SECTION HBC
HYBRID CONTROL SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

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

INFOID:0000000008144349

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

WARNING:

Always observe the following items for preventing accidental activation.

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the 12V battery, and wait at least 3 minutes before performing any service.**

High Voltage Precautions

INFOID:0000000008144350

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield, and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**

CAUTION:

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

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

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

HANDLING OF HIGH VOLTAGE HARNESS AND TERMINALS

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

REGULATIONS ON WORKERS WITH MEDICAL ELECTRONICS

WARNING:

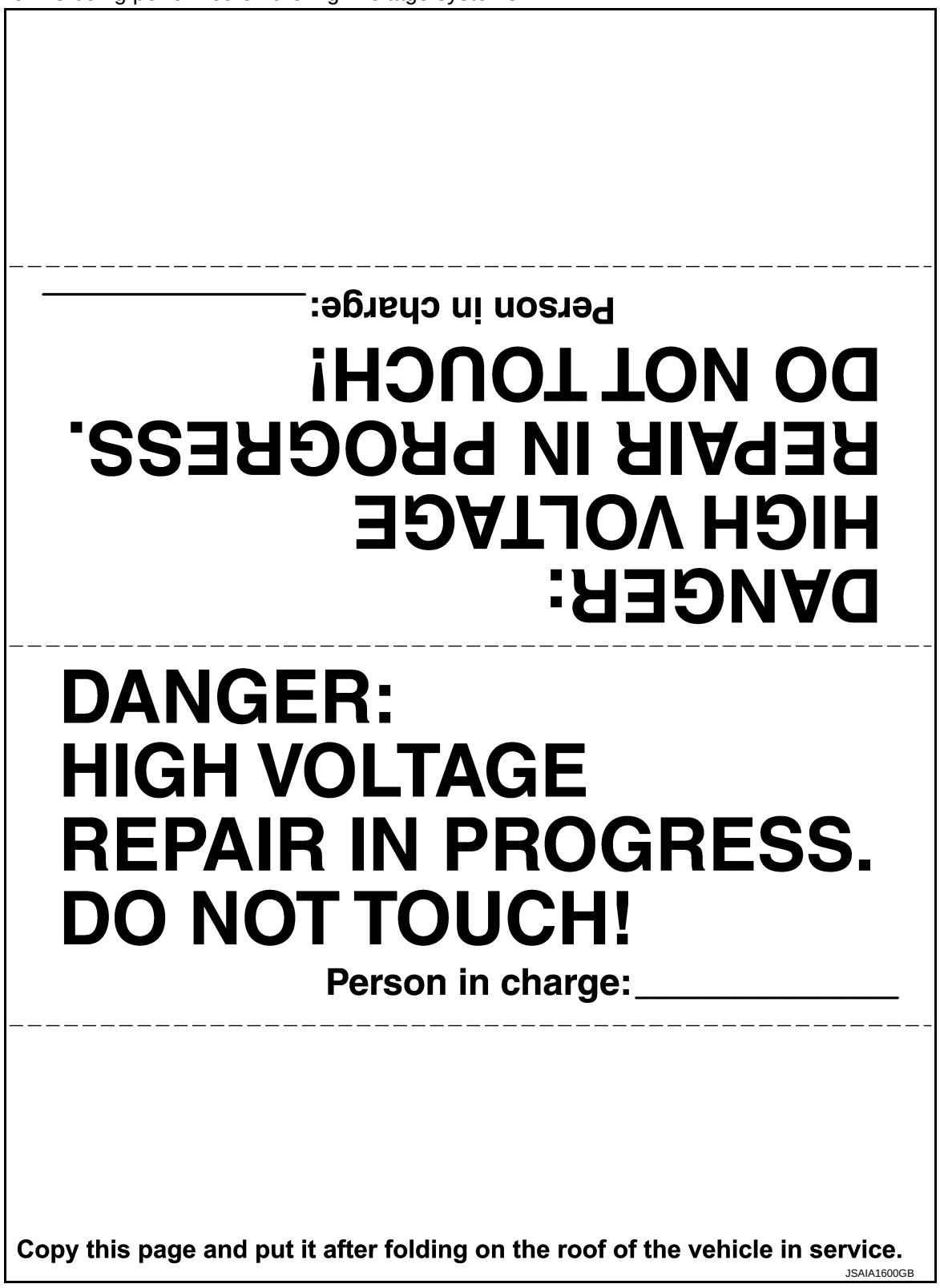
The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

PROHIBITED ITEMS TO CARRY DURING THE WORK

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

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

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.



Precautions Concerning On-board Servicing of Hybrid Systems

INFOID:0000000008144351

CAUTION:

Be sure to turn the ignition switch OFF before performing inspection and servicing inside the engine compartment or underneath the vehicle. If the ignition switch is ON (vehicle READY state), even if the engine is stopped, the conditions of the vehicle may cause the engine to start automatically.

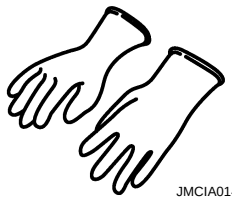
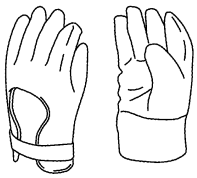
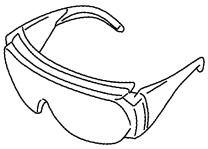
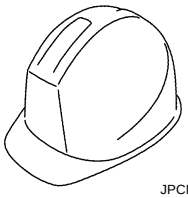
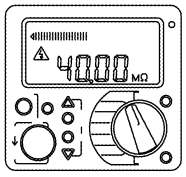
If it is necessary to continually operate the engine during inspection or servicing, use the designated inspection mode. HBC-89, "Description".

PREPARATION

PREPARATION

Commercial Service Tools

INFOID:0000000008144352

Tool name		Description
Insulated gloves [Guaranteed insulation performance for 1000V/300A]	 JMCIA0149ZZ	Removing and installing high voltage components
Leather gloves [Use leather gloves that can fasten the wrist tight]	 JPCIA0066ZZ	• Removing and installing high voltage components • Protect insulated gloves
Insulated safety shoes	 JPCIA0011ZZ	Removing and installing high voltage components
Safety glasses [ANSI Z87.1]	 JPCIA0012ZZ	• Removing and installing high voltage components • To protect eye from the spatter on the work to electric line
Insulated helmet	 JPCIA0013ZZ	Removing and installing high voltage components
Insulation resistance tester (Multi tester)	 JPCIA0014ZZ	Measuring voltage and insulation resistance

SYSTEM DESCRIPTION

DESCRIPTION

Description

INFOID:0000000008144353

HYBRID CONTROL SYSTEM

INFINITI Direct Response Hybrid (Hybrid) System

- A parallel hybrid system is used in which a single motor serves for both engine and drive/power generation, and two clutches* directly connect the motor to the transmission. (1-motor, 2-clutch parallel hybrid system)
  NOTE:
  *: Torque transmission and interruption to the drive wheels is performed by the components inside the transmission (clutch, brake, etc.).
- The combination of a parallel hybrid system in which the engine power is transmitted directly and a power assist from a high-power Li-ion battery improves acceleration performance. The installation of a clutch between the engine and traction motor delivers a large improvement in fuel economy by disconnecting the engine and driving the vehicle using the Li-ion battery.

Driving Mode

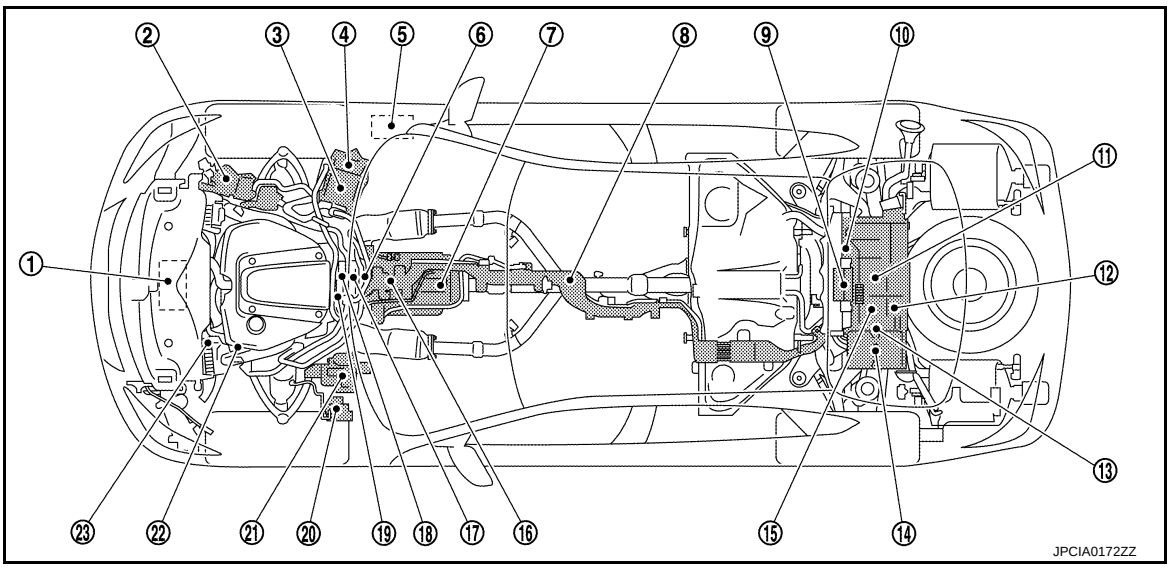
By combining the driving modes shown below, the hybrid system HPCM performs integrated control to maximize efficiency according to a variety of driving conditions and road conditions.

Driving mode	Description
Motor driving	The engine is stopped and the vehicle is driven by the traction motor alone.
Engine driving	The engine output is used to charge the traction motor while the vehicle is driving.
Motor assist driving	The traction motor output assists the engine output while driving.
Regenerative braking	Energy during deceleration is used generate power from the traction motor.

COMPONENT PARTS
HYBRID CONTROL SYSTEM
HYBRID CONTROL SYSTEM : Component Parts Location

INFOID:0000000008144354

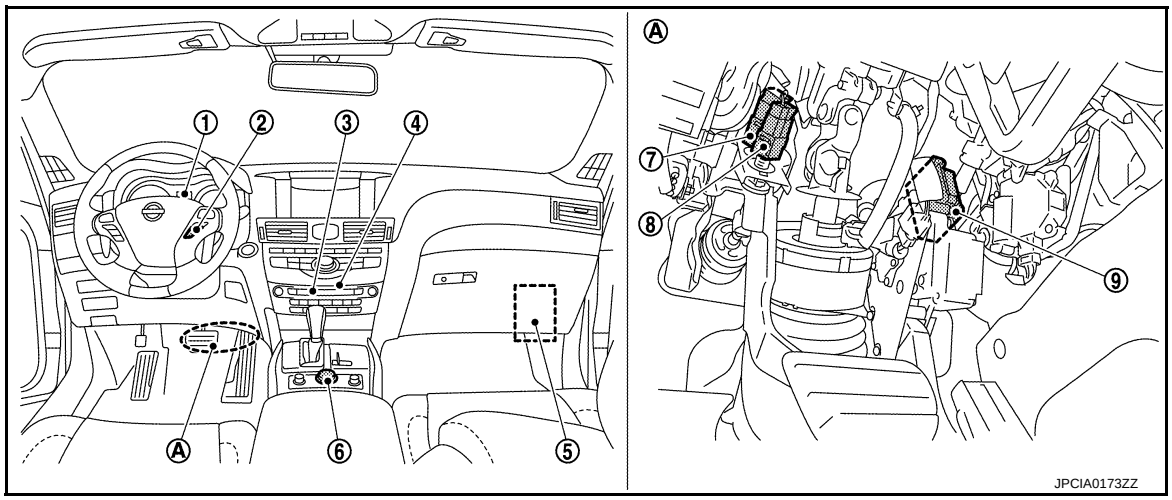
Vehicle Compartment



No.	Component	Description
1.	Cooling fan	EC-20, "Cooling Fan" For details of installation position, refer to EC-15, "ENGINE CONTROL SYSTEM : Component Parts Location".
2.	Power steering control module	STC-6, "Power Steering Oil Pump Assembly" For details of installation position, refer to STC-5, "Component Parts Location".
3.	IPDM E/R	Input a ignition switch status (ON) to HPCM. For details of installation position, refer to PCS-5, "IPDM E/R : Component Parts Location".
4	Traction motor inverter	TMS-10, "Traction Motor Inverter" For details of installation position, refer to TMS-10, "Component Parts Location".
5.	ECM	EC-21, "ECM" For details of installation position, refer to EC-15, "ENGINE CONTROL SYSTEM : Component Parts Location".
6.	Traction motor	TMS-11, "Traction Motor" For details of installation position, refer to TMS-10, "Component Parts Location".
7.	Transmission (Clutch 2)	The torque transfer/shutoff is performed by the clutch included in the transmission and controlled by TCM according to a command from HPCM. The clutch used at startup or engine starting is called Clutch 2. For the structure and operation, refer to TM-21, "TRANSMISSION : Cross-Sectional View".
8.	High-voltage harness	Harness for high voltage and high current. This is used mainly for the connection with a part that a high voltage is supplied from the ion battery. All high voltage harnesses and connectors are orange-colored.
9.	HPCM	HBC-15, "HPCM"
10.	Battery cooling fan	HBB-16, "Battery Cooling Fan" For details of installation position, refer to HBB-12, "Component Parts Location".

No.	Component	Description
11.	Li-ion battery	HBB-13, "Li-ion Battery" For details of installation position, refer to HBB-12, "Component Parts Location".
12.	Li-ion battery controller	HBB-14, "Li-ion Battery Controller" For details of installation position, refer to HBB-12, "Component Parts Location".
13.	Battery junction box	HBB-16, "Battery Junction Box" For details of installation position, refer to HBB-12, "Component Parts Location".
	System main relay	HBC-15, "System Main Relay"
14.	12V battery	PG-7, "12V Battery"
15.	DC/DC converter	HBC-15, "DC/DC Converter" For details of installation position, refer to HBB-12, "Component Parts Location".
16.	TCM	TM-15, "A/T CONTROL SYSTEM : TCM" For details of installation position, refer to TM-13, "A/T CONTROL SYSTEM : Component Parts Location".
17.	Clutch 1 stroke sensor	HBC-16, "Clutch 1 Stroke Sensor"
18.	Clutch 1	CL-5, "Description"
19.	Sub electric oil pump	TM-18, "SUB ELECTRIC OIL PUMP SYSTEM : Sub Electric Oil Pump" For details of installation position, refer to TM-17, "SUB ELECTRIC OIL PUMP SYSTEM : Component Parts Location".
20.	ABS actuator and electric unit (control unit)	BRC-13, "ABS Actuator and Electric Unit (Control Unit)" For details of installation position, refer to BRC-11, "Component Parts Location".
21.	Electrically-driven intelligent brake unit	BR-12, "Electrically-driven Intelligent Brake" For details of installation position, refer to BR-10, "Component Parts Location".
22.	Electric compressor	HA-14, "Component Description" For details of installation position, refer to HA-14, "Component Parts Location".
23.	Electric water pump	HCO-5, "High Voltage Cooling System"

Interior Compartment



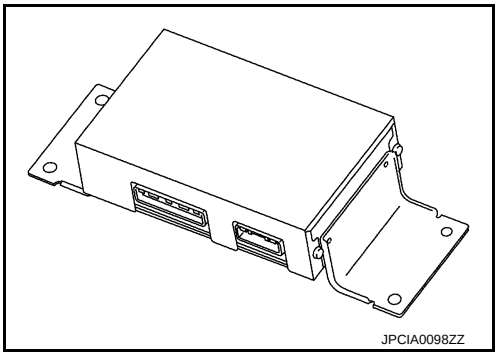
A. Periphery of pedals

No.	Component	Description
1.	Combination meter	Performs the ON/OFF control of the indicator lamp, warning lamp, and the information display, according to signals received from HPCM via CAN communication.
2.	ASCD steering switch	HBC-17, "ASCD steering Switch"
	ICC steering switch	HBC-17, "ICC Steering Switch"
3.	A/C auto amp.	Controls the air-conditioning system (e.g. electric compressor, blower fan motor), according to a command from HPCM. For details of installation position, refer to HAC-8, "AUTOMATIC AIR CONDITIONING SYSTEM : Component Parts Location".
4.	AV control unit	Displays a vehicle status on the display screen, according to signals received from HPCM. For details of installation position, refer to AV-11, "Component Parts Location".
5.	BCM	• Sends an ignition switch status (start) to HPCM. • Sends a vehicle state (e.g. door open/close status) via CAN communication. For details of installation position, refer to BCS-4, "BODY CONTROL SYSTEM : Component Parts Location".
6.	Drive mode select switch	DMS-4, "Drive Mode Select Switch" For details of installation position, refer to DMS-3, "Component Parts Location".
7.	Brake switch	HBC-16, "Brake Switch & Stop Lamp Switch"
8.	Stop lamp switch	
9.	Accelerator pedal position switch	HBC-16, "Accelerator Pedal Position Sensor"

HPCM

INFOID:0000000008144355

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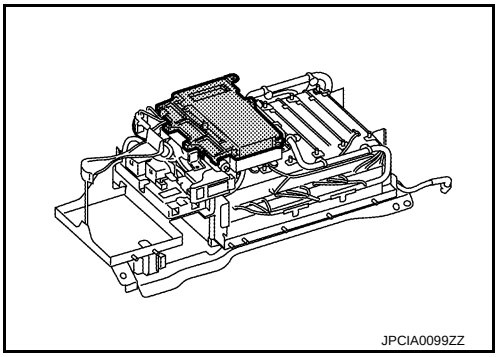
DC/DC Converter

INFOID:0000000008144356

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

INFOID:0000000008144357

DESCRIPTION

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

SYSTEM MAIN RELAY 1

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

SYSTEM MAIN RELAY 2

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

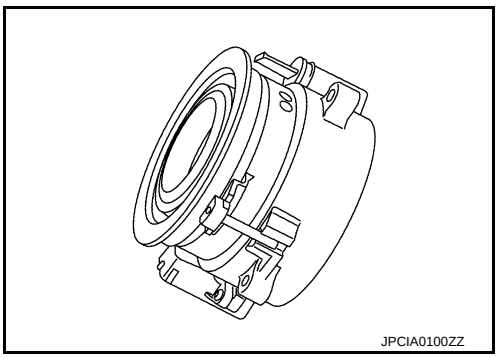
PRE-CHARGE RELAY

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

Clutch 1 Stroke Sensor

INFOID:0000000008144358

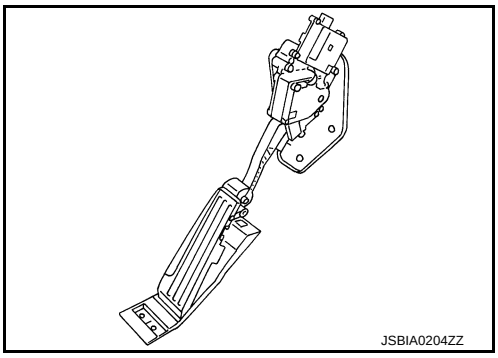
The clutch 1 stroke sensor is contained in the CSC (Concentric Slave Cylinder), and detects the status of clutch 1.
When clutch 1 operates, the magnet installed on the CSC piston moves together with clutch 1, causing a change in the magnetic field of the coil inside the clutch 1 stroke sensor. The clutch 1 stroke sensor converts this change in magnetic field to a voltage signal and inputs it into HPCM. HPCM detects the clutch 1 status from the change in this voltage signal.



