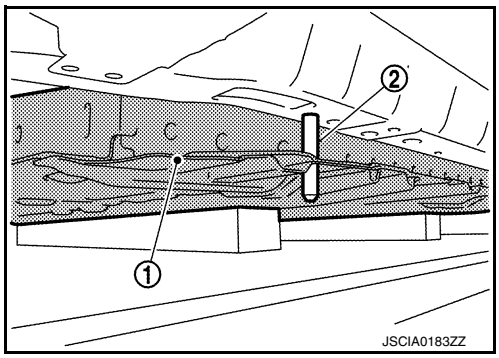


⇦ : Vehicle front

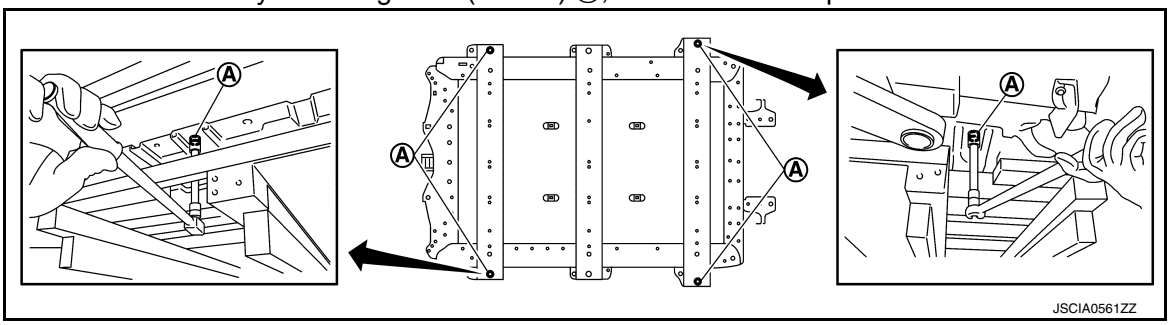
3. Install the Li-ion battery onto the vehicle body.
   - Align the Li-ion battery ① and the locating pin ②.

   WARNING:

   To prevent electric shock, wear insulated protective gear.



4. Tighten the Li-ion battery mounting bolts (4 bolts) Ⓐ, then remove the pallet.



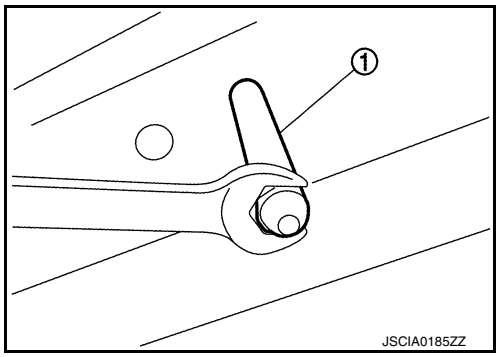
WARNING:

To prevent electric shock, wear insulated protective gear.

5. Remove the locating pin from the body.
   - If the locating pin ① is stuck and cannot be removed, remove it using a wrench.

   WARNING:

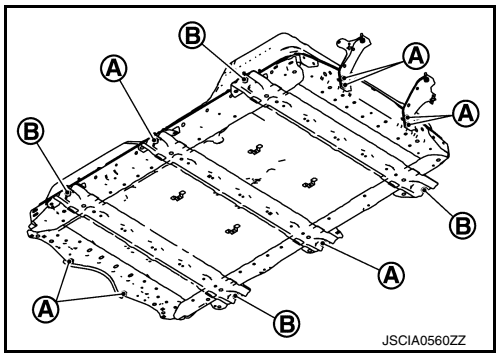
   To prevent electric shock, wear insulated protective gear.



6. Install the Li-ion battery mounting bolts Ⓐ.

   WARNING:

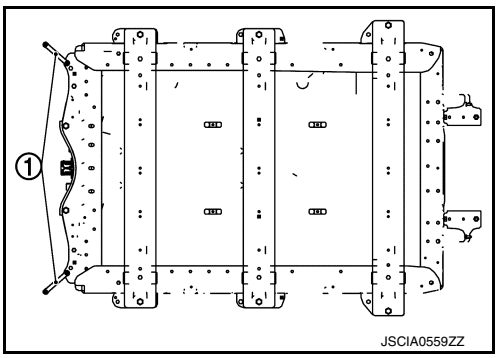
   To prevent electric shock, wear insulated protective gear.



7. Install the bonding plate ①.

WARNING:

To prevent electric shock, wear insulated protective gear.

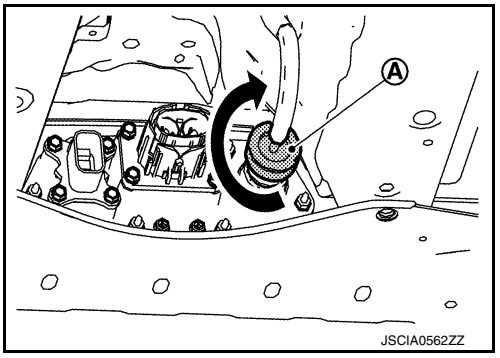


8. After installing the bonding plate, perform an electric equipotential test. EVB-201, "Inspection".

9. Rotate the vehicle communications connector Ⓐ clockwise to connect it.

WARNING:

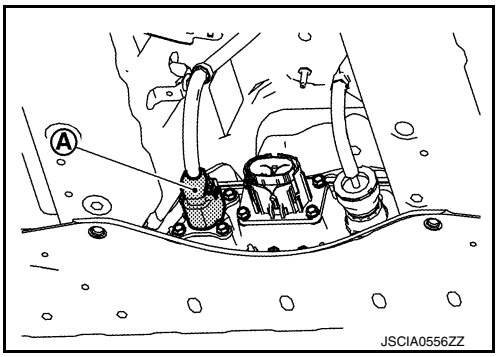
To prevent electric shock, wear insulated protective gear.



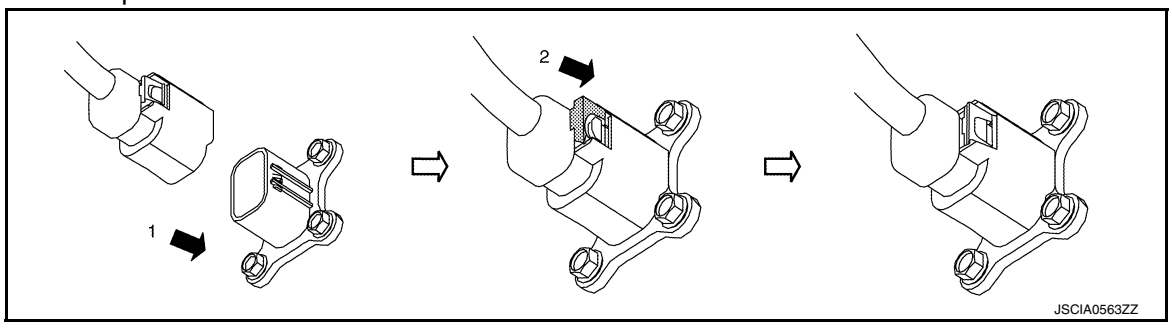
10. Install the Li-ion battery heater harness connector Ⓐ.

DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear.**



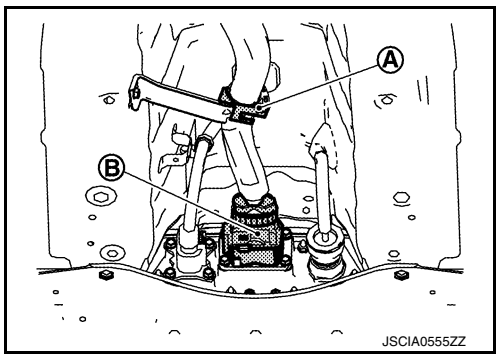
- Follow the procedure below to connect the heater harness connector.



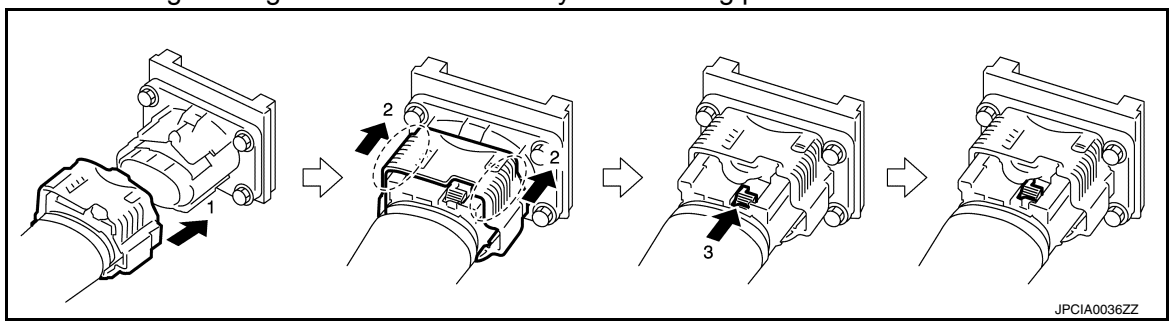
11. Install the high-voltage harness connector Ⓑ and install the harness clamp Ⓐ.

WARNING:

To prevent electric shock, wear insulated protective gear.



- Connect the high-voltage harness connector by the following procedure.



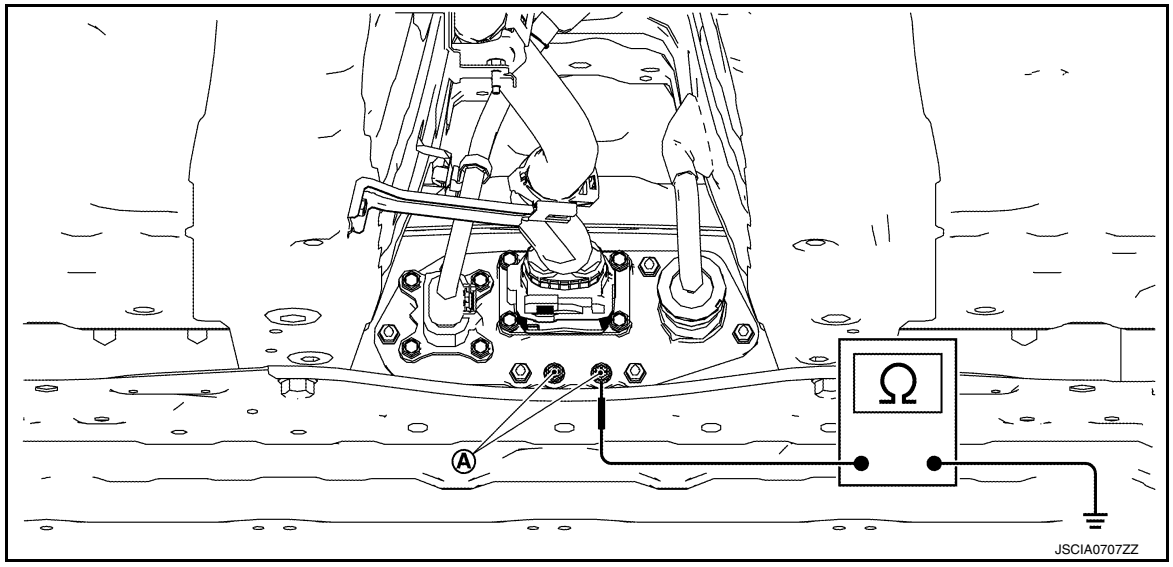
12. Install the Li-ion battery undercover.
13. Install the service plug GI-33, "How to Disconnect High Voltage".

Inspection

INFOID:0000000009298672

ELECTRIC EQUIPOTENTIAL TEST

After installing the Li-ion battery, measure the resistance between the battery pack ground bolt Ⓐ and the body ground.



WARNING:

To prevent electric shock, wear insulated protective gear.

Standard : Less than 0.1Ω

If the result deviates from the standard value, check the following and correct the malfunction location.

- Conditions of bonding plate connection
- Corrosion on bonding plate mounting surface
- Presence of paint, oil, dirt, or other substance on the bonding plate mounting surface

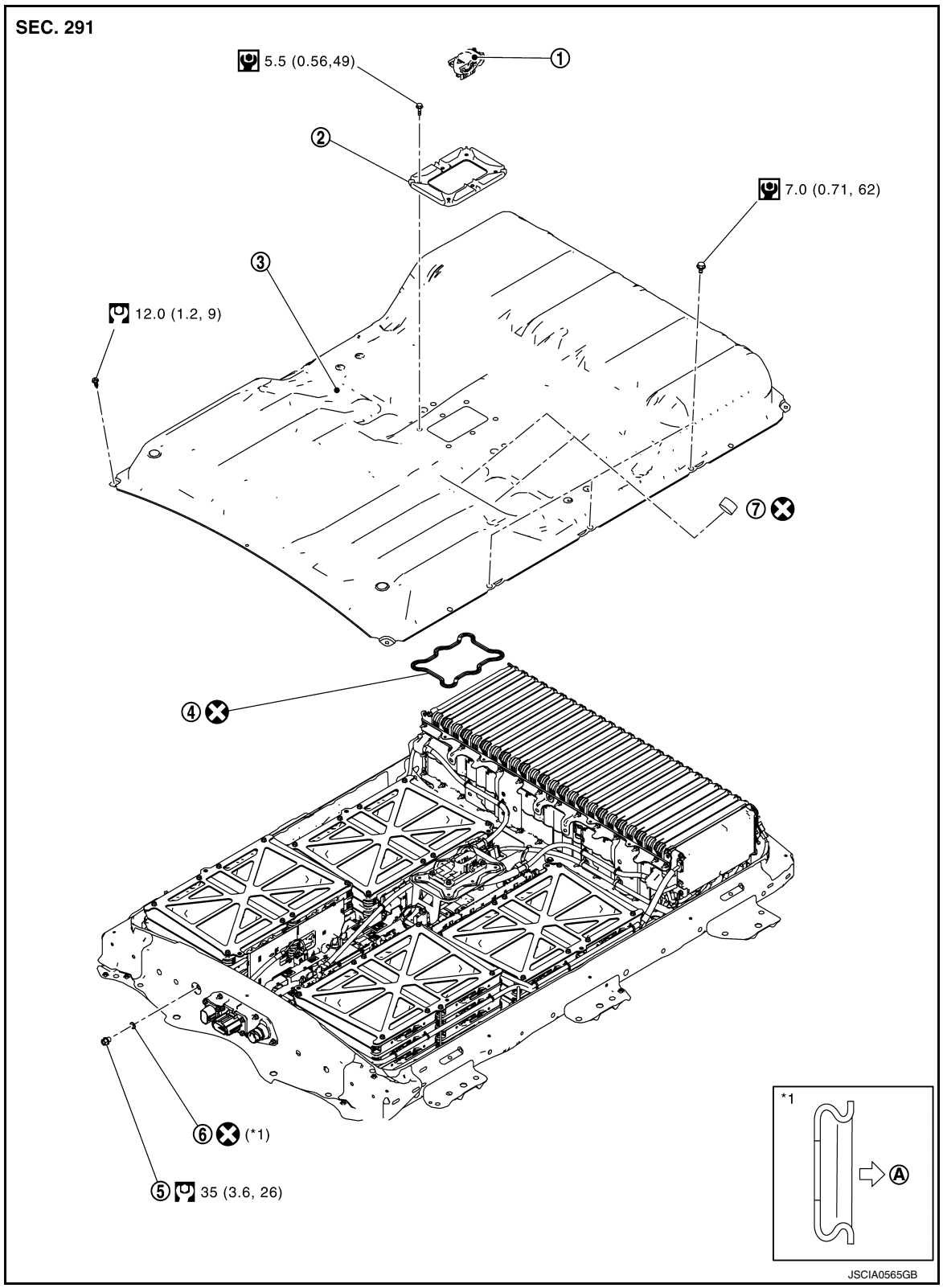
UNIT DISASSEMBLY AND ASSEMBLY

LI-ION BATTERY

BATTERY PACK UPPER CASE

BATTERY PACK UPPER CASE : Exploded View

INFOID:0000000009298673



① Service plug
② Service plug retainer
③ Battery pack upper case
④ Seal
⑤ Plug
⑥ Plug washer
⑦ Breather
Ⓐ Battery pack case side
: Always replace after every disassembly.
: N·m (kg-m, in-lb)
: N·m (kg-m, ft-lb)

BATTERY PACK UPPER CASE : Removal and Installation

INFOID:0000000009298674

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to 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 pocket and carry it or store it in a tool box or other container so that another person does not accidentally connect it while work is in progress.**
- **Be sure to put on insulating protective gear 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 components with an anti-static cover sheet or similar item to prevent contact with other persons.**
- **Refer to EVB-6, "High Voltage Precautions".**
- **If the battery pack is to be disassembled, be sure to remove the Li-ion battery controller for preventing electric shock, fire, and damage to parts.**

CAUTION:

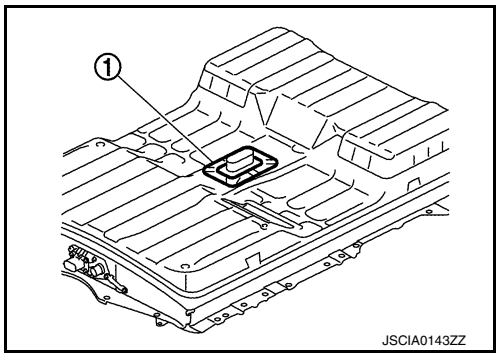
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

ENVIRONMENT FOR LI-ION BATTERY DISASSEMBLY WORK

1. Must be an indoor environment.
   - The environment must utilize a shutter or other means to shut out the outside environment and prevent rain, snow, dust, or other substances from entering.
   - The environment must not cause the intrusion of sweat during work, or cause condensation to occur due to high temperature or humidity.
2. Metal powder, grease, and other foreign substances must not enter.
   - The indoor environment must also prevent metal powder, grease, and other foreign substances from entering due to maintenance performed on other vehicles and other sources during disassembly work.
   - If there is a risk of the above substances entering, take appropriate countermeasures, such as use of a vinyl curtain or an equivalent to shut out the outside environment.
3. The floor must be dry.
   - The floor must not be wet as a result of factors such as vehicle entry during rain or snow.
4. Work space
   - The work space must be approximately the size of one entire vehicle.
   - Take appropriate countermeasures so that persons other than the operator do not enter the work space, such as by placing signs indicating that disassembly work is in progress.
5. Standard fire fighting equipment
   - Always place a standard fire fighting equipment in the disassembly work area.
   - Depending on type of fire (vehicle or battery) use standard fire fighting equipment (water or extinguisher).

REMOVAL

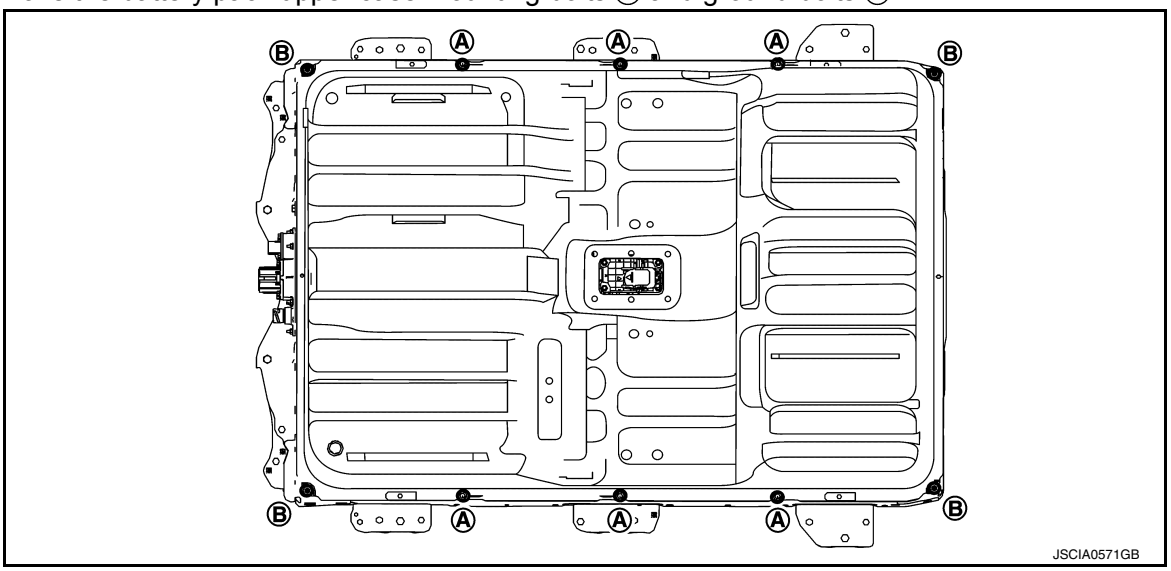
1. Clean any dust or dirt adhered to the battery pack.
2. Remove the service plug retainer ①.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

3. Remove the battery pack upper case mounting bolts Ⓐ and ground bolts Ⓑ.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

4. Cut the battery pack upper case adhesive according to the following procedure.

WARNING:

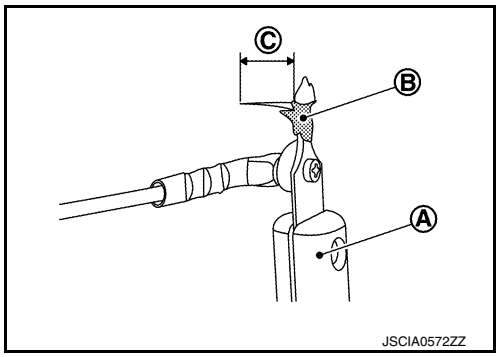
To prevent electric shock, wear insulated protective gear.

a. Prepare a windshield cutter.

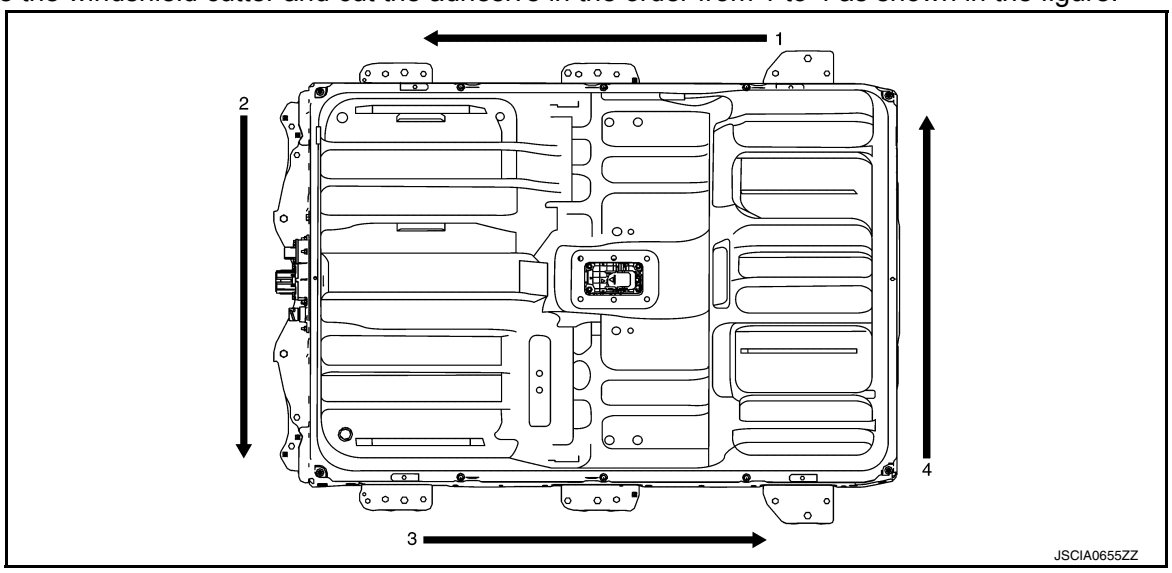
NOTE:

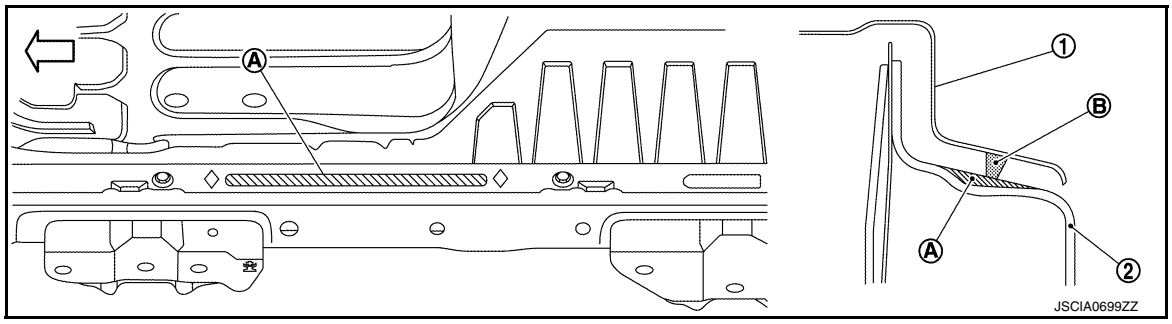
- Sharpen the blade of the windshield cutter Ⓐ.
- Apply a tape Ⓑ for preventing damage to the battery pack.

Ⓒ : 38 mm (1.50 in)



b. Use the windshield cutter and cut the adhesive in the order from 1 to 4 as shown in the figure.





① Battery pack upper case
② Battery pack lower case
Ⓐ Paint sealant
Ⓑ Adhesive
◇ : Paint sealant mark
⇦ : Battery front

CAUTION:

- **When cutting the adhesive, be careful to avoid scratching the battery pack coating to the maximum extent possible.**
- **The paint sealant is set between the paint sealant marks stamped on the battery pack upper case (between ◇ to ◇). Therefore be careful not to damage the paint sealant when cutting the adhesive.**
- **Because the paint sealant functions to release pressure from inside the battery pack, if the paint sealant is damaged beyond the limit, the battery pack lower case must be replaced. If the paint sealant damage is less than the limit, repair by applying primer (adhesive primer: 999MP-43533PP).**

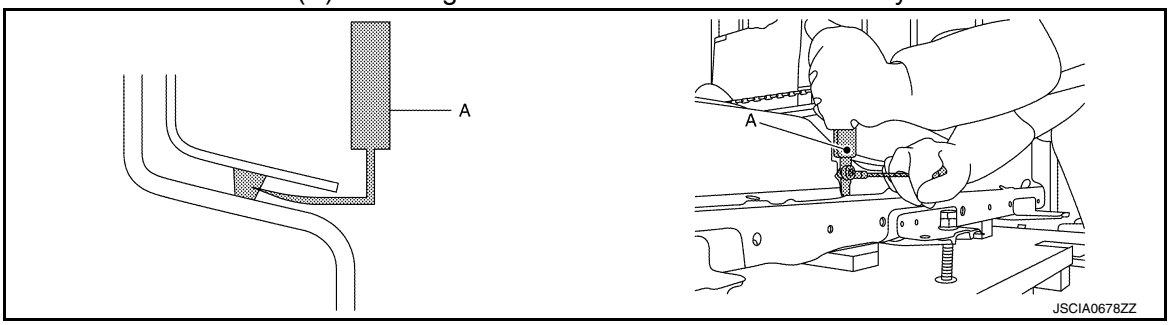
Paint sealant damage limit:

Continuous length of undamaged section: : 210 mm (8.27 in) or more

NOTE:

- Because there is no clearance at the embossed part, cut the adhesive there last.

- Set the windshield cutter (A) at an angle of 90° to the surface of the battery case.



- Hold the windshield cutter facing toward the grip, and cut the adhesive while holding the blade level.

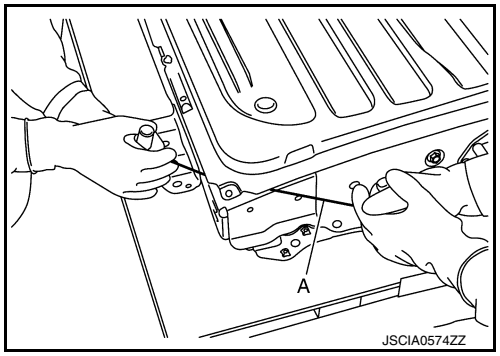
c. Use piano wire (A) to cut the adhesive at the battery pack corners.

CAUTION:

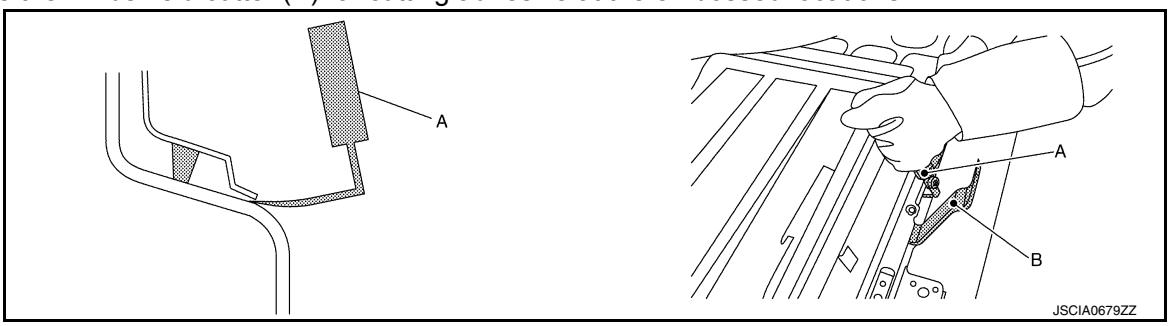
When cutting the adhesive, be careful to avoid scratching the battery pack coating and paint sealant to the maximum extent possible.

NOTE:

Press the piano wire against the adhesive at the battery pack corner, and pull it in alternate directions for cutting of adhesive.



d. Use the windshield cutter (A) for cutting adhesive at the embossed locations.



i. Insert a plastic remover tool (B) into the embossed locations to open a clearance.

CAUTION:

Do not press the remover tool farther in than necessary. Doing so may deform the battery pack upper case.

ii. Tilt the windshield cutter blade at an angle and cut the adhesive at the embossed locations.