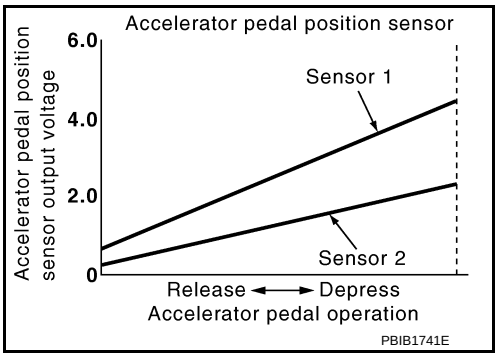
Accelerator Pedal Position Sensor

INFOID:0000000008144359

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



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



Brake Switch & Stop Lamp Switch

INFOID:0000000008144360

When the brake pedal is depressed, brake switch is turned OFF and stop lamp switch is turned ON.
HPCM detects the brake pedal status from two types of input (ON/OFF signal).

Brake pedal	Brake switch	Stop lamp switch
Depressed	OFF	ON
Not depressed	ON	OFF

ASCD steering Switch

INFOID:0000000008144361

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.
Refer to HBC-35, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description".

ICC Steering Switch

INFOID:0000000008144362

The intelligent cruise control steering switch is connected in series to different resistors in each switch circuit. HPCM reads the voltage values that are sent from each switch and split by the resistors, and detects which button is operated. For the intelligent cruise control function, refer to CCS-12, "System Description".

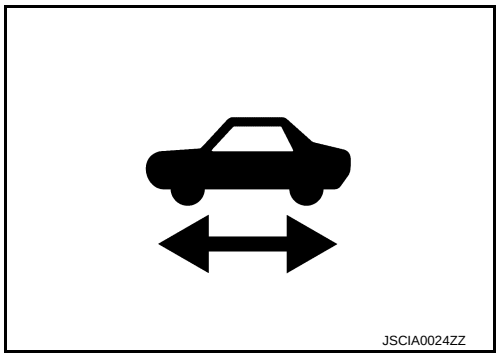
Warning Lamps and Indicator Lamps

INFOID:0000000008144363

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

READY TO DRIVE INDICATOR LAMP

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

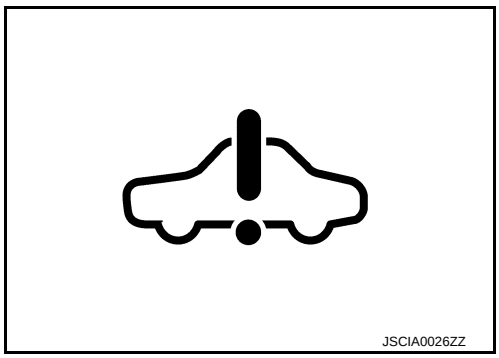


Condition	Illumination status
When ignition switch is operated from ON to READY	Blink
READY*	ON
Except above	OFF

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

HYBRID SYSTEM WARNING LAMP

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

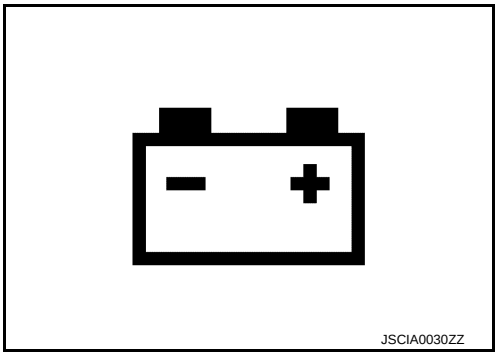


Condition	Illumination status
When ignition switch is operated from ON to READY	ON (Bulb check)
When there is a malfunction in the hybrid system*	ON
Except above	OFF

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

12-VOLT BATTERY CHARGE WARNING LAMP

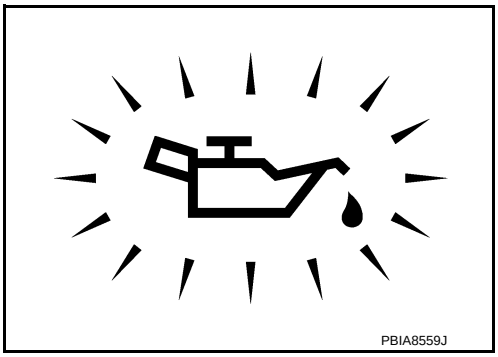
The 12-volt battery charge warning lamp turns ON when a malfunction occurs in the DC/DC converter.
When it detects a DC/DC converter malfunction, HPCM transmits the 12-volt battery charge warning lamp signal to the combination meter via CAN communication to turn the lamp ON.
The 12-volt battery charge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


JSCIA0030ZZ

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

OIL PRESSURE WARNING LAMP

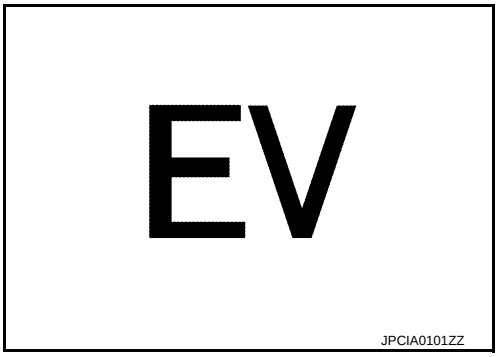
The oil pressure warning lamp turns ON when a malfunction is detected in the engine hydraulic system.
When it detects an engine hydraulic system malfunction, HPCM transmits the oil pressure warning lamp signal to the combination meter via CAN communication to turn the lamp ON.
The oil pressure warning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


PBIA8559J

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

EV INDICATOR LAMP

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

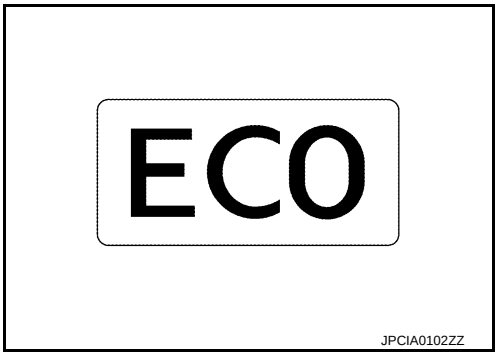


JPCIA0101ZZ

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

ECO DRIVE INDICATOR LAMP

Turns ON when ECO mode is selected with the drive mode selector.
When ECO mode is selected, the ECO mode signal is transmitted from TCM to HPCM via CAN communication. When HPCM receives the signal, it transmits the ECO drive indicator control signal to the combination meter via CAN communication.
The ECO drive indicator lamp operates as follows.



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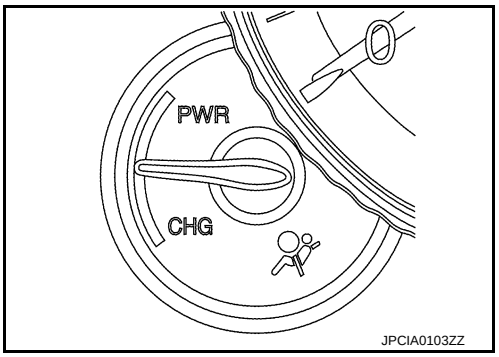
Condition	Illumination status
During ECO mode driving	ON (green)
When ECO mode is limited	Blinking (green)
During non-ECO mode driving	ON (orange)
Except above	OFF

ASSIST CHARGE GAUGE

Indicates the status of the traction motor.
HPCM transmits the traction motor state as the assist charge signal to the combination meter via CAN communication.
The assist charge gauge operates as follows.

Assist charge gauge	Traction motor state
PWR	Output
CHG	Generating power



Information Display

INFOID:0000000008144364

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

Display item	Display content
Shift P warning	Warns the driver to shift to P position.
HV system over heat warning*	Warns the driver that the hybrid system temperature is too high.
Li-ion battery state of charge	Indicates the Li-ion battery level.
Acceleration guide	Indicates the ECO pedal position and the driver's pedal position.
Energy monitor	Displays a simplified version of the energy monitor that is displayed in the navigation display.
EV mode odometer and twin trip meter	Displays the total mileage driven in motor driving mode.
CRUISE indicator	Indicates the ASCD operating status.
SET indicator	Indicates that a vehicle speed is set.

CAUTION:
***: The hybrid system over heat warning indicates that the temperature of the hybrid system is too high. It may become impossible to drive the vehicle if driving is continued.**
For the information display, refer to MWI-22, "INFORMATION DISPLAY : System Description".

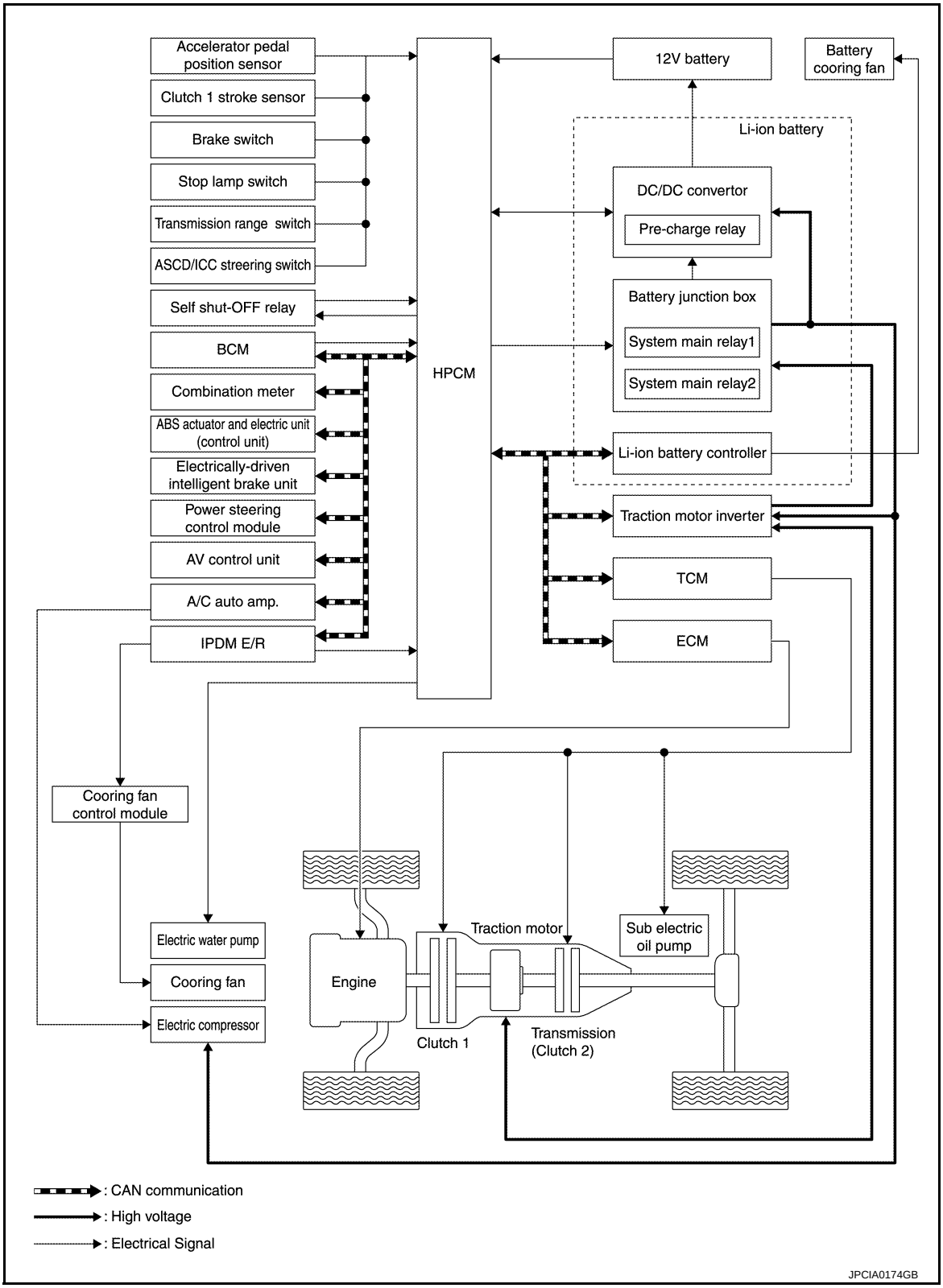
SYSTEM

HYBRID CONTROL SYSTEM

HYBRID CONTROL SYSTEM : System Description

INFOID:0000000008144365

SYSTEM DIAGRAM



HPCM INPUT/OUTPUT SIGNAL CHART

Input Signal Item

Transmitting sensor/unit	Signal name		Description
Accelerator pedal position sensor	Accelerator pedal position		Detects the amount that the accelerator pedal is depressed.
Clutch 1 stroke sensor	Clutch 1 position		Detects the clutch 1 status.
Brake switch	Brake pedal position		Detects the brake pedal status.
Stop lamp switch			
12V battery	Battery voltage		Turn ON the HPCM operating power.
ABS actuator and electric unit (control unit)	CAN communication	Decel G sensor signal	Receives the longitudinal G acting on the vehicle.
		Wheel speed signal	Receives the wheel speeds from the front, rear, left, and right wheels.
Li-ion battery controller	CAN communication	Li-ion battery state od charge signal	Receives the Li-ion battery charge condition.
		Li-ion battery temperature signal	Receives the Li-ion battery temperature.
		Discharge control electricity signal	Transmits the Li-ion battery power value which can be output.
		Charge control electricity signal	Transmits the Li-ion battery power value which can be charged.
		Li-ion battery voltage signal	Receives the Li-ion battery voltage.
		Li-ion battery current signal	Receives the Li-ion battery current.
Combination meter	CAN communication	Vehicle speed signal	Receives the vehicle speed that is calculated by the combination meter.
BCM	READY signal		Detects the ignition switch condition (start).
	CAN communication	Door switch signal	Receives driver door open/close condition.
ECM	CAN communication	Engine coolant temperature signal	Receives engine coolant temperature.
		Intake air temperature	Receives engine intake air temperature.
		Engine speed signal	Receives engine speed.
		Engine torque limit signal	Receives engine output torque limit value.
		Target idle speed signal	Receives the idle speed upper and lower limit values.
		Engine stop request signal	Receives engine stop request.
		Fuel cut-off prohibit signal	Receives the fuel cut permit/prohibit status.
		Idling stop prohibit signal	Receives the idle stop (engine stop) permit/prohibit status.
Traction motor inverter	CAN communication	Motor output torque signal	Receives traction motor torque value.
		Motor speed signal	Receives traction motor speed.
		Motor torque limit signal	Receives traction motor output torque limit value.
		Traction motor inverter voltage signal	Receives traction motor inverter voltage value.

Transmitting sensor/unit	Signal name		Description
TCM	CAN communication	Current gear position signal	Receives current gear position.
		Target gear position signal	Receives target gear position.
		ATF temperature signal	Receives A/T fluid temperature.
		Output shaft revolution speed signal	Receives output shaft speed.
		Input speed signal	Receives input shaft speed.
		Clutch 2 temperature signal	Receives clutch 2 temperature.
Electrically-driven intelligent brake unit	CAN communication	Braking force signal	Receives brake control force.
		Cooperative regenerative practicable torque signal	Receives the torque value that permits regenerative braking.
		Cooperative regenerative torque signal	Receives regenerative braking torque value.
		Accelerator start assist operation signal	Receives the accelerator start assist system operating status.
A/C auto amp.	CAN communication	Engine ON request signal	Receives engine start request.

Output Signal Item

Receiving sensor/unit	Signal name		Description
ECM	CAN communication	Target engine torque signal	Transmits the signal and generates the required engine output torque.
		Engine stop permit signal	Transmits the signal and stops the engine.
Traction motor inverter	CAN communication	Drive command signal	Transmits the signal and controls the traction motor output.
TCM	CAN communication	Clutch operation signal	Transmits the signal and operates clutch 1 and 2.
		Sub electric oil pump start up request signal.	Transmits the signal and operates the sub electric oil pump.
Electrically-driven intelligent brake unit	CAN communication	Target cooperative regenerative torque signal	Transmits the signal and generates the required regenerative braking torque.
A/C auto amp.	CAN communication	A/C cut-off request signal	Transmits the signal and stops operation of the electric compressor.
Combination meter	CAN communication	READY to drive indicator lamp signal	Transmits the signal and activates the indicator lamp.
		EV indicator lamp signal	
		Assist charge signal	Transmits the signal and activates the assist charge gauge.
		Energy monitor signal	Transmits the signal and displays the status on the information display.
		Li-ion battery state of charge signal	
		Acceleration guide signal	
AV control unit	CAN communication	Energy monitor signal	Transmits the signal and displays the status on the navigation display.

SYSTEM DESCRIPTION

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

HYBRID SYSTEM OUTPUT CONTROL

To control the drive force, HPCM detects the vehicle conditions based on information from the sensors and control modules, and controls the engine and traction motor.
HPCM judges the driving conditions based on the throttle position, vehicle speed, selector lever position, and other signals, and calculates the target drive force for those conditions. Based on the calculated target drive force and the status of each system, it distributes the required output between the engine and traction motor, and transmits the command signals to each control module. When each control module receives the signal, it performs control based on the command signal from the HPCM.

NOTE:
The status of each system control can be checked from “Energy monitor” on either the “Navigation display” or combination meter “Information Display”. Refer to MWI-22, "INFORMATION DISPLAY : System Description" or AV-15, "MULTI AV SYSTEM : System Description".

Functions of Primary Control Modules

Control module	Description	Reference
ECM	• Transmits engine status to HPCM via CAN communication. • Performs engine start, stop, and other engine controls based on commands from HPCM. • Outputs engine torque based on commands from HPCM.	• Engine control system EC-30 • Engine stop control EC-41
Traction motor inverter	• Transmits traction motor status to HPCM via CAN communication. • Controls traction motor power generation or output based on commands from HPCM.	• Motor power control TMS-17, • Motor regeneration control TMS-17
TCM	• Transmits transmission status to HPCM via CAN communication. • Activates clutch 1, clutch 2, and sub electric oil pump based on commands from HPCM. • Performs shift change control according to the vehicle driving conditions.	• A/T control system TM-49 • Sub electric oil pump system TM-60 • Shift change control TM-55
Li-ion battery controller	Transmits Li-ion battery status to HPCM via CAN communication.	• Hybrid battery system HBB-19
Electrically-driven intelligent brake unit	• Transmits brake operating status to HPCM via CAN communication. • Performs cooperative regenerative braking control together with HPCM.	• Brake system BR-14 • Cooperative regenerative brake function BR-19
Combination meter	Receives request signals transmitted by CAN communication from HPCM, and activates the indicator lamps on the combination meter and displays vehicle condition in the information display.	• Meter system MWI-9 • Information display MWI-16

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

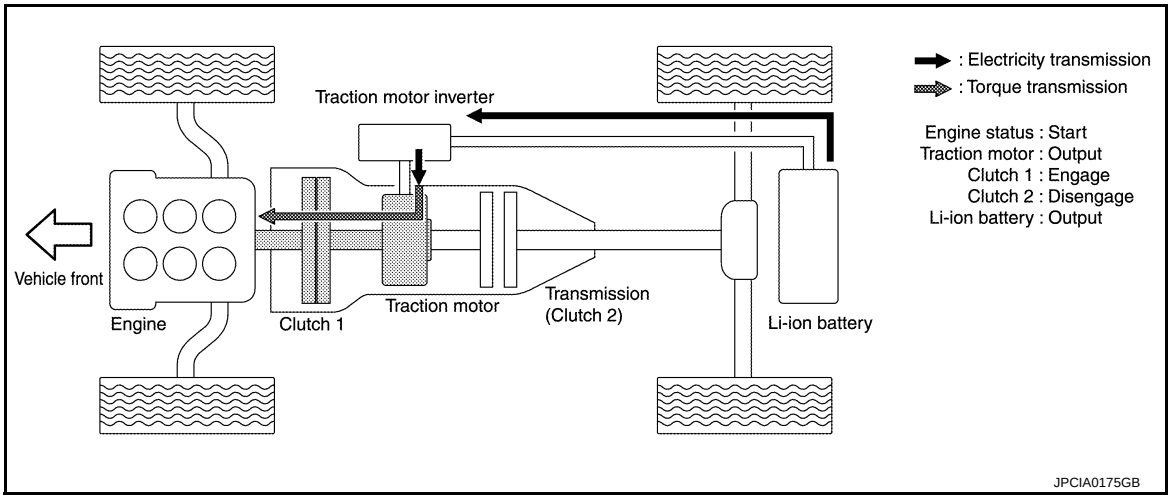
HPCM controls the driving mode according to a range of driving conditions. Examples of vehicle driving modes under different driving conditions are shown below.

Hybrid System Activation

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

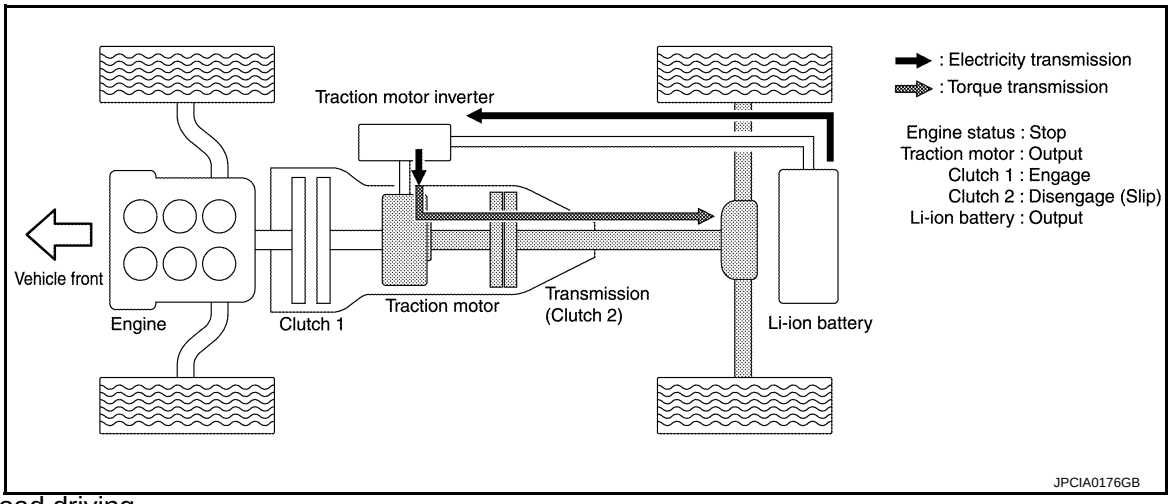
When Vehicle is READY

- When the vehicle is READY, HPCM controls the system main relay and connects the high-voltage circuit. Refer to HBC-30, "SYSTEM MAIN RELAY CONTROL : System Description".
- The combination meter activates the READY to drive indicator lamp, informing the driver that the vehicle is ready to drive.
- HPCM detects the engine and Li-ion battery status based on signals from the ECM and Li-ion battery controller.
  When engine is cold and Li-ion battery level is low, in order to warm the engine or charge the Li-ion battery, clutch 1 is engaged and the traction motor output is used to start the engine.
  NOTE:
  Even after the engine is warm or the Li-ion battery level is sufficient, in some cases the engine still may not start due to other conditions.

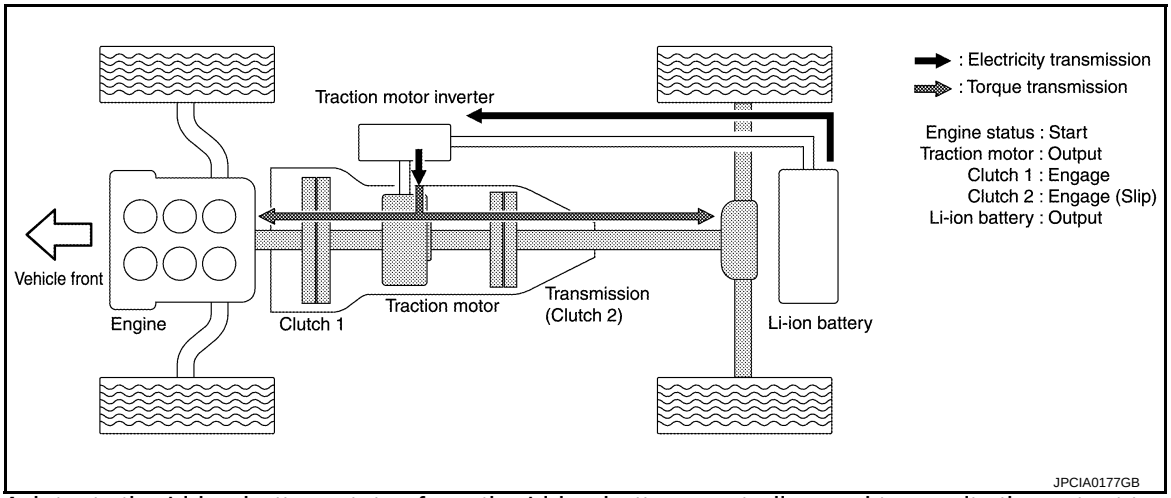


Normal Driving

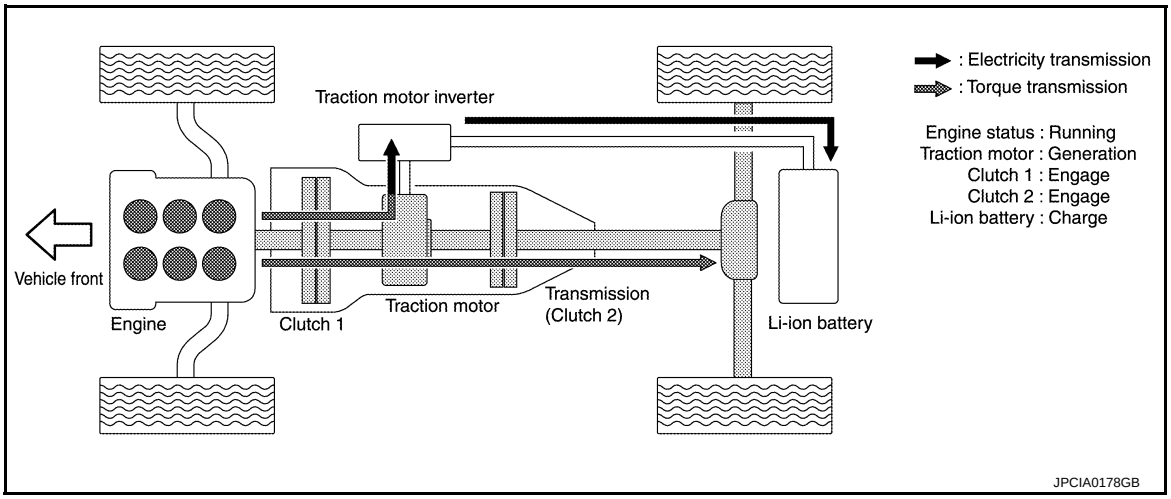
- When starting and driving at low speed (motor driving)
- When starting and driving at low speed, the mode is motor driving in which the electrical power from the Li-ion battery is used to drive the vehicle using traction motor output torque only.
  NOTE:
  Motor driving may not be engaged when engine is cold and Li-ion battery level is low, or due to other conditions.
- HPCM transits the engine stop command signal to the ECM, stopping the engine and disengaging clutch 1. It also transmits the drive command signal to the traction motor inverter, controlling the traction motor output.
- HPCM transmits the EV indicator lamp signal to the combination meter via CAN communication. When the combination meter receives the signal, it activates the EV indicator lamp.



- Low-load driving
- During low-load driving, the vehicle is driven by engine output torque, and the traction motor generates power to charge the Li-ion battery (when the Li-ion battery level is low).
- HPCM engages clutch 1 and starts the engine.

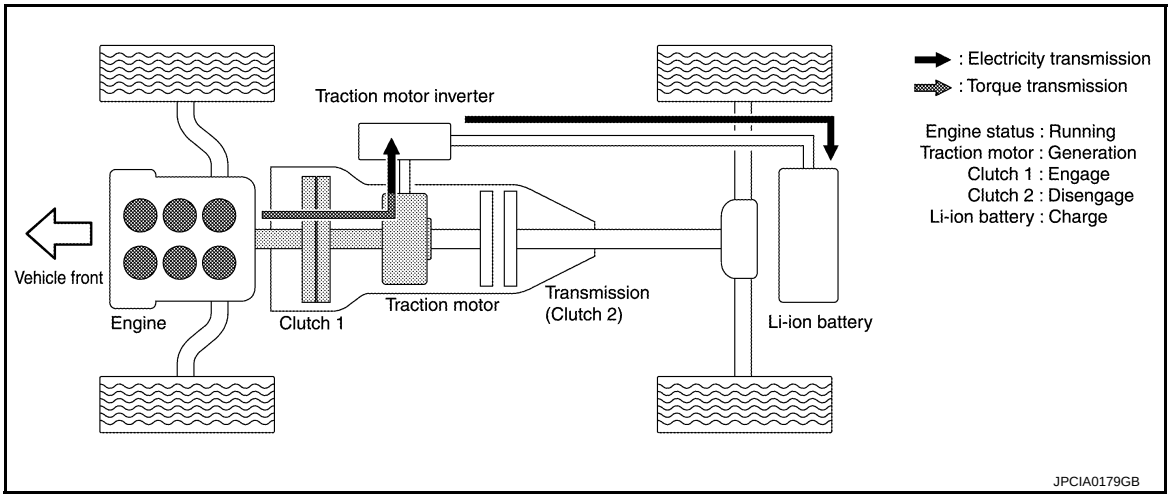


- HPCM detects the Li-ion battery status from the Li-ion battery controller, and transmits the output torque signal to the ECM to control the engine output. The traction motor inverter controls the power generation by the traction motor and charges the Li-ion battery.



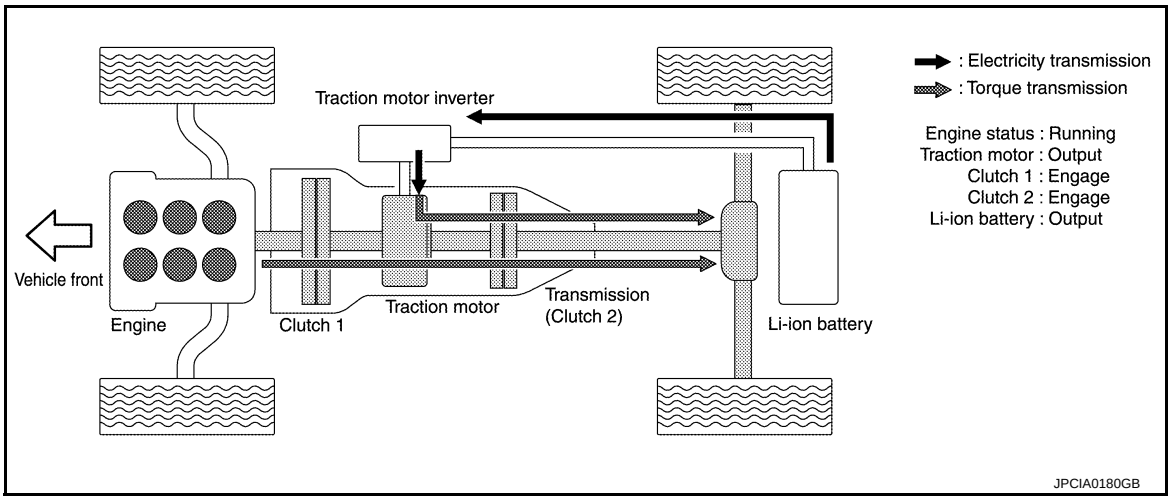
Vehicle Stopped

- When the Li-ion battery level is low, engine output is used to generate power from the traction motor and charge the Li-ion battery.
  NOTE:
  When the Li-ion battery level is sufficient, or due to other conditions, the engine may stop.
- HPCM detects the Li-ion battery status from the Li-ion battery controller, and transmits the output torque signal to the ECM to control the engine output.
- HPCM engages clutch 1 and disengages clutch 2.



Accelerating or Load is High

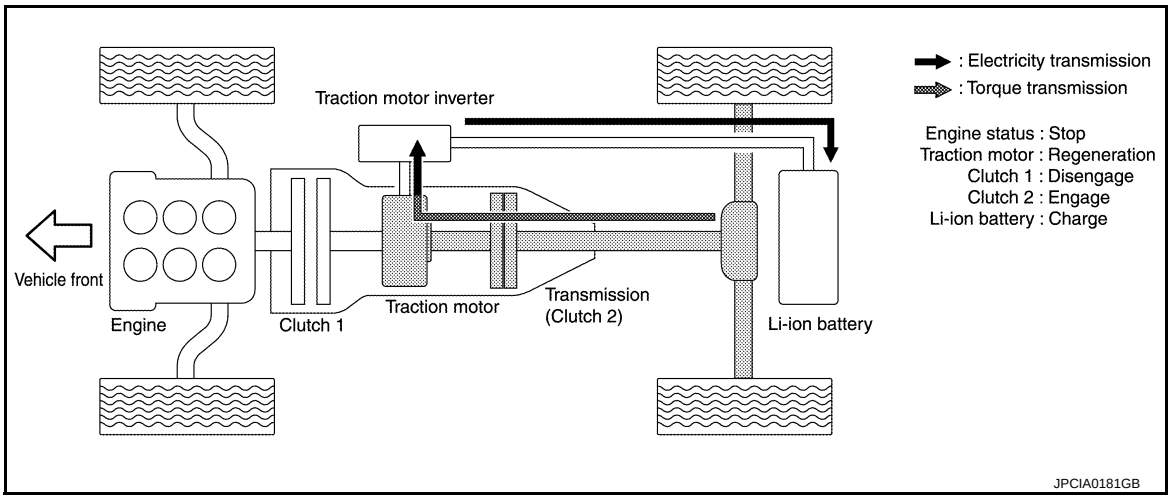
- When the accelerator pedal is fully depressed, the engine output torque assists the output torque from the traction motor.
- HPCM engages clutch 1 and clutch 2 and transmits the output torque signal to the ECM and the drive command signal to the traction motor inverter, and controls the engine and traction motor output.



Deceleration Driving

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

Cooperative control with the electrically-driven intelligent brake system increases the amount of power generated by regenerative braking. Refer to HBC-29, "BRAKE SYSTEM COOPERATION CONTROL : System Description" for details.



Hybrid System Stop

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

CONDITIONS FOR MOTOR DRIVING

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

Item	Condition
Li-ion battery level	Approx. 50% or greater
Engine coolant temperature	50°C or more
Accelerator pedal	At or below a certain amount of depression
Vehicle speed	90 km/h (56 MPH) or less

Item	Condition
Li-ion battery temperature	Not too high
Hybrid system	No malfunctions*

*: Even if there is a malfunction in the hybrid system, in some cases the fail-safe function may allow motor driving.

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

CLUTCH FUNCTION

Clutch 1 Function
- Clutch 1 is installed between the engine and traction motor.
- When the engine is running and engine output torque is transmitted to the transmission, the clutch is engaged.
- During motor driving, the clutch is disengaged in order to reduce the load on the traction motor.

For the clutch structure and operation, refer to CL-5, "Description".

Clutch 2 Function
- Clutch 2 is a component inside the transmission. It is used for engine start, starting from a stop, and shifting speeds.
  For the clutch structure and operation, refer to TM-21, "TRANSMISSION : Cross-Sectional View".
- For engine start, starting from a stop, and changing speeds, clutch 2 is allowed to slip, controlling the drive force that is transmitted to the drive wheels and providing smooth driving.

SYSTEM DISPLAY FUNCTION

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

Energy Monitor
- The operating status of each system can be checked by displaying the energy monitor on the navigation display or on the information display in the combination meter.
- HPCM transmits the status of each system to the AV control unit and combination meter via CAN communication. When the AV control unit and combination meter receive the signals, the energy monitor and fuel economy history are each displayed on the navigation display and information display.
  For the displayed screen, refer to AV-15, "MULTI AV SYSTEM : System Description".