CAUTION:

When cutting the adhesive, be careful to avoid scratching the battery pack coating to the maximum extent possible.

5. Remove the battery pack upper case.

WARNING:

To prevent electric shock, wear insulated protective gear.

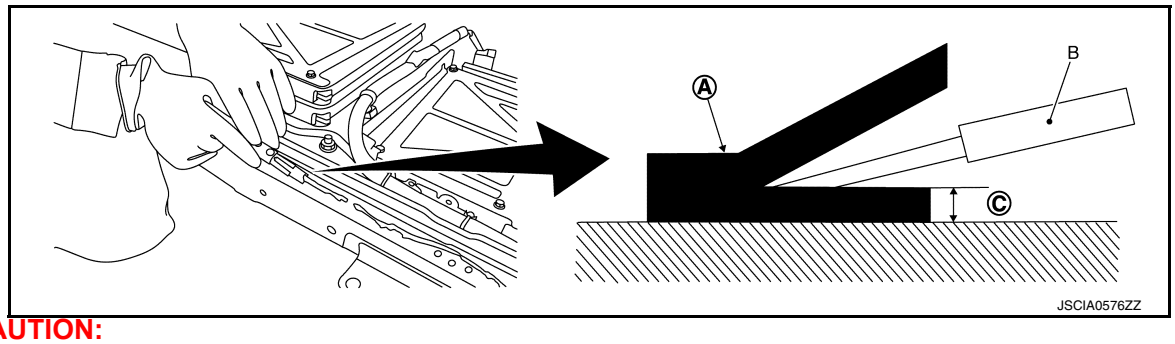
CAUTION:

- **Check that the adhesive is fully cut before removing. Use of excessive force during removal may deform the battery pack upper case.**
- **When removing the battery pack upper case, be careful that cutting particles do not enter the battery pack.**

- **If adhesive cutting particles enter the battery pack, clean (use of air blow is prohibited) when assembling so that no particles remain on the battery module, bus bar, and high-voltage harness.**
- **Operation must be performed by 2 persons. Be careful that the battery pack upper case does not contact the battery module.**

INSTALLATION

1. To remove remaining adhesive on the battery pack upper case and battery pack lower case Ⓐ, use a scraper (B), and cut so that the surface is smooth, leaving approximately 1 – 2 mm (0.04 – 0.08 in) Ⓒ of adhesive behind.



CAUTION:

- **Because airtightness leakage is likely to occur, cut the seal in such a way that burrs are not produced.**
- **Be careful not to damage the paint sealant.**
- **If the paint sealant on a straight section is damaged in excess of the limit, the battery pack lower case must be replaced. If the paint sealant damage is less than the limit, repair by applying primer (adhesive primer: 999MP-43533PP).**

Paint sealant damage limit:

Continuous length of undamaged section: : 210 mm (8.27 in) or more

- **If the paint sealant damage on a corner is damaged, repair by applying primer (adhesive primer: 999MP-43533PP).**

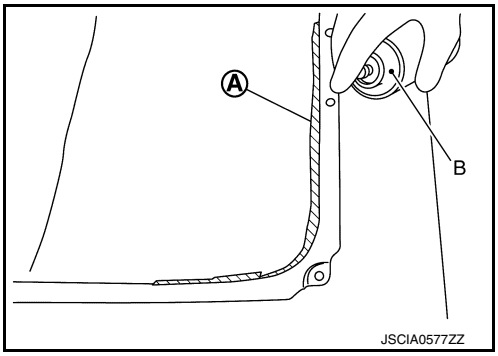
NOTE:

- Leave 1 – 2 mm (0.04 – 0.08 in) of adhesive so that the battery pack coating surface and paint sealant are not damaged.
- Sharpen the blade of the scraper.

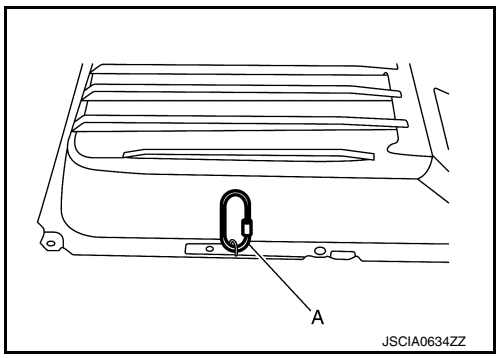
2. Repair scratches to the battery pack upper case by the following procedure.

a. Protect the seal with masking tape Ⓐ.
NOTE:
If primer surfacer (anti-corrosion primer) contacts the seal, the adhesive strength is reduced.

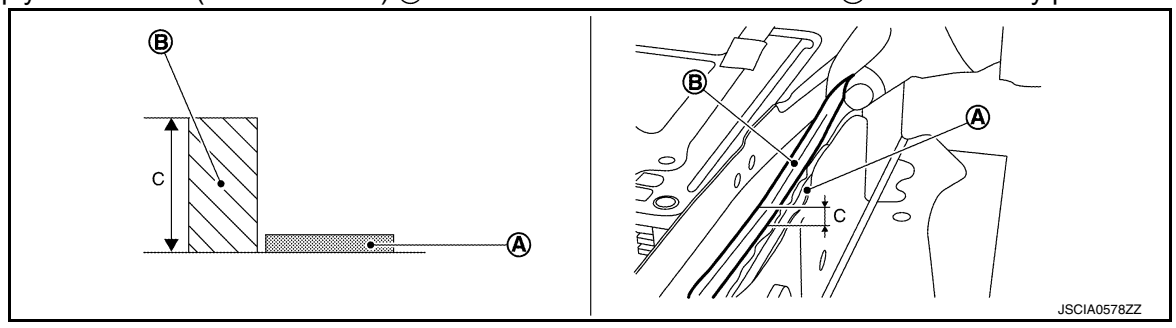
b. Spray primer surfacer (anti-corrosion primer) (B) into the cracks in the battery pack upper case.



3. Install a carabiner (A) onto the bracket of the battery pack upper case.
NOTE:
This is to provide a handle for use after the adhesive is applied and prevent adhesive from adhering to the operator's hands.



4. Apply dam rubber (KA390-0059U) Ⓑ on the inside of the old adhesive Ⓐ on the battery pack lower case.



C : 10 mm (0.39 in)

WARNING:

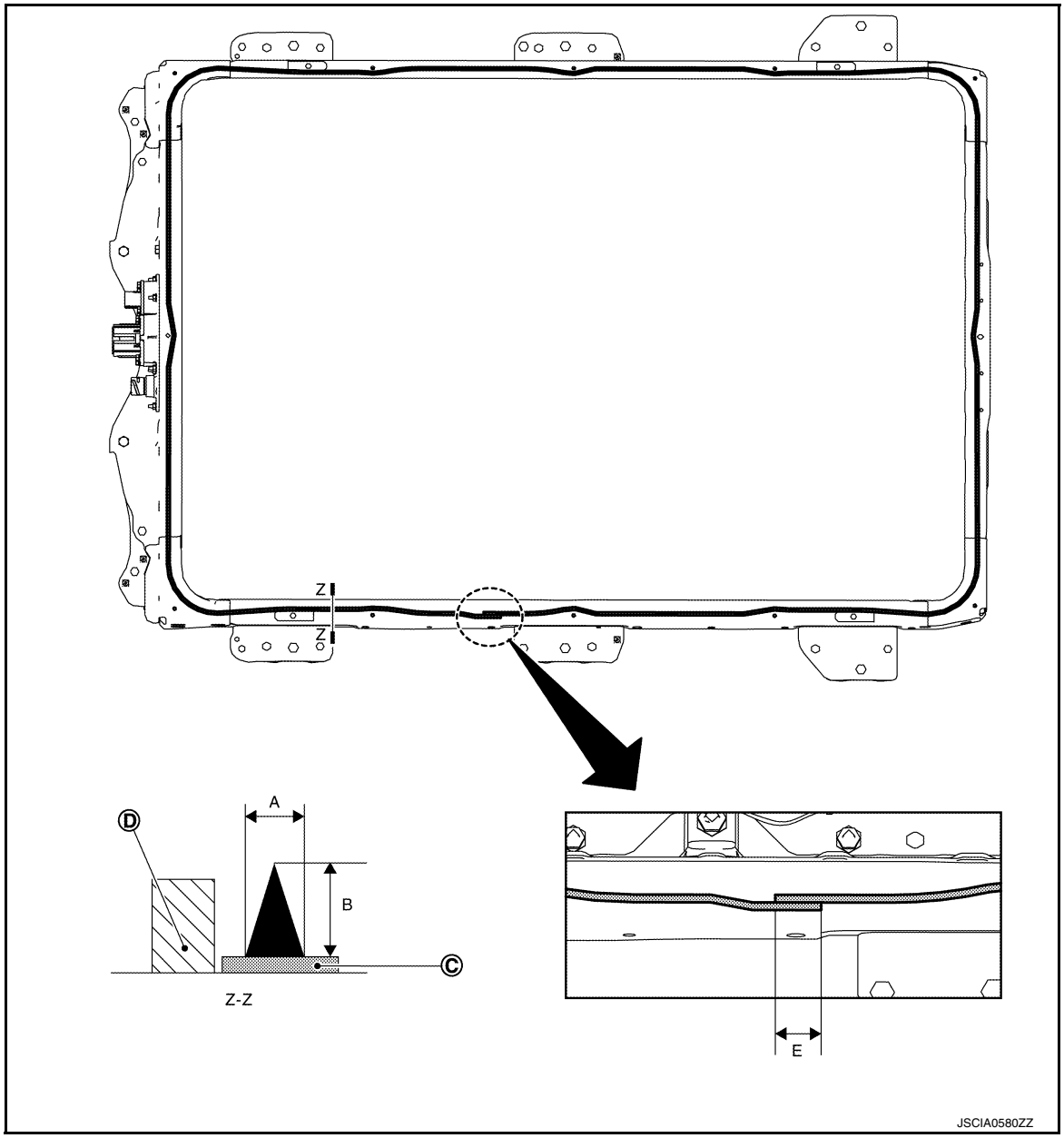
To prevent electric shock, wear insulated protective gear.

CAUTION:
If dam rubber is already applied there, replace it with new dam rubber.
NOTE:
Apply the dam rubber so that adhesive does not enter the inner side. If the adhesive enters the inner side, then the next time the battery pack is disassembled, the windshield cutter may not be able to reach the adhesive and removing the battery pack upper case may be difficult.

5. Apply adhesive (999MP-57302NP) to the battery pack lower case as shown in the figure.

WARNING:

To prevent electric shock, wear insulated protective gear.



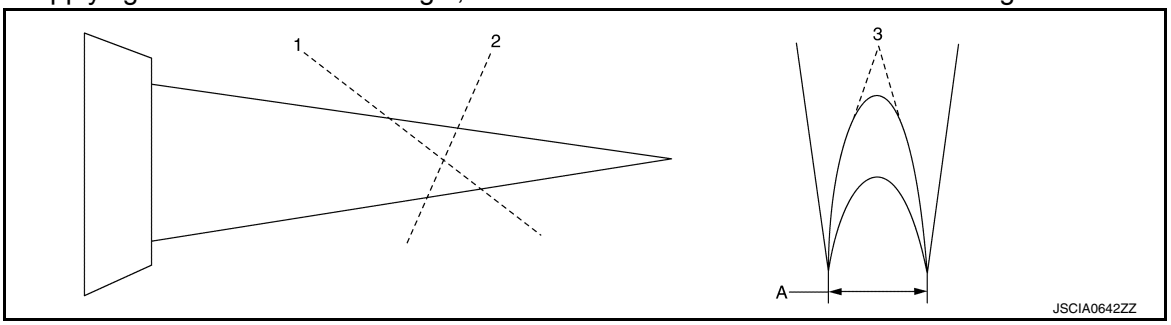
A : 5 mm (0.20 in)
B : 10 mm (0.39 in)
Ⓒ : Old adhesive
Ⓓ : Dam rubber
E : 50 mm (1.97 in) or more

CAUTION:

- **Because there is a risk of airtightness leakage, apply the adhesive so that there are no seams or overlaps.**
- **Complete installation of the battery pack upper case before the adhesive surface hardens. The adhesive begins to harden in as little as 12 minutes. [Humidity: 80%, Temperature: 35°C (95°F)]**
- **Before installing the battery pack upper case, check that there are no locations of insufficient adhesive. If there is insufficient adhesive, correct the location. (If the adhesive height is lower than the height of the dam rubber, then the amount of adhesive is insufficient.)**
- **Do not apply too much adhesive as doing so may make work difficult the next time the battery pack upper case is removed.**

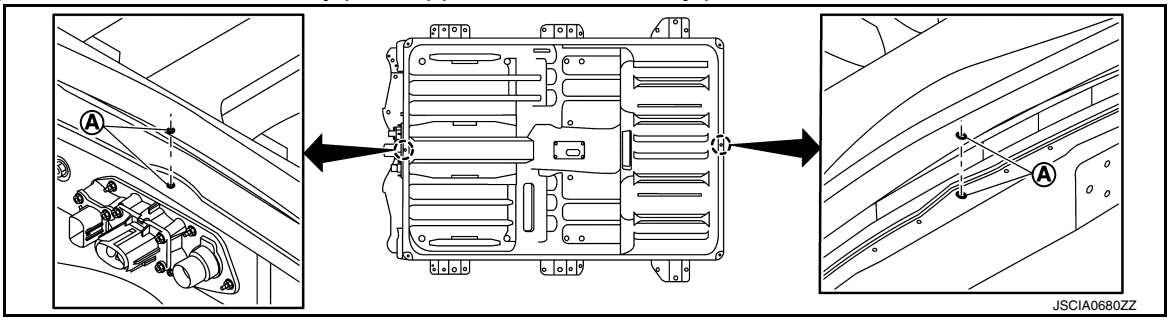
NOTE:

- For applying the adhesive in a triangle, cut the end of the nozzle as shown in the figure.



Nozzle inner diameter (A) : Approx. 5 mm (0.20 in)

6. Grasp the carabiner installed in Step 3, and install the battery pack upper case while visually aligning the alignment holes on the battery pack upper case and battery pack lower case Ⓐ.

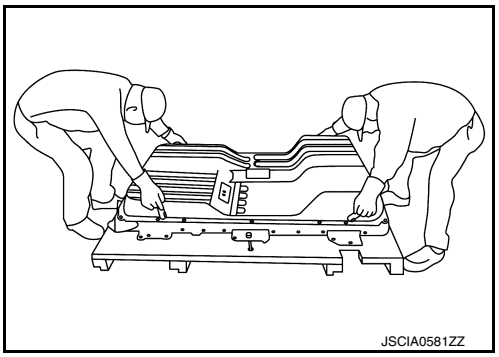


WARNING:

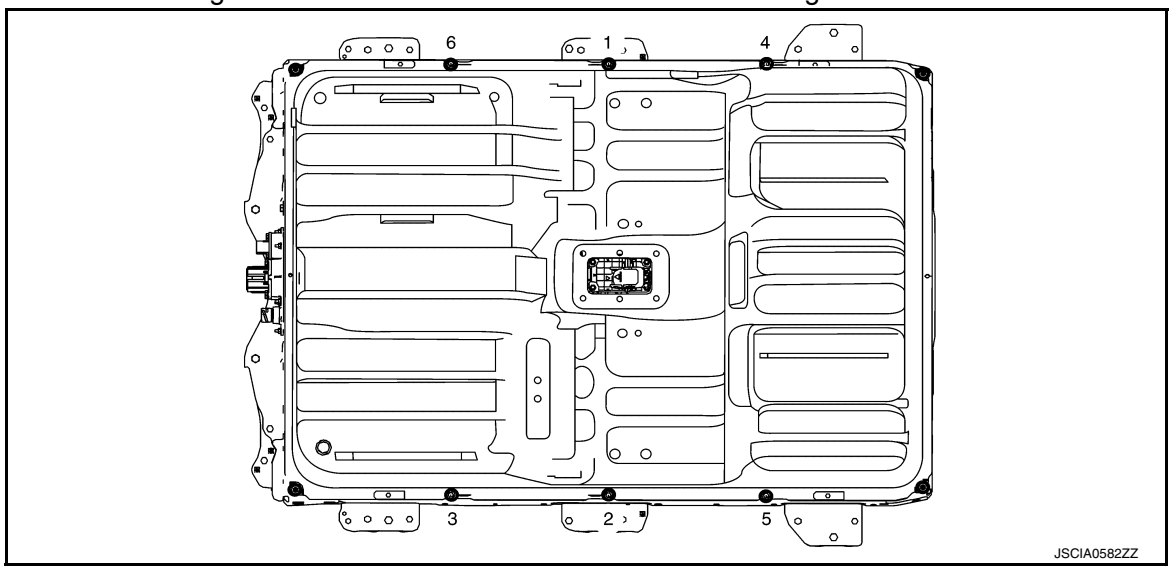
To prevent electric shock, wear insulated protective gear.

CAUTION:

- **Operation must be performed by 2 persons. Be careful that the battery pack upper case does not contact the battery module.**
- **Moving the upper case after it is installed makes airtightness leakage more likely. Therefore, position the upper case carefully.**



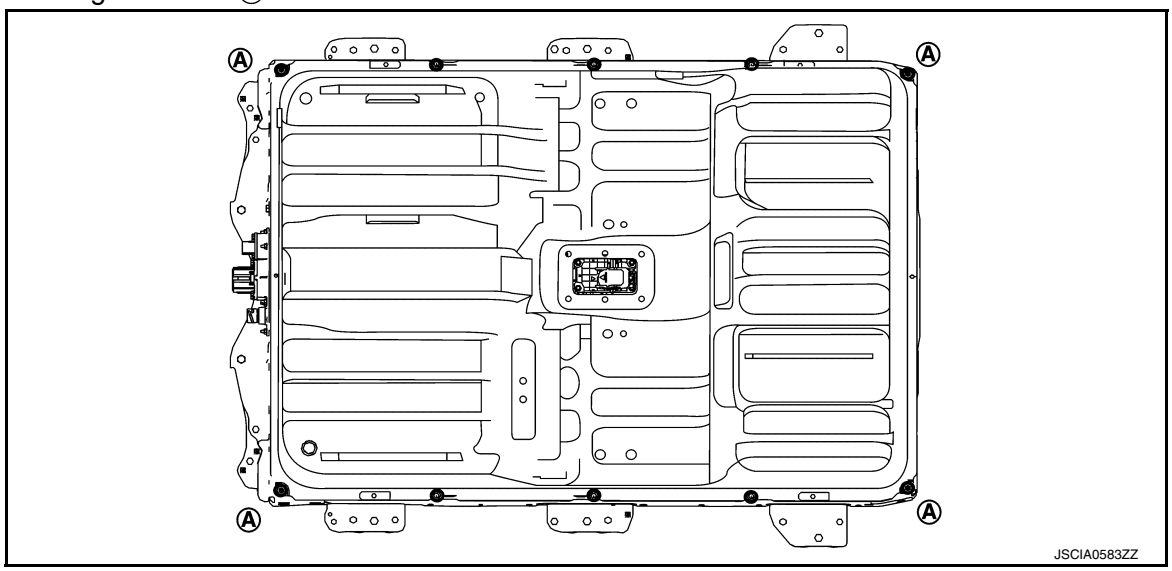
7. Tighten the mounting bolts in the order from 1 to 6 as shown in the figure.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

8. Install the ground bolt Ⓐ.



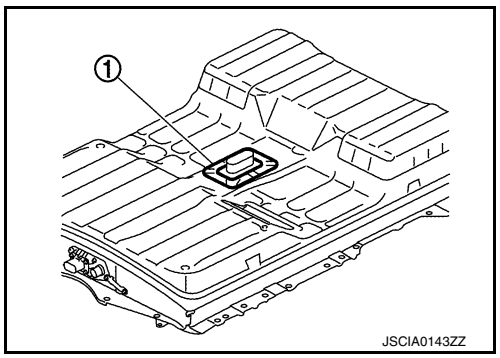
WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

9. Install the service plug retainer ①.

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.



10. Perform a battery pack air leak inspection. Refer to EVB-269, "Inspection".

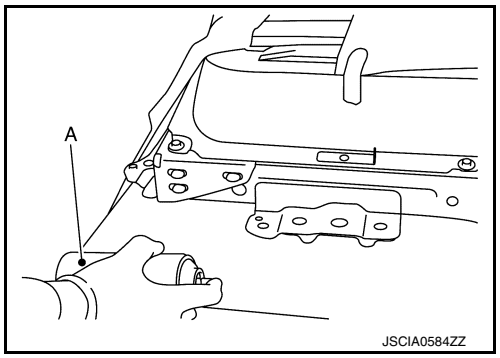
CAUTION:

If air leakage occurs, remove the battery pack upper case and wipe off the adhesive, then apply new dam rubber and apply adhesive again. (Proceed to Step 4.)

11. Spray primer surfacer (anti-corrosion primer) (A) into cracks in the periphery of the battery pack adhesive.

WARNING:

To prevent electric shock, wear insulated protective gear.



CAUTION:

- **After the battery pack is assembled, it can be installed into the vehicle. However the battery pack must not be subjected to any external force (such as high-pressure washing or parking in a location which strains the vehicle body) for approximately 3 hours after installation.**
- **Be sure to reinstall the high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.**
- **After assembling the battery pack, perform an electric equipotential test.**
- **Check the following items after installing battery pack: Refer to EVB-269, "Inspection".**

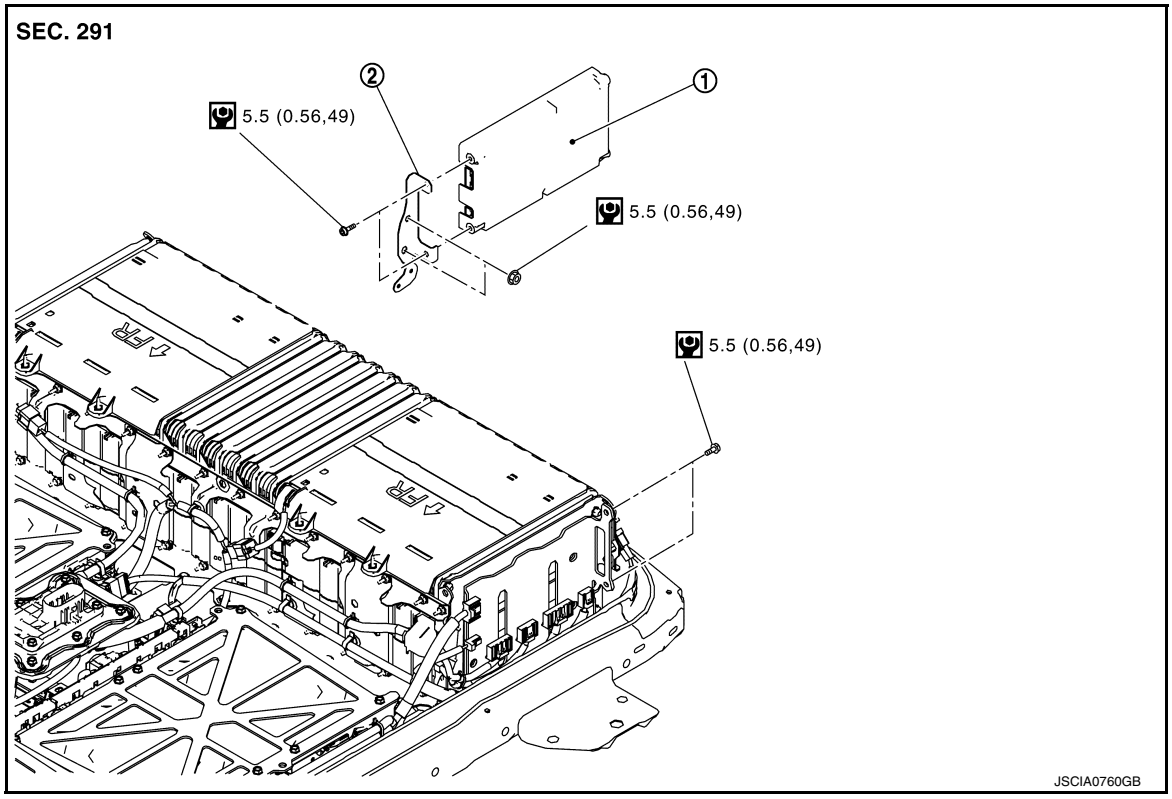
■AIR LEAK INSPECTION

■ELECTRIC EQUIPOTENTIAL TEST

LI-ION BATTERY CONTROLLER

LI-ION BATTERY CONTROLLER : Exploded View

INFOID:0000000009298675



① Li-ion battery controller ② Controller bracket

: N·m (kg-m, in-lb)

LI-ION BATTERY CONTROLLER : Removal and Installation

INFOID:0000000009298676

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to 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 pocket and carry it or store it in a tool box or other container so that another person does not accidentally connect it while work is in progress.**
- **Be sure to put on insulating protective gear 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 components with an anti-static cover sheet or similar item to prevent contact with other persons.**
- **Refer to EVB-6, "High Voltage Precautions".**
- **If the battery pack is to be disassembled, be sure to remove the Li-ion battery controller for preventing electric shock, fire, and damage to parts.**

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.

ENVIRONMENT FOR LI-ION BATTERY DISASSEMBLY WORK

1. Must be an indoor environment.

- The environment must utilize a shutter or other means to shut out the outside environment and prevent rain, snow, dust, or other substances from entering.
- The environment must not cause the intrusion of sweat during work, or cause condensation to occur due to high temperature or humidity.

2. Metal powder, grease, and other foreign substances must not enter.
   - The indoor environment must also prevent metal powder, grease, and other foreign substances from entering due to maintenance performed on other vehicles and other sources during disassembly work.
   - If there is a risk of the above substances entering, take appropriate countermeasures, such as use of a vinyl curtain or an equivalent to shut out the outside environment.
3. The floor must be dry.
   - The floor must not be wet as a result of factors such as vehicle entry during rain or snow.
4. Work space
   - The work space must be approximately the size of one entire vehicle.
   - Take appropriate countermeasures so that persons other than the operator do not enter the work space, such as by placing signs indicating that disassembly work is in progress.
5. Standard fire fighting equipment
   - Always place a standard fire fighting equipment in the disassembly work area.
   - Depending on type of fire (vehicle or battery) use standard fire fighting equipment (water or extinguisher).

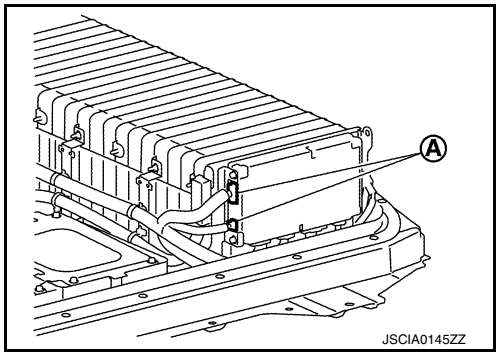
REMOVAL

1. Remove the battery pack upper case. EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".
2. Disconnect the low-voltage harness connector Ⓐ of the Li-ion battery controller.

   WARNING:

   To prevent electric shock, wear insulated protective gear.

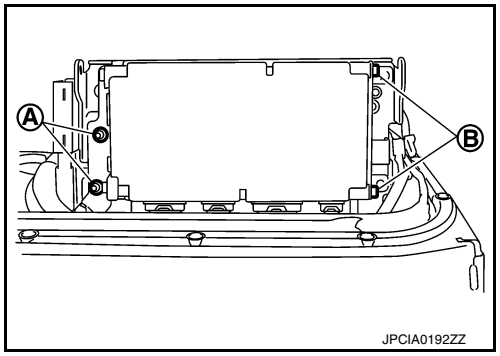


3. Remove the Li-ion battery controller mounting nuts Ⓐ, then remove the mounting bolts Ⓑ.

   WARNING:

   To prevent electric shock, wear insulated protective gear and use insulated tools.



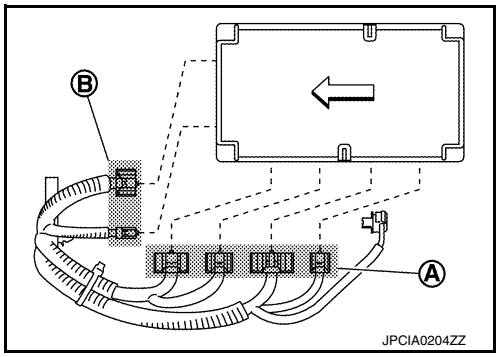
4. Disconnect the high-voltage harness connector Ⓐ, then remove the Li-ion battery controller.

   Ⓑ : Low-voltage harness connector

   ⇦ : Battery front

   WARNING:

   - **To prevent electric shock, wear insulated protective gear.**



- **Because there is a risk of electric shock, immediately protect the terminals of the disconnected high-voltage harness connector with insulating tape so that they are not exposed.**

INSTALLATION

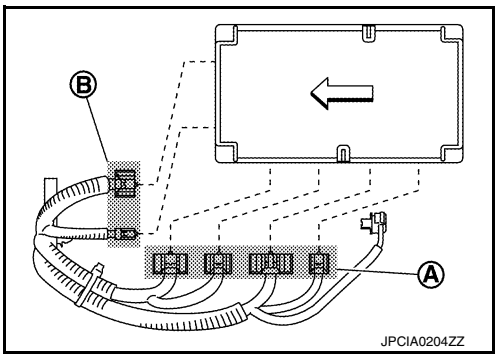
1. Install the Li-ion battery controller.