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

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

HYBRID CONTROL SYSTEM : Fail-safe

INFOID:0000000008144366

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

DTC	Detection items	Hybrid system operation and vehicle behavior	
U0100 P0510 P314D P314E P31A6	Engine	If engine fuel is cut off or ECM CAN communication are abnormal	The engine is stopped and the vehicle is driven by the traction motor alone.
		If ECM stopped control of the electric throttle control actuator	The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed.
		If ECM is limiting speed due to fuel cut-off	Engine stop control is prohibited and the vehicle is driven by the engine alone with a limit on the engine speed. For this reason, acceleration performance decreases.
P2857 P2859	Clutch 1	If there is a malfunction on the clutch 1 engaged side	Engine stop control is prohibited.
		If there is a malfunction on the clutch 1 disengaged side	The engine is stopped and the vehicle is driven by the traction motor alone.
U0110 P0A1D P3176 P3177 P317A P317B P31A7	Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
		If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.
U0101 P3185 P31A8	Transmission	Transmission malfunction (If clutch 2 is unable to slip)	The engine is stopped and the vehicle is driven by the traction motor alone.
		Transmission malfunction (If clutch 2 is able to slip)	Driving occurs according to the restrictions on transmission gears.
		If CAN communication with the TCM computing unit or TCM are abnormal	• The engine and traction motor are stopped. • Driving is not possible even when the accelerator pedal is depressed.
P3149	Sub electric oil pump	• Engine stop control is prohibited in low vehicle-speed ranges. • If the engine is stopped, driving becomes impossible, and the “Shift P Warning” is displayed on the information display. When the warning instructions are followed and the driver shifts to the P position, the engine starts and driving becomes possible again.	
U0111 P0A1F P317F P3181 P3182 P31A9	Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
		If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.
P0AA6 P3117 P3118 P3119 P3120	High-voltage system insulation resistance	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P0A95 P311D P311E	High-voltage power wiring	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0AA0 P0AA1 P0AA4	System main relay	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P0ADB P0ADC		• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0B37	Service plug	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A0A	Interlock switch	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	

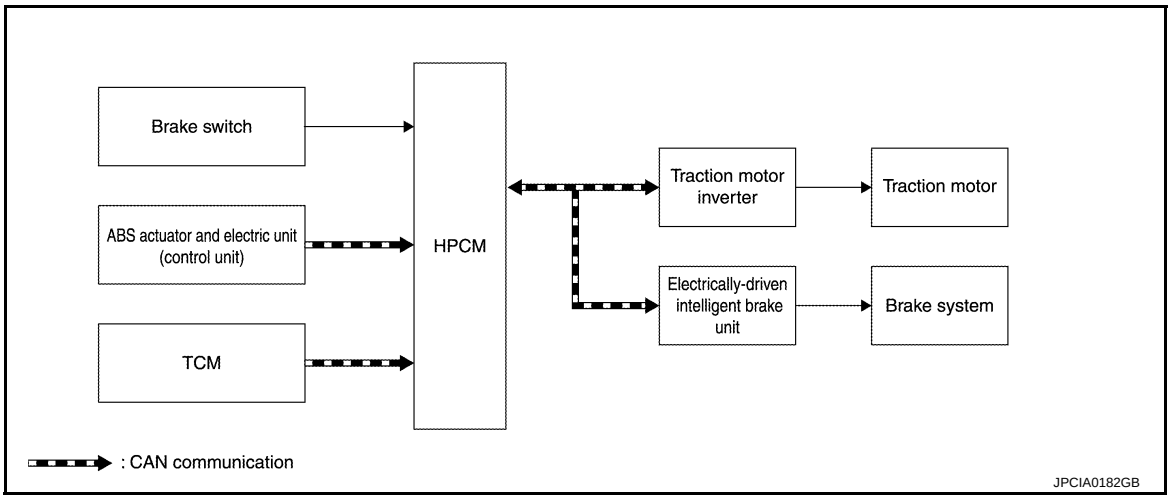
DTC	Detection items	Hybrid system operation and vehicle behavior
P0A08 P0A12	DC/DC converter	Vehicle speed is limited according to the drop in 12V battery voltage. After vehicle speed gradually decreases and only creep drive force is output, drive force output stops.
P0AE2 P0AE6 P0AE7 P311F	Pre-charge relay	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
P0A1D P3146	HPCM	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
U1000	CAN Communication	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
P3157	Sensor power supply	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	• Engine stop control is prohibited, and the drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.
P0A0F P3150	Engine start control	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.

BRAKE SYSTEM COOPERATION CONTROL

BRAKE SYSTEM COOPERATION CONTROL : System Description

INFOID:0000000008144367

SYSTEM DIAGRAM



HPCM INPUT/OUTPUT SIGNAL ITEMS

Input Signal Item

Transmitting sensor/unit	Signal name		Description
Brake switch	Brake pedal position		Detects the brake pedal status.
ABS actuator and electric unit (control unit)	CAN communication	Wheel speed signal	Receives the wheel speeds from the left and right rear wheels.
TCM	CAN communication	Current gear position signal	Receives current gear position.
		Target gear position signal	Receives target gear position.
		Output shaft revolution speed signal	Receives output shaft speed.
Traction motor inverter	CAN communication	Motor output torque signal	Receives traction motor torque value.

Transmitting sensor/unit	Signal name		Description
Electrically-driven intelligent brake unit	CAN communication	Braking force signal	Receives brake control force.
		Cooperative regenerative practicable torque signal	Receives the torque value that permits regenerative braking.
		Cooperative regenerative torque signal	Receives regenerative braking torque value.

Output Signal Item

Transmitting sensor/unit	Signal name		Description
Traction motor inverter	CAN communication	Drive command signal	Transmits the signal and controls the traction motor output.
Electrically-driven intelligent brake unit	CAN communication	Target cooperative regenerative torque signal	Transmits the signal and generates the required regenerative braking torque.

SYSTEM DESCRIPTION

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

REGENERATIVE BRAKE CONTROL

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

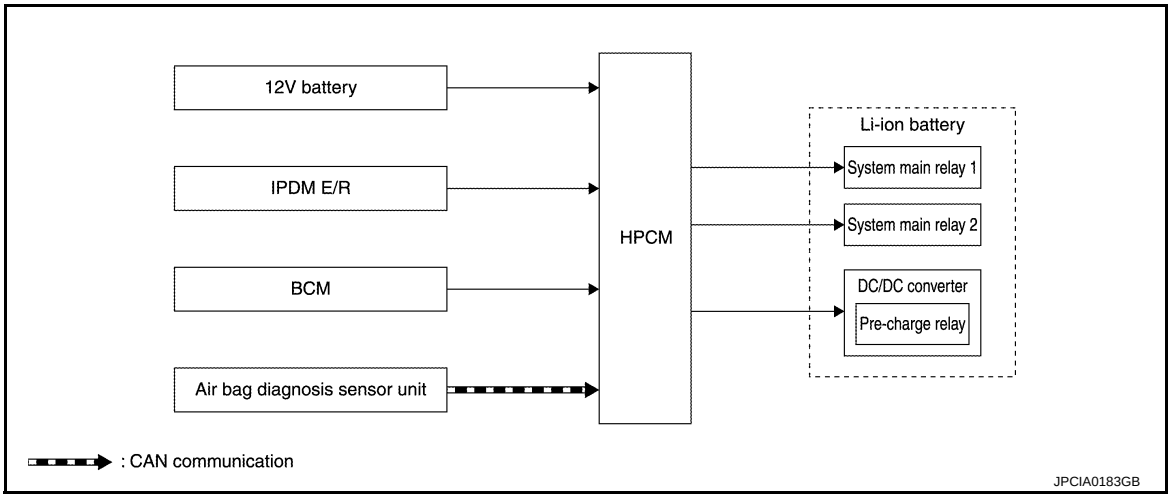
For electrically-driven intelligent brake system cooperative control, refer to BR-19, "COOPERATIVE REGENERATIVE BRAKE FUNCTION : System Description".

SYSTEM MAIN RELAY CONTROL

SYSTEM MAIN RELAY CONTROL : System Description

INFOID:0000000008144368

SYSTEM DIAGRAM



HPCM INPUT/OUTPUT SIGNAL CHART

Input Signal Item

Transmitting sensor/unit	Signal name		Description
BCM	READY signal		Receives the ignition switch condition (start).
IPDM E/R	IGN signal		Receives the ignition switch condition (ON).
Air bag diagnosis sensor unit	CAN communication	Car crush information signal	Receives the car crush information signal.

Output Signal Item

Receiving sensor/unit	Signal name	Description
System main relay 1	System main relay 1 operation signal	Transmits the signal and activates system main relay 1.
System main relay 2	System main relay 2 operation signal	Transmits the signal and activates system main relay 2.
DC/DC converter (pre-charge relay)	DC/DC converter pre-charge signal	Transmits the signal and activates the pre-charge relay.

DESCRIPTION

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

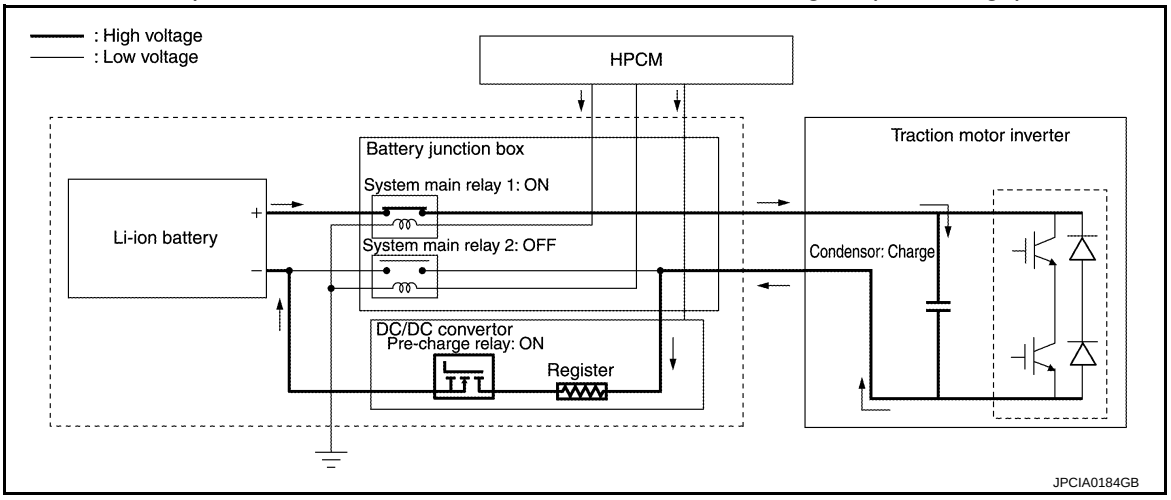
OPERATION DESCRIPTION

When High-voltage System is Connected

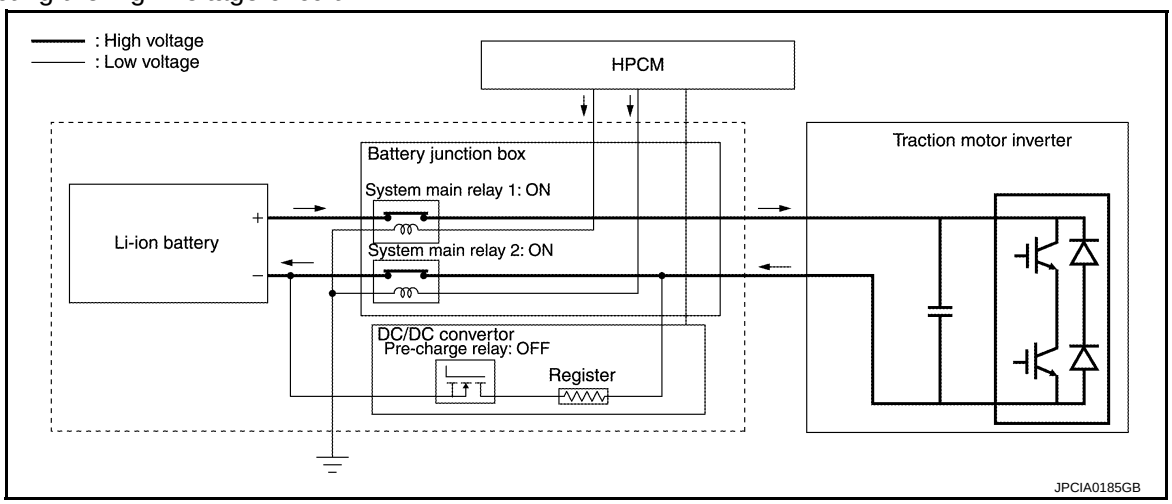
When vehicle is READY, HPCM controls the system main relays and first applies current via the resistor inside the DC/DC converter, protecting the circuit from high-voltage inrush current.

System relay operation

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



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



When High-voltage System is Disconnected

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

POWER DISCONNECT CONTROL AT TIME OF VEHICLE COLLISION

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

CONDITIONS FOR SYSTEM MAIN RELAY OFF

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

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

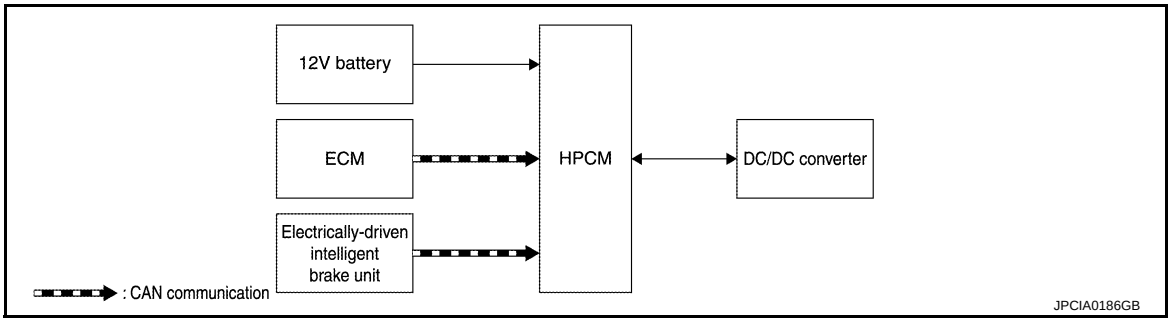
NOTE:

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

POWER VOLTAGE VARIABLE CONTROL SYSTEM

POWER VOLTAGE VARIABLE CONTROL SYSTEM : System Description *INFOID:0000000008144369*

SYSTEM DIAGRAM



HPCM INPUT/OUTPUT SIGNAL ITEMS

Input Signal Item

Transmitting sensor/unit	Signal name		Description
12V battery	12V power		12V power voltage
DC/DC CONVERTER	DC/DC converter activate signal		Receives the DC/DC converter operating status.
ECM	CAN communication	Voltage request signal	Receives the power generation target value requested by the ECM.
Electrically-driven intelligent brake unit	CAN communication	Voltage request signal	Receives the power generation target value requested by the electrically-driven intelligent brake unit.

Output Signal Item

Receiving sensor/unit	Signal name	Description
DC/DC Converter	DC/DC converter output signal (duty)	Transmits the signal and controls the generated voltage.

SYSTEM DESCRIPTION

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

CAUTION:

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

VARIABLE VOLTAGE CONTROL

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

NOTE:

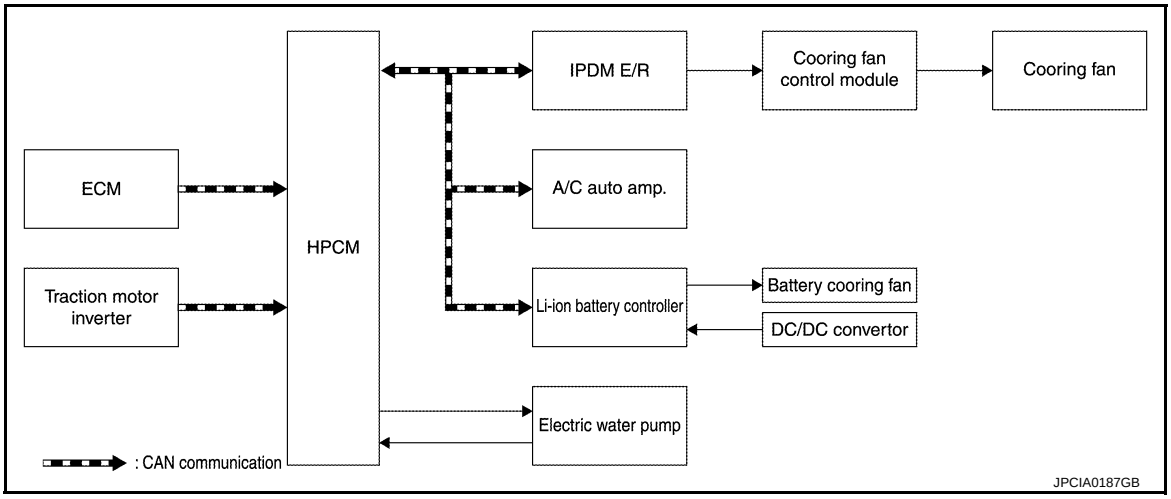
If the vehicle electrical equipment load increases and the output voltage decreases, the DC/DC converter temporarily stops the supply of power to the climate controlled seat control unit to maintain the optimal voltage.

COOLING SYSTEM CONTROL

COOLING SYSTEM CONTROL : System Description

INFOID:0000000008144370

SYSTEM DIAGRAM



HPCM INPUT/OUTPUT SIGNAL ITEMS

Input Signal Item

Transmitting sensor/unit	Signal name		Description
ECM	CAN communication	Cooling fan operation request signal	Receives the cooling fan operation request from the ECM.
Traction motor inverter	CAN communication	Cooling fan operation request signal	Receives the cooling fan operation request from the traction motor inverter.
Li-ion battery controller	CAN communication	DC/DC converter cooling mode signal	Receives the DC/DC converter cooling mode request from the Li-ion battery controller.
Electric water pump	Electric water pump feedback signal		Receives the electric water pump operating status.

Output Signal Item

Transmitting sensor/unit	Signal name		Description
IPDM E/R	CAN communication	Cooling fan operation request signal	Transmits the signal and activates the cooling fan. (via IPDM E/R)
A/C auto amp.	CAN communication	DC/DC converter cooling fan mode signal	Transmits the signal and controls the operation of the blower fan motor.
Electric water pump	Electric water pump operation signal		Transmits the signal and operates the electric water pump.

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

COOLING FAN CONTROL
Based on the request signals from the ECM and traction motor inverter, HPCM transmits the cooling fan control signal to IPDM E/R via CAN communication. IPDM E/R transmits the pulse duty signal that corresponds to the received signal to the cooling fan control module. The cooling fan control module controls the duty of the fan motor drive voltage in order to control the speed of the cooling fan motor.
Refer to EC-36, "COOLING FAN CONTROL : System Description".

DC/DC CONVERTER COOLING CONTROL
If deterioration of the DC/DC converter cooling performance causes the temperature to rise, the Li-ion battery controller transmits the DC/DC converter cooling mode request signal to HPCM. When HPCM receives the signal, it transmits the DC/DC converter cooling mode signal to A/C auto amp. via CAN communication. When the A/C auto amp. receives the signal, it introduces outside air to lower the temperature of the DC/DC converter.
Refer to HAC-17, "AUTOMATIC AIR CONDITIONING SYSTEM : Air Flow Control".