WARNING:

- **To prevent electric shock, wear insulated protective gear and use insulated tools.**

- **The Li-ion battery controller includes 2 harness connectors: a high-voltage connector Ⓐ and a low-voltage connector Ⓑ. If the high-voltage harness connector is inserted at the low-voltage point, smoking and component damage may occur. Be very careful not to insert the connectors at the wrong points.**

⇦ : Battery front



2. Install the battery pack upper case. EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

CAUTION:

- **Be sure to reinstall the high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.**
- **Check the following items after installing battery pack: Refer to EVB-269, "Inspection".**

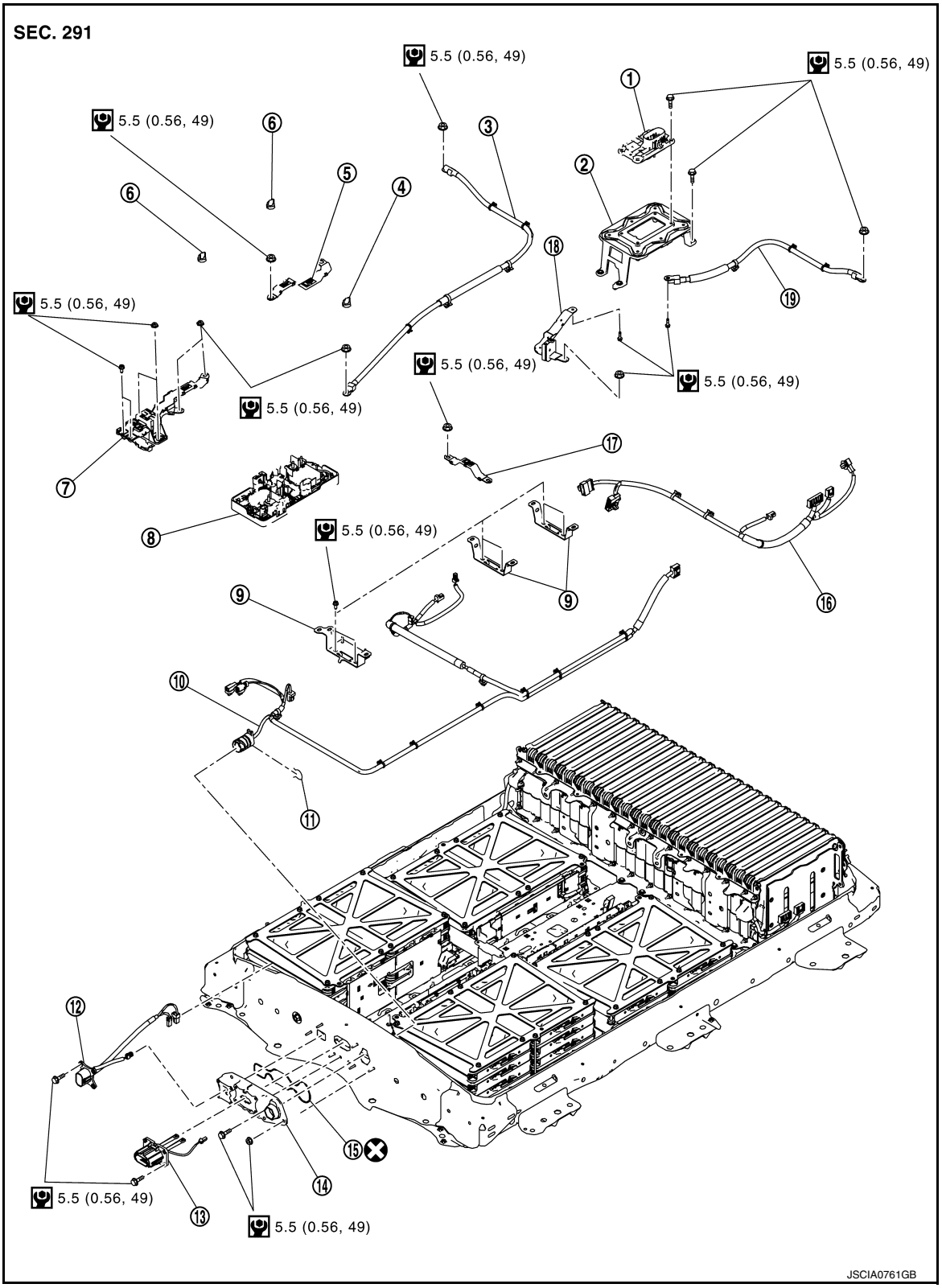
■AIR LEAK INSPECTION

■ELECTRIC EQUIPOTENTIAL TEST

BATTERY JUNCTION BOX AND BATTERY HARNESS

BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View

INFOID:0000000009298677



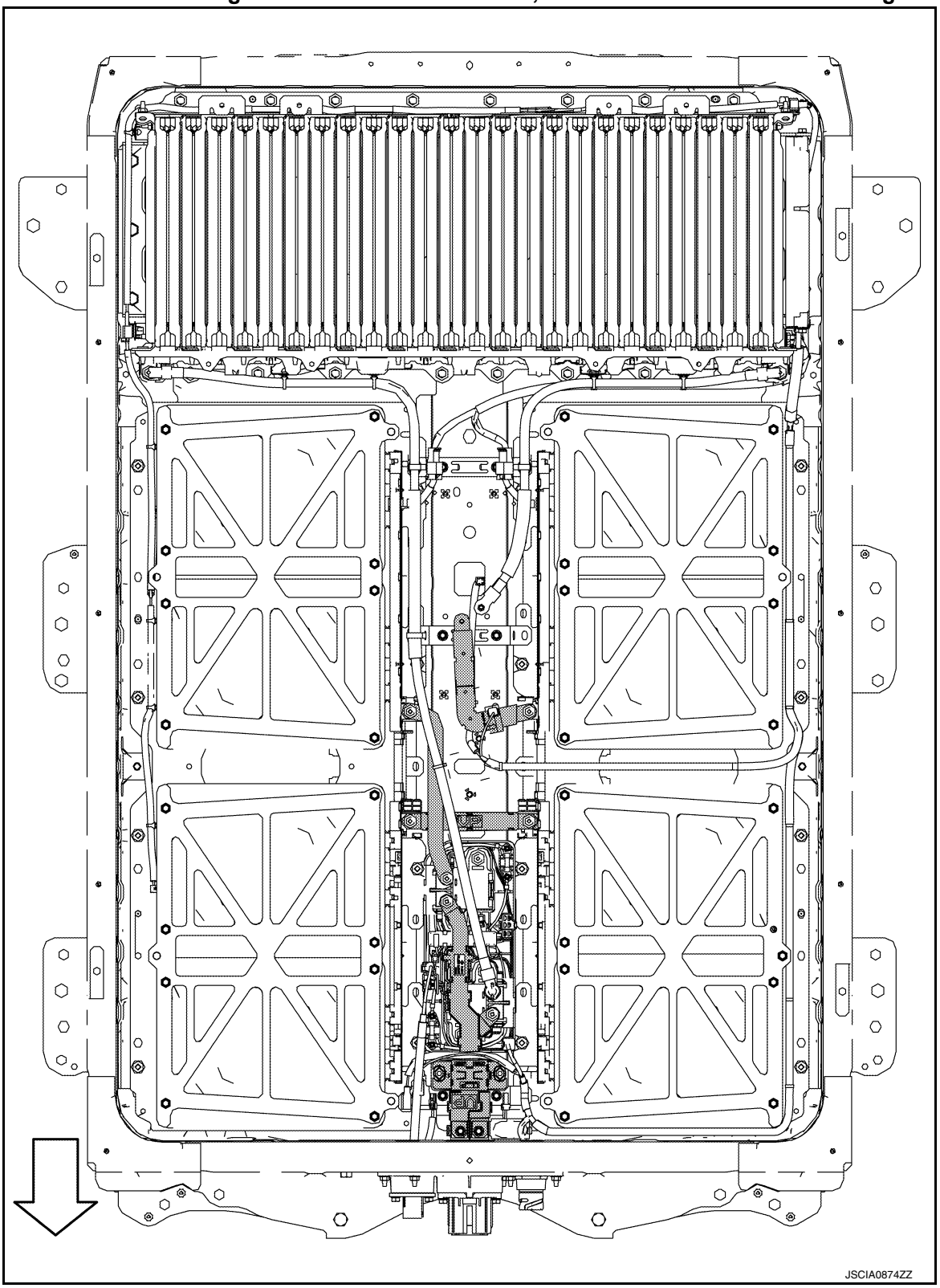
① Service plug switch
② Service plug switch bracket
③ High-voltage battery harness
④ Bus bar nut cap
⑤ Bus bar
⑥ Bus bar nut cap
⑦ Bus bar (integrated with noise filter)
⑧ Battery junction box
⑨ Harness bracket
⑩ Vehicle communications harness
⑪ Snap ring
⑫ PTC heater harness connector

⑬ High-voltage harness connector
⑭ Connector flange
⑮ Seal
⑯ Voltage detection harness
⑰ Bus bar
⑱ Battery current sensor (integrated with bus bar)
⑲ High-voltage battery harness
: Always replace after every disassembly.
: N·m (kg-m, in-lb)

Bus bar Layout

DANGER:

Because there is a danger of electric shock and fire, never contact bus bar in a wrong terminal.



⇦ : Battery front

BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly

INFOID:0000000009298678

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to 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 pocket and carry it or store it in a tool box or other container so that another person does not accidentally connect it while work is in progress.**
- **Be sure to put on insulating protective gear 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 components with an anti-static cover sheet or similar item to prevent contact with other persons.**
- **Refer to EVB-6, "High Voltage Precautions".**
- **If the battery pack is to be disassembled, be sure to remove the Li-ion battery controller for preventing electric shock, fire, and damage to parts.**

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.

ENVIRONMENT FOR LI-ION BATTERY DISASSEMBLY WORK

1. Must be an indoor environment.
   - The environment must utilize a shutter or other means to shut out the outside environment and prevent rain, snow, dust, or other substances from entering.
   - The environment must not cause the intrusion of sweat during work, or cause condensation to occur due to high temperature or humidity.
2. Metal powder, grease, and other foreign substances must not enter.
   - The indoor environment must also prevent metal powder, grease, and other foreign substances from entering due to maintenance performed on other vehicles and other sources during disassembly work.
   - If there is a risk of the above substances entering, take appropriate countermeasures, such as use of a vinyl curtain or an equivalent to shut out the outside environment.
3. The floor must be dry.
   - The floor must not be wet as a result of factors such as vehicle entry during rain or snow.
4. Work space
   - The work space must be approximately the size of one entire vehicle.
   - Take appropriate countermeasures so that persons other than the operator do not enter the work space, such as by placing signs indicating that disassembly work is in progress.
5. Standard fire fighting equipment
   - Always place a standard fire fighting equipment in the disassembly work area.
   - Depending on type of fire (vehicle or battery) use standard fire fighting equipment (water or extinguisher).

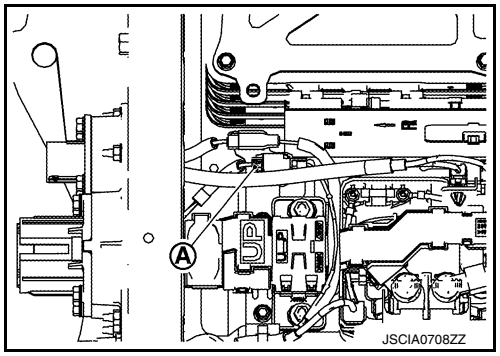
DISASSEMBLY

1. Remove the battery pack upper case. EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

3. Disconnect the high-voltage harness engagement detection switch harness connector Ⓐ.

WARNING:

To prevent electric shock, wear insulated protective gear.

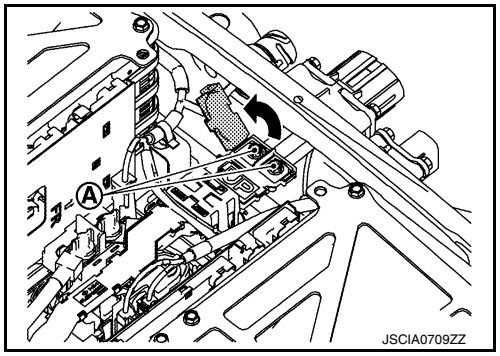


4. Open the bus bar cover and remove the high-voltage harness connector terminal mounting bolt Ⓐ.

DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

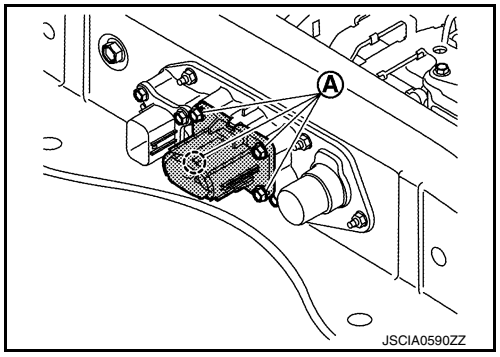
- **Because of the danger of electric shock, be sure to close the bus bar cover after removing the bus bar.**



5. Remove the mounting bolt Ⓐ and disconnect the high-voltage harness connector from the connector flange.

WARNING:

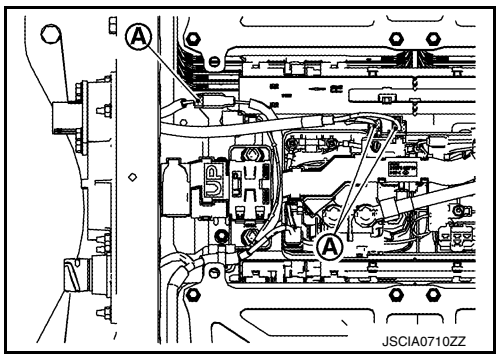
To prevent electric shock, wear insulated protective gear and use insulated tools.



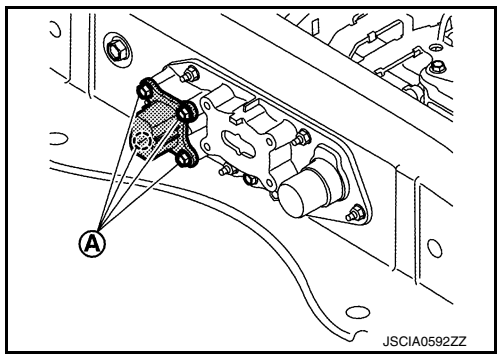
6. Disconnect the PTC heater harness connector Ⓐ.

WARNING:

To prevent electric shock, wear insulated protective gear.



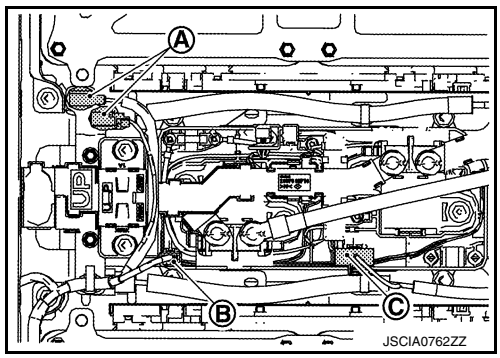
7. Remove the mounting bolts Ⓐ and remove the PTC heater harness connector from the connector flange.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

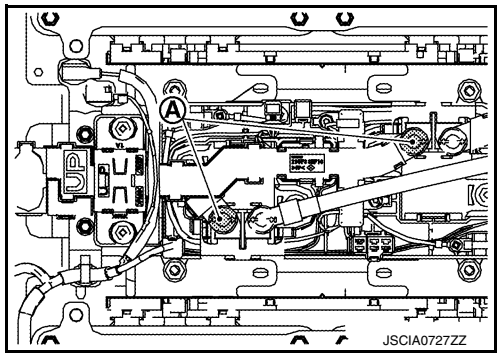
8. Disconnect the vehicle communications harness connector Ⓐ, connector clips Ⓑ, and Li-ion battery heater harness connector Ⓒ.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

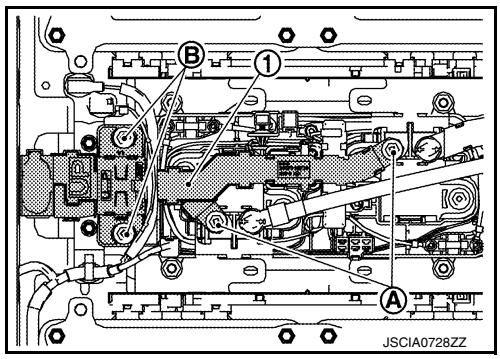
9. Remove the bus bar nut caps Ⓐ.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

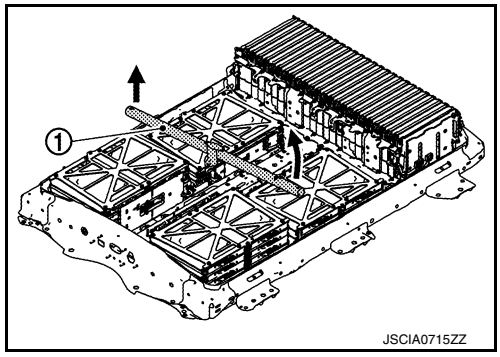
10. Remove the bus bar mounting nuts Ⓐ and Ⓑ, and remove the bus bar (integrated with noise filter) ①.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

11. Remove the harness clips, then remove the battery member pipe ①.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

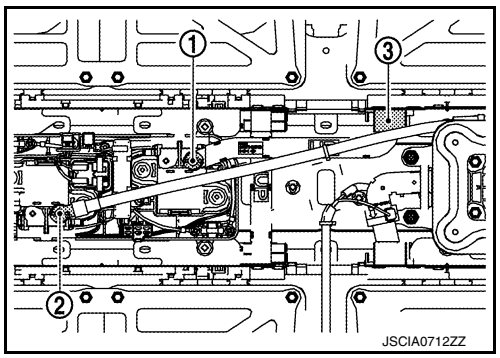
NOTE:

The right-side mounting hole is larger for facilitating removal of the battery member pipe. Lifting up the left side first makes removal easier.

12. Remove the bus bar nut cap ① and remove the high-voltage harness nut cap ②, then open the bus bar cover ③.

WARNING:

To prevent electric shock, wear insulated protective gear.

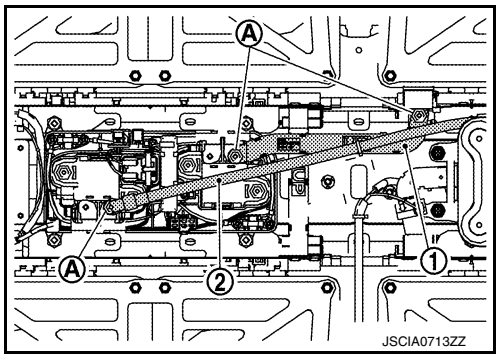


13. Remove the mounting nuts Ⓐ, and remove the bus bar ① and high-voltage harness ②.

DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

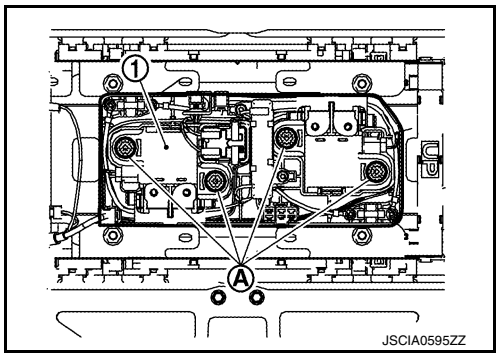
- **Because there is a risk of electric shock, immediately protect the terminals of the disconnected high-voltage harness connector (high-voltage terminals) with insulating tape so that they are not exposed.**
- **Because of the danger of electric shock, be sure to close the bus bar cover after removing the bus bar.**



14. Remove the mounting nuts Ⓐ and remove the junction box ①.

WARNING:

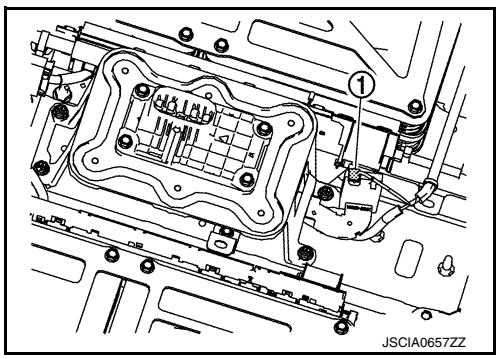
To prevent electric shock, wear insulated protective gear and use insulated tools.



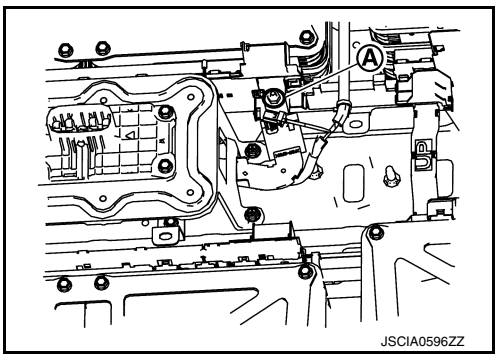
15. Disconnect the current sensor harness connector ①.

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.



16. Remove the bus bar mounting nut which connects the current sensor and left front module stack Ⓐ.

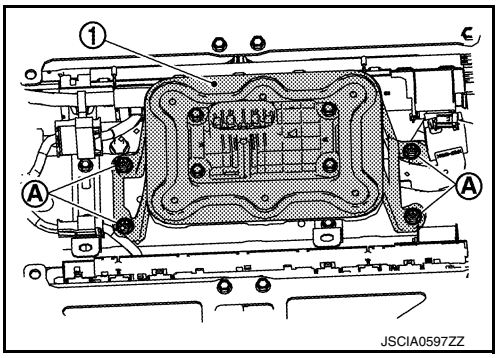


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **Because of the danger of electric shock, be sure to close the bus bar cover after removing the bus bar.**

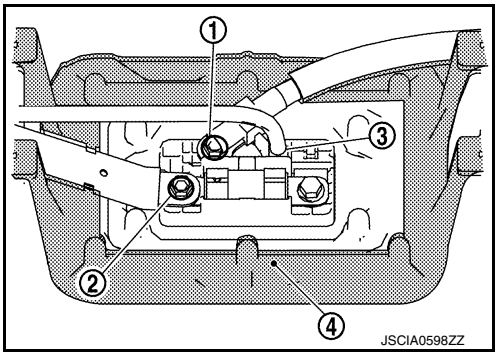
17. Remove the service plug switch bracket ① mounting bolts Ⓐ.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

18. Invert the service plug switch bracket and remove the high-voltage harness mounting bolt ①, current sensor mounting bolt ②, and the connector ③, then remove the service plug switch bracket ④.

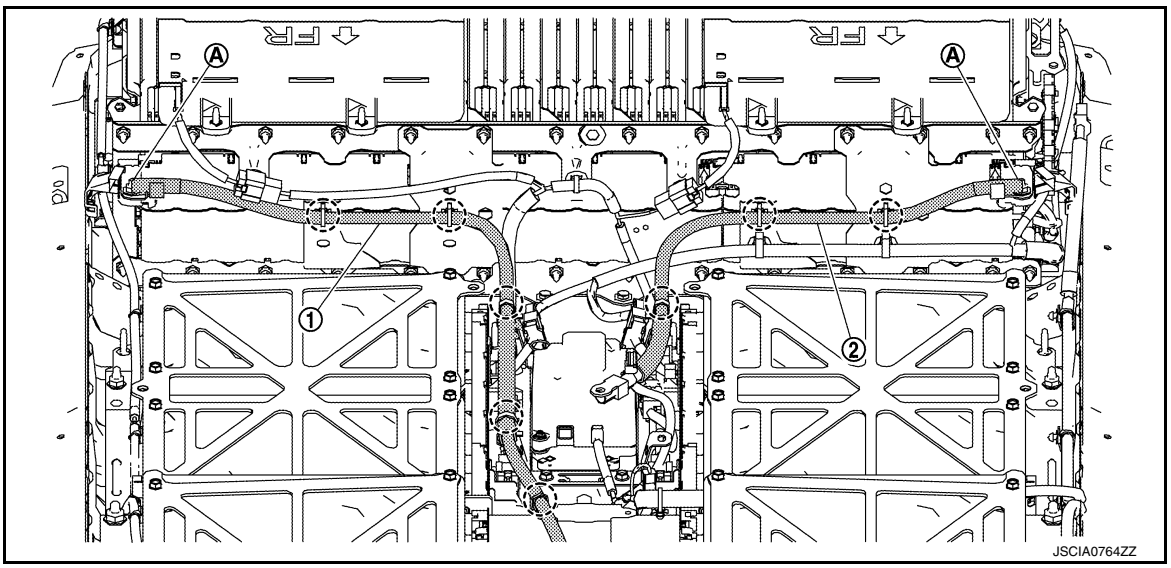


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **Because there is a risk of electric shock, immediately protect the terminals of the disconnected high-voltage harness connector (high-voltage terminals) with insulating tape so that they are not exposed.**

19. Remove the mounting nuts Ⓐ, then remove high-voltage harness ① and ②.



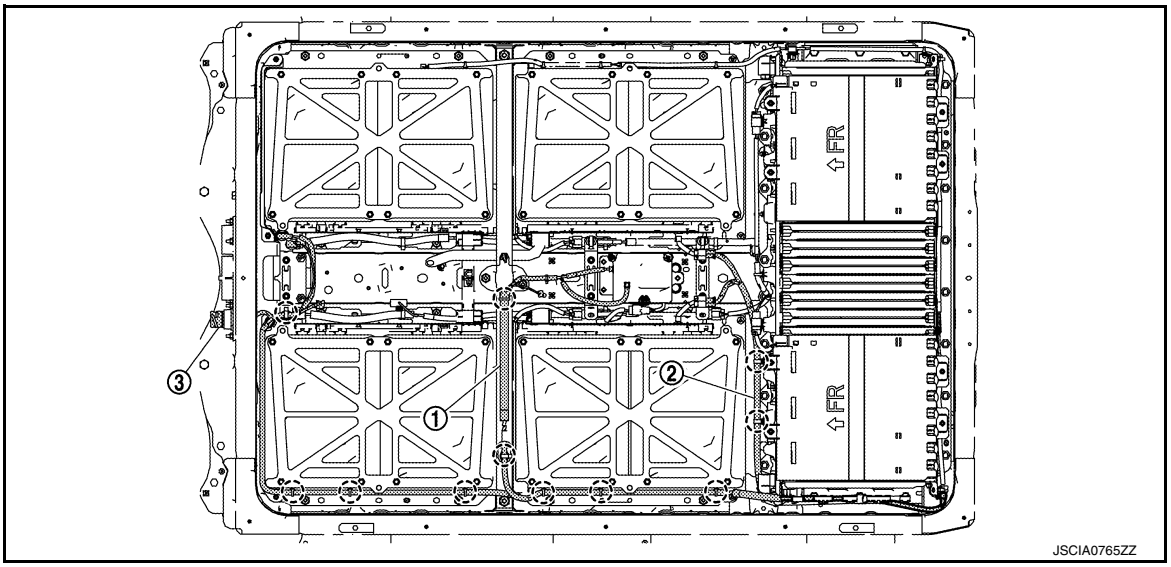
: Harness clip

DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **Because of the danger of electric shock, be sure to close the bus bar cover after removing the bus bar.**

20. Remove the vehicle communications harness and voltage detection harness.



① Vehicle communications harness ② Voltage detection harness ③ Snap ring

: Harness clip

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

ASSEMBLY

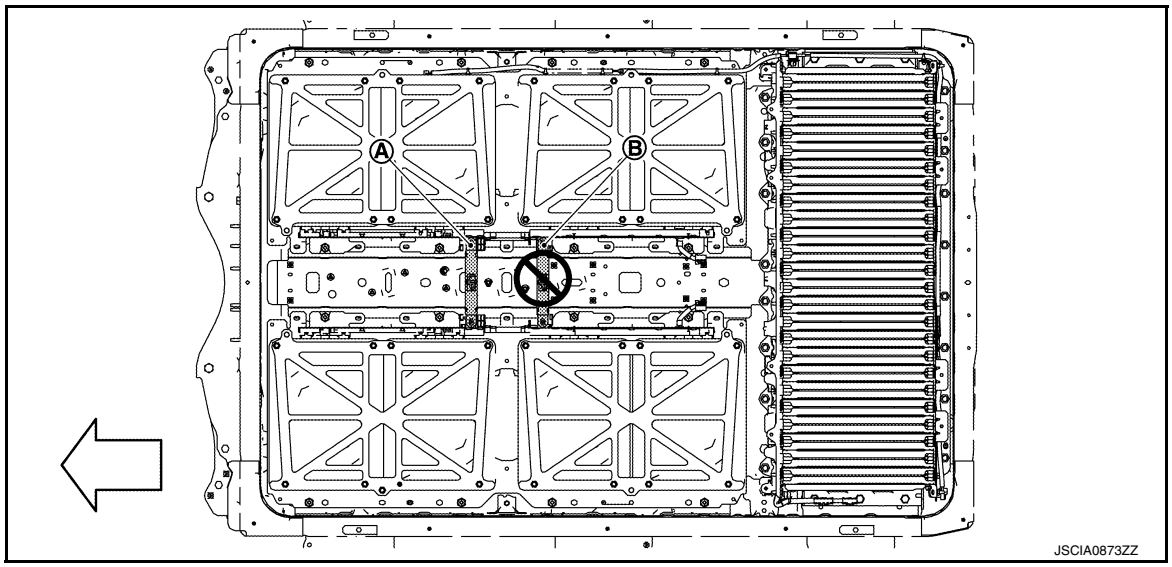
Note the following items, and disassembly in the reverse order of disassembly.

DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **Because there is a danger of electric shock and fire, never allow bus bar to contact a wrong terminal.**

- If bus bar contacts a wrong terminal, the circuit becomes energized and a short may occur.
- Always keep the bus bar cover closed until immediately before the installation of bus bar.
- Since the correct installation position for the bus bar connected to both front module stacks is commonly-confused with the wrong position Ⓑ, install the bus bar to the correct position Ⓐ with extreme caution.