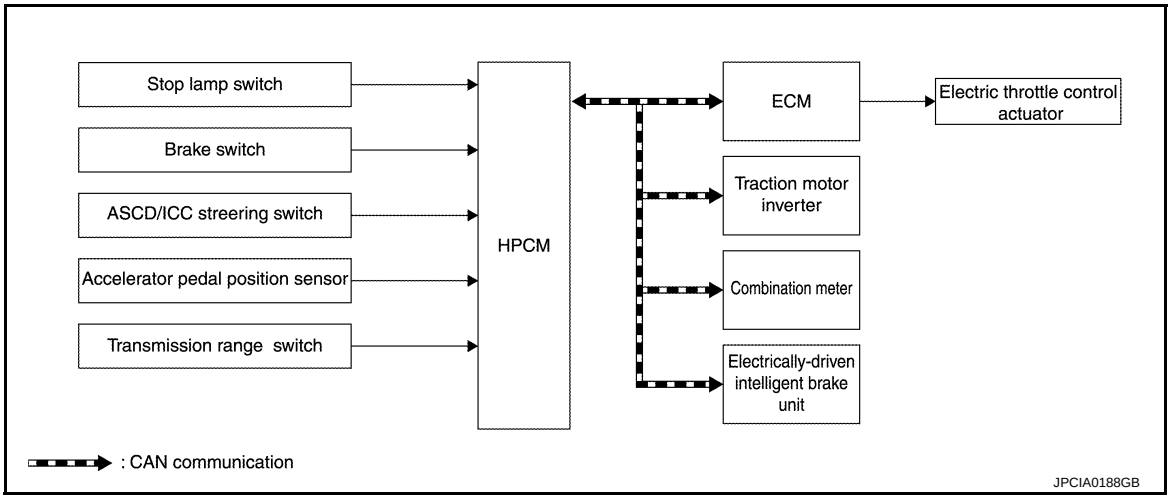
ELECTRIC WATER PUMP CONTROL
When vehicle is READY, HPCM transmits the activation signal to the electric water pump, activating the pump. It also performs duty control of the drive voltage according to the vehicle conditions, in order to control the operation of the electric water pump and reduce operating noise.
Refer to HCO-5, "High Voltage Cooling System".

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000008144371

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

Input Signal Item

Transmitting sensor/unit	Signal	
Stop lamp switch	Brake pedal operation	
Brake switch		
Accelerator pedal position switch	Accelerator pedal operation	
Transmission position switch	Transmission gear position	
ASCD/ICC steering switch	Steering switch operating status	
Traction motor inverter	CAN communication	Traction motor speed signal
Combination meter	CAN communication	Vehicle speed signal
Electrically-driven intelligent brake unit	CAN communication	Braking force signal

Output Signal Item

Signal		Reception unit	Actuator
Target engine torque signal	CAN communication	ECM	Electric throttle control actuator
Drive command signal	CAN communication	Traction motor inverter	Traction motor
ASCD status signal	CAN communication	Combination meter	Combination meter (Information display)

ASCD BASIC SYSTEM

CAUTION:

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

- ASCD (automatic speed control device) enables the driver to drive the vehicle at a constant speed with the acceleration pedal released once he a desired vehicle speed is set. *
  *: The driver can select a desired vehicle speed in a range from approximately 40 km/h (25 MPH) to 144 km/h (90 MPH).
- HPCM controls engine and traction motor output and adjusts vehicle speed to match the set speed. In addition, HPCM transmits an ASCD status signal to the combination meter and the information display displays the operation status. (Refer to HBC-39, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function".)

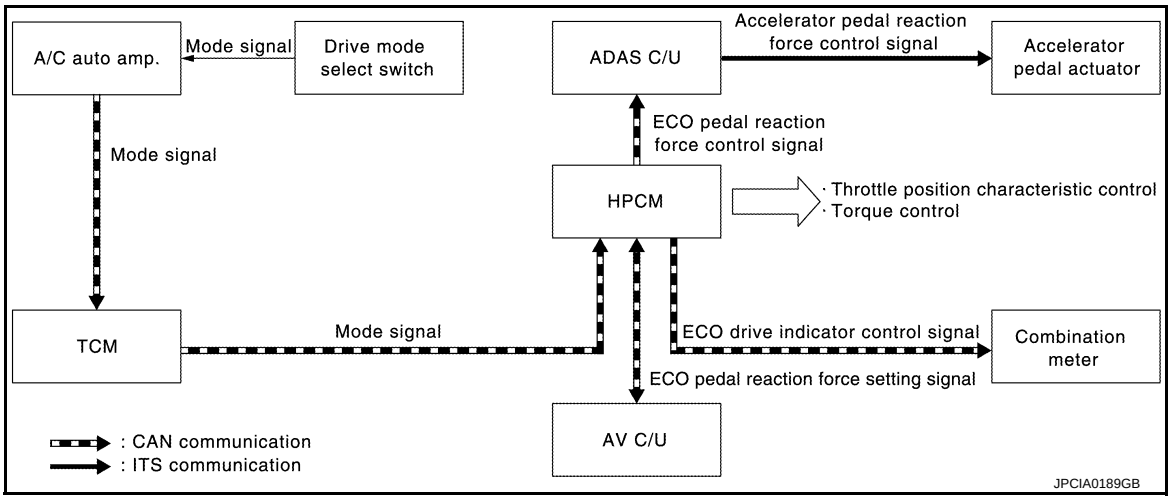
- If a non-standard condition is detected during ASCD control, the ASCD control is cancelled automatically.

INFINITI DRIVE MODE SELECTOR

INFINITI DRIVE MODE SELECTOR : System Description

INFOID:0000000008144372

SYSTEM DIAGRAM



NOTE:

- This section provides description only about the control by HPCM.
  For overall control, refer to DMS-2, "Infiniti Drive Mode Selector".
- ECO pedal control is only for vehicles with intelligent pedal (distance control assist).

Infiniti Drive Mode Selector

- A/C auto amp. receives an operation state signal of the drive mode select switch and transmits a mode signal (see below) to TCM via CAN communication.

- STANDARD: ON/OFF
- SPORT: ON/OFF
- ECO: ON/OFF
- SNOW: ON/OFF

- TCM transmits a mode state signal to HPCM via CAN communication, based on a ECO mode signal received from A/C auto amp.
- HPCM controls torque appropriate to each mode, based on a ECO mode signal received from TCM via CAN communication.
- ECM controls the throttle position characteristics and controls engine output torque, based on the command signal from HPCM.
- Traction motor inverter controls the traction motor output torque, based on a command signal from HPCM.
- When ECO mode is engaged, the ECO mode indicator lamp is turned ON or blinks based on the ECO mode indicator lamp signal received by CAN communication from HPCM.

ECO Pedal Control

- AV control unit transmits the ECO pedal reaction force setting signal (Standard/Soft/OFF) to HPCM via CAN communication.
  NOTE:
  The ECO pedal reaction force setting signal which determines reaction force of the accelerator pedal can be selected on the settings screen of the Multi AV System.
- HPCM transmits the ECO pedal reaction force control signal to ADAS control unit via CAN communication, based on a ECO mode signal received from TCM via CAN communication and an ECO pedal reaction force setting signal received from AV control unit via CAN communication.
- HPCM sends back an ECO pedal reaction force setting signal received from the AV control unit to the AV control unit for confirmation.
- ADAS control unit controls pedal reaction force of the accelerator pedal actuator via ITS communication, based on a ECO pedal reaction force control signal received from HPCM.

CONTROL

- With the drive mode selector, a drive mode select switch installed at the top of the center console switches a vehicle drive mode, changes throttle angle characteristics, and controls torque and ECO pedal.

- vehicle characteristics are controlled in the following modes, on the basis of STANDARD mode ("●" position of the drive mode select switch).
- SPORT: Changing throttle angle characteristics allows to use the high range of dynamic performance and increases driving performance.
- ECO: Changing throttle angle characteristics and controlling torque, ECO drive indicator lamp, and ECO pedal enhance fuel economy in a actual traffic.
- SNOW: Changing throttle angle characteristics enhances driving performance on roads with a low coefficient of friction.

Control item	Vehicle drive mode			Description
	SPORT	ECO	SNOW	
Engine	×	×	×	Controls torque and ECO drive indicator control*
Traction motor	×	×	×	
ECO pedal		×		ECO pedal control (accelerator pedal reaction force control)

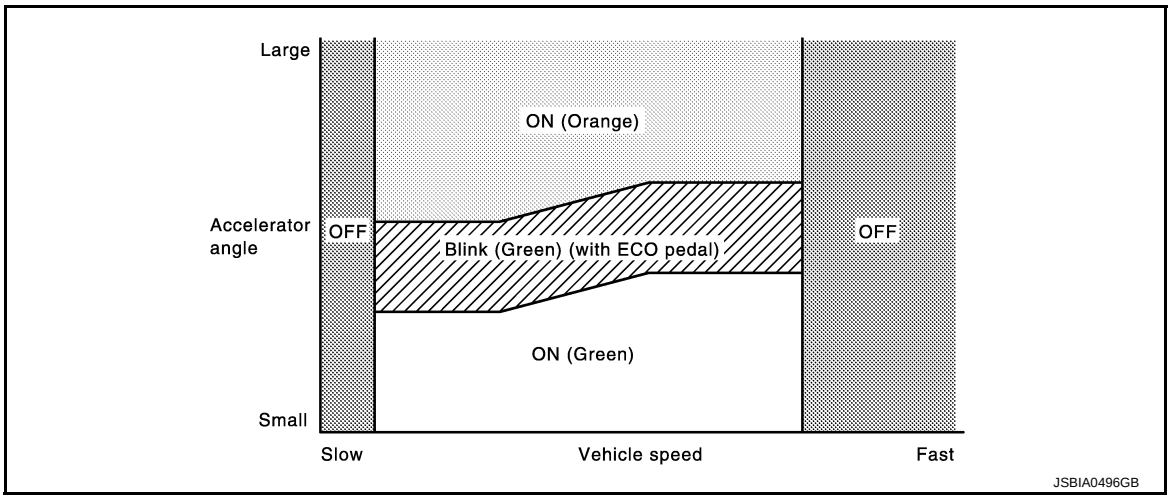
*: ECO drive indicator is available only in ECO mode.

ECO Drive Indicator Control

- ECO drive indicator turns ON or blinks (with ECO pedal) when in ECO mode, according to the operation of the accelerator pedal.
- For vehicles with ECO pedal, the blinking timing of the ECO drive indicator (green) synchronizes to the generation timing of ECO pedal reaction force.

ECO drive indicator	Drive condition
ON (green)	Within ECO driving range (good fuel economy area).
Blink (green)*	Likely over the ECO driving range (at limits of good fuel economy area).
ON (orange)	Over the ECO driving range (beyond limits of good fuel economy area).
OFF	Low-speed range [Approx. 4.8 km/h (3MPH) or less] and high-speed range [approx. 144 km/h (90 MPH) or more] (outside of good fuel economy area)

*: If so equipped ECO pedal

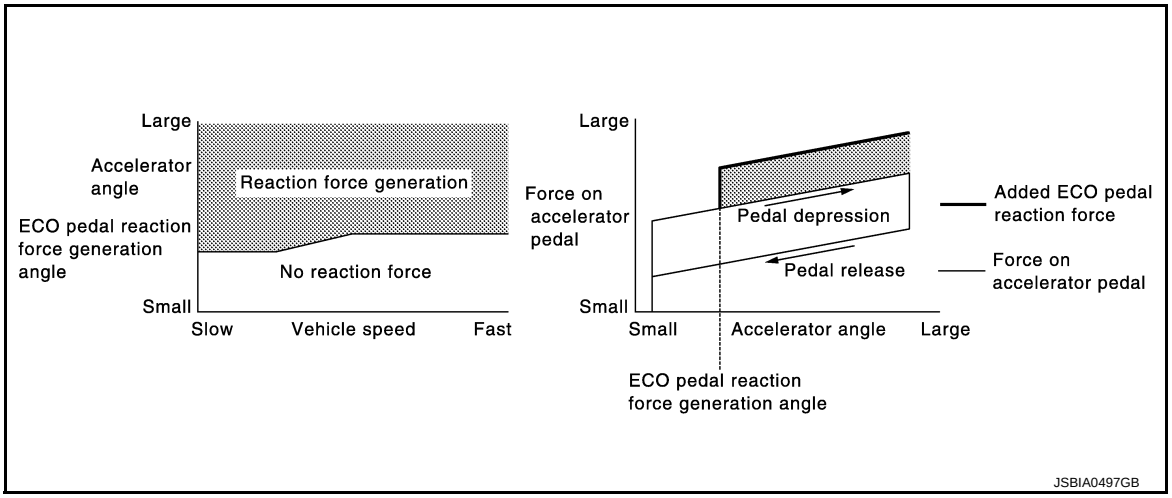


NOTE:
ECO drive indicator turns OFF as per the following condition.

- Intelligent cruise control is operation.
- Selector lever is in R position.

ECO Pedal Control

- Increasing reaction force of the accelerator pedal supports ECO driving in accordance with the accelerator pedal operation when in ECO mode.
- The level of reaction force to the accelerator pedal reaction force can be changed among Standard/Soft/OFF on the navigation screen. ECO pedal reaction force can be turned OFF even when in ECO mode.
- The generation timing of ECO pedal reaction force synchronizes to the blinking timing of the ECO drive indicator (Green).



NOTE:

- When switching from ECO mode to the other mode by operating the drive mode select switch, ECO pedal reaction force is generated in common with ECO mode until the accelerator pedal is released.
- ECO pedal reaction force is not generated under either of the conditions below.

- Intelligent cruise control is operation.
- Accelerator pedal is depressed quickly.
- Select lever is in N or R position.

Acceleration Guide

When in ECO mode, the amount of accelerator pedal depression where ECO pedal control generates reaction force is displayed on the information display in the combination meter, allowing the driver to check the accelerator pedal operation in the ECO driving range.

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000008144373

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

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

For details about CAN communications, refer to LAN-31, "CAN COMMUNICATION SYSTEM : System Description".

OPERATION

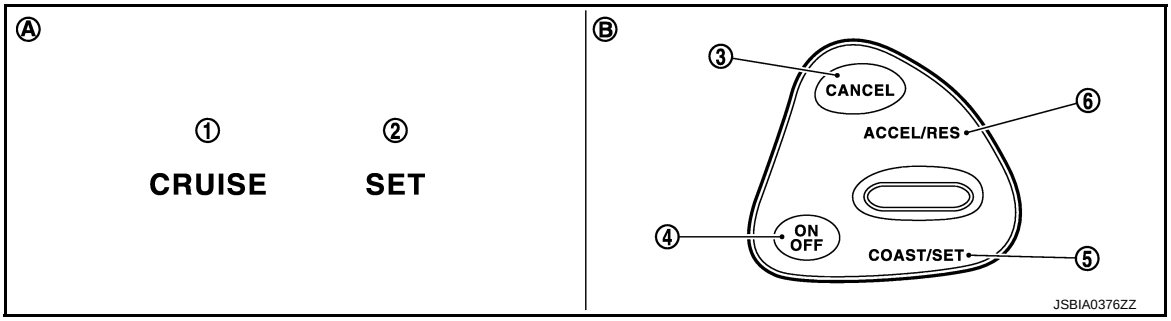
AUTOMATIC SPEED CONTROL DEVICE (ASCD)

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

INFOID:0000000008144374

SWITCHES AND INDICATORS (WITHOUT ICC MODELS)

ASCD steering switch



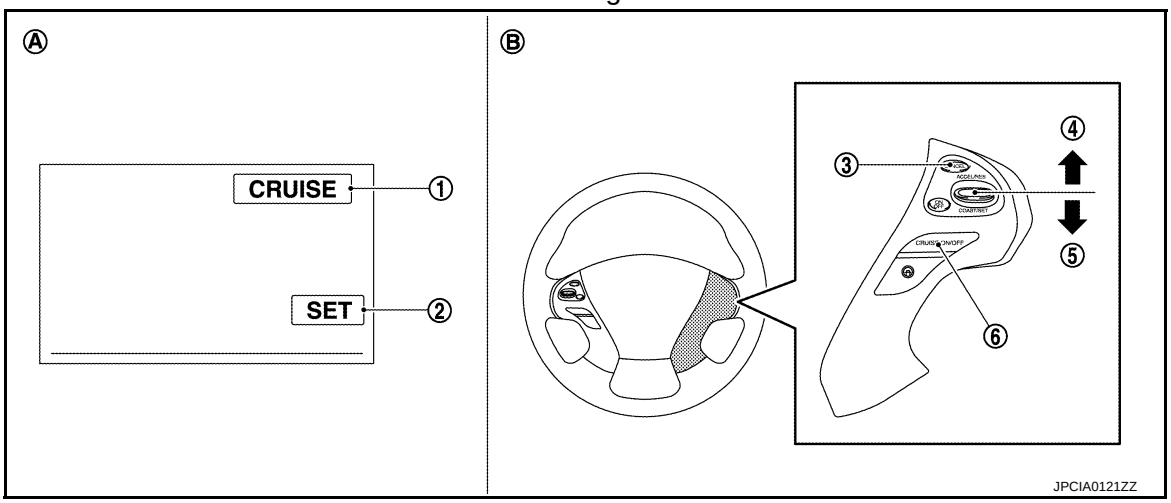
1. CRUISE indicator
2. SET indicator
3. CANCEL switch
4. ASCD MAIN switch
5. RESUME/ACCELERATE switch
6. COAST/SET switch

A. On the combination meter (Information display)

B. On the steering wheel

SWITCHES AND INDICATORS (WITH ICC MODELS)

ICC steering switch



1. CRUISE indicator
2. SET indicator
3. CANCEL switch
4. RESUME/ACCELERATE switch
5. COAST/SET switch
6. ASCD MAIN switch

A. On the combination meter (Information display)

B. On the steering wheel

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

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

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
RESUME/ACCELERATE switch	• Resumes the set speed. • Increases speed incrementally during cruise control driving.
COAST/SET switch	• Sets desired cruise speed. • Decreases speed incrementally during cruise control driving.
ASCD MAIN switch	Master switch to activate the ASCD system.

CANCEL OPERATION

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

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

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

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

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

HANDLING PRECAUTION

Infiniti Drive Mode Selector

INFOID:0000000008144375

ECO DRIVE INDICATOR LAMP CONTROL

- ECO drive indicator turns OFF under the following conditions.
- While driving at low speeds [3 MPH (4.8 km/h) or less] or high speeds [90 MPH (144 km/h) or more].
- Intelligent cruise control is in operation.
- Selector lever is in R range.

ECO PEDAL CONTROL

- When switching from ECO mode to the other mode by operating the drive mode select switch, ECO pedal reaction force is generated in common with ECO mode until the accelerator pedal is released.
- ECO pedal reaction force is not generated under the following conditions.
- Intelligent cruise control is in operation.
- Accelerator pedal is depressed quickly.
- Selector lever is in N or R range.
- ECO pedal reaction force setting is OFF.

NOTE:
ECO pedal control is only for vehicles with an intelligent pedal (distance control assist).

ENGINE AND TRACTION MOTOR OUTPUT CHARACTERISTICS AFTER SWITCHING MODE

- Engine and traction motor output characteristics after switching mode by operating the drive mode select switch are as follows.
- After switching mode to a mode that engine and traction motor output increase, engine and traction motor output characteristics are changed by releasing the accelerator pedal.
- After switching mode to a mode that engine and traction motor output decreases, engine and traction motor output characteristics are changed immediately.
- When an accelerator angle is constant, engine and traction motor output characteristics are as follows.
- SPORT > STANDARD > ECO > SNOW

Output characteristics of each mode

Control mode	Engine and traction motor output
SPORT	Increase
STANDARD	Normal
ECO	Decrease
SNOW	Decrease (More reduction than ECO mode)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000008144376

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

GST (Generic Scan Tool)

INFOID:0000000008144377

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control module equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to GI-58, "CONSULT/GST Data Link Connector (DLC) Circuit".

NOTE:

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

DIAGNOSIS SYSTEM (HPCM)

DIAGNOSIS DESCRIPTION

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

INFOID:0000000008144378

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

×: Applicable —: Not applicable

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

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000008144379

DTC AND 1ST TRIP DTC

The following shows 2nd trip detection diagnosis that illuminates the MIL.
The 1st trip DTC number is the same as the DTC number.
If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the HPCM memory. At this time, the MIL does not illuminate. Some of the diagnoses illuminate the hybrid system warning lamp and/or the 12-volt battery charge warning lamp, and other diagnoses do not illuminate them.
If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the HPCM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the HPCM memory and the MIL, the hybrid system warning lamp, and/or the 12-volt battery charge warning lamp illuminate.
The procedure for erasing the DTC and the 1st trip DTC from HPCM memory is described in “How to Erase DTC and 1st Trip DTC” in HBC-49, "CONSULT Function".
Refer to HBC-71, "DTC Index" for the malfunctions for which the 1st trip DTC is displayed.
1st trip DTC is specified in Service $07 of SAE J1979/ISO 15031-5.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to HBC-83, "Flowchart of Trouble Diagnosis".
Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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

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

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

Both 1st trip freeze frame data and freeze frame data (along with the DTC) are cleared when the HPCM memory is erased. For the procedure for erasing the HPCM memory, refer to “How to Erase DTC and 1st Trip DTC” of HBC-49, "CONSULT Function".

DIAGNOSIS DESCRIPTION : Counter System

INFOID:0000000008144380

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

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

COUNTER SYSTEM CHART

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

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000008144381

CAUTION:
Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.
- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (32°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

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

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.
- Engine speed reaches 400 rpm or more.

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

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

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

INFOID:0000000008144382

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

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

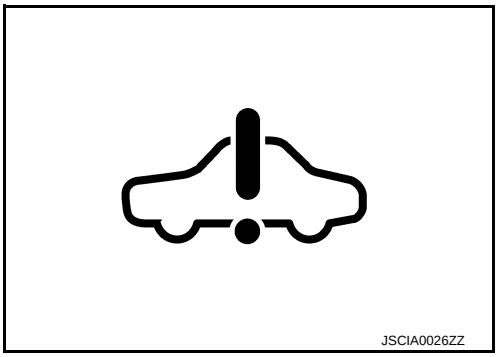
PERMANENT DTC SET TIMING

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

DIAGNOSIS DESCRIPTION : Hybrid System Warning Lamp

INFOID:0000000008144383

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


JSCIA0026ZZ

- Control modules which record DTC that cause the hybrid system warning lamp to turn ON or blink.
  (The control module which stores the DTC is different for each DTC.)

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

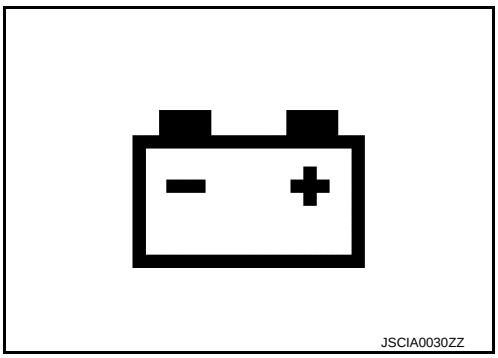
1. When the ignition switch is turned ON, the hybrid system warning lamp turns ON.
   NOTE:
   If the hybrid system warning lamp does not turn ON, inspect the warning lamp system circuit. HBC-330, "Component Function Check".
2. When the vehicle is READY, the hybrid system warning lamp turns OFF.

NOTE:
If the hybrid system warning lamp turns ON or flashes continuously, this means a DTC related to the hybrid system is detected. Execute self-diagnosis, and perform inspection or repair.

DIAGNOSIS DESCRIPTION : 12-Volt Battery Charge Warning Lamp

INFOID:0000000008144384

- When a DTC related to the DC/DC converter is detected, HPCM transmits the 12-volt battery charge warning lamp signal to the combination meter via CAN communication.
  Based on the signal from HPCM, the combination meter activates the 12-volt battery charge warning lamp, notifying the driver that a malfunction is detected.

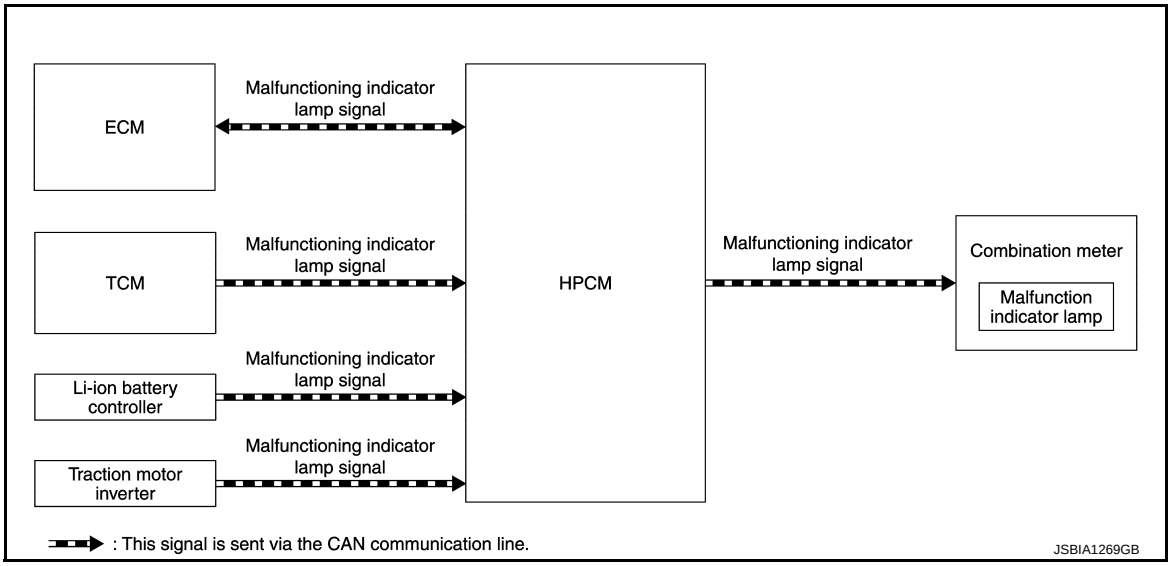


1. When the ignition switch is turned ON, the 12-volt battery charge warning lamp turns ON.
   NOTE:
   If the 12-volt battery charge warning lamp does not turn ON, inspect the warning lamp system circuit. HBC-330, "Component Function Check".
2. When the vehicle is READY, the 12-volt battery charge warning lamp turns OFF.
   NOTE:
   If the 12-volt battery charge warning lamp remains ON continuously, this means a DTC related to the DC/DC converter is detected. Execute self-diagnosis, and perform inspection or repair.

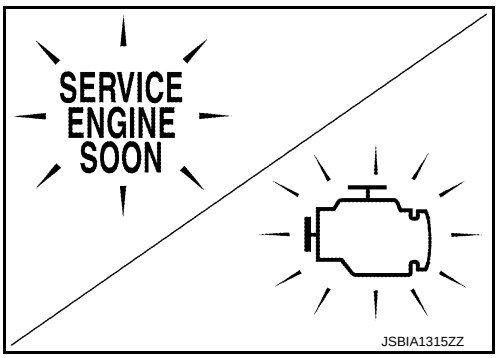
DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

INFOID:0000000008144385

SYSTEM DIAGRAM



SYSTEM DESCRIPTION



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

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

On Board Diagnosis Function

INFOID:0000000008144386

ON BOARD DIAGNOSIS (OBD) SYSTEM FUNCTIONS

The on board diagnosis (OBD) system includes the following functions.

Diagnosis test mode	Function
Check bulb	Check the bulbs of the hybrid system warning lamp and 12-volt battery charge warning lamp.
Malfunction warning	When a malfunction in the hybrid system is detected, the hybrid system warning lamp or 12-volt battery charge warning lamp is activated, notifying the driver of the malfunction.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to HBC-87, "Description".
Clutch 1 position learning	ECM can learn the clutch 1 position. Refer to HBC-88, "Description".
Inspection mode	Hybrid system control is forcibly limited, allowing exhaust measurement, driving on a chassis dynamometer, and other vehicle tests to be performed.

BULB CHECK MODE

Description

This function checks for damage (burn-out, open circuit, etc.) of the hybrid system warning lamp and 12-volt battery charge warning lamp.

Operation procedure

1. Turn ignition switch OFF.

2. Check that the hybrid system warning lamp and 12-volt battery charge warning lamp turn ON.
   If the hybrid system warning lamp or 12-volt battery charge warning lamp does not turn ON, check the circuit of the hybrid system warning lamp or 12-volt battery charge warning lamp. HBC-330, "Component Function Check".

MALFUNCTION WARNING MODE

Description

When HPCM detects a malfunction in the components of the hybrid system, it activates the hybrid system warning lamp. If a malfunction in the DC/DC converter is detected, the 12-volt battery charge warning lamp is activated, notifying the driver of the malfunction.

Operation Procedure

1. Turn ignition switch OFF.
2. Check that the hybrid system warning lamp and 12-volt battery charge warning lamp turn ON.
   If the hybrid system warning lamp or 12-volt battery charge warning lamp does not turn ON, check the circuit of the hybrid system warning lamp or 12-volt battery charge warning lamp. HBC-330, "Component Function Check".
3. Set the vehicle to READY.

- 1 trip detection diagnosis activates the hybrid system warning lamp or 12-volt battery charge warning lamp at the 1st trip.
- If the malfunction is detected a second time at the next driving cycle, the hybrid system warning lamp is activated to notify the driver that a malfunction is detected. (2 trip detection diagnosis)

INSPECTION MODE

Description

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

Inspection mode*1	Primary purpose	Control	Combination meter	
			Hybrid system warning lamp	12-volt battery charge warning lamp
Inspection mode 1*2, *3	Example: inspections that are performed with no load on the engine	• Disengage clutch 1 to eliminate any load on the engine. (P position only) • Operate the engine continuously.	Blink	—
Inspection mode 2	Example: driving on a 2-axle chassis dynamometer	Change the balance of the regenerative brake at the front and rear wheels.	—	Blink
Inspection mode 3	Example: driving on a 4-axle chassis dynamometer	Prohibit slope estimation.	Blink	Blink
Inspection mode 5*3	Example: driving using the engine only	Operate the engine continuously.	Blink	—

CAUTION:

- ***1: Inspection mode is canceled when the ignition switch is turned OFF. It is not canceled when the mode changed from CONSULT "EV/HEV", "ACTIVE TEST" mode to another mode. However inspection mode 1 is canceled if the select lever is shifted from P position to D position.**
- ***2: Check the conditions listed below before using inspection mode 1.**
- **If maintenance mode 1 is engaged when the Li-ion battery level is low, then in order to engage clutch 1 and charge the battery from the engine, use CONSULT "EV/HEV" "DATA MONITOR" mode and check that the "HV BATTERY LEVEL" reading is 50% or more, or else use the "Li-ion battery state of charge" in the information display on the combination meter and check that the battery level is 50% or more.**
- **Check that the engine coolant temperature is 70 °C (158 °F) or more.**
- ***3: When the select lever is in the P or N position, adjustments to the throttle position prevent the engine speed from exceeding 3,000 rpm.**

Operation Procedure
- Inspection mode 1: Refer to HBC-89, "Work Procedure (Inspection Mode 1)".
- Inspection mode 2: Refer to HBC-90, "Work Procedure (Inspection Mode 2)".
- Inspection mode 3: Refer to HBC-90, "Work Procedure (Inspection Mode 3)".
- Inspection mode 5: Refer to HBC-91, "Work Procedure (Inspection Mode 5)".

CONSULT Function

INFOID:0000000008144387

FUNCTION

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

*: When HPCM memory is erased, the following diagnosis information is erased.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip DTC freeze frame data
- Restart-prohibit fail-safe mode

CAUTION:

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

SELF-DIAGNOSTIC RESULTS MODE

Self Diagnostic Item

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

How to Read DTC and 1st Trip DTC

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

How to Erase DTC and 1st Trip DTC

NOTE:

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

Freeze Frame Data and 1st Trip DTC Freeze Frame Data

Freeze frame Data item*1	Unit	Description
DIAG TROUBLE CODE	—	When there is a malfunction in the hybrid system, the malfunction code is displayed. (Refer to HBC-71, "DTC Index".)
ENG CAL/LD VALUE	%	Indicates the calculated engine load value at the time the malfunction is detected.
COOLANT TEMP	°C	Indicates the engine coolant temperature at the time the malfunction is detected.
ENGINE SPEED	rpm	Indicates the engine speed at the time the malfunction is detected.
VEHICLE SPEED	km/h	Indicates the vehicle speed at the time the malfunction is detected.

Freeze frame Data item*1	Unit	Description
INTAKE AIR TEMP	°C	Indicates the intake air temperature at the time the malfunction is detected.
THRTL OPEN ANGLE	%	Indicates the throttle position at the time the malfunction is detected.
ENGINE RUN TIME	s	Indicates the engine running time at the time the malfunction is detected.
HPCM POWER SUPPLY	V	Indicates the HPCM power voltage at the time the malfunction is detected.
THRTL OPEN ANGLE	%	Indicates the throttle position at the time the malfunction is detected.
ACCEL SENSOR 1	%	Indicates the accelerator pedal position sensor 1 position at the time the malfunction is detected.
ACCEL SENSOR 2	%	Indicates the accelerator pedal position sensor 2 position at the time the malfunction is detected.
HV BATT LEVEL	%	Indicates the high-voltage battery level at the time the malfunction is detected.
THRTL OPEN ANGLE	deg	Indicates the throttle position at the time the malfunction is detected.
VEHICLE SPEED	km/h	Indicates the vehicle speed at the time the malfunction is detected.
TARGET ENGINE TORQUE	Nm	Indicates the target engine torque at the time the malfunction is detected.
ENGINE SPEED	rpm	Indicates the engine speed at the time the malfunction is detected.
ENGINE TORQUE	Nm	Indicates the engine torque at the time the malfunction is detected.
MOTOR TORQUE	Nm	Indicates the motor torque at the time the malfunction is detected.
MOTOR SPEED	rpm	Indicates the motor speed at the time the malfunction is detected.
CMD MOTOR TORQ	Nm	Indicates the motor torque command value at the time the malfunction is detected.
TRG MOTOR SPEED	rpm	Indicates the target motor speed at the time the malfunction is detected.
GEAR POSITION	—	Indicates the actual gear position at the time the malfunction is detected.
NEXT GEAR	—	Indicates the next gear at the time the malfunction is detected.
TM OUTPUT REV	rpm	Indicates the output shaft speed at the time the malfunction is detected.
BRAKING FORCE	N	Indicates the brake braking force at the time the malfunction is detected.
ENG TRQ LIMIT MAX	Nm	Indicates the engine torque upper-limit value at the time the malfunction is detected.
ENG TRQ LIMIT MIN	Nm	Indicates the engine torque lower-limit value at the time the malfunction is detected.
HV DISCHARGE POWER	kW	Indicates the high-voltage discharge power at the time the malfunction is detected.
HV CHARGE POWER	kW	Indicates the high-voltage charge power at the time the malfunction is detected.
MOTOR TORQ LIMIT (OUT)	Nm	Indicates the motor torque limit value at the time the malfunction is detected.
MOTOR TORQ LIMIT (REGE)	Nm	Indicates the motor torque limit value at the time the malfunction is detected.
ACSD CONTROL 1	—	Indicates the ACSD control information at the time the malfunction is detected.
ACSD CONTROL 2		Indicates the ACSD control information at the time the malfunction is detected.
COOLANT TEMP	°C	Indicates the engine coolant temperature at the time the malfunction is detected.
ATF TEMP	°C	Indicates the ATF temperature at the time the malfunction is detected.
CLUTCH 2 TEMP	°C	Indicates the clutch 2 temperature at the time the malfunction is detected.
HV BATTERY TEMP	°C	Indicates the Li-ion battery temperature at the time the malfunction is detected.
HVE BATTERY VOLT	V	Indicates the Li-ion battery voltage at the time the malfunction is detected.
HV BATTERY CURRENT	A	Indicates the Li-ion battery current at the time the malfunction is detected.
INVERTER VOLTAGE	V	Indicates the traction motor inverter voltage at the time the malfunction is detected.
DC/DC CONV SIG VOLT	mV	Indicates the DC/DC converter signal voltage at the time the malfunction is detected.
TM INPUT REV	rpm	Indicates the input shaft speed at the time the malfunction is detected.