Ⓐ Correct position

Ⓑ Wrong position

⇦ : Battery front

WARNING:

Install the Li-ion battery controller immediately before installing the battery pack upper case. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

CAUTION:

- **Perform the "LI-ION BATTERY JUNCTION BOX DATA CLEAR" when battery junction box is replaced. Refer to EVC-148, "Work Procedure".**
- **Be sure to reinstall the high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.**
- **Check the following items after installing battery pack: Refer to EVB-269, "Inspection".**

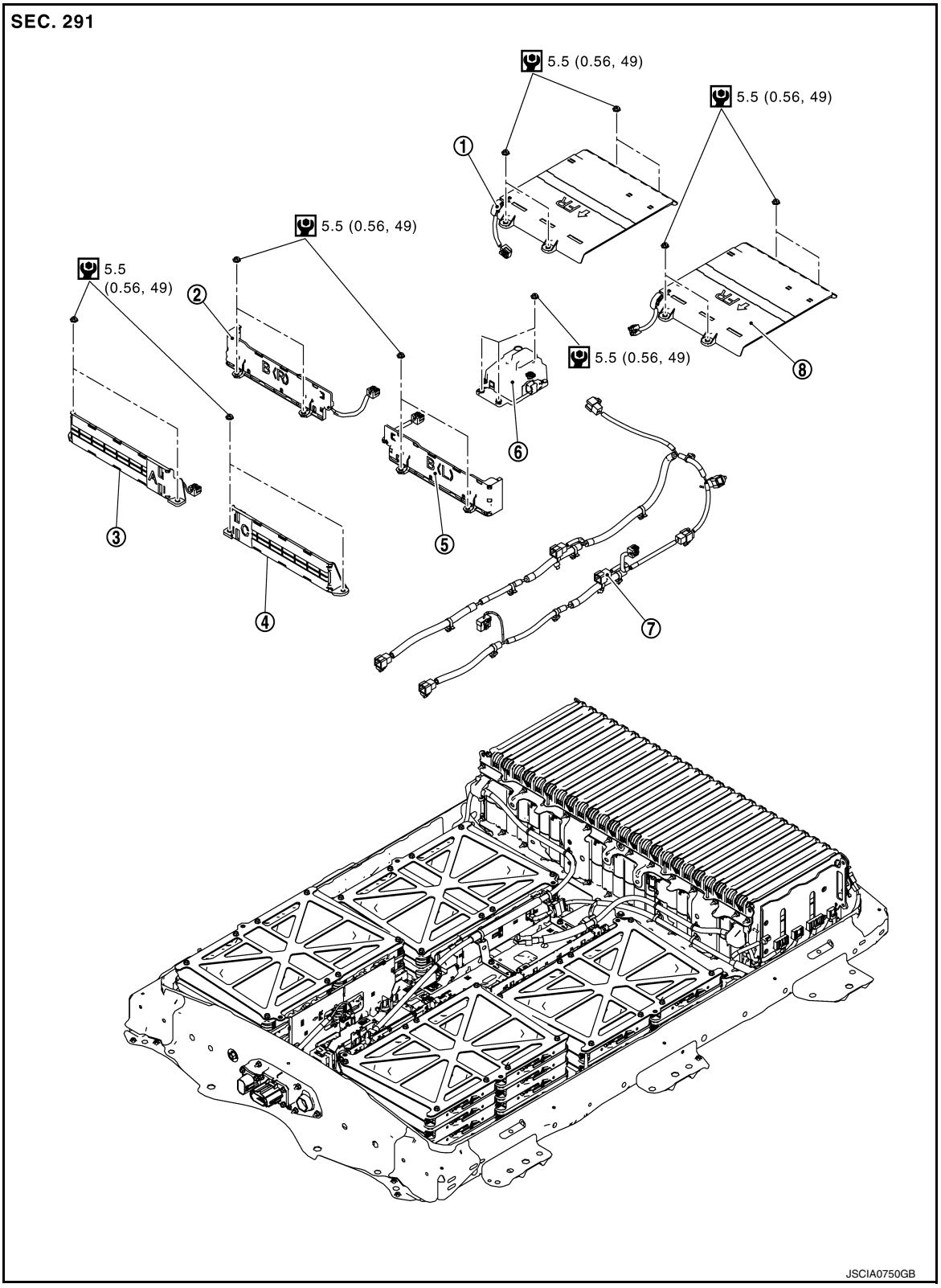
■AIR LEAK INSPECTION

■ELECTRIC EQUIPOTENTIAL TEST

LI-ION BATTERY HEATER

LI-ION BATTERY HEATER : Exploded view

INFOID:0000000009298679



① Li-ion battery heater RR2
② Li-ion battery heater RH2
③ Li-ion battery heater RH1
④ Li-ion battery heater LH1
⑤ Li-ion battery heater LH2
⑥ Li-ion battery heater relay unit

⑦ Li-ion battery heater harness ⑧ Li-ion battery heater RR1

: N·m (kg-m, in-lb)

LI-ION BATTERY HEATER : Disassembly and Assembly

INFOID:0000000009298680

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **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.**
- **Refer to EVB-6, "High Voltage Precautions".**
- **To prevent electric shock hazards, ignition, and damage to parts, always remove Li-ion battery controller before disassembling battery pack.**

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.

WORK ENVIRONMENT FOR DISASSEMBLY OF LI-ION BATTERY

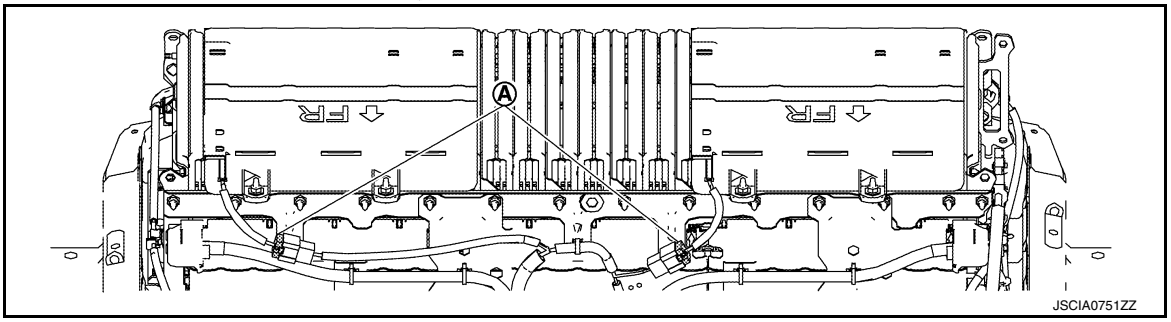
1. Must be an indoor environment.
   - The work environment must be able to be isolated from the outside by shutters or other means to prevent the intrusion of rain, snow, sand, and other substances.
   - The environment must prevent the entry of sweat during work, and also prevent condensation from occurring as a result of high temperature and humidity.
2. No entry of foreign materials.
   - In addition to being indoors, the environment must not permit the entry during disassembly work of metal powders, oil, or foreign substances resulting from causes such as servicing of other vehicles.
   - If there is any risk of the above, use a plastic curtain or other means to block off the work area, or take other necessary steps.
3. The floor must be dry.
   - The floor must not become wet as a result of causes such as vehicles entering when it is raining or snowing.
4. Work space
   - Space approximately the size of one vehicle must be secured as the disassembly space.
   - A sign indicating that disassembly is in progress or other measures must be taken so that persons other than the workers do not enter the work space.
5. Standard fire fighting equipment
   - Always place a standard fire fighting equipment in the disassembly work area.
   - Depending on type of fire (vehicle or battery) use standard fire fighting equipment (water or extinguisher).

REMOVAL

Li-Ion Battery Heater RR1 & RR2

1. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

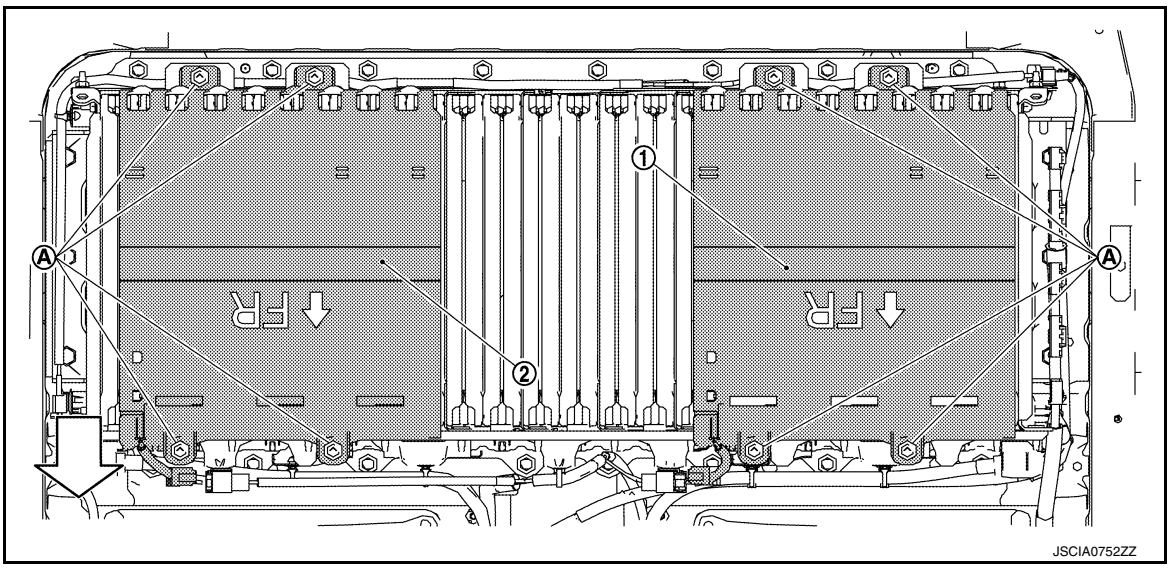
3. Disconnect the harness connectors Ⓐ.



WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

4. Remove mounting nuts Ⓐ and then remove Li-ion battery heaters.



① Li-ion battery heater RR1 ② Li-ion battery heater RR2

⇦ : Battery front

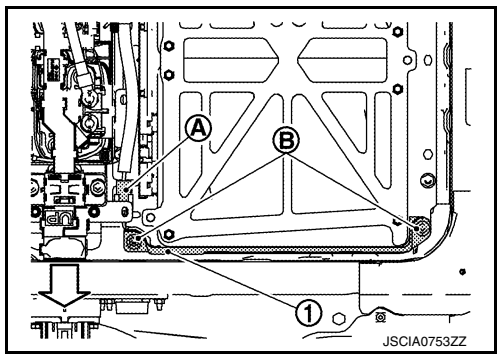
WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

Li-Ion Battery Heater LH1

1. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
3. Remove vehicle communication harness. Refer to EVB-219, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly".

4. Disconnect Li-ion battery heater LH1 harness connector Ⓐ.



⇦ : Battery front

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

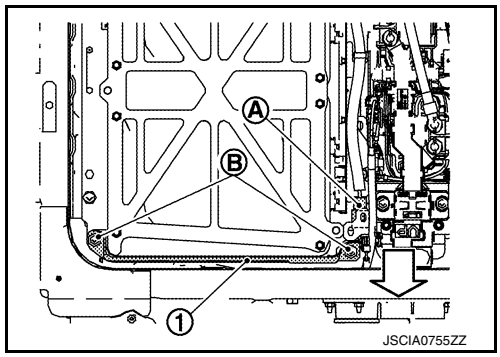
5. Remove mounting nuts Ⓑ and then remove Li-ion battery heater LH1 ①.

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

Li-Ion Battery Heater RH1

1. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
3. Disconnect Li-ion battery heater RH1 harness connector Ⓐ.



⇦ : Battery front

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

4. Remove mounting nuts Ⓑ and then remove Li-ion battery heater RH1 ①.

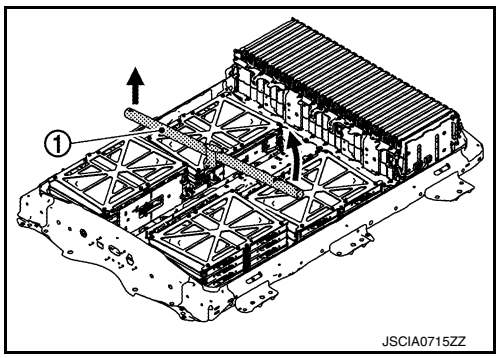
WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

Li-Ion Battery Heater LH2

1. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
3. Remove the following parts; Refer to EVB-219, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly".
   - Vehicle communication harness
   - Battery current sensor (integrated with bus bar)

4. Remove the battery member pipe ①.



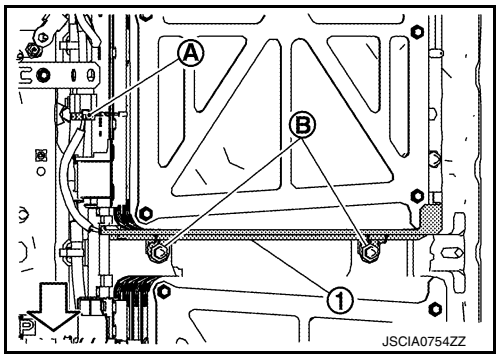
WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

NOTE:
The right-side mounting hole is larger for facilitating removal of the battery member pipe. Lifting up the left side first makes removal easier.

5. Disconnect Li-ion battery heater LH2 harness connector Ⓐ.

⇦ : Battery front



WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

6. Remove mounting nuts Ⓑ and then remove Li-ion battery heater LH2 ①.

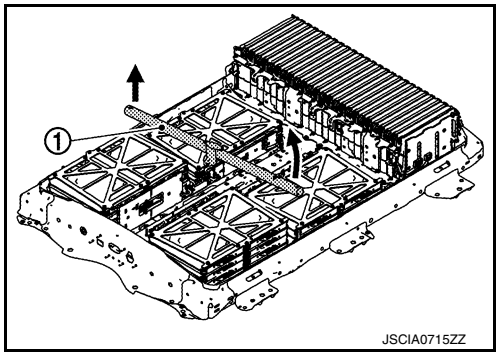
WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

Li-Ion Battery Heater RH2

1. Remove battery pack upper case. Refer to EVB-203, "BATTERY PACK UPPER CASE : Exploded View".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
3. Remove the following parts; Refer to EVB-219, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly".
   - Vehicle communication harness
   - Bus bar [Battery junction box – Front module stack (RH)]

4. Remove the battery member pipe ①.

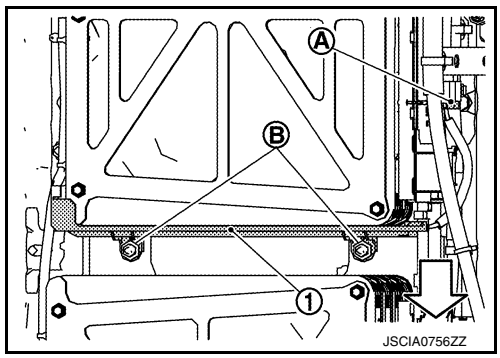


WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

NOTE:
The right-side mounting hole is larger for facilitating removal of the battery member pipe. Lifting up the left side first makes removal easier.

5. Disconnect Li-ion battery heater RH2 harness connector Ⓐ.



⇦ : Battery front

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

6. Remove mounting nuts Ⓑ and then remove Li-ion battery heater RH2 ①.

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

Li-ion battery heater harness

Remove Li-ion battery heater harness after front module stack is removed. Refer to EVB-239, "FRONT MODULE STACK : Removal and Installation".

INSTALLATION

Note the following, and install in the reverse order of removal.

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

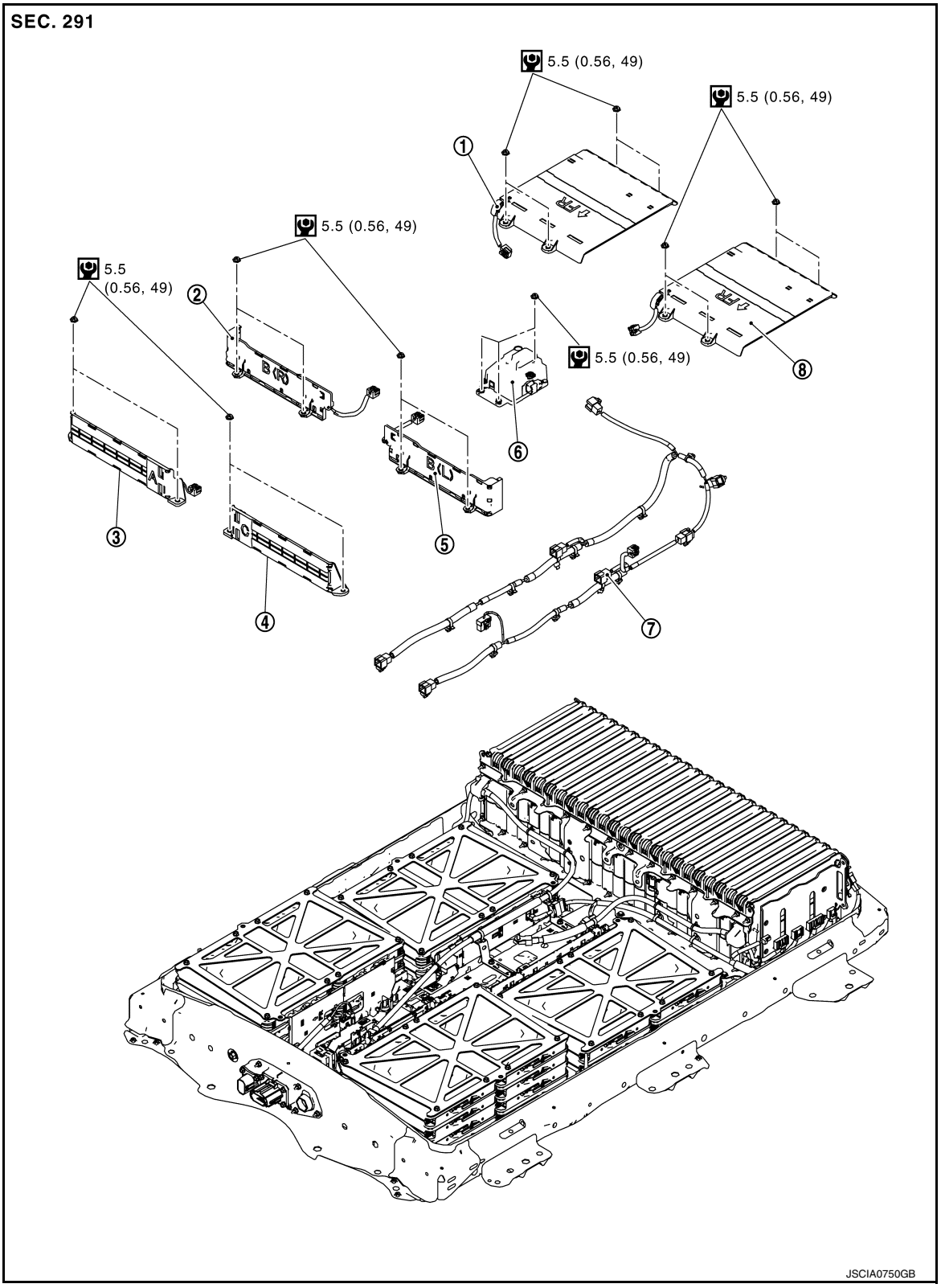
CAUTION:

- **Install Li-ion battery controller immediately before installing battery pack upper case. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".**
- **Be sure to reinstall the high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.**
- **Check the following items after installing battery pack: Refer to EVB-269, "Inspection".**
  ■AIR LEAK INSPECTION
  ■ELECTRIC EQUIPOTENTIAL TEST

LI-ION BATTERY HEATER RELAY UNIT

LI-ION BATTERY HEATER RELAY UNIT : Exploded view

INFOID:0000000009325593



① Li-ion battery heater RR2
② Li-ion battery heater RH2
③ Li-ion battery heater RH1
④ Li-ion battery heater LH1
⑤ Li-ion battery heater LH2
⑥ Li-ion battery heater relay unit

⑦ Li-ion battery heater harness ⑧ Li-ion battery heater RR1

: N·m (kg-m, in-lb)

LI-ION BATTERY HEATER RELAY UNIT : Disassembly and Assembly

INFOID:0000000009298682

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **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.**
- **Refer to EVB-6, "High Voltage Precautions".**
- **To prevent electric shock hazards, ignition, and damage to parts, always remove Li-ion battery controller before disassembling battery pack.**

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.

WORK ENVIRONMENT FOR DISASSEMBLY OF LI-ION BATTERY

1. Must be an indoor environment.
   - The work environment must be able to be isolated from the outside by shutters or other means to prevent the intrusion of rain, snow, sand, and other substances.
   - The environment must prevent the entry of sweat during work, and also prevent condensation from occurring as a result of high temperature and humidity.
2. No entry of foreign materials.
   - In addition to being indoors, the environment must not permit the entry during disassembly work of metal powders, oil, or foreign substances resulting from causes such as servicing of other vehicles.
   - If there is any risk of the above, use a plastic curtain or other means to block off the work area, or take other necessary steps.
3. The floor must be dry.
   - The floor must not become wet as a result of causes such as vehicles entering when it is raining or snowing.
4. Work space
   - Space approximately the size of one vehicle must be secured as the disassembly space.
   - A sign indicating that disassembly is in progress or other measures must be taken so that persons other than the workers do not enter the work space.
5. Standard fire fighting equipment
   - Always place a standard fire fighting equipment in the disassembly work area.
   - Depending on type of fire (vehicle or battery) use standard fire fighting equipment (water or extinguisher).

DISASSEMBLY

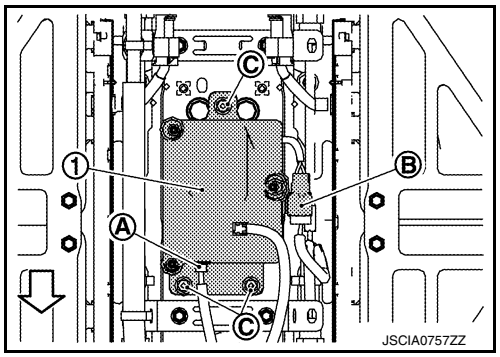
1. Remove battery pack upper case. Refer to EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
3. Remove the following; Refer to EVB-219, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly".
   - Battery current sensor (integrated with bus bar)
   - Service plug switch bracket

4. Disconnect harness connector Ⓐ and heater harness connector Ⓑ.

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

5. Remove mounting nuts Ⓒ and then remove the Li-ion battery heater relay unit ①.



ASSEMBLY

Assemble in the reverse order of disassembly.

WARNING:

To prevent electric shock hazards, be sure to put on insulated protective gear and use insulated tools.

CAUTION:

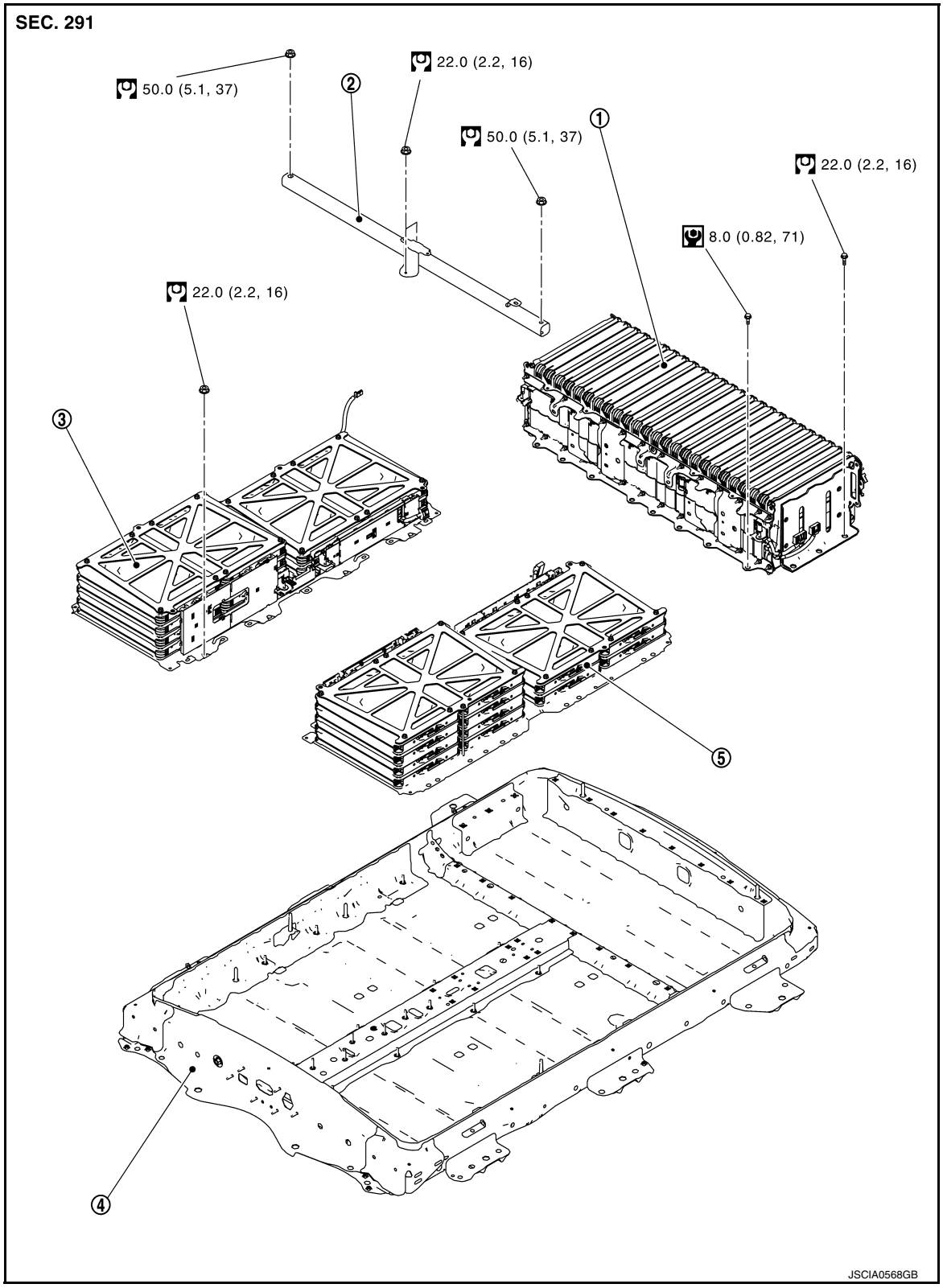
- **Check the following items after installing battery pack: Refer to EVB-269, "Inspection".**
  - **■AIR LEAK INSPECTION**
  - **■ELECTRIC EQUIPOTENTIAL TEST**
- **Install Li-ion battery controller immediately before installing battery pack upper case.**

FRONT MODULE STACK

FRONT MODULE STACK : Exploded View

INFOID:0000000009298683

REMOVAL AND INSTALLATION

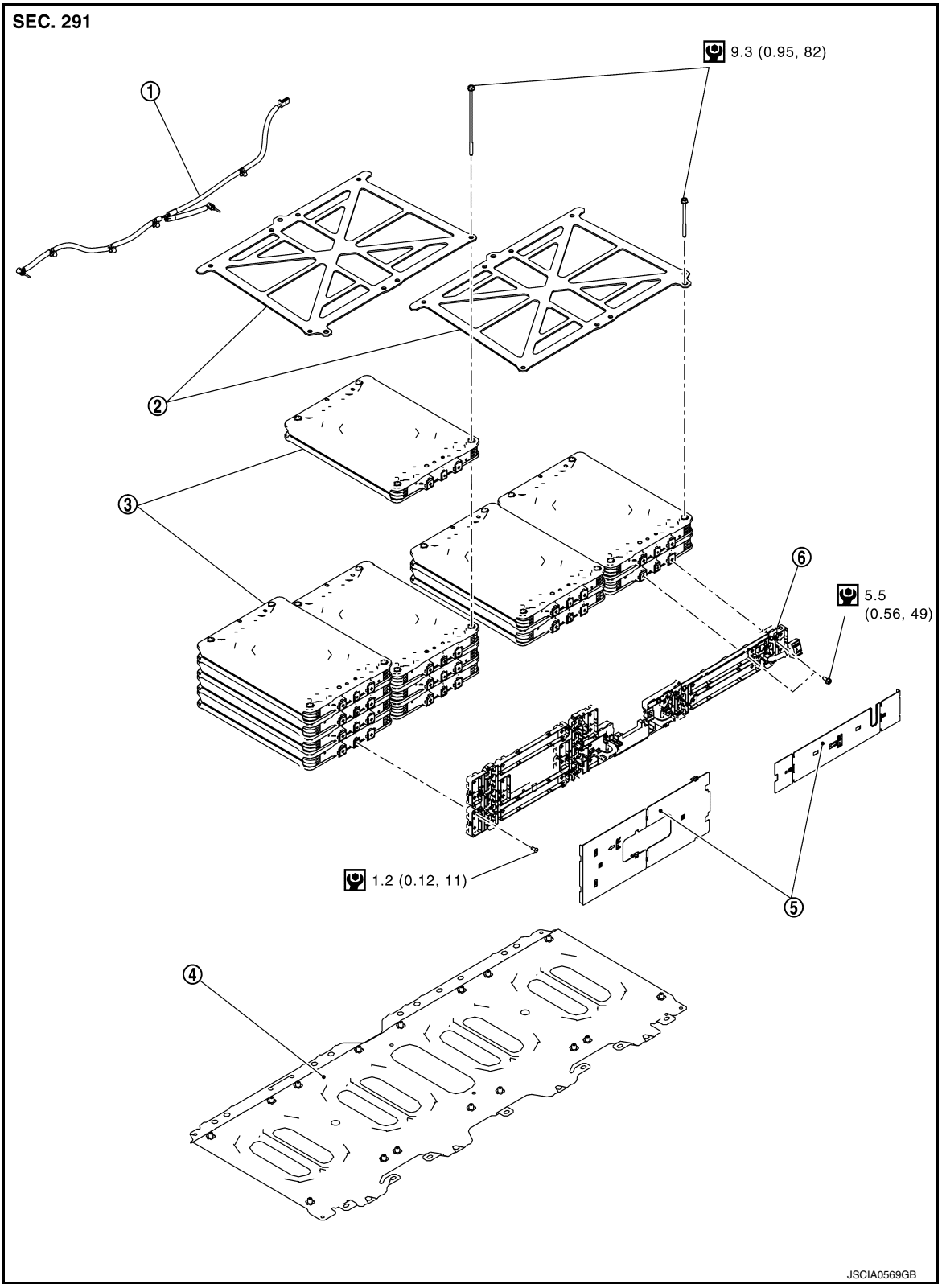


① Rear module stack
② Battery member pipe
③ Front module stack RH
④ Battery pack lower case
⑤ Front module stack LH

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

SEC. 291

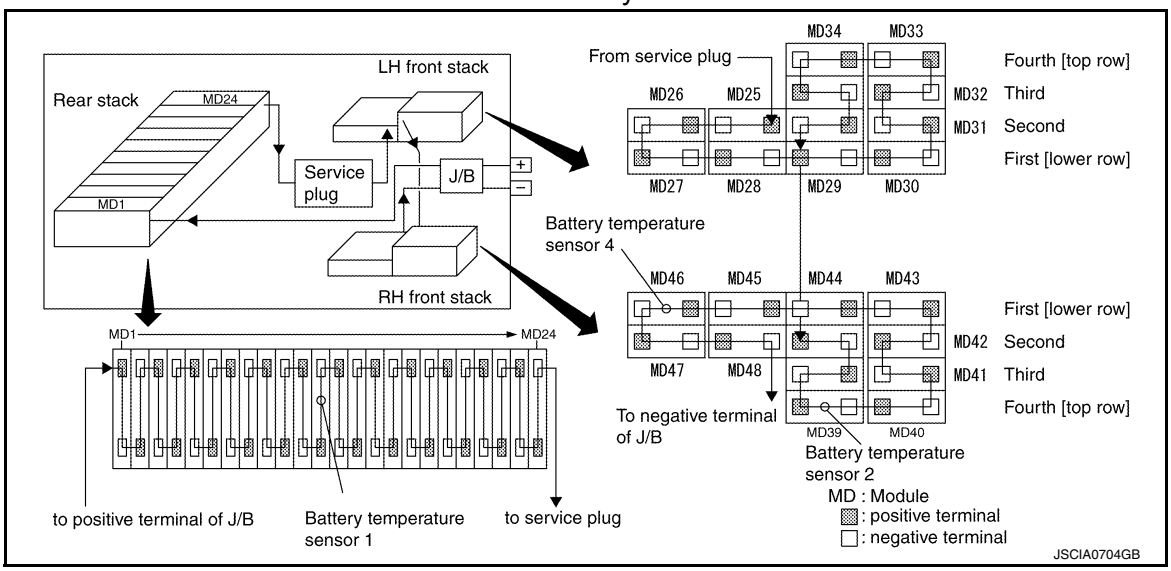


① Battery temperature sensor harness (front)
② End plate
③ Module
④ Sub frame
⑤ Bus bar cover
⑥ Bus bar module

: N·m (kg-m, in-lb)

NOTE:
The figure shows the right front.