Freeze frame Data item*1	Unit	Description
CLUTCH 1 TRG OIL PRESS	kPa	Indicates the clutch 1 target oil pressure at the time the malfunction is detected.
CLUTCH 1 STRK MONI	mV	Indicates the clutch 1 stroke sensor status at the time the malfunction is detected.
CLUTCH 1 STRK SEN	mV	• Indicates the clutch learning value at the time the malfunction is detected. • The clutch 1 stroke sensor indicates the learning value for the degree of clutch 1 wear.
GRADIENT RATIO	%	Indicates the slope ratio at the time the malfunction is detected.
G SENSOR	G	Indicates the G sensor status at the time the malfunction is detected.
FUEL LEVEL SENSOR	mV	Indicates the fuel level sensor status at the time the malfunction is detected.
POWER CONSUMPTION (A/C)	kW	Indicates the A/C power consumption at the time the malfunction is detected.
INDIVIDUAL MONI 1	—	Indicates the particular saved parameters that are set for each malfunction code.
INDIVIDUAL MONI 2	—	
INDIVIDUAL MONI 3	—	
INDIVIDUAL MONI 4	—	
INDIVIDUAL MONI 5	—	
INDIVIDUAL MONI 6	—	
INDIVIDUAL MONI 7	—	
INDIVIDUAL MONI 8	—	
OCCURRENCE ORDER	—	
READY ON TIME	min	Indicates the READY ON time at the time the malfunction is detected.
KEY ON TIME	min	Indicates the ignition ON time at the time the malfunction is detected.
MAX VEHICLE SPEED	km/h	Indicates the maximum vehicle speed at the time the malfunction is detected.
HV BATT LEVEL AFTR KEY ON	%	Indicates the Li-ion battery level after ignition ON at the time the malfunction is detected.
HV BATTERY LEVEL MAX	%	Indicates the maximum value of the Li-ion battery level at the time the malfunction is detected.
HV BATTERY LEVEL MIN	%	Indicates the minimum value of the Li-ion battery level at the time the malfunction is detected.
ENGINE STOP REQUEST	ON/OFF	Indicates the engine stop request status at the time the malfunction is detected.
FUEL CUT STATUS	ON/OFF	Indicates the fuel cut status at the time the malfunction is detected.
ENGINE START REQ	ON/OFF	Indicates the engine start request status at the time the malfunction is detected.
IDLE REQUEST	ON/OFF	Indicates the idle request status at the time the malfunction is detected.
IDLE STOP INHIBIT	ON/OFF	Indicates the idle stop inhibit status at the time the malfunction is detected.
FUEL CUT REQ	ON/OFF	Indicates the fuel cut request at the time the malfunction is detected.
ENGINE POWER LOW	ON/OFF	Indicates the engine output drop at the time the malfunction is detected.
STOP LAMP SW	ON/OFF	Indicates the stop lamp switch status at the time the malfunction is detected.
TM SUB O/P STOP REQ	ON/OFF	Indicates the sub oil pump stop request status at the time the malfunction is detected.
TM SUB O/P ACTIVAT REQ	ON/OFF	Indicates the sub oil pump activation request status at the time the malfunction is detected.

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

DATA MONITOR MODE

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For reference values of the following items, refer to HBC-59, "Reference Value".

Monitored Items

Monitor item	Unit	Description	Note
SHIFT POSITION (METER)	OFF/P/R/N/D/M1/M2/M3/M4/M5/M6/M7	• Displays the selector lever position received from TCM by CAN communication. - OFF: — - P: Selector lever P position - R: Selector lever R position - N: Selector lever N position - D: Selector lever D position - M1 - M7: Selector lever position manual mode	
GEAR POSITION	—	Indicates the gear position received from TCM by CAN communication.	
NEXT GEAR POSITION	—	Indicates the gear to shift to next that is received from TCM by CAN communication.	
ASC MODE	—	Indicates the adaptive speed control operating status.	
APP SENSOR 1	%	Indicates the value calculated from the accelerator pedal position sensor 1 signal voltage.	
APP SENSOR 2	%	Indicates the value calculated from the accelerator pedal position sensor 2 signal voltage.	
ENGINE COOLANT TEMP	°C	Displays the engine coolant temperature received from ECM via CAN communication.	
INTAKE AIR TEMP SEN	°C	Receives the intake temperature received from ECM via CAN communication.	
HV BATTERY LEVEL	%	Indicates the Li-ion battery level received from the Li-ion battery controller by CAN communication.	
HV BATTERY TEMP	°C	Indicates the Li-ion battery temperature received from the Li-ion battery controller by CAN communication.	
ATF TEMP	°C	Indicates the ATF temperature received from TCM by CAN communication.	
DC/DC CONV CONT DUTY	%	Indicates the duty ratio of the DC/DC converter voltage control signal.	
COOL FAN ACT REQ (DC/DC)	—	Indicates the status of the battery cooling fan activation request signal from the DC/DC converter that is received from the Li-ion battery by CAN communication.	
INVERTER W/P MONITOR	%	Indicates the electric water pump control status.	
INVERTER W/P DUTY	%	Indicates the electric water pump operating status.	
COOL FAN ACT REQ (MOTOR)	—	Indicates the status of the cooling fan activation request signal that is received from the traction motor inverter by CAN communication.	
RAD FAN DUTY	%	Indicates the cooling fan control status that is confirmed by HPCM.	
DOOR SW-DR	—	Indicates the driver door switch status received from BCM by CAN communication.	
DRIVE MODE	ECO/SPORT/SNOW	Indicates the status of the drive mode selector switch.	
ECO PEDAL STATUS	—	• Indicates the ECO pedal status that is set on the navigation display. - 0: No control - 1: OFF - 2: Soft - 3: Standard	
ECO PEDAL REACTN FORCE	N	Indicates the ECO pedal reaction force value.	
READY LAMP SIGNAL	OFF/BLINK/ON	Indicates the READY to drive indicator lamp status [OFF/BLINK/ON].	

Monitor item	Unit	Description	Note
HYBRID SYSTEM W/L SIGNAL	OFF/ BLINK/ON	Indicates the hybrid system warning lamp status [OFF/ BLINK/ON].	
CHARGE LAMP SIGNAL	OFF/ BLINK/ON	Indicates the 12-volt battery charge warning lamp status [OFF/BLINK/ON].	
READY ON TIME	min	Indicates the time elapsed after the vehicle entered READY state.	
IGN SW ON TIME	min	Indicates the time elapsed after the ignition switch is turned ON.	
MAX VEHICLE SPEED	km/h	Indicates the maximum vehicle speed.	
HV BATT LEVEL AFTR IGN ON	%	Indicates the Li-ion battery level after ignition switch is turned ON.	
HV BATTERY LEVEL MAX	%	Indicates the maximum value of the Li-ion battery level after ignition switch is turned ON.	
HV BATTERY LEVEL MIN	%	Indicates the minimum value of the Li-ion battery level after ignition switch is turned ON.	
NUMBER OF PDTC	—	Indicates the number of permanent DTC stored in HPCM.	
BRAKE SIGNAL	—	• Indicates the brake which is received by CAN communication from the electrically-driven intelligent brake unit. - 0: Brake OFF - 1: Brake ON	
INSPECTION MODE 2	—	• Indicates the inspection mode 2 status received by CAN communication from the electrically-driven intelligent brake unit. - 0: Normal - 1: Inspection mode 2 - 2: — - 3: Inspection mode 2 prohibit	
HV BATTERY LEVEL (METER)	—	Indicates the indicated battery level gauge value that is transmitted to the combination meter.	
ACCEL OPEN ANGLE (METER)	—	Indicates the indicated throttle position value that is transmitted to the combination meter.	
ECO ACCEL OPN ANG (MTR)	—	Indicates the indicated ECO throttle position value that is transmitted to the combination meter.	
ASSIST CHARGE (METER)	deg	Indicates the indicated assist charge gauge position value that is transmitted to the combination meter.	
DRIVE CONDITION 1	—	• Indicates the displayed energy monitor signal that is displayed on the navigation display. - 0: No flow - 1: Motor assist driving - 2: Engine driving, power generation - 3: EV driving (Motor driving) - 4: Regenerative braking - 5: Power generation - 6: Engine driving - 7: Power regeneration	Display 1 indicates the status between engine and tires.
DRIVE CONDITION 2	—		Display 2 indicates the status between engine and traction motor.
DRIVE CONDITION 3	—		Display 3 indicates the status between traction motor and Li-ion battery.
DRIVE CONDITION 4	—		Display 4 indicates the status between traction motor and tires.
TIRE ROTATION DIRECTION	—	Indicates the tire rotation direction for the energy monitor that is displayed on the navigation display.	
AMOUNT OF REGENERATION	kW	Indicates the amount of regenerative braking that is transmitted from HPCM to AV control unit by CAN communication.	
ESTIMAT VEHICLE SPEED	km/h	Indicates the vehicle speed that is calculated by HPCM.	
ACCEL OPEN ANGLE	deg	Indicates the throttle position that is calculated by HPCM.	

Monitor item	Unit	Description	Note
TARGET ENGINE TORQUE	Nm	Indicates the engine torque command value that is transmitted by HPCM to ECM via CAN communication.	
ENGINE SPEED	rpm	Displays the engine speed received from ECM via CAN communication.	
ENGINE TORQUE	Nm	Displays the engine speed torque from ECM via CAN communication.	
COMMAND MOTOR TORQUE	Nm	Indicates the motor torque command value that is transmitted from HPCM to the traction motor inverter via CAN communication.	
MOTOR TORQUE	Nm	Indicates the traction motor torque value that is received from the traction motor inverter by CAN communication.	
MOTOR SPEED	rpm	Indicates the traction motor speed that is received from the traction motor inverter by CAN communication.	
COMMAND MOTOR SPEED	rpm	Indicates the traction motor speed command value that is transmitted from HPCM to the traction motor inverter via CAN communication.	
TM OUTPUT REV	rpm	Indicates the output shaft speed received from TCM via CAN communication.	
REGENERATION TORQUE	Nm	Indicates the regenerative torque value which is received by CAN communication from the electrically-driven intelligent brake unit.	
CMD REGENERATION TORQ	Nm	Indicates the regenerative torque command value that is transmitted from HPCM to the traction motor inverter via CAN communication.	
BRAKING FORCE	Nm	Indicates the brake which is received by CAN communication from the electrically-driven intelligent brake unit.	
TARGET IDLE SPEED MAX	rpm	Indicates the upper-limit value of the target idle speed that is transmitted from HPCM to ECM via CAN communication.	
TARGET IDLE SPEED MIN	rpm	Indicates the lower-limit value of the target idle speed that is transmitted from HPCM to ECM via CAN communication.	
HV DISCHARGE POWER	kW	Indicates the discharge control power received from the Li-ion battery controller by CAN communication.	
HV CHARGE POWER	kW	Indicates the charge control power received from the Li-ion battery controller by CAN communication.	
MOTOR TORQ LIMIT (OUT)	Nm	Indicates the traction motor output limit value that is received from the traction motor inverter by CAN communication.	
MOTOR TORQ LIMIT (REGE)	Nm	Indicates the traction motor regenerative limit value that is received from the traction motor inverter by CAN communication.	
MOT TORQUE LIMIT (INV)	%	Indicates the traction motor output limit value that is received from the traction motor inverter by CAN communication.	
REGE EXECUT TORQ	Nm	Indicates the torque signal that allows regenerative cooperation which is received by CAN communication from the electrically-driven intelligent brake unit.	
HPCM POWER SUPPY	V	Indicates the power voltage input into HPCM.	
HV BATTERY VOLTAGE	V	Indicates the Li-ion battery voltage value received from the Li-ion battery controller by CAN communication.	
HV BATTERY CURRENT	A	Indicates the Li-ion battery current value received from the Li-ion battery controller by CAN communication.	

Monitor item	Unit	Description	Note
INVERTER VOLTAGE	V	Indicates the traction motor inverter voltage value that is received from the traction motor inverter by CAN communication.	
TM INPUT REV	rpm	Indicates the input shaft speed received from TCM via CAN communication.	
CLUTCH 2 TEMPERATURE	°C	Indicates the clutch 2 temperature received from TCM via CAN communication.	
CLUTCH 1 STROKE SENSOR	mV	Indicates the clutch 1 stroke sensor signal voltage.	
GRADIENT RATIO	%	Displays the inclination angle calculated from the G sensor signal.	
G SENSOR	G	Indicates the G sensor signal value received from TCM via CAN communication.	
ISOLAT SENS WAVE AMP	mV	Indicates the insulation detection voltage width received from the Li-ion battery controller by CAN communication.	
POWER CONSUMPTION (A/C)	kW	Indicates the A/C power consumption that is transmitted from HPCM to the A/C auto amp. by CAN communication.	
ASCD VEHICLE SPEED	km/h	Indicates the set vehicle speed.	
ASCD CMD VEHICLE SPEED	km/h	Indicates the vehicle speed command value.	
ACCEL SENSOR 1 VOLTAGE	mV	Indicates the signal voltage that is input from accelerator pedal position sensor 1.	
ACCEL SENSOR 2 VOLTAGE	mV	Indicates the signal voltage that is input from accelerator pedal position sensor 2.	
HV PRE CHG RLY ACTIV VOLT	mV	Indicates the pre-charge relay operating voltage monitor value.	
DC/DC CONV SIG VOLT	mV	Indicates the DC/DC converter control voltage.	
SENSOR POWER SUPPLY 1	mV	Indicates the sensor power 1 voltage.	
SENSOR POWER SUPPLY 2	mV	Indicates the sensor power 2 voltage.	
FUEL LEVEL SENSOR	—	Indicates the fuel level sensor voltage.	
WHEEL SENSOR (FR-RH)	rpm	Indicates the front right wheel speed received from ABS actuator and control unit via CAN communication.	
WHEEL SENSOR (FR-LH)	rpm	Indicates the front left wheel speed received from ABS actuator control unit via CAN communication.	
DC/DC TARGET VOLTAGE	mV	Indicates the request generation target value for the DC/DC converter that is received from the electrically-driven intelligent brake unit via CAN communication.	
ECM REQ DC/DC VOL	mV	Indicates the voltage request signal received from ECM via CAN communication.	
DC/DC VOLT CORRECT	mV	Indicates the DC/DC converter voltage correction.	
ENGINE STOP REQUEST	OFF/ON	Displays the engine stop request transmitted ECM via CAN communication.	
FUEL CUT STATUS	OFF/ON	Indicates the fuel cut-off status received from ECM via CAN communication.	
ENGINE START REQUEST	OFF/ON	Indicates the engine stop request transmitted to ECM via CAN communication.	
IDLE REQUEST	OFF/ON	Displays the idle request (engine independence request) transmitted ECM via CAN communication.	
ENGINE STOP PERMIT	OFF/ON	Displays the engine stop permit received from ECM via CAN communication.	
ENGINE START REQ (A/C)	OFF/ON	Displays the engine start permit received from the A/C auto amp. via CAN communication.	
IDLE STOP INHIBIT	OFF/ON	Indicates the idle stop prohibit signal received from ECM via CAN communication.	

Monitor item	Unit	Description	Note
FUEL CUT INHIBIT	OFF/ON	Indicates the fuel cut-off prohibit signal received from ECM via CAN communication.	
COMPUL ENG STOP PERMIT	OFF/ON	Indicates the HPCM engine forced-stop permit.	
ENGINE STOP JUDGE	OFF/ON	Indicates the HPCM engine stop permit signal.	
ENGINE STOP JUDGE (FINAL)	OFF/ON	Indicates the engine stop permit signal that is transmitted by HPCM to ECM via CAN communication.	
HV P MAIN RLY ACTIV	OFF/ON	Indicates the output status of system main relay 1 operation voltage.	
HV N MAIN RLY ACTIV	OFF/ON	Indicates the output status of system main relay 2 operation voltage.	
HV PRE CHG RLY ACTIV	OFF/ON	Indicates the output status of system pre-charge relay operation voltage.	
HV P MAIN RLY ACTIV MONI	OFF/ON	Indicates system main relay 1 [ON/OFF] status.	
HV N MAIN RLY ACTIV MONI	OFF/ON	Indicates system main relay 2 [ON/OFF] status.	
START SIGNAL	OFF/ON	Indicates status of the start signal (READY signal) that is input from BCM.	
IGN SW SIGNAL	OFF/ON	Indicates status of ignition switch signal that is input from IPDM E/R.	
CLUTCH 2 PROTECT	OFF/ON	Indicates activation status of clutch 2 overheat protection control	
SHIFT POSITION WARNING	OFF/ON	Indicates activation status of Shift P warning.	
ENGINE OIL PRESS WARNING	OFF/ON	Indicates activation status of engine oil pressure warning lamp.	
EV LAMP	OFF/ON	Indicates activation status of EV indicator lamp.	
P/N POS SIGNAL	OFF/ON	Indicates park/neutral position signal [ON/OFF] status.	
BRAKE OPERATION JUDGE	OFF/ON	Indicates the brake operation judgment status.	
INV COVER INTERLOCK SIG	OFF/ON	Indicates interlock switch [ON/OFF] status.	
SERVICE PLUG	OFF/ON	Indicates service plug [ON/OFF] status.	
SS OFF RELAY	OFF/ON	Indicates self shut-OFF relay [ON/OFF] status.	
I/A VOLUME LEARN PERMIT	OFF/ON	Indicates intake air amount learning permit status.	
A/C CUT REQ	OFF/ON	Indicates A/C cut-off request status.	
COMPUL A/C STOP PERMIT	OFF/ON	Indicates A/C forced-stop permit status.	
SUB OIL PUMP ACTIV REQ	OFF/ON	Indicates sub electric oil pump activation request status.	
DC/DC CONV ACTIV REQ	OFF/ON	Indicates the DC/DC activation request status.	
EPS ACTIV REQ	OFF/ON	Indicates the EPS activation request status.	
REV SYNC G/SFT PRHBT REQ	OFF/ON	Indicates status of speed-synchronized shift prohibit request.	
RESTART PROHIBITION	OFF/ON	Indicates restart prohibit status.	
ENGINE POWER LOW JUDGE	OFF/ON	Indicates engine output drop status.	
GEAR RATIO ABNORMAL JUDGE	OFF/ON	Indicates status of gear ratio error judgment.	
OIL PUMP ABNORMAL JUDGE	OFF/ON	Indicates status of sub electric oil pump stop request.	
OIL PUMP ACTIV REQ	OFF/ON	Indicates status of sub electric oil pump activation request.	
DISTANCE SW	OFF/ON	Indicates distance switch [ON/OFF] status.	
STOP LAMP SW SIGNAL	OFF/ON	Indicates stop lamp switch [ON/OFF] status.	
ASCD BRAKE SW	OFF/ON	Indicates brake switch [ON/OFF] status.	
ASCD SET SW	OFF/ON	Indicates SET/COAST switch [ON/OFF] status.	