Module layout

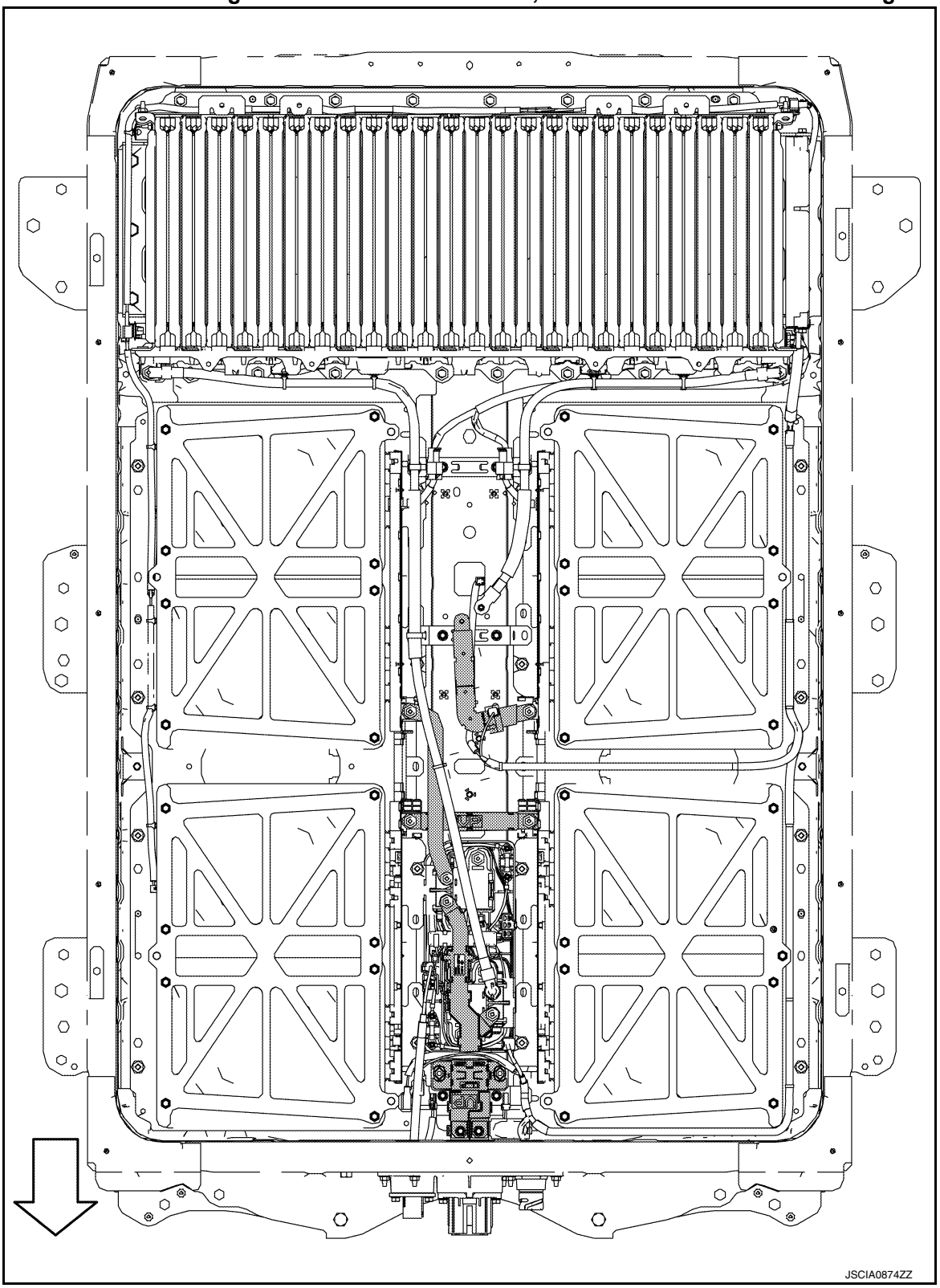


Left front module stack			Right front module stack		
Module No.	Module name	Cell No.	Module No.	Module name	Cell No.
MD25	Module A	49 & 50	MD37	Module A	73 & 74
MD26	Module A	51 & 52	MD38	Module A	75 & 76
MD27	Module A	53 & 54	MD39	Module A	77 & 78
MD28	Module A	55 & 56	MD40	Module A	79 & 80
MD29	Module A	57 & 58	MD41	Module A	81 & 82
MD30	Module A	59 & 60	MD42	Module A	83 & 84
MD31	Module A	61 & 62	MD43	Module A	85 & 86
MD32	Module A	63 & 64	MD44	Module A	87 & 88
MD33	Module A	65 & 66	MD45	Module A	89 & 90
MD34	Module A	67 & 68	MD46	Module A	91 & 92
MD35	Module A	69 & 70	MD47	Module A	93 & 94
MD36	Module A	71 & 72	MD48	Module A	95 & 96

Bus bar Layout

DANGER:

Because there is a danger of electric shock and fire, never contact bus bar in a wrong terminal.



⇦ : Battery front

FRONT MODULE STACK : Removal and Installation

INFOID:0000000009298684

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to 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 pocket and carry it or store it in a tool box or other container so that another person does not accidentally connect it while work is in progress.**
- **Be sure to put on insulating protective gear 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 components with an anti-static cover sheet or similar item to prevent contact with other persons.**
- **Refer to EVB-6, "High Voltage Precautions".**
- **If the battery pack is to be disassembled, be sure to remove the Li-ion battery controller for preventing electric shock, fire, and damage to parts.**

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.

ENVIRONMENT FOR LI-ION BATTERY DISASSEMBLY WORK

1. Must be an indoor environment.
   - The environment must utilize a shutter or other means to shut out the outside environment and prevent rain, snow, dust, or other substances from entering.
   - The environment must not cause the intrusion of sweat during work, or cause condensation to occur due to high temperature or humidity.
2. Metal powder, grease, and other foreign substances must not enter.
   - The indoor environment must also prevent metal powder, grease, and other foreign substances from entering due to maintenance performed on other vehicles and other sources during disassembly work.
   - If there is a risk of the above substances entering, take appropriate countermeasures, such as use of a vinyl curtain or an equivalent to shut out the outside environment.
3. The floor must be dry.
   - The floor must not be wet as a result of factors such as vehicle entry during rain or snow.
4. Work space
   - The work space must be approximately the size of one entire vehicle.
   - Take appropriate countermeasures so that persons other than the operator do not enter the work space, such as by placing signs indicating that disassembly work is in progress.
5. Standard fire fighting equipment
   - Always place a standard fire fighting equipment in the disassembly work area.
   - Depending on type of fire (vehicle or battery) use standard fire fighting equipment (water or extinguisher).

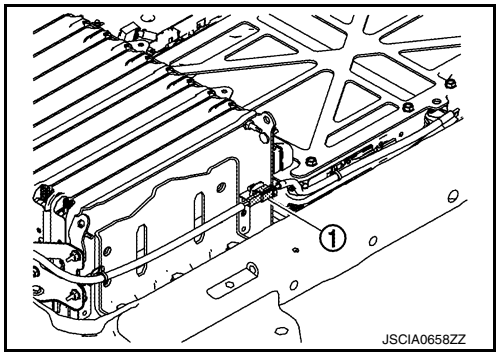
REMOVAL

1. Remove the battery pack upper case. EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
3. Remove the following parts. Refer to EVB-219, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Disassembly and Assembly".
   - Battery junction box
   - Service plug switch bracket
   - High-voltage battery harnesses
   - Vehicle communications harness
   - Voltage detection harness
   - Harness brackets

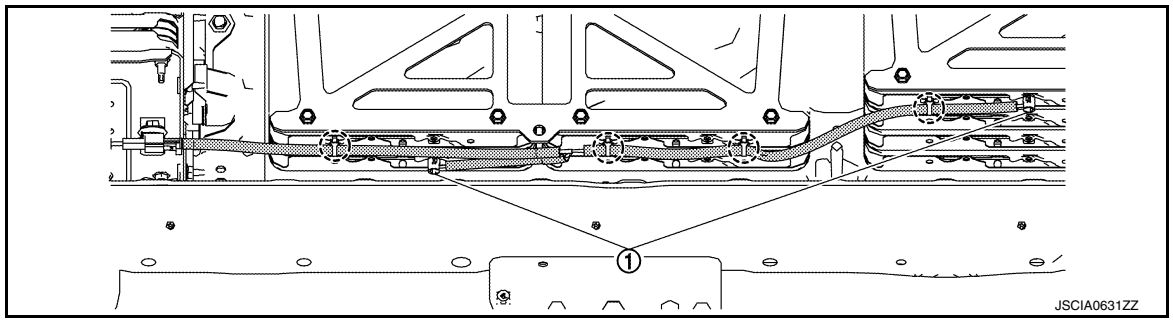
4. Disconnect the harness connector ① between the battery temperature sensor harness (front) and the battery temperature sensor harness (rear).

WARNING:

To prevent electric shock, wear insulated protective gear.



5. Remove the battery temperature sensor harness (front) ① from the front module stack RH.



: Harness clip

WARNING:

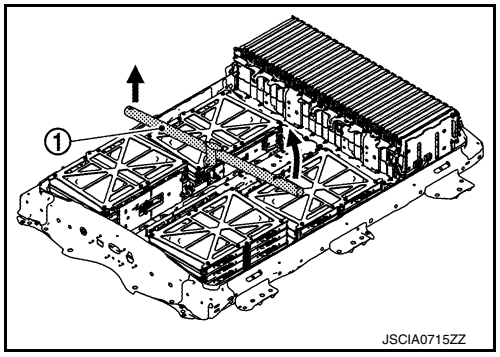
To prevent electric shock, wear insulated protective gear and use insulated tools.

6. Remove the battery member pipe ①.

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

NOTE:
The right-side mounting hole is larger for facilitating removal of the battery member pipe. Lifting up the left side first makes removal easier.

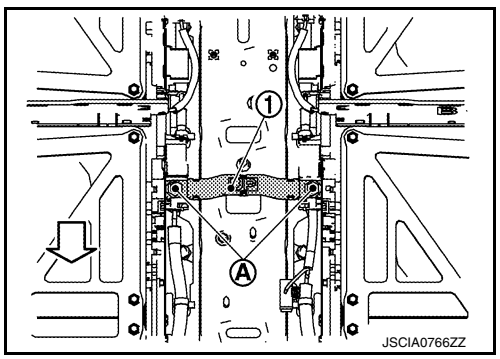


7. Remove the mounting nuts Ⓐ, then remove the bus bar ① which connects the left and right front module stacks.

⇦ : Battery front

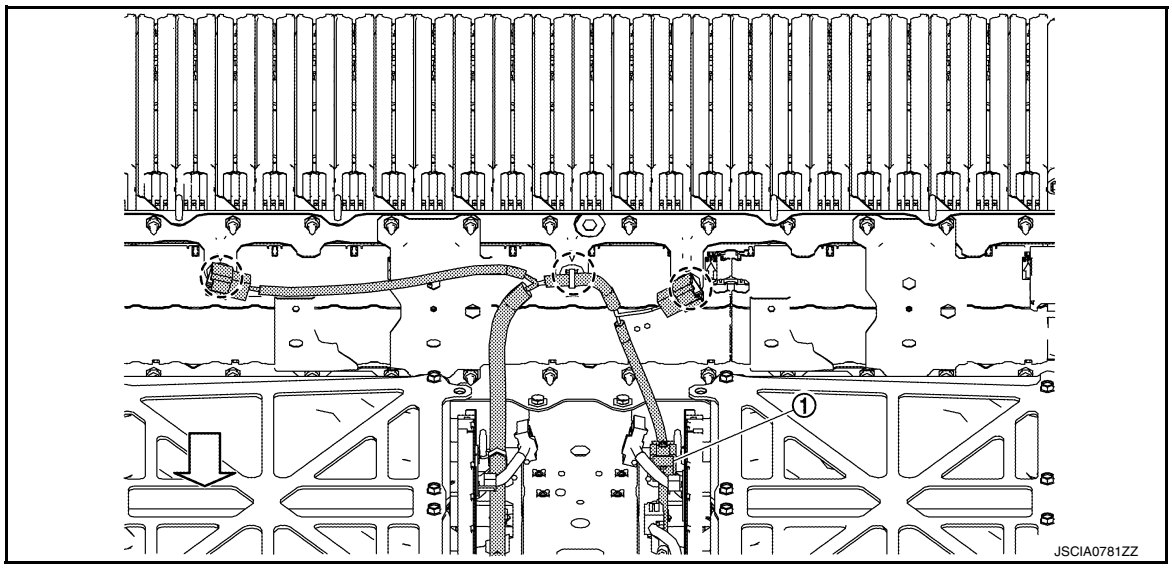
DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**



- **Because there is a danger of electric shock, be sure to close the bus bar cover after removing the bus bar.**

8. Remove the following parts. Refer to EVB-228, "LI-ION BATTERY HEATER : Disassembly and Assembly".
   - Li-ion battery heater RH1
   - Li-ion battery heater RH2
   - Li-ion battery heater LH1
   - Li-ion battery heater LH2
9. Remove the Li-ion battery heater relay unit. Refer to EVB-234, "LI-ION BATTERY HEATER RELAY UNIT : Disassembly and Assembly".
10. Disconnect the Li-ion battery heater harness connector ①. And then remove the harness clips and move them to a location where they do not inhibit with work.



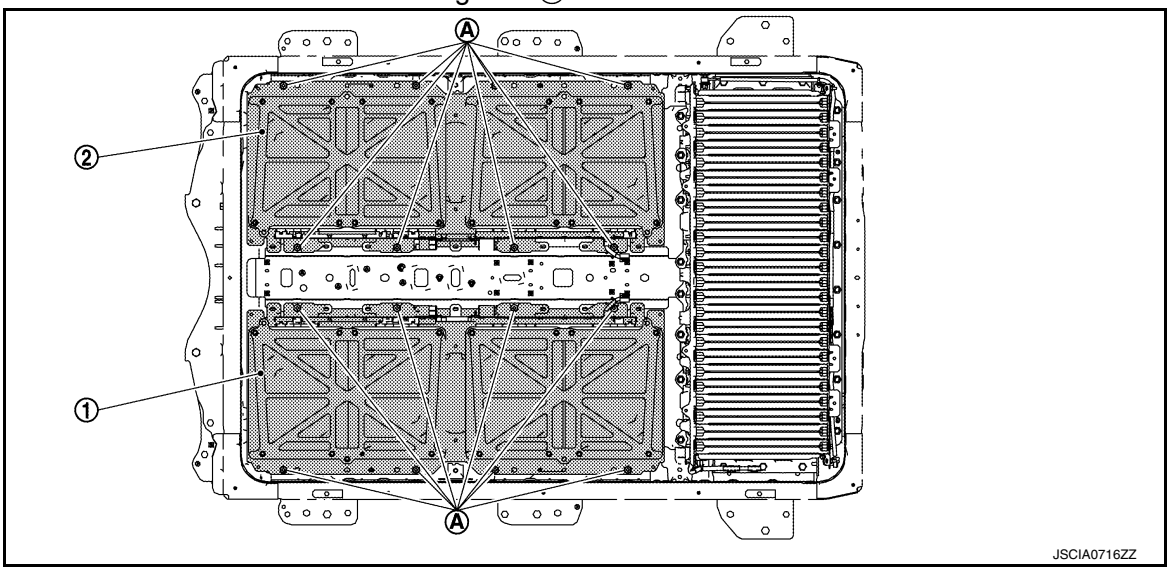
◌ : Harness clip

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

11.

12. Remove the front module stack mounting nuts Ⓐ.



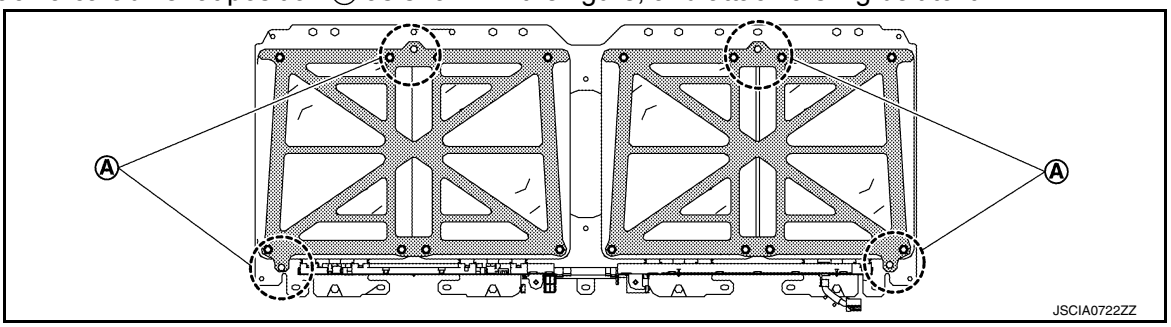
① Front module stack LH ② Front module stack RH

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

13. Follow the procedure below and remove the front module stack from the battery pack.

a. Attach a carabiner at position Ⓐ as shown in the figure, and attach a sling belt to it.



WARNING:

To prevent electric shock, wear insulated protective gear.

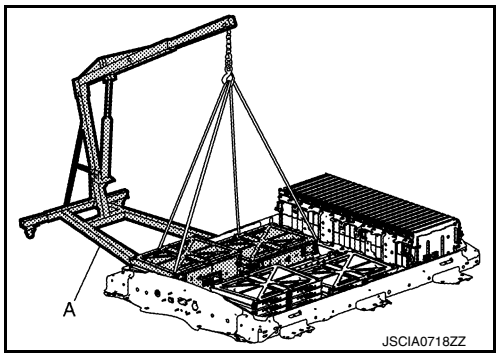
b. Use the engine frame (A) and lift up the front module stack.

WARNING:

To prevent electric shock, wear insulated protective gear.

CAUTION:

Do not move the engine crane when the front module stack is lifted up.



c. Move the battery pack and place the workbench below the front module stack.

WARNING:

To prevent electric shock, wear insulated protective gear.

CAUTION:

Place the removed battery pack upper case onto the battery pack for storage.

d. Place the front module stack onto the workbench.

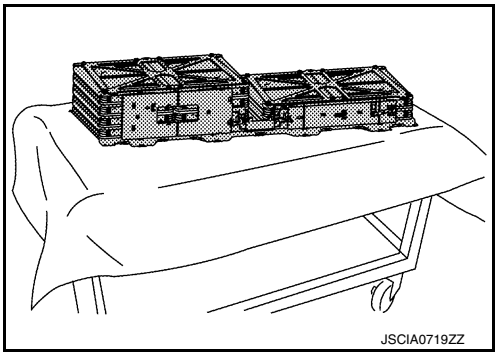
WARNING:

- **To prevent electric shock, wear insulated protective gear.**

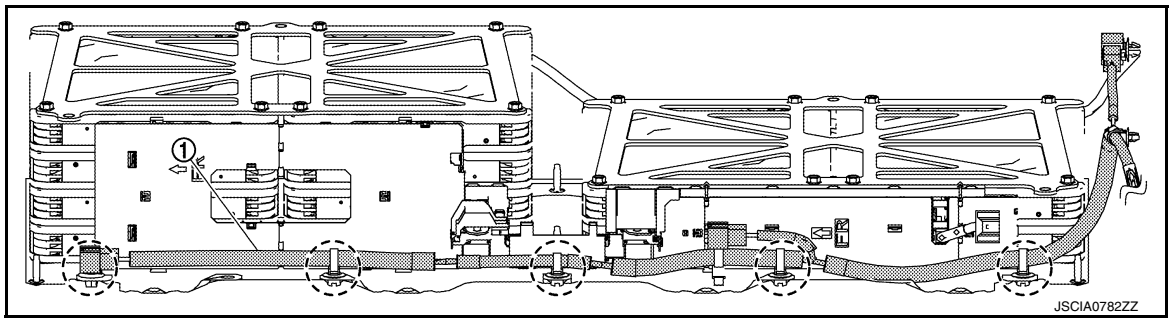
- **Because there is a risk of electric shock, lay an anti-static rubber sheet on the workbench.**

NOTE:

The figure shows the front module stack RH.



14. Remove the Li-ion battery heater harness ①.



◌ : Harness clip

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

INSTALLATION

Note the following items, and disassembly in the reverse order of disassembly.

DANGER:

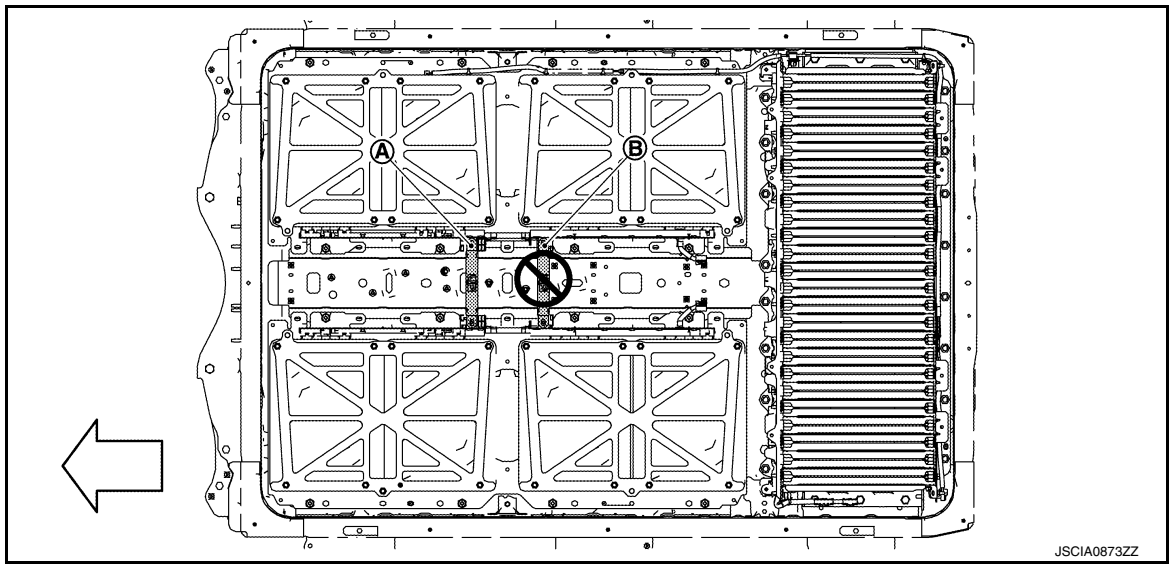
- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **Because there is a danger of electric shock and fire, never allow bus bar to contact a wrong terminal.**

- If bus bar contacts a wrong terminal, the circuit becomes energized and a short may occur.

- Always keep the bus bar cover closed until immediately before the installation of bus bar.

- **Since the correct installation position for the bus bar connected to both front module stacks is commonly-confused with the wrong position Ⓑ, install the bus bar to the correct position Ⓐ with extreme caution.**



Ⓐ Correct position
Ⓑ Wrong position
⇦ : Battery front

WARNING:

Install the Li-ion battery controller immediately before installing the battery pack upper case. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".

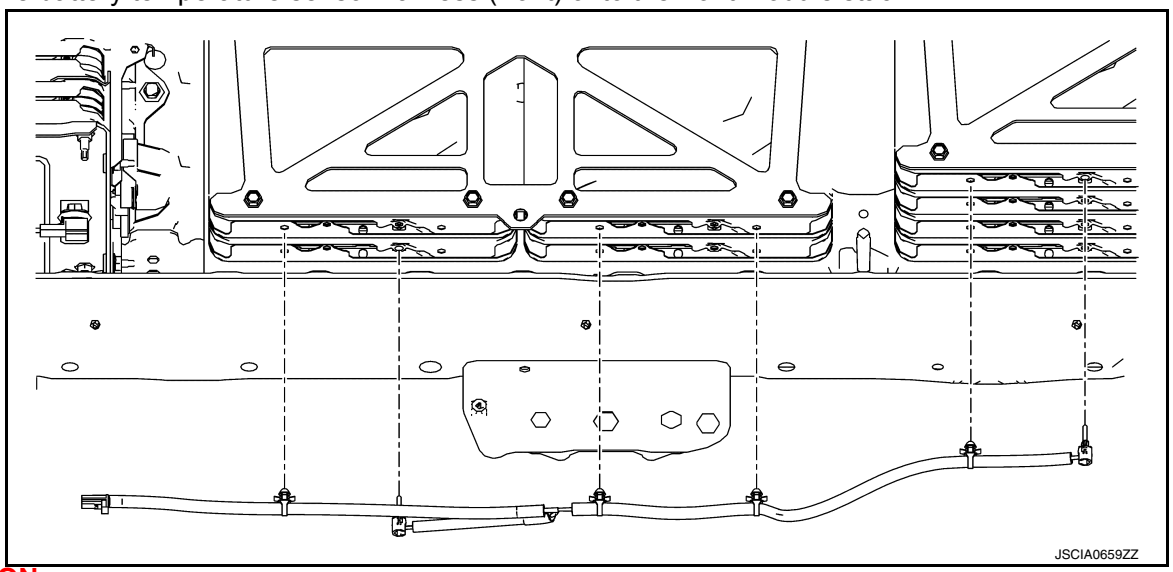
EV Battery Tracking Identification Seal

When replacing the Li-ion battery with a new battery, perform the following operation.

1. Enter the date of the (replacement) work on the EV battery tracking identification seal that is packaged together with the new part.
2. Cut the EV battery tracking identification tool into 2 pieces and apply them to the body of the replaced (old) LI-ion battery and to the “Li-ion battery replacement history record”.
3. Enter the necessary information in the “Li-ion battery replacement history record”.

Battery Temperature Sensor Harness (Front)

Install the battery temperature sensor harness (front) onto the front module stack RH.



CAUTION:

- **Be sure to reinstall the high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.**
- **Check the following items after installing battery pack: Refer to EVB-269, "Inspection".**

■AIR LEAK INSPECTION

■ELECTRIC EQUIPOTENTIAL TEST

NOTE:

Install the battery temperature sensor onto module No. MD39 and MD46.

FRONT MODULE STACK : Disassembly and Assembly

INFOID:0000000009298685

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to 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 pocket and carry it or store it in a tool box or other container so that another person does not accidentally connect it while work is in progress.**
- **Be sure to put on insulating protective gear 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 components with an anti-static cover sheet or similar item to prevent contact with other persons.**
- **Refer to EVB-6, "High Voltage Precautions".**
- **If the battery pack is to be disassembled, be sure to remove the Li-ion battery controller for preventing electric shock, fire, and damage to parts.**

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.

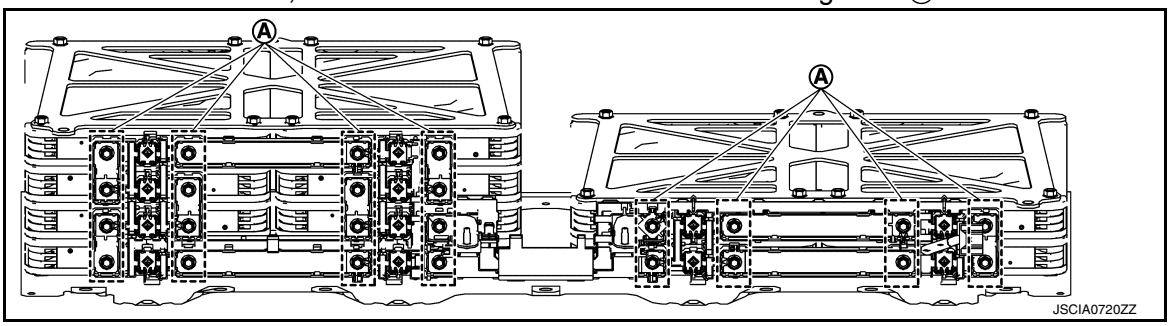
ENVIRONMENT FOR LI-ION BATTERY DISASSEMBLY WORK

1. Must be an indoor environment.
   - The environment must utilize a shutter or other means to shut out the outside environment and prevent rain, snow, dust, or other substances from entering.
   - The environment must not cause the intrusion of sweat during work, or cause condensation to occur due to high temperature or humidity.
2. Metal powder, grease, and other foreign substances must not enter.
   - The indoor environment must also prevent metal powder, grease, and other foreign substances from entering due to maintenance performed on other vehicles and other sources during disassembly work.
   - If there is a risk of the above substances entering, take appropriate countermeasures, such as use of a vinyl curtain or an equivalent to shut out the outside environment.
3. The floor must be dry.
   - The floor must not be wet as a result of factors such as vehicle entry during rain or snow.
4. Work space
   - The work space must be approximately the size of one entire vehicle.
   - Take appropriate countermeasures so that persons other than the operator do not enter the work space, such as by placing signs indicating that disassembly work is in progress.
5. Standard fire fighting equipment
   - Always place a standard fire fighting equipment in the disassembly work area.
   - Depending on type of fire (vehicle or battery) use standard fire fighting equipment (water or extinguisher).

DISASSEMBLY

1. Follow the procedure below and remove the bus bar module from the front module stack.

a. Remove the bus bar cover, then remove the module terminal mounting bolts Ⓐ.

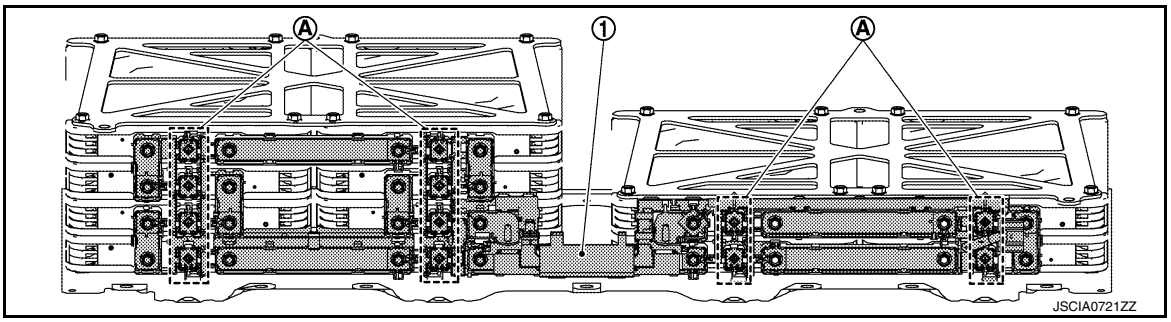


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

b. Remove the voltage detection terminal mounting screws Ⓐ, then remove the bus bar module ① from the front module stack.

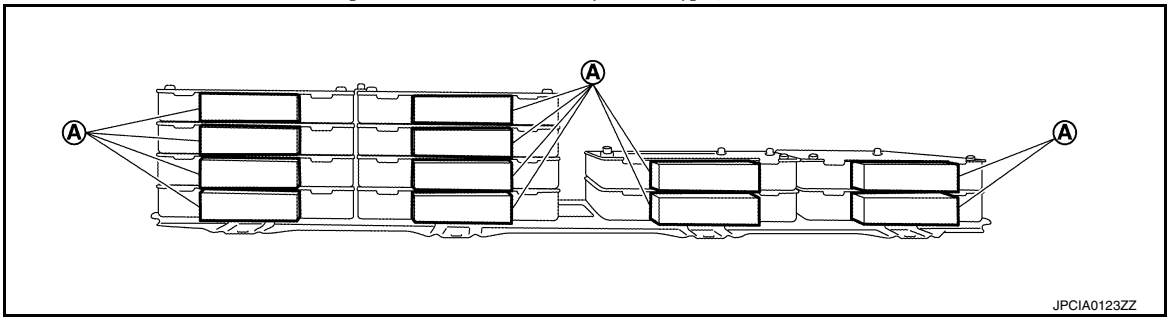


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

c. Install a module terminal cover [SST: KV99111500 (—)] Ⓐ onto all module terminals.



WARNING:

To prevent electric shock, wear insulated protective gear.

2. Remove the end plate and disassemble the front module stack.

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

ASSEMBLY

1. When replacing the Li-ion battery with a new battery, perform the following operation.

a. Enter the date of the (replacement) work on the EV battery tracking identification seal that is packaged together with the new part.

b. Cut the EV battery tracking identification tool into 2 pieces and apply them to the body of the replaced (old) LI-ion battery and to the “Li-ion battery replacement history record”.

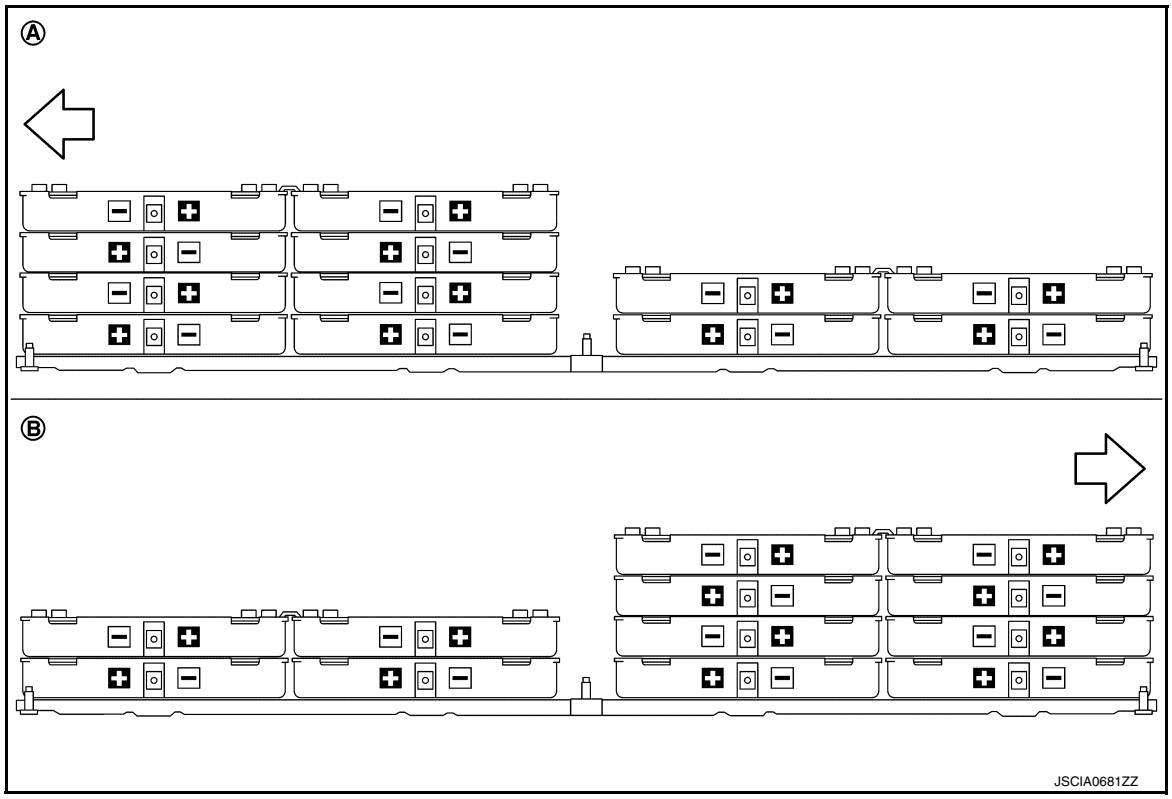
c. Enter the necessary information in the “Li-ion battery replacement history record”.

2. Follow the procedure below to assemble the front module stack.

DANGER:

There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.

a. Assemble the module so that the module terminals are arranged as shown in the figure.



Ⓐ Right module stack

Ⓑ Left module stack

⇦ : Battery front

WARNING:

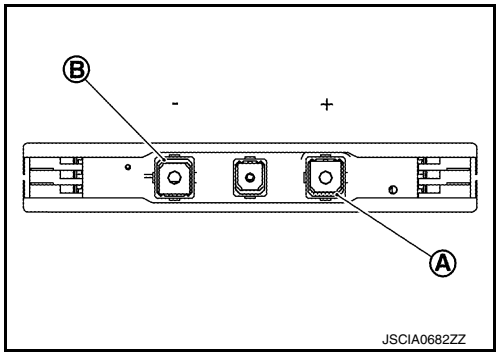
Be careful of the directions of the + terminal and – terminal when assembling the module. If the polarity is incorrect, there is a risk of electric shock, fire, and component damage.

NOTE:

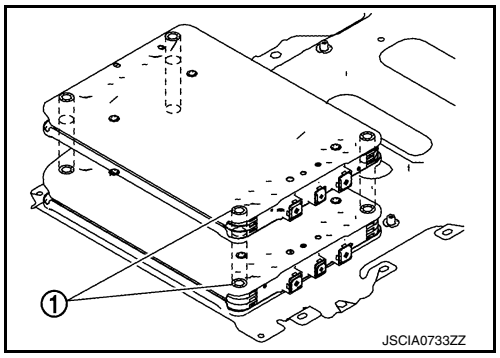
- To identify the module + terminal and – terminal, refer to the figure.

  + terminal identification color Ⓐ : Red

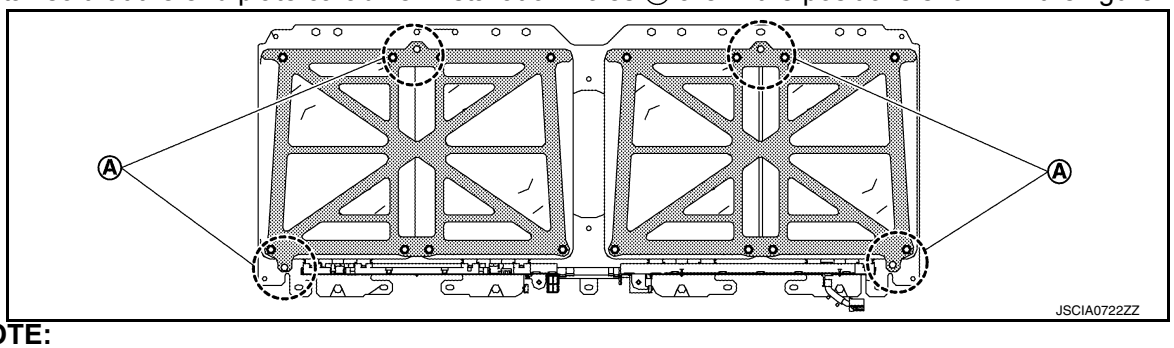
  – terminal identification color Ⓑ : Black



- Install the module while aligning the position of the module collar ①.



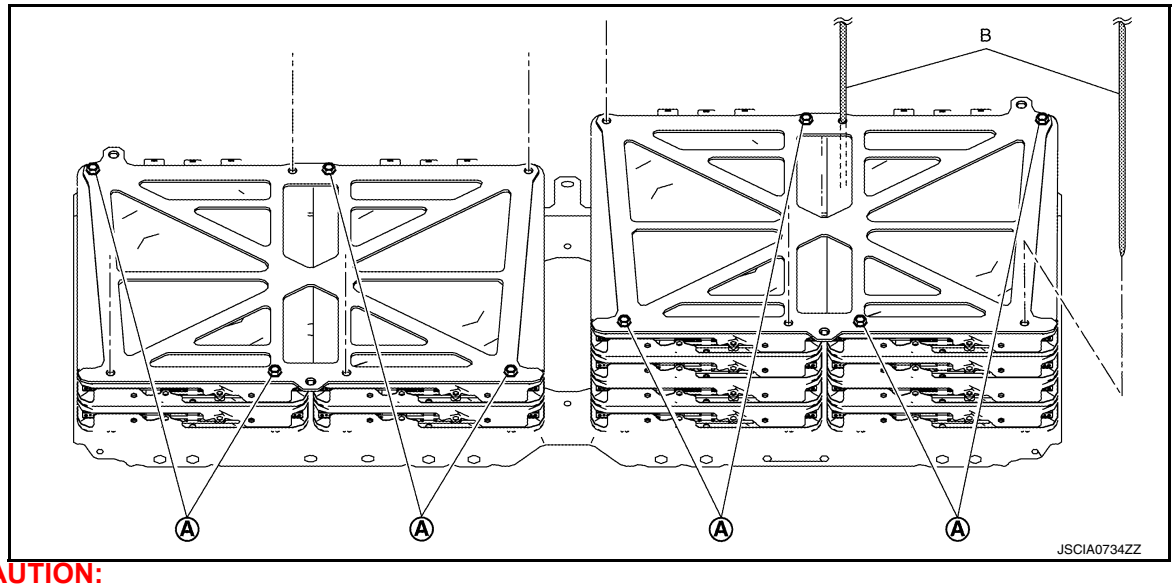
b. Install so that the end plate carabiner installation holes Ⓐ are in the positions shown in the figure.



NOTE:

There are 2 end plates, each with different carabiner installation hole positions. If they are installed reversed, the carabiner installation hole is positioned on the inside and lifting up is not possible.

c. Install the mounting bolts Ⓐ at opposite corners for each module, then insert ϕ7 mm (0.28 in) metal bars (B) into the empty bolt holes and perform centering of the module collar position.



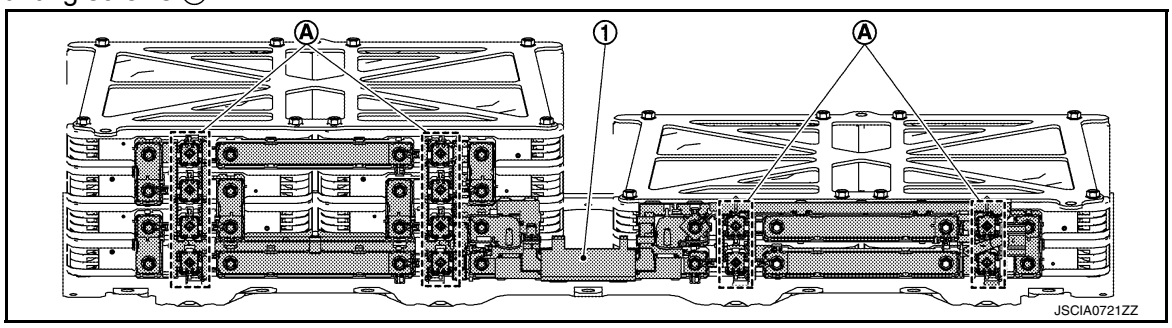
CAUTION:

If the collar position is incorrect, there is a risk of the bolts loosening because they are not supported by the collar between the modules.

d. Tighten the mounting bolt to the specified torque.

3. Follow the following procedure and install the bus bar module onto the front module stack.

a. Install the bus bar module ①, then use an insulated torque driver to tighten the voltage detection terminal mounting screws Ⓐ.

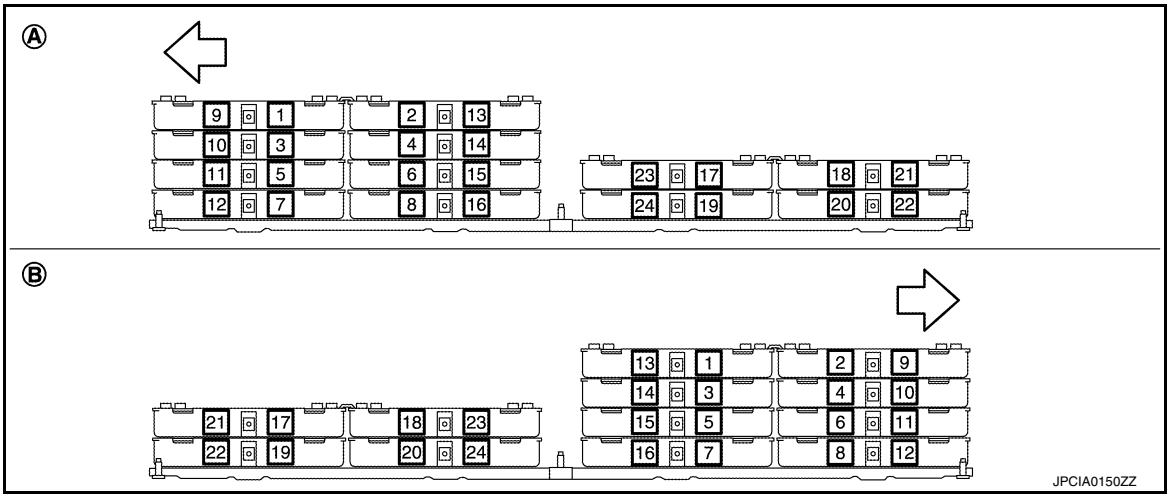


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

b. Tighten the module terminal mounting bolts in numerical order as shown in the figure.



Ⓐ Right module stack

Ⓑ Left module stack

⇦ : Battery front

DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

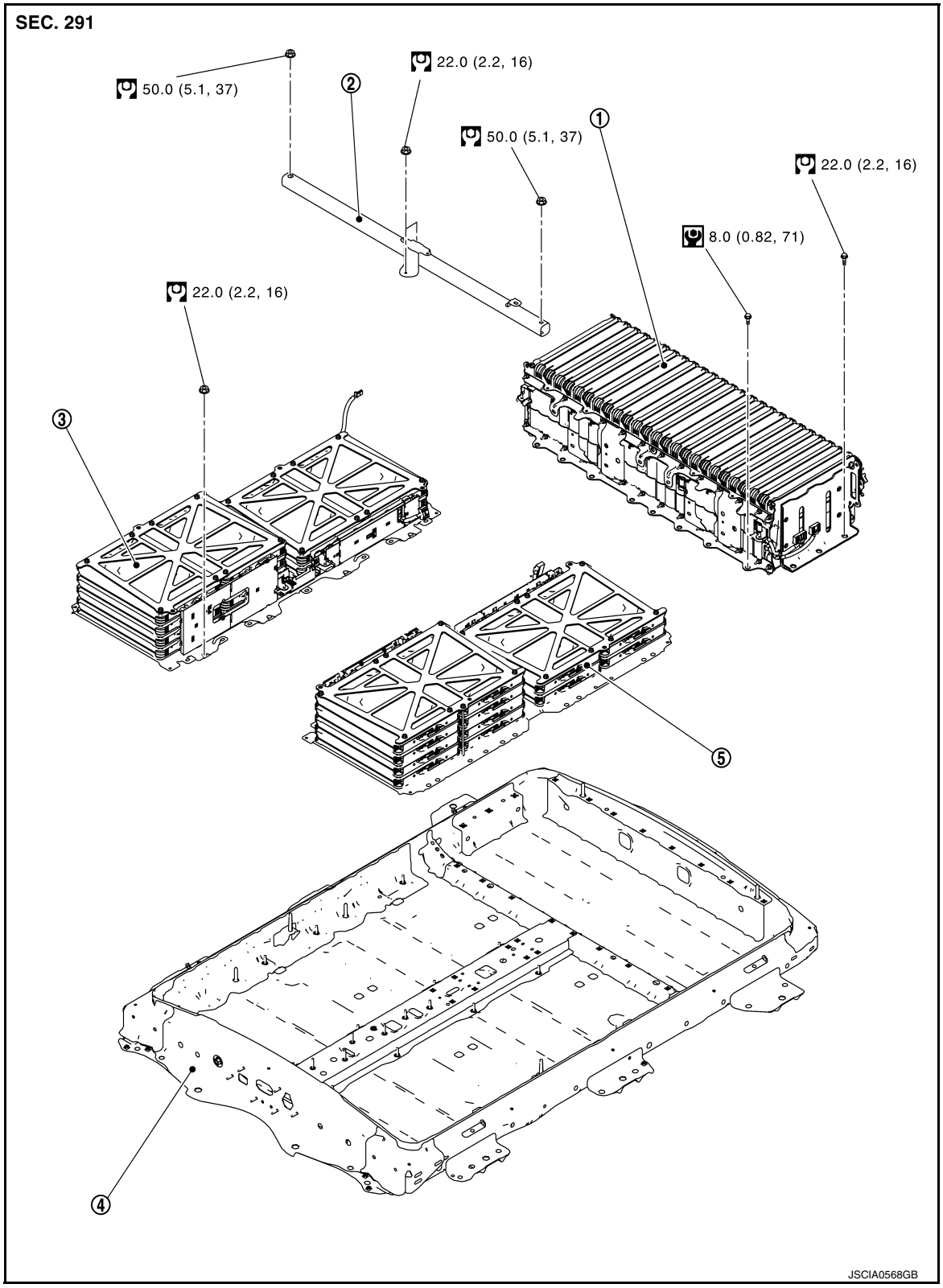
c. Install the bus bar cover.

REAR MODULE STACK

REAR MODULE STACK : Exploded View

INFOID:0000000009298686

REMOVAL AND INSTALLATION

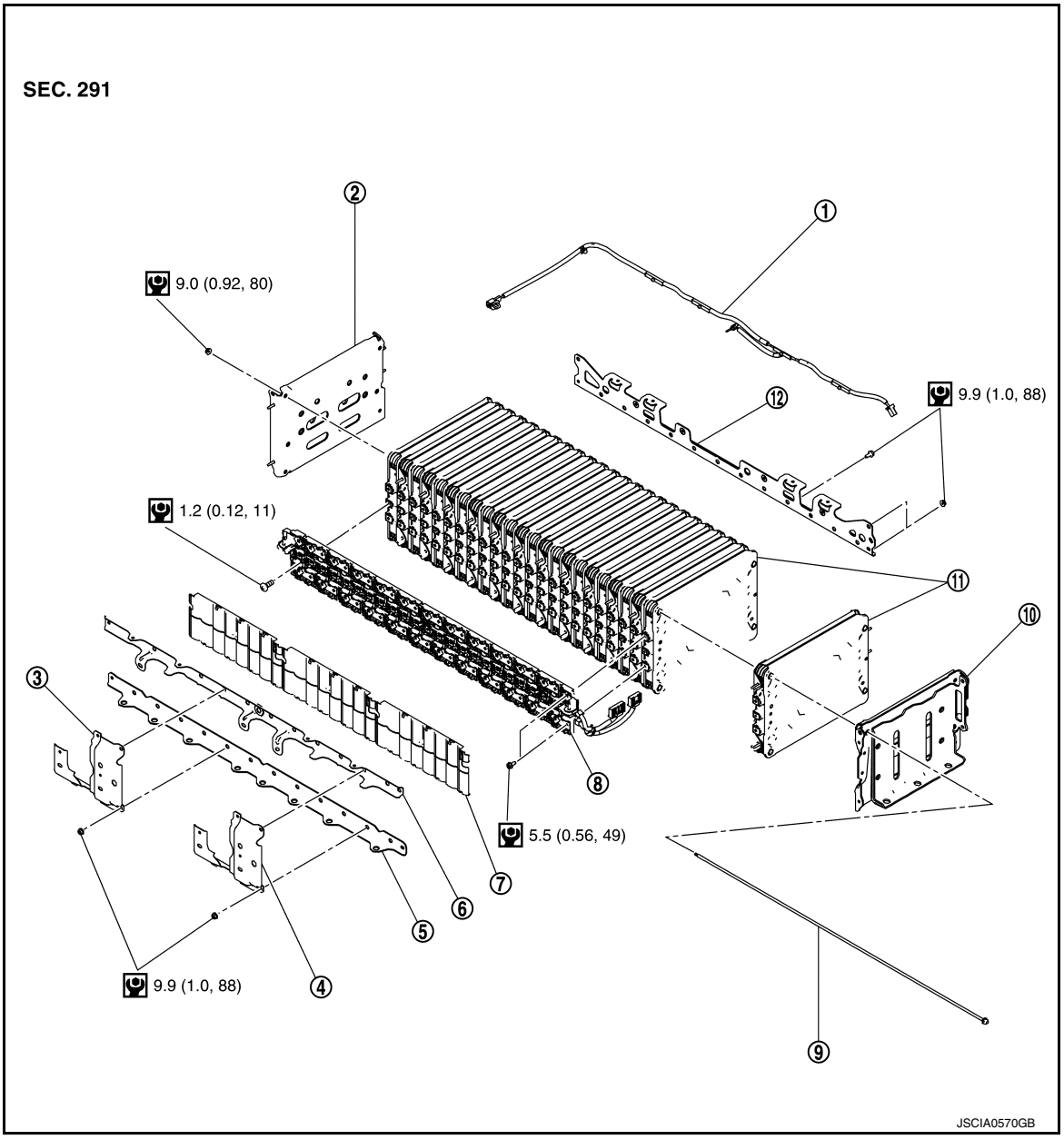


① Rear module stack
② Battery member pipe
③ Front module stack RH
④ Battery pack lower case
⑤ Front module stack LH

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

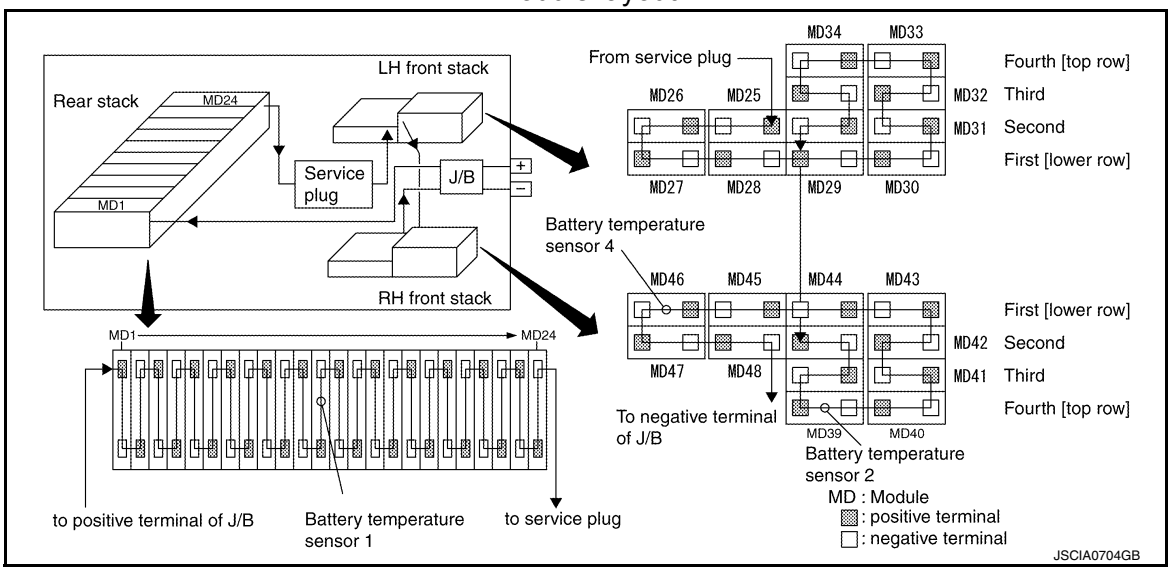
SEC. 291



① Battery temperature sensor harness (rear)	② Right end plate	③ Harness bracket
④ Harness bracket	⑤ Front stack member	⑥ Harness bracket
⑦ Bus bar cover	⑧ Bus bar module	⑨ Through-bolt
⑩ Left end plate	⑪ Module	⑫ Rear stack member

: N·m (kg-m, in-lb)

Module layout



Rear module stack

Module No.	Module name	Cell No.	Module No.	Module name	Cell No.
MD1	Module A	1 & 2	MD13	Module A	25 & 26
MD2	Module B	3 & 4	MD14	Module B	27 & 28
MD3	Module A	5 & 6	MD15	Module A	29 & 30
MD4	Module B	7 & 8	MD16	Module B	31 & 32
MD5	Module A	9 & 10	MD17	Module A	33 & 34
MD6	Module B	11 & 12	MD18	Module B	35 & 36
MD7	Module A	13 & 14	MD19	Module A	37 & 38
MD8	Module B	15 & 16	MD20	Module B	39 & 40
MD9	Module A	17 & 18	MD21	Module A	41 & 42
MD10	Module B	19 & 20	MD22	Module B	43 & 44
MD11	Module A	21 & 22	MD23	Module A	45 & 46
MD12	Module B	23 & 24	MD24	Module B	47 & 48

NOTE:
- Module A: No bracket
- Module B: With bracket

REAR MODULE STACK : Removal and Installation

INFOID:0000000009298687

DANGER:

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

WARNING:
- **Be sure to remove the service plug in order to 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 pocket and carry it or store it in a tool box or other container so that another person does not accidentally connect it while work is in progress.**
- **Be sure to put on insulating protective gear 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 components with an anti-static cover sheet or similar item to prevent contact with other persons.**
- **Refer to EVB-6, "High Voltage Precautions".**

- **If the battery pack is to be disassembled, be sure to remove the Li-ion battery controller for preventing electric shock, fire, and damage to parts.**

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.