Monitor item	Unit	Description	Note
RESUME/ACC SW	OFF/ON	Indicates RESUME/ACCELERATE switch [ON/OFF] status.	
CANCEL SW	OFF/ON	Indicates ASCD CANCEL switch [ON/OFF] status.	
MAIN SW	OFF/ON	Indicates ASCD MAIN switch [ON/OFF] status.	
ASCD SET LAMP	OFF/ON	Indicates activation status of SET indicator lamp.	
O/D CANCEL REQ	OFF/ON	Indicates OD cancel signal [ON/OFF] status.	
O/D MONITOR	OFF/ON	Indicates the OD [ON/OFF] status received from TCM by CAN communication.	
CRUISE LAMP	OFF/ON	Indicates activation status of ASCD CRUISE lamp.	
ASCD CANCEL (LOW SPEED)	OFF/ON	• Indicates the vehicle cruise control status. - OFF: Set speed is retained. - ON: Cruise control is canceled when the vehicle decelerates below the minimum speed that allows cruise control to be set.	
ASCD CANCEL (SPEED DIFF)	OFF/ON	• Indicates the vehicle cruise control status. - OFF: Set speed is retained. - ON: Cruise control is canceled when the vehicle decelerates excessively below the set speed.	
G SEN CORRECT ERROR	OFF/ON	Indicates the status of G sensor calibration.	
INSPCT MODE 2 REQ (E-DIB)	OFF/ON	Indicates the status of the inspection mode 2 request signal that is transmitted to the electrically-driven intelligent brake unit by CAN communication.	
ACCEL START ASSIST REQ	OFF/ON	Indicates the status of the accelerator start assist activation request signal that is transmitted to the electrically-driven intelligent brake unit by CAN communication.	
ACCEL START ASSIST OPE	OFF/ON	Indicates the accelerator start assist function [ON/OFF] status.	
ECO PEDAL CONT PERMIT	OFF/ON	Indicates the HPCM ECO pedal control permit status.	
ACCEL POS SELECT (AUTO)	OFF/ON	Indicates the drive mode selector status (AUTO).	
ACCEL POS SELECT (SPORTS)	OFF/ON	Indicates the drive mode selector status (SPORT).	
ACCEL POS SELECT (SNOW)	OFF/ON	Indicates the drive mode selector status (SNOW).	
ACCEL POS SELECT (ECO)	OFF/ON	Indicates the drive mode selector status (ECO).	

NOTE:

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

WORK SUPPORT MODE

Work Item

Work item	Condition	Usage
CLUTCH 1 POSITION LEARNING	**NOTE:** The item is indicated, but not used.	

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgement	Check item (Remedy)
INSPECTION MODE 1*1, *2	Prohibits engine idle stop under engine no-load conditions. Clutch 1: Disengaged Traction motor: Not operating	• Hybrid system warning lamp blinks. • For details, refer to HBC-89.	Example: inspections that are performed with no load on the engine
INSPECTION MODE 2	Changes the regenerative braking balance of the front and rear wheels when driving on a 2-wheel chassis dynamometer.	• 12-volt battery charge warning lamp blinks. • For details, refer to HBC-90.	Example: driving on a 2-axle chassis dynamometer
INSPECTION MODE 3	Prohibits gradient estimation when driving on a 4-wheel chassis dynamometer.	• Hybrid system warning lamp and 12-volt battery charge warning lamp blinks. • For details, refer to HBC-90.	Example: driving on a 4-axle chassis dynamometer
INSPECTION MODE 5*2	Prohibits engine idle stop in order to perform emissions measurement.	• Engine operates continuously. • Hybrid system warning lamp blinks. • For details, refer to HBC-91.	Example: driving using the engine only
ENGINE CRANKING	This vehicle inspection mode stops fuel injection control and ignition timing control and performs cranking.	Runs the engine in vehicle READY state.	Inspection of engine compression pressure and other items
WATER PUMP	Forcibly drives the electric water pump to check pump operation and when adding coolant.	Electric water pump operates when ignition switch is ON.	• Harness and connector • Electric water pump • Adding coolant
VOLTAGE CONTROL	Changes the voltage command value periodically in order to check operation of the DC/DC converter.	Changes the DC/DC converter drive voltage between 13V and 15V (20 second cycle).	• Harness and connector • DC/DC converter

CAUTION:

- ***1: Inspection mode is canceled when the ignition switch turns OFF. It is not canceled when a mode other than "ACTIVE TEST" is selected. However inspection mode 1 is canceled if the select lever is shifted from P position to D position.**
  Check the conditions listed below before using inspection mode 1.
  - **If maintenance mode 1 is engaged when the Li-ion battery level is low, then in order to engage clutch 1 and charge the battery from the engine, use CONSULT "EV/HEV" "DATA MONITOR" mode and check that the "HV BATTERY LEVEL" reading is 50% or more, or else use the "Li-ion battery state of charge" in the information display on the combination meter and check that the battery level is 50% or more.**
  - **Check that the engine coolant temperature is 70 °C (158 °F) or more.**
- ***2: When the select lever is in the P or N position, adjustments to the throttle position prevent the engine speed from exceeding 3,000 rpm.**

ECU DIAGNOSIS INFORMATION

HPCM

Reference Value

INFOID:0000000008144388

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- Specification data are reference values.
- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For outlines of following items, refer to HBC-49, "CONSULT Function".

CONSULT MONITOR ITEM

Monitor Item	Condition		Values/Status
SHIFT POSITION (METER)	Ignition switch: ON		Indicates selector lever position
GEAR POSITION	During driving		0 - 15
NEXT GEAR POSITION	During driving		0 - 15
ASC MODE	During driving		0 - 225
APP SENSOR 1	Ignition switch: ON	Accelerator pedal open angle	0 - 100 %
APP SENSOR 2	Ignition switch: ON	Accelerator pedal open angle	0 - 100 %
ENGINE COOLANT TEMP	Engine: After warming up		More than 70 °C
INTAKE AIR TEMP SEN	Engine: After warming up		Indicates intake air temperature
HV BATTERY LEVEL	Ignition switch: ON		15 - 85 %
HV BATTERY TEMP	Ignition switch: ON		–40 - 65 °C
ATF TEMP	Ignition switch: ON		–40 - 205 °C
DC/DC CONV CONT DUTY	Ignition switch: ON		15 - 85 %
COOL FAN ACT REQ (DC/DC)	Ignition switch: ON		0 - 3
INVERTER W/P MONITOR	Ignition switch: ON		5 - 15 %
	READY		15 - 85 %
INVERTER W/P DUTY	Ignition switch: ON		5 - 15 %
	READY		15 - 85 %
COOL FAN ACT REQ (MOTOR)	READY		0 - 3
RAD FAN DUTY	READY		0 - 100 %
DOOR SW-DR	—		0 - 32
DRIVE MODE	Ignition switch: ON	Drive mode select switch: ECO	ECO
		Drive mode select switch: SPORT	SPORT
		Drive mode select switch: SNOW	SNOW
ECO PEDAL STATUS	—		—
ECO PEDAL REACTN FORCE	—		N
READY LAMP SIGNAL	Ignition switch: OFF		OFF
	Ignition switch: ON → START		BLINK
	READY		ON

Monitor Item	Condition		Values/Status
HYBRID SYSTEM W/L SIGNAL	Ignition switch: ON	System normal	OFF
		Inspection mode	BLINK
		System abnormality	ON
CHARGE LAMP SIGNAL	Ignition switch: ON	System normal	OFF
		Inspection mode	BLINK
		DC/DC converter abnormality	ON
READY ON TIME	READY		Indicates multiplication operation time of READY.
IGN SW ON TIME	Ignition switch: ON		Indicates multiplication operation time of ignition switch ON.
MAX VEHICLE SPEED	READY	During driving	0 - 255 km/h
HV BATT LEVEL AFTR IGN ON	Ignition switch: ON		15 - 85 %
HV BATTERY LEVEL MAX	Ignition switch: ON		15 - 85 %
HV BATTERY LEVEL MIN	Ignition switch: ON		15 - 85 %
NUMBER OF PDTC	—		0 - 8
BRAKE SIGNAL	Ignition switch: ON		0 - 4
INSPECTION MODE 2	Ignition switch: ON	Perform inspection mode 2	0 - 4
HV BATTERY LEVEL (METER)	Ignition switch: ON		0 - 100 %
ACCEL OPEN ANGLE (METER)	READY		0 - 100
ECO ACCEL OPN ANG (MTR)	READY		0 - 100
ASSIST CHARGE (METER)	READY		–63 -63 deg
DRIVE CONDITION 1	READY	During driving	0 - 7
DRIVE CONDITION 2	READY	During driving	0 - 7
DRIVE CONDITION 3	READY	During driving	0 - 7
DRIVE CONDITION 4	READY	During driving	0 - 7
TIRE ROTATION DIRECTION	READY	During driving	0 - 3
AMOUNT OF REGENERATION	READY	During driving (Braking)	0 - 63.5 kW
ESTIMAT VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication.
ACCEL OPEN ANGLE	Ignition switch: ON		0 - 100 deg
TARGET ENGINE TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.
ENGINE SPEED	Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
ENGINE TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.
COMMAND MOTOR TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.
MOTOR TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.

Monitor Item	Condition		Values/Status
MOTOR SPEED	READY	During driving	Changes the value according to the acceleration or deceleration.
COMMAND MOTOR SPEED	READY	During driving	Changes the value according to the acceleration or deceleration.
TM OUTPUT REV	READY	During driving	Changes the value according to the acceleration or deceleration.
REGENERATION TORQUE	READY	During driving	Changes the value according to the acceleration or deceleration.
CMD REGENERATION TORQ	READY	During driving	Changes the value according to the acceleration or deceleration.
BRAKING FORCE	READY	During driving	Changes the value according to the acceleration or deceleration.
TARGET IDLE SPEED MAX	READY	During driving	Changes the value according to the acceleration or deceleration.
TARGET IDLE SPEED MIN	READY	During driving	Changes the value according to the acceleration or deceleration.
HV DISCHARGE POWER	Ignition switch: ON		0 - 65 kW
HV CHARGE POWER	Ignition switch: ON		0 - 30 kW
MOTOR TORQ LIMIT (OUT)	READY	During driving	Changes the value according to the acceleration or deceleration.
MOTOR TORQ LIMIT (REGE)	READY	During driving	Changes the value according to the acceleration or deceleration.
MOT TORQUE LIMIT (INV)	READY	During driving	0 - 100 %
REGE EXECUT TORQ	READY	During driving	Changes the value according to the acceleration or deceleration.
HPCM POWER SUPPY	Ignition switch: ON		5 - 13 V
	READY		9.5 - 15.5 V
HV BATTERY VOLTAGE	Ignition switch: ON		150 - 415 V
HV BATTERY CURRENT	Ignition switch: ON		–10 - 10 A
INVERTER VOLTAGE	Ignition switch: ON		0 - 15 V
TM INPUT REV	READY	During driving	0 - 7,300 rpm
CLUTCH 2 TEMPERATURE	READY		40 - 550 °C
CLUTCH 1 STROKE SENSOR	Ignition switch: ON		0 - 2,900 mV
	READY		0 - 4,000 mV
GRADIENT RATIO	Ignition switch: ON (Level road)		0 - 10 %
G SENSOR	Ignition switch: ON (Level road)		–2 - 2 G
ISOLAT SENS WAVE AMP	READY	During driving (A/C: MAX)	More than 3,150 mV
POWER CONSUMPTION (A/C)	READY	During driving (A/C: MAX)	0 - 8 kW
ASCD VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the tachometer indication.
ASCD CMD VEHICLE SPEED			0 - 510 km/h
ACCEL SENSOR 1 VOLTAGE	Ignition switch: ON	Accelerator pedal: Fully released	450 - 1,000 mV
		Accelerator pedal: Sightly depressed	4,400 - 4,800 mV

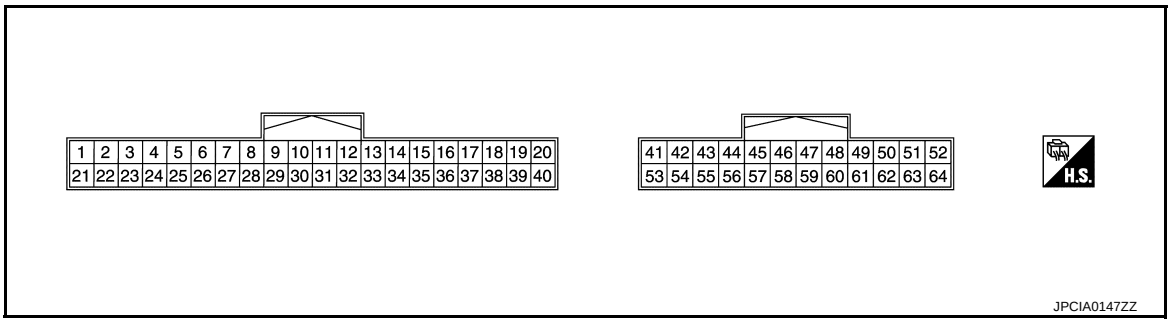
Monitor Item	Condition		Values/Status
ACCEL SENSOR 2 VOLTAGE	Ignition switch: ON	Accelerator pedal: Fully released	450 - 1,000 mV
		Accelerator pedal: Sightly depressed	4,400 - 4,800 mV
HV PRE CHG RLY ACTIV VOLT	Ignition switch: ON		Less than 1,000 mV
	Ignition switch: ON → READY		1,000 - 5,000 mV
	READY		8,000 - 13,000 mV
DC/DC CONV SIG VOLT	Ignition switch: ON		Less than 1,000 mV
	READY		Less than 5,000 - 7,000 mV
SENSOR POWER SUPPLY 1	Ignition switch: ON		5,000 mV
SENSOR POWER SUPPLY 2	Ignition switch: ON		5,000 mV
FUEL LEVEL SENSOR	Ignition switch: ON		0 - 3,094
WHEEL SENSOR (FRRH)	—		0 - 4095 rpm
WHEEL SENSOR (FRLH)	—		0 - 4095 rpm
DC/DC TARGET VOLTAGE	Ignition switch: ON		1,4000 mV
	READY		13,000 - 15,000 mV
ECM REQ DC/DC VOL	READY		13,000 - 15,000 mV
DC/DC VOLT CORRECT	READY		13,000 - 15,000 mV
ENGINE STOP REQUEST	READY	During engine stopped	ON
	Except above		OFF
FUEL CUT STATUS	READY	During engine stopped	ON
	Except above		OFF
ENGINE START REQUEST	READY	During engine running	ON
	READY	During engine stopped	OFF
IDLE REQUEST	READY	Engine independence request	ON
	Except above		OFF
ENGINE STOP PERMIT	READY	Engine stop judgment	ON
	Except above		OFF
ENGINE START REQ (A/C)	READY	Receives a engine ON request signal from A/C auto amp.	ON
	Except above		OFF
IDLE STOP INHIBIT	READY	Receives a idling stop inhibit signal from ECM	ON
	Except above		OFF
FUEL CUT INHIBIT	READY	Receives a fuel cut signal from ECM	ON
	Except above		OFF
COMPUL ENG STOP PERMIT	READY	Engine stop judgment	ON
	Except above		OFF
ENGINE STOP JUDGE	READY	Engine stop judgment	ON
	Except above		OFF
ENGINE STOP JUDGE (FINAL)	READY	Engine stop judgment	ON
	Except above		OFF

Monitor Item	Condition		Values/Status
HV P MAIN RLY ACTIV	READY		ON
	Ignition switch: ON		OFF
HV N MAIN RLY ACTIV	READY		ON
	Ignition switch: ON		OFF
HV PRE CHG RLY ACTIV	Ignition switch OFF → READY		ON
	Ignition switch: ON		OFF
HV P MAIN RLY ACTIV MONI	READY		ON
	Ignition switch: ON		OFF
HV N MAIN RLY ACTIV MONI	READY		ON
	Ignition switch: ON		OFF
START SIGNAL	READY		ON
	Ignition switch: ON		OFF
IGN SW SIGNAL	Ignition switch: ON → OFF → ON		ON → OFF → ON
CLUTCH 2 PROTECT	READY	Normal	ON
		Clutch 2 overheat judgment	OFF
SHIFT POSITION WARNING	Shift P warning (Information display)	Indicated	ON
		Not indicated	OFF
ENGINE OIL PRESS WARNING	Ignition switch: ON		ON
	READY	Normal	OFF
EV LAMP	READY	During motor driving	ON
		Except motor driving	OFF
P/N POS SIGNAL	Ignition switch: ON	Selector lever: N or P	ON
		Selector lever: Except above	OFF
BRAKE OPERATION JUDGE	READY	During braking	ON
		Normal	OFF
INV COVER INTER-LOCK SIG	Ignition switch: ON	Inverter cover: Install	ON
		Inverter cover: Remove	OFF
SERVICE PLUG	Ignition switch: ON	Service Plug: Install	ON
		Service Plug: Remove	OFF
SS OFF RELAY	Ignition switch: ON		ON
I/A VOLUME LEARN PERMIT	Perform intake air volume learning		ON
	Except above		OFF
A/C CUT REQ	READY	A/C cut request	ON
	Except above		OFF
COMPUL A/C STOP PERMIT	READY		ON
	Ignition switch: ON		OFF
SUB OIL PUMP ACTIV REQ	READY	Clutch 2 overheat judgment	ON
	Except above		OFF
DC/DC CONV ACTIV REQ	READY		ON
	Ignition switch: ON		OFF
EPS ACTIV REQ	READY		ON
	Ignition switch: ON		OFF
REV SYNC G/SFT PRH-BT REQ	READY	Prohibition	ON
		Normal	OFF

Monitor Item	Condition		Values/Status
RESTART PROHIBITION	Ignition switch: ON	Abnormality	ON
		Normal	OFF
ENGINE POWER LOW JUDGE	READY	Engine output torque low	ON
		Normal	OFF
GEAR RATIO ABNORMAL JUDGE	READY	Abnormality	ON
		Normal	OFF
OIL PUMP ABNORMAL JUDGE	READY	Receives a sub oil pump operation limit from TCM	ON
	Except above		OFF
OIL PUMP ACTIV REQ	READY		ON
	Ignition switch: ON		OFF
DISTANCE SW	Ignition switch: ON	DISTANCE switch: Pressed	ON
		DISTANCE switch: Released	OFF
STOP LAMP SW SIGNAL	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
ASCD BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
ASCD SET SW	Ignition switch: ON	SET/COAST switch: ON	ON
		SET/COAST switch: OFF	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: ON	ON
		RESUME/ACCELERATE switch: OFF	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: ON	ON
		CANCEL switch: OFF	OFF
MAIN SW	Ignition switch: ON	MAIN switch: ON	ON
		MAIN switch: OFF	OFF
ASCD SET LAMP	• Main switch: ON • Vehicle speed : 40 - 100 km/h	ASCD: Operation	ON
		ASCD: Not operation	OFF
O/D CANCEL REQ	Ignition switch: ON		OFF
O/D MONITOR	Ignition switch: ON		OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
ASCD CANCEL (LOW SPEED)	Ignition switch