ENVIRONMENT FOR LI-ION BATTERY DISASSEMBLY WORK

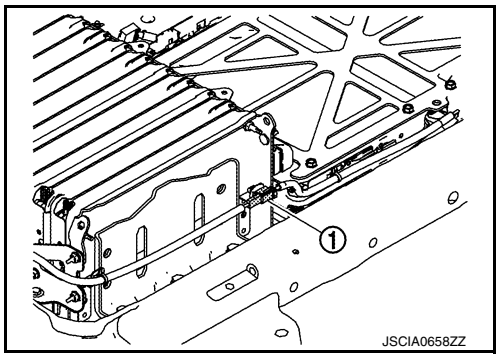
1. Must be an indoor environment.
   - The environment must utilize a shutter or other means to shut out the outside environment and prevent rain, snow, dust, or other substances from entering.
   - The environment must not cause the intrusion of sweat during work, or cause condensation to occur due to high temperature or humidity.
2. Metal powder, grease, and other foreign substances must not enter.
   - The indoor environment must also prevent metal powder, grease, and other foreign substances from entering due to maintenance performed on other vehicles and other sources during disassembly work.
   - If there is a risk of the above substances entering, take appropriate countermeasures, such as use of a vinyl curtain or an equivalent to shut out the outside environment.
3. The floor must be dry.
   - The floor must not be wet as a result of factors such as vehicle entry during rain or snow.
4. Work space
   - The work space must be approximately the size of one entire vehicle.
   - Take appropriate countermeasures so that persons other than the operator do not enter the work space, such as by placing signs indicating that disassembly work is in progress.
5. Standard fire fighting equipment
   - Always place a standard fire fighting equipment in the disassembly work area.
   - Depending on type of fire (vehicle or battery) use standard fire fighting equipment (water or extinguisher).

REMOVAL

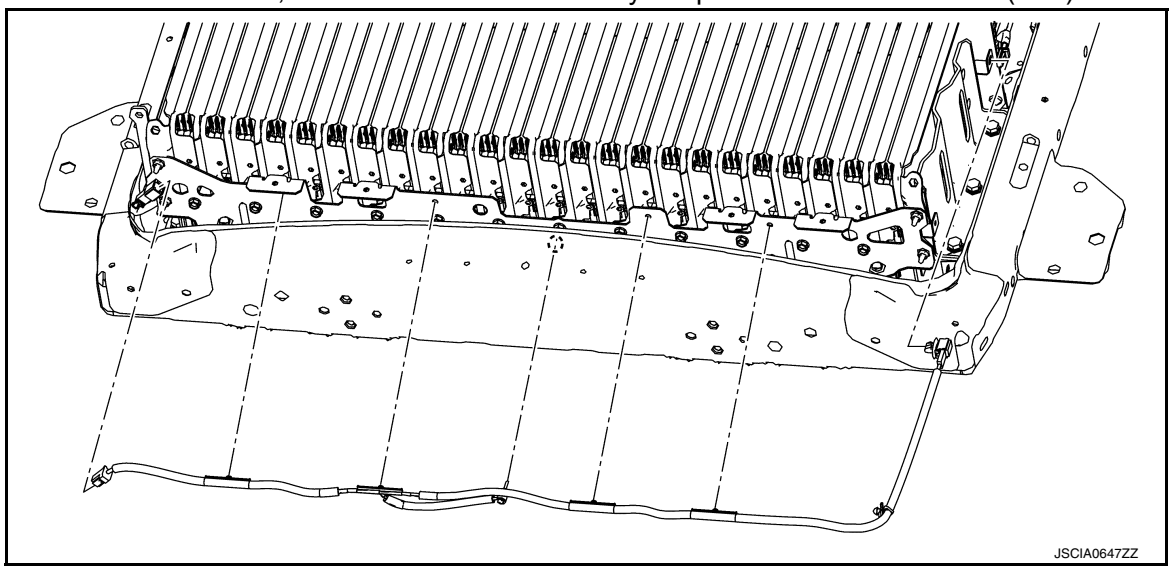
1. Remove the battery pack upper case. EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".
2. Remove Li-ion battery controller. Refer to EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
3. Remove Li-ion battery heater RR1 and RR2. Refer to EVB-228, "LI-ION BATTERY HEATER : Disassembly and Assembly".
4. Disconnect the harness connector ① between the battery temperature sensor harness (front) and the battery temperature sensor harness (rear).

   WARNING:

   To prevent electric shock, wear insulated protective gear.



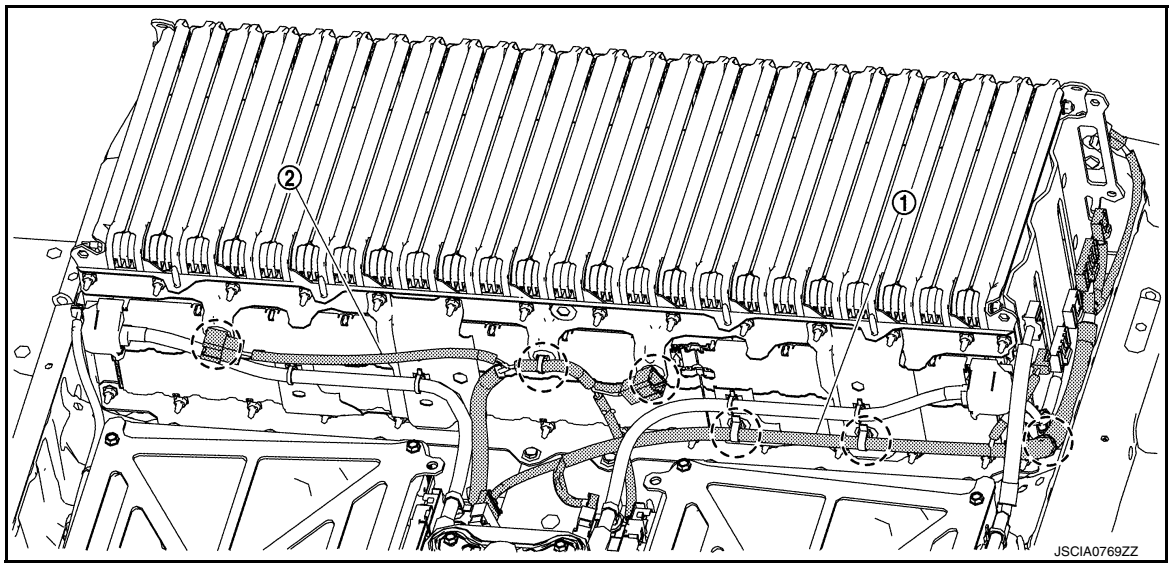
5. Disconnect the connector, and then remove the battery temperature sensor harness (rear).



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

6. Remove the harness clips of the voltage detection harness ① and the Li-ion battery heater harness ② from the harness bracket, and move them to a location where they do not inhibit with work.

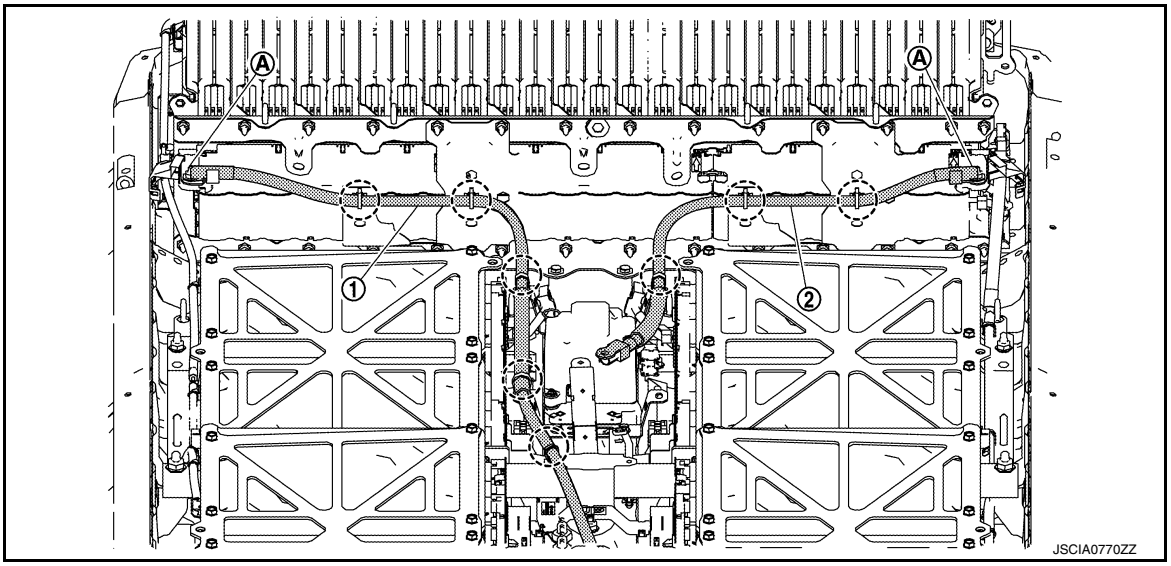


◌ : Harness clip

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

7. Remove the mounting nuts Ⓐ and remove the high-voltage harness ①, ② from the rear module stack.



◌ : Harness clip

DANGER:

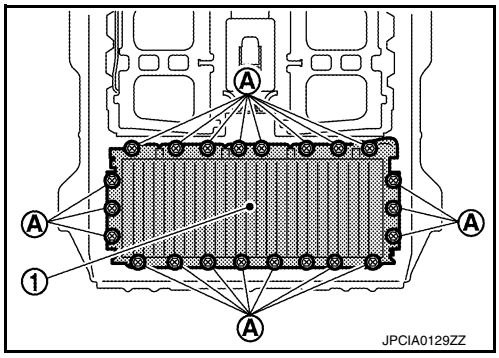
- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **Because there is a risk of electric shock, immediately protect the disconnected high-voltage terminals with insulating tape so that they are not exposed.**

8. Remove the rear module stack ① mounting bolts Ⓐ.

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

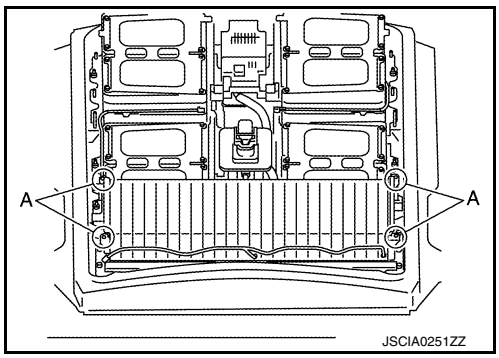


9. Follow the procedure below and remove the rear module stack from the battery pack.

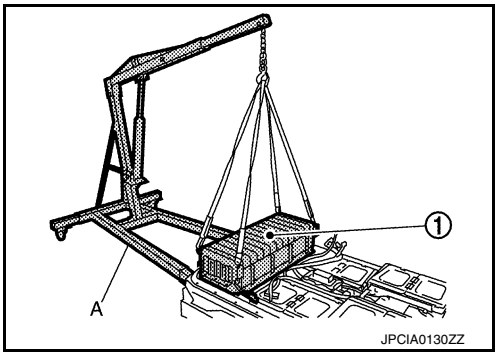
a. Attach a carabiner to position (A) as shown in the figure and connect a lashing belt to it.

WARNING:

To prevent electric shock, wear insulated protective gear.



b. Use the engine frame (A) and lift up the rear module stack ①.



WARNING:

To prevent electric shock, wear insulated protective gear.

CAUTION:

Do not move the engine crane when the rear module stack is lifted up.

c. Move the battery pack and place the workbench below the rear module stack.

WARNING:

To prevent electric shock, wear insulated protective gear.

CAUTION:

Place the removed battery pack upper case onto the battery pack for storage.

d. Place the rear module stack onto the workbench.

WARNING:

- **To prevent electric shock, wear insulated protective gear.**

- **Because there is a risk of electric shock, lay an anti-static rubber sheet on the workbench.**

INSTALLATION

1. When replacing the Li-ion battery with a new battery, perform the following operation.

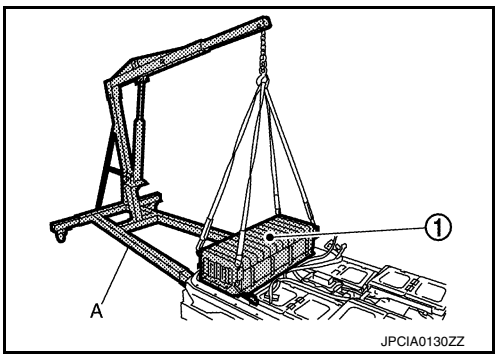
a. Enter the date of the (replacement) work on the EV battery tracking identification seal that is packaged together with the new part.

b. Cut the EV battery tracking identification tool into 2 pieces and apply them to the body of the replaced (old) LI-ion battery and to the “Li-ion battery replacement history record”.

c. Enter the necessary information in the “Li-ion battery replacement history record”.

2. Follow the following procedure and install the rear module stack onto the battery pack.

a. Use the engine frame (A) and lift up the rear module stack ①.



WARNING:

To prevent electric shock, wear insulated protective gear.

CAUTION:

Do not move the engine crane when the rear module stack is lifted up.

b. Move the workbench and place the battery pack below the rear module stack.

c. Mount the rear module stack onto the battery pack.

WARNING:

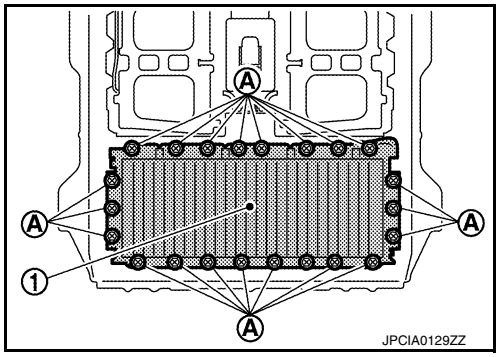
To prevent electric shock, wear insulated protective gear.

CAUTION:
Be sure to align the locating pin position.

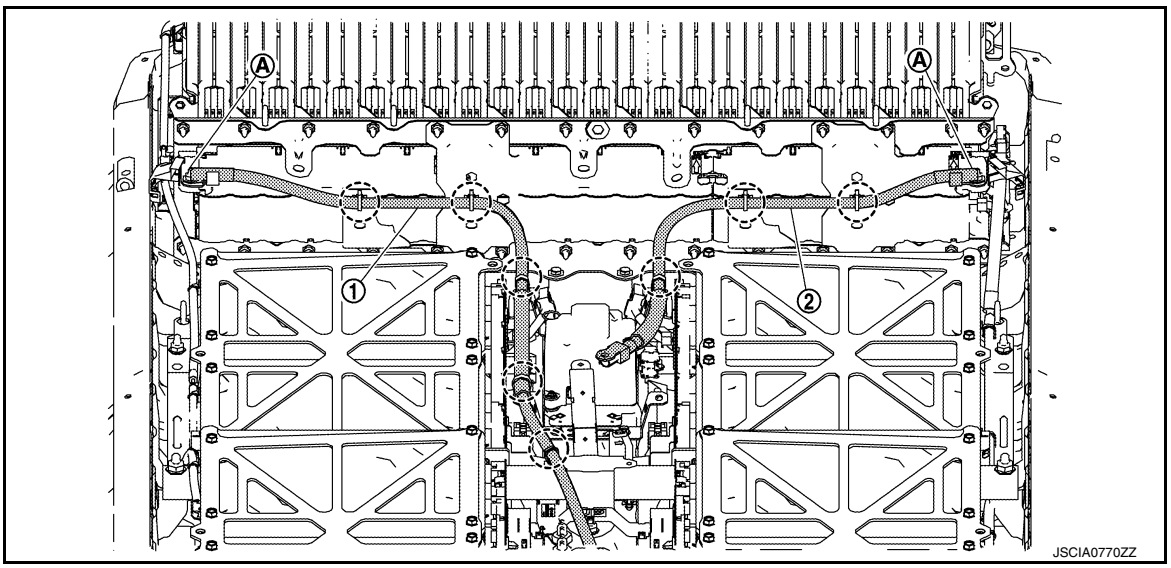
3. Tighten the rear module stack ① mounting bolts Ⓐ.

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.



4. Tighten the mounting nuts Ⓐ, and then install the high-voltage harness ①, ② onto the rear module stack.



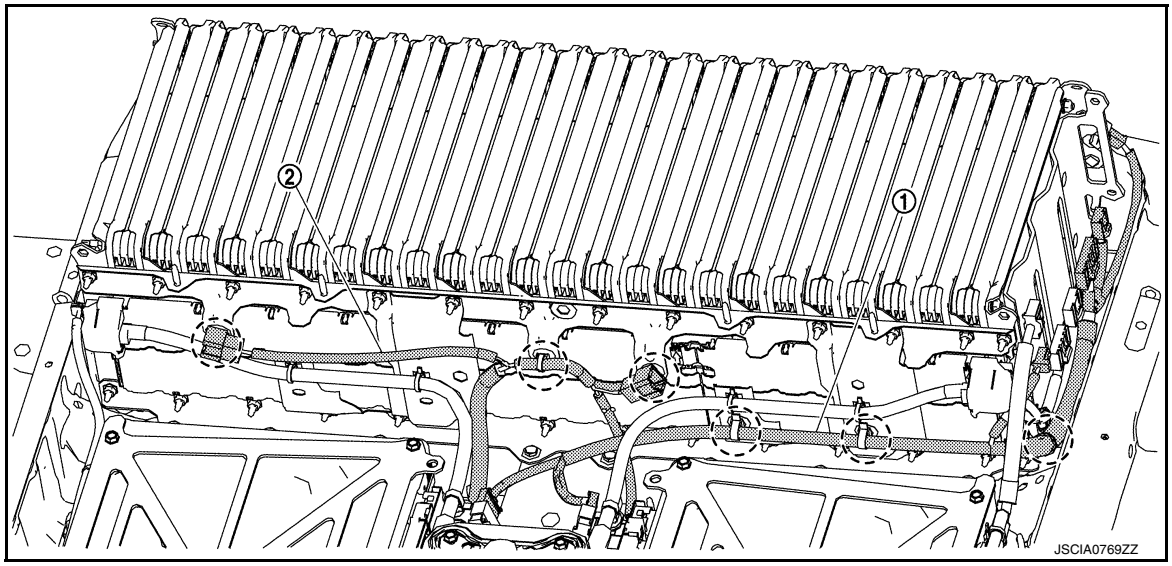
: Harness clip

DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **Because there is a risk of electric shock, immediately protect the disconnected high-voltage terminals with insulating tape so that they are not exposed.**

5. Install the voltage detection harness ① and the Li-ion battery heater harness ②.

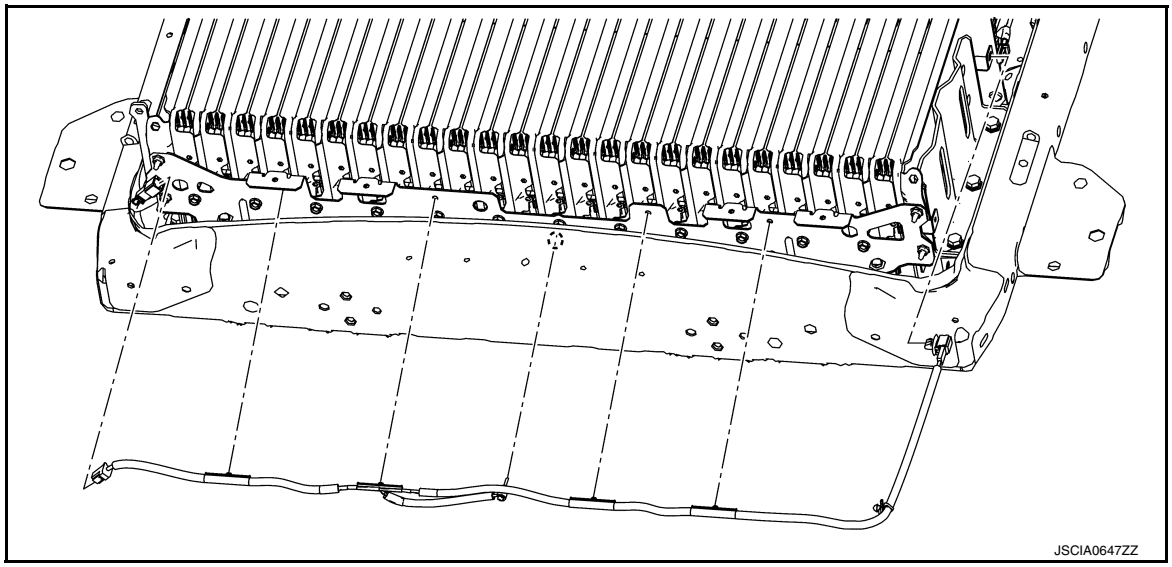


: Harness clip

WARNING:

To prevent electric shock, wear insulated protective gear.

6. Install the battery temperature sensor harness (rear).

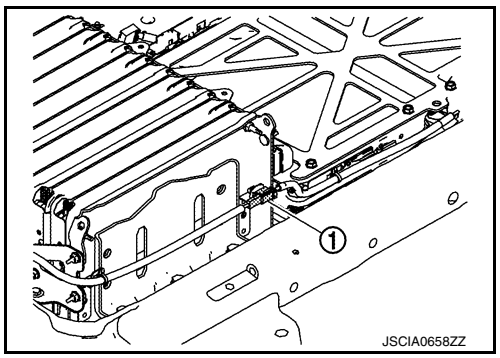


WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

NOTE:
Install the battery temperature sensor onto module No. MD12.

7. Connect the harness connector ① between the battery temperature sensor harness (front) and battery temperature sensor harness (rear).



WARNING:

To prevent electric shock, wear insulated protective gear.

8. Install the Li-ion battery heater RR1 and RR2. Refer to EVB-228, "LI-ION BATTERY HEATER : Disassembly and Assembly".
9. Install the Li-ion battery controller. EVB-214, "LI-ION BATTERY CONTROLLER : Removal and Installation".
10. Install the battery pack upper case. EVB-204, "BATTERY PACK UPPER CASE : Removal and Installation".

CAUTION:

- **Be sure to reinstall the high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.**
- **Check the following items after installing battery pack: Refer to EVB-269, "Inspection".**
  ■AIR LEAK INSPECTION
  ■ELECTRIC EQUIPOTENTIAL TEST

REAR MODULE STACK : Disassembly and Assembly

INFOID:0000000009298688

DANGER:

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

WARNING:

- **Be sure to remove the service plug for shutting off high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in pocket and carry it or store it in a tool box or other container so that another person does not accidentally connect it while work is in progress.**
- **Be sure to put on insulating protective gear 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 components with an anti-static cover sheet or similar item to prevent contact with other persons.**
- **Refer to EVB-6, "High Voltage Precautions".**
- **If the battery pack is to be disassembled, be sure to remove the Li-ion battery controller for preventing electric shock, fire, and damage to parts.**

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.

ENVIRONMENT FOR LI-ION BATTERY DISASSEMBLY WORK

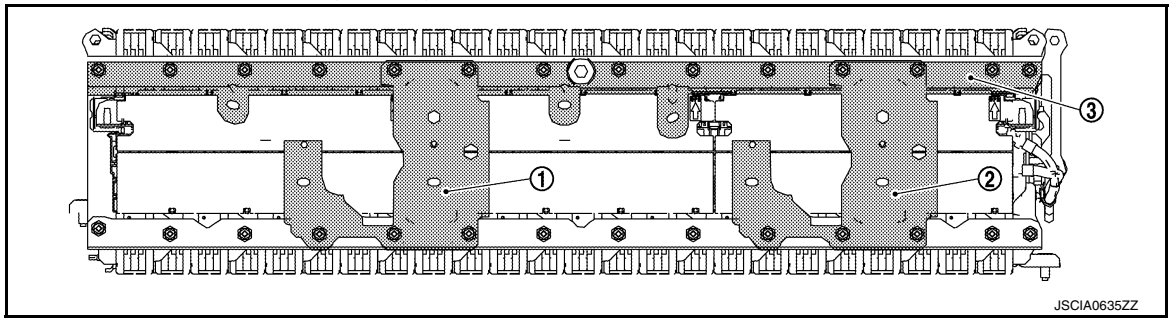
1. Must be an indoor environment.
   - The environment must utilize a shutter or other means to shut out the outside environment and prevent rain, snow, dust, or other substances from entering.
   - The environment must not cause the intrusion of sweat during work, or cause condensation to occur due to high temperature or humidity.
2. Metal powder, grease, and other foreign substances must not enter.
   - The indoor environment must also prevent metal powder, grease, and other foreign substances from entering due to maintenance performed on other vehicles and other sources during disassembly work.

- If there is a risk of the above substances entering, take appropriate countermeasures, such as use of a vinyl curtain or an equivalent to shut out the outside environment.

3. The floor must be dry.
   - The floor must not be wet as a result of factors such as vehicle entry during rain or snow.
4. Work space
   - The work space must be approximately the size of one entire vehicle.
   - Take appropriate countermeasures so that persons other than the operator do not enter the work space, such as by placing signs indicating that disassembly work is in progress.
5. Standard fire fighting equipment
   - Always place a standard fire fighting equipment in the disassembly work area.
   - Depending on type of fire (vehicle or battery) use standard fire fighting equipment (water or extinguisher).

DISASSEMBLY

1. Remove harness bracket ①, ② and ③ from the rear module stack.

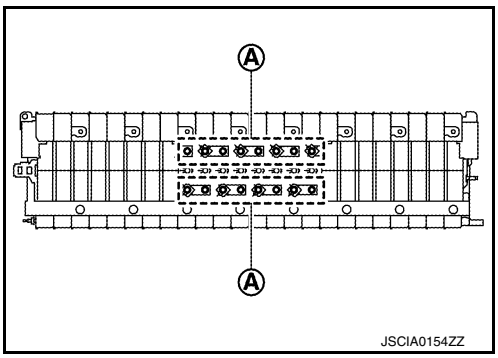


WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

2. Follow the following procedure and remove the bus bar from the rear module stack.

a. Remove the center bus bar cover, then remove the module terminal mounting bolts Ⓐ.



DANGER:

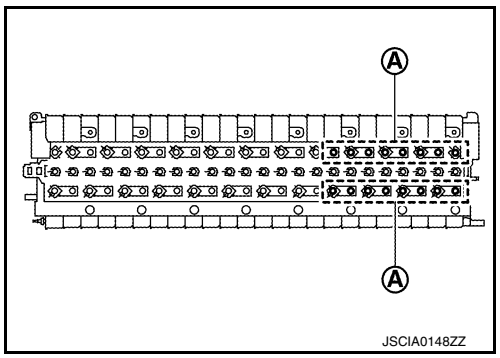
- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

CAUTION:

Do not remove all bus bar covers and all module terminal mounting bolts at the same time.

b. Remove the left-side bus bar cover, then remove the module terminal mounting bolts Ⓐ.

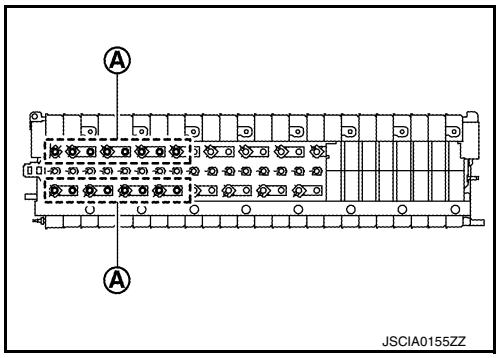


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

c. Remove the right-side bus bar cover, then remove the module terminal mounting bolts Ⓐ.

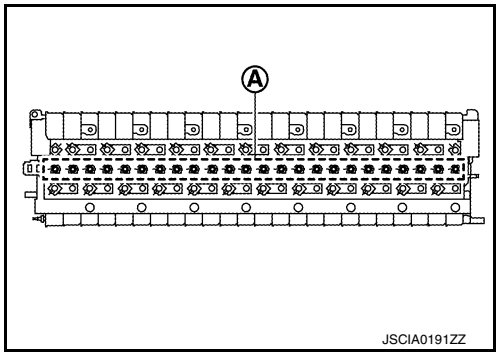


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

d. Remove the voltage detection terminal mounting screws Ⓐ, then remove the bus bar from the rear module stack.

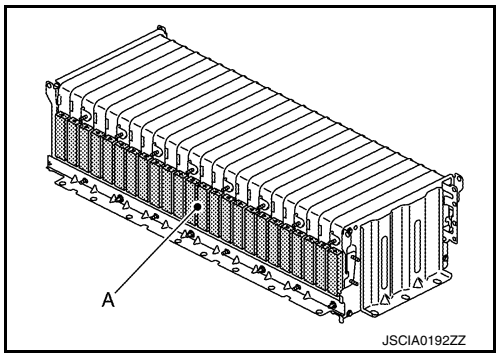


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

e. Install a module terminal cover [SST: KV99111500 (—)] (A) onto all module terminals.

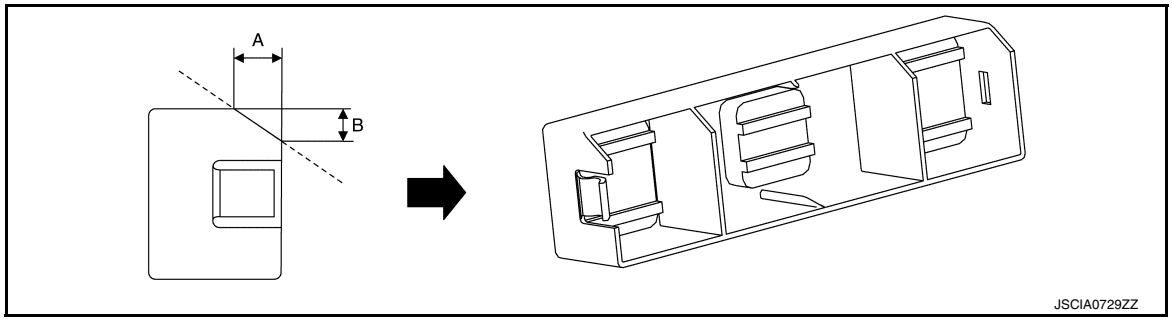


WARNING:

To prevent electric shock, wear insulated protective gear.

NOTE:

- Because “module B” interferes with the bracket and cover, cut the module terminal cover at the position shown in the figure.

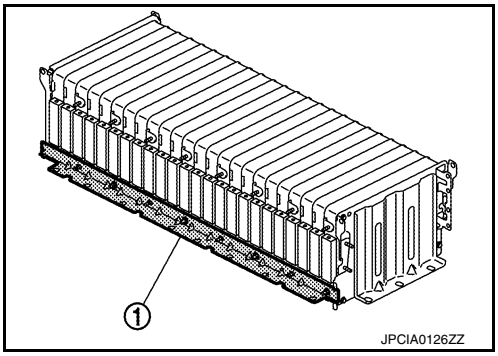


A : 7 mm (0.28 in) B : 5 mm (0.20 in)

3. Remove the front stack member ①.

WARNING:

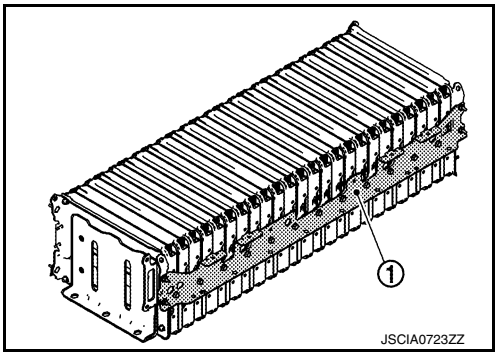
To prevent electric shock, wear insulated protective gear and use insulated tools.



4. Remove the rear stack member ①.

WARNING:

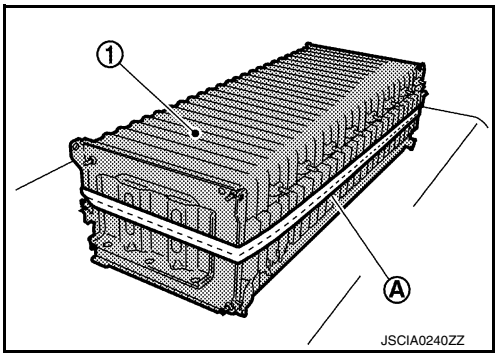
To prevent electric shock, wear insulated protective gear and use insulated tools.



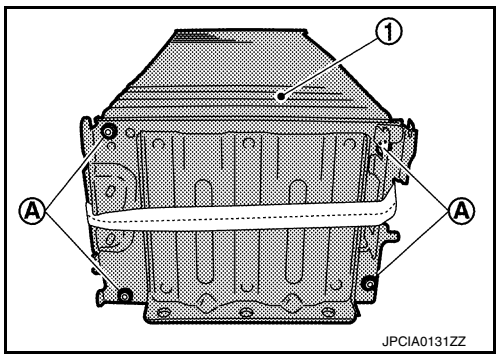
5. Fasten the rear module stack ① with a lashing belt Ⓐ.

WARNING:

To prevent electric shock, wear insulated protective gear.



6. Remove the through bolt Ⓐ mounting nut, then disassemble the rear module stack ①.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

ASSEMBLY

1. When replacing the Li-ion battery with a new battery, perform the following operation.

a. Enter the date of the (replacement) work on the EV battery tracking identification seal that is packaged together with the new part.

b. Cut the EV battery tracking identification tool into 2 pieces and apply them to the body of the replaced (old) LI-ion battery and to the “Li-ion battery replacement history record”.

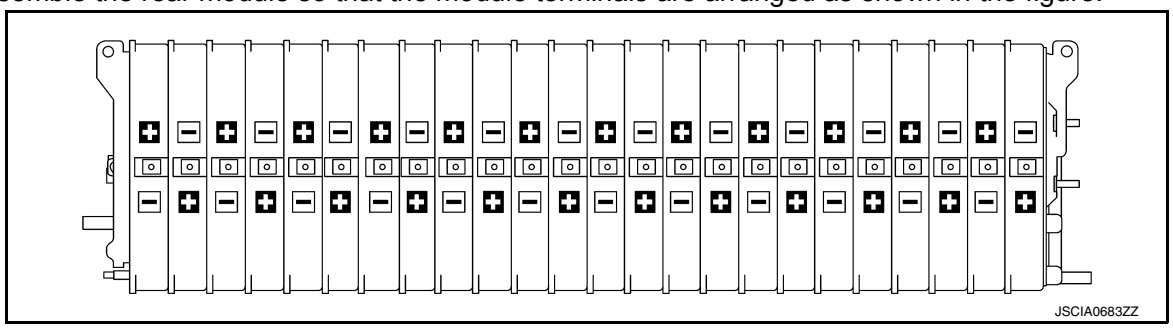
c. Enter the necessary information in the “Li-ion battery replacement history record”.

2. Follow the procedure below to assemble the rear module.

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

a. Assemble the rear module so that the module terminals are arranged as shown in the figure.

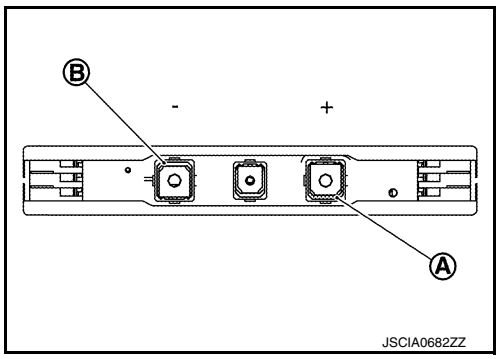


WARNING:

Be careful of the directions of the + terminal and – terminal when assembling the module. If the polarity is incorrect, there is a risk of electric shock, fire, and component damage.

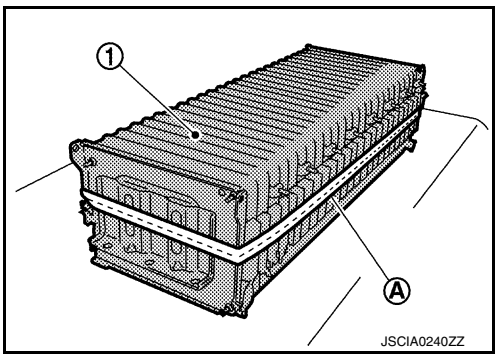
NOTE:

- To identify the module + terminal and – terminal, refer to the figure.



+ terminal identification color Ⓐ	: Red
– terminal identification color Ⓑ	: Black

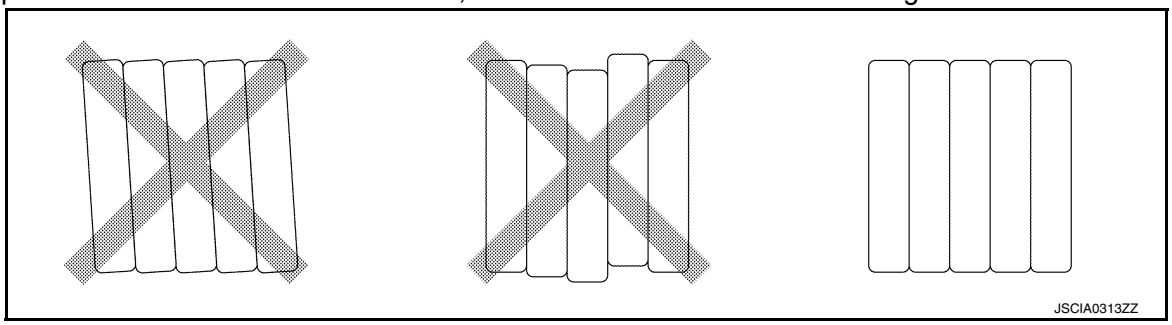
b. Use a lashing belt Ⓐ and apply pressure to the rear module stack ①.



WARNING:

To prevent electric shock, wear insulated protective gear.

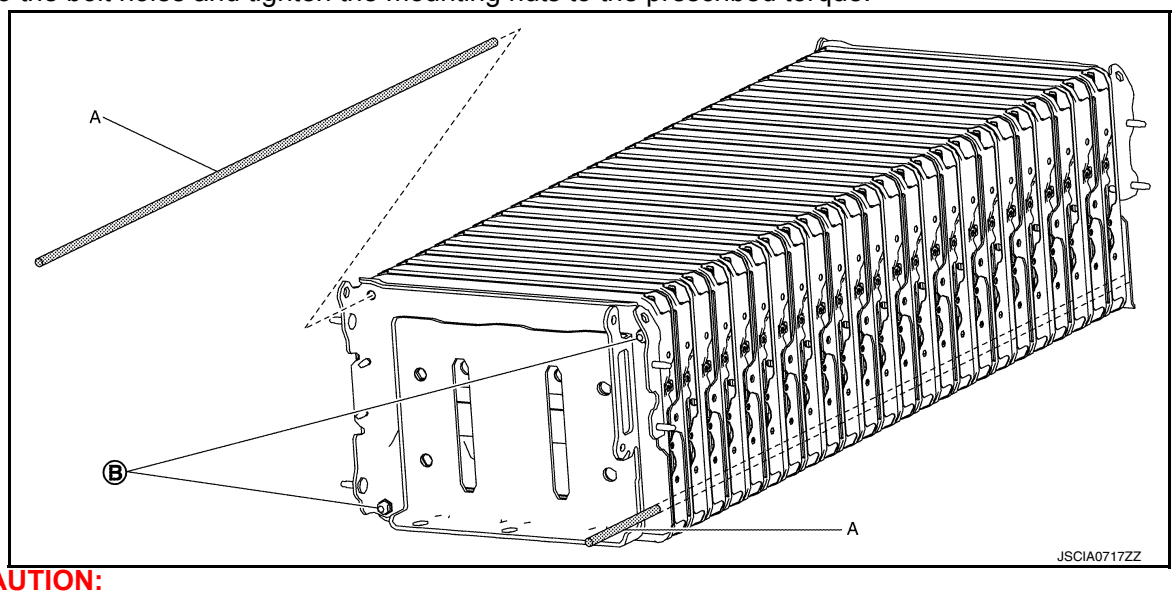
c. Inspect the module installation condition, and correct it if it is skewed or a large distortion is found.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

d. Install the 2 through-bolts Ⓑ at opposite corners of the module, then insert ϕ7 mm (0.28 in) metal bars (A) into the bolt holes and tighten the mounting nuts to the prescribed torque.

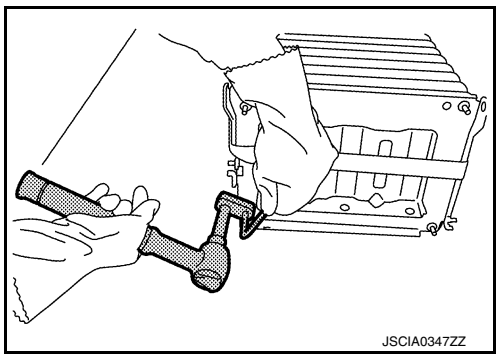


CAUTION:

If the collar position is incorrect, there is a risk of the bolts loosening because they are not supported by the collar between the modules.

e. Install the remaining 2 through-bolts, and tighten the mounting nuts to the prescribed torque.

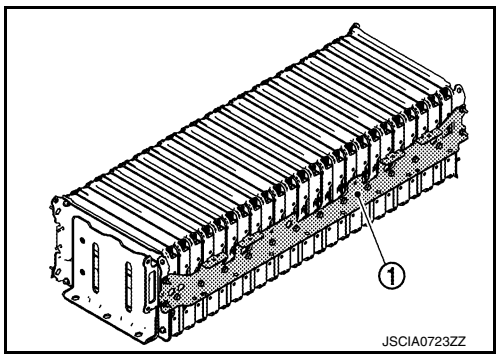
- When installing, hold the end of the through bolt stationary and tighten the installation nut.


JSCIA0347ZZ

3. Install the rear stack member ①.

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

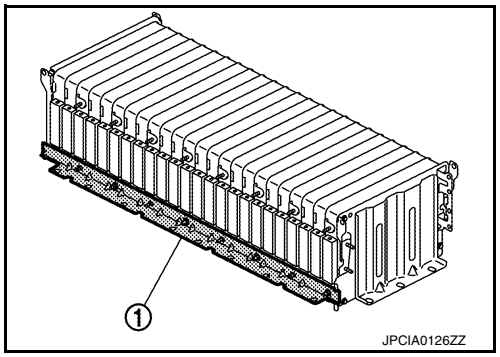


JSCIA0723ZZ

4. Install the front stack member ①.

WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

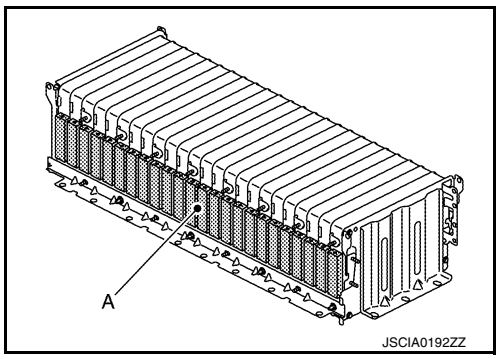


JPCIA0126ZZ

5. Remove the module terminal cover [SST: KV99111500 (—)] (A).

WARNING:

To prevent electric shock, wear insulated protective gear.



JSCIA0192ZZ

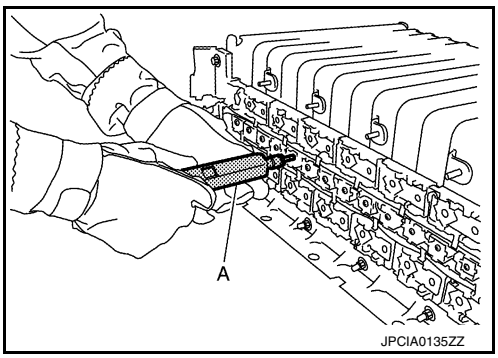
6. Follow the procedure below and install the bus bar module onto the rear module stack.

a. Install the bus bar module onto the rear module stack.

WARNING:

To prevent electric shock, wear insulated protective gear.

b. Use an insulated torque driver (A) and tighten the voltage detection terminal mounting screws to the prescribed torque.

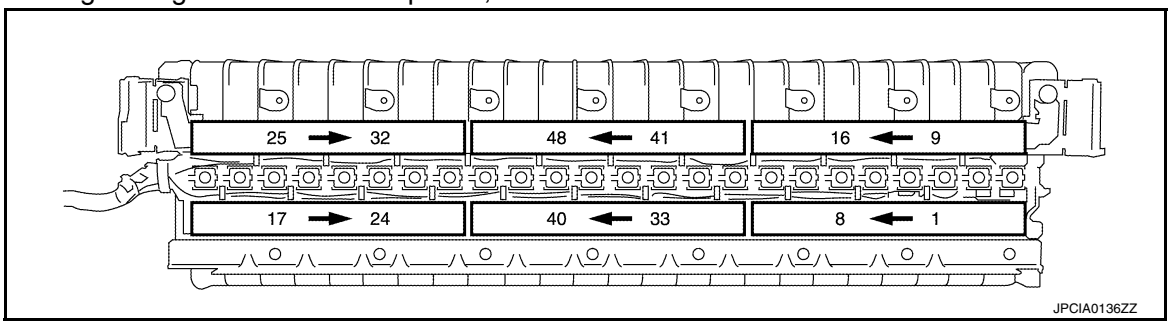


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

c. Tighten the module terminal mounting bolts in numerical order as shown in the figure.
- When tightening of 1 – 16 is completed, install the left-side bus bar cover.
- When tightening of 17 – 32 is completed, install the right-side bus bar cover.
- When tightening of 33 – 48 is completed, install the center bus bar cover.

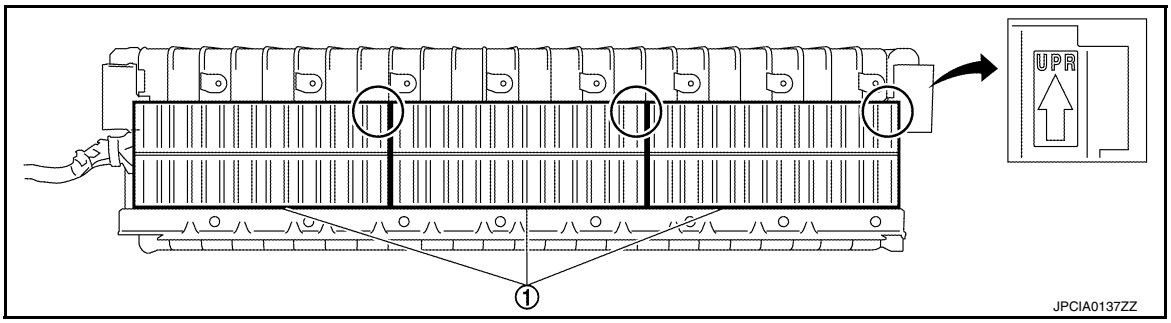


DANGER:

- **There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear and use insulated tools.**

- **This work must not be performed by multiple operators because there is a risk of electric shock if the operators contact one another.**

d. Install the bus bar cover ①.

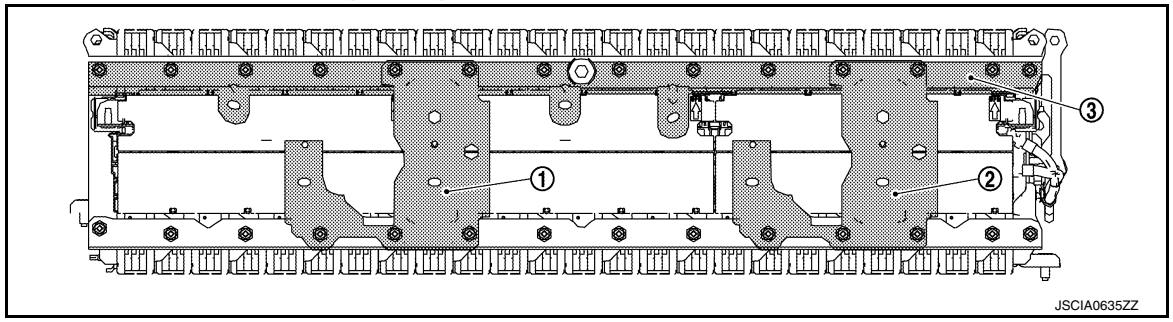


WARNING:

To prevent electric shock, wear insulated protective gear.

CAUTION:
- **Be careful not to install with the top and bottom facing in the wrong directions.**
- **After installation, check that the mating is not skewed.**

7. Install the harness bracket ①, ② and ③ to the rear module stack.



WARNING:

To prevent electric shock, wear insulated protective gear and use insulated tools.

CAUTION:

- **Be sure to reinstall the high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.**
- **Check the following items after installing battery pack: Refer to EVB-269, "Inspection".**
  ■AIR LEAK INSPECTION
  ■ELECTRIC EQUIPOTENTIAL TEST

Inspection

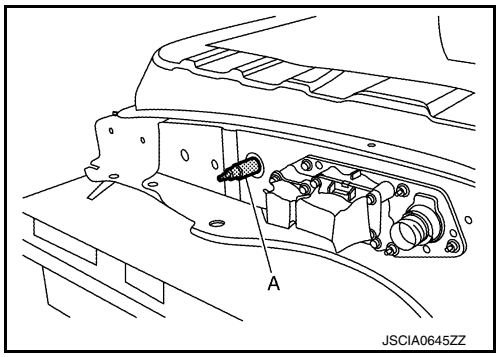
INFOID:0000000009298689

AIR LEAK INSPECTION

1. Remove the plug and install the adapter (A) of the air leak tester [SST: KV99111400 (—)].

WARNING:

To prevent electric shock, wear insulated protective gear.



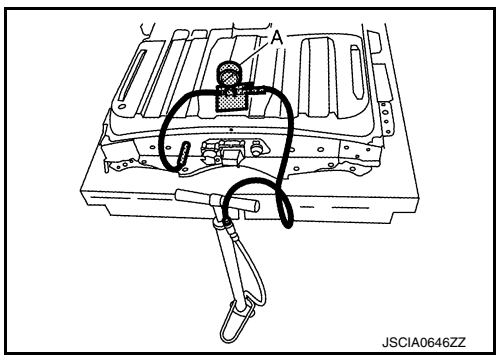
2. Install the gauge (A) of the air leak tester [SST: KV99111400 (—)].

WARNING:

To prevent electric shock, wear insulated protective gear.

CAUTION:

The gauge is a precision instrument. Be careful not to drop it when handling it.



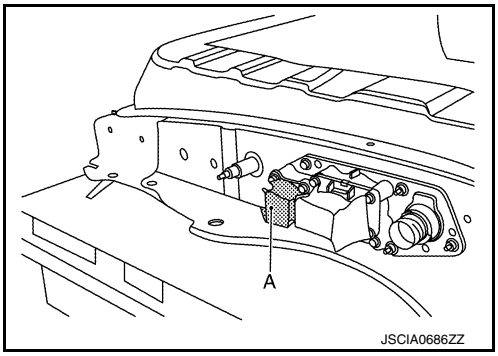
3. Install the service plug.

DANGER:

There is the danger of electric shock caused by contact with the terminals. Be sure to wear insulated protective gear.

NOTE:
Because the service plug location is open, install the service plug for sealing the case.

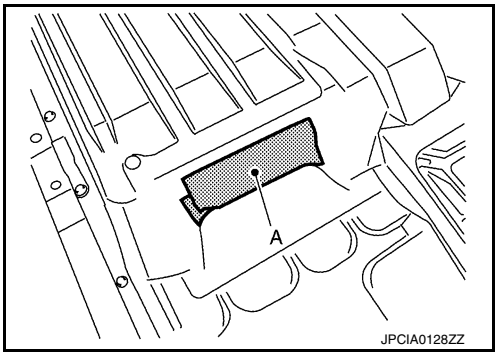
4. Use vinyl tape or similar means (A) for preventing air leakage from the PTC harness connector.
   - Use wide vinyl tape that is capable of covering all of the PTC harness connector with one strip.
   - Apply carefully so that no wrinkles in the tape occur.



WARNING:

To prevent electric shock, wear insulated protective gear.

5. Use vinyl tape or similar means (A) to prevent air leakage from the breather.
   - Use wide vinyl tape that is capable of covering all of the breather with one strip.
   - Apply carefully so that no wrinkles in the tape occur.



WARNING:

To prevent electric shock, wear insulated protective gear.

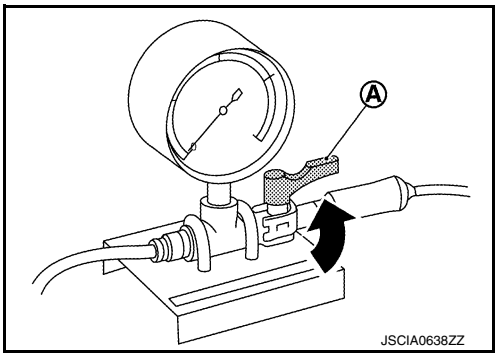
6. Follow the procedure below to check the battery case pressure.

WARNING:

To prevent electric shock, wear insulated protective gear.

a. Open the cock Ⓐ on the air leak tester.

CAUTION:
Do not operate the pump before opening the cock on the air leak tester. Doing so may damage the gauge. If the pump is operated before the cock is opened, first disconnect the air pump hose to release the pressure.



b. Operate the air pump slowly and apply the specified inspection pressure inside the battery pack. If the gauge pressure does not rise, or if the gauge reading fluctuates, check for the location of air leakage.

Specified inspection pressure : 1.6 kPa (0.016 bar, 0.0163 kg/cm^2, 0.232 psi)

CAUTION:
- **Operate the air pump carefully when applying pressure. If pressure is applied suddenly to the gauge, the gauge may be damaged.**
- **Do not apply pressure of 2.0 kPa (0.0204 kg/cm^2) or more to the battery case or air leak tester.**

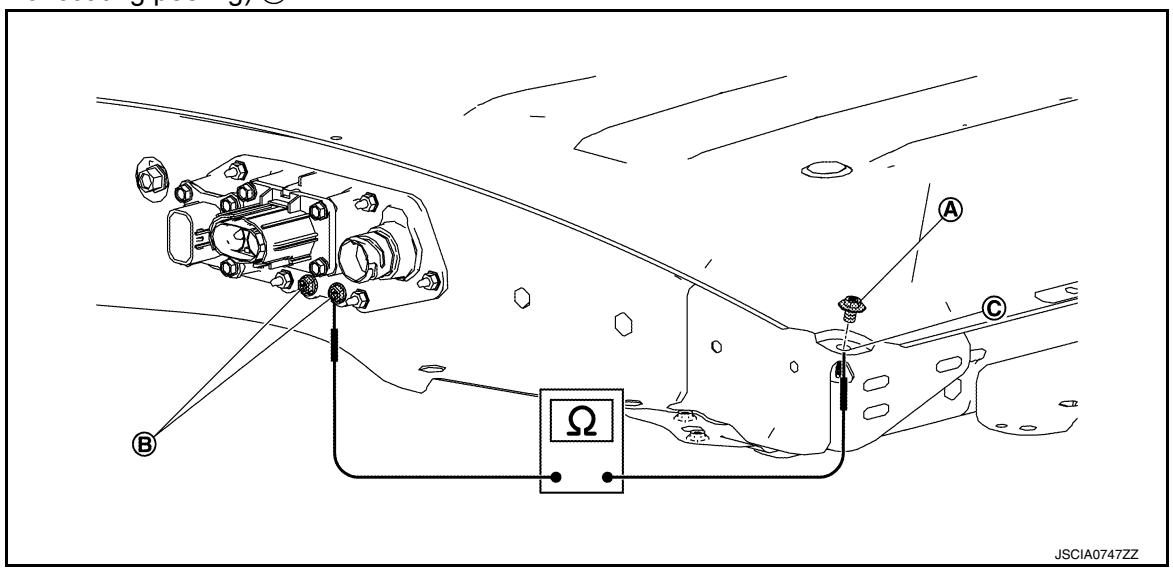
c. Close the cock and wait for 1 minute.
d. Check that the air leak tester reading remains at or above the limit value.

Repair limit : 1.4 kPa (0.014 bar, 0.0142 kg/cm^2, 0.203 psi)

e. If the pressure is below the limit value, check for the locations of air leakage.
NOTE:
Check for air leakage from the sound of air escaping when pressure is applied.

ELECTRIC EQUIPOTENTIAL TEST

After assembling the Li-ion battery pack, remove the battery pack upper case ground bolt Ⓐ, then measure the resistance between the high-voltage harness connector flange ground bolts Ⓑ and the ground bolt seat (location of coating peeling) Ⓒ.



WARNING:

To prevent electric shock, wear insulated protective gear.

Standard : Less than 0.1Ω

If the result deviates from the standard value, check the following and correct the malfunction location.
- Ground bolt connection condition
- Corrosion on ground bolt mounting surface
- Presence of paint, oil, dirt, or other substance on ground bolt mounting surface

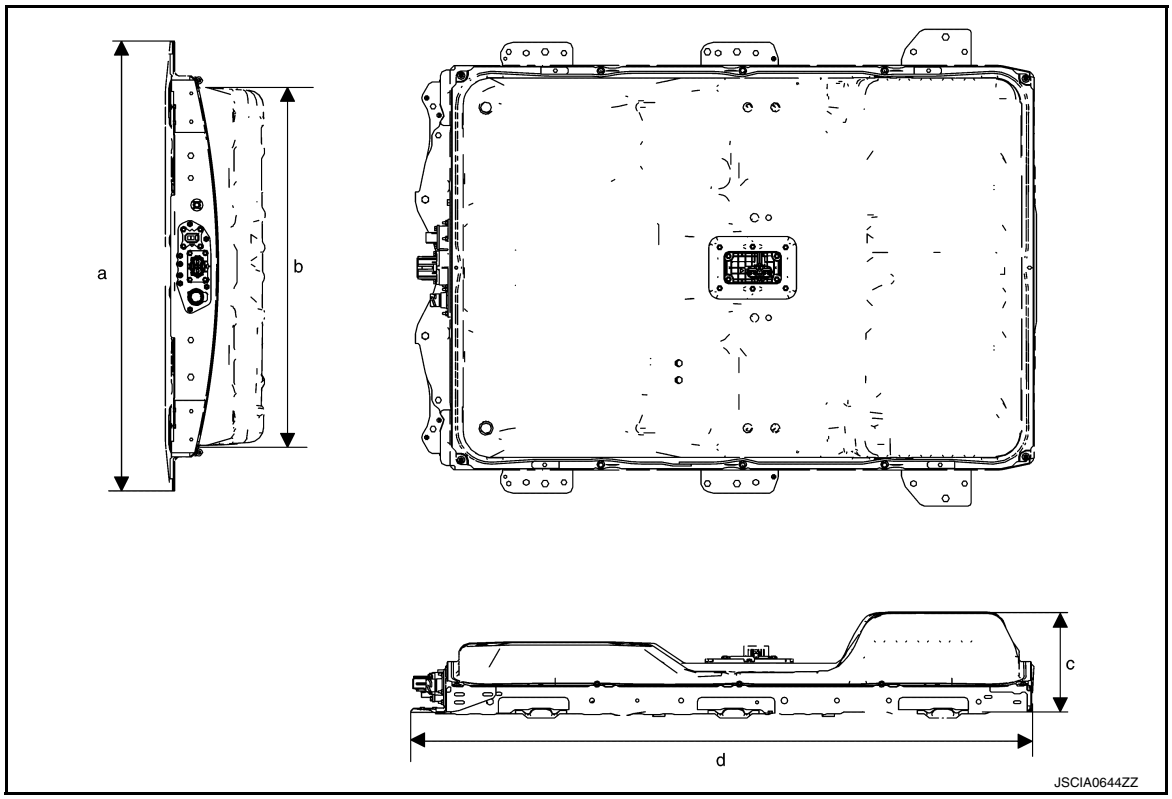
SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Li-ion Battery

INFOID:0000000009298744

Items		Specification
Type		Li-ion battery
Structure		48 modules (192 cells)
Rated voltage	(V)	Approx. 360
Battery capacity	(kWh)	Approx. 24
Weight	[kg (lb)]	Approx. 275 (606)



External dimension	“a”	[mm (in)]	1188 (46.77)
	“b”	[mm (in)]	1007 (39.65)
	“c”	[mm (in)]	264 (10.39)
	“d”	[mm (in)]	1547 (60.90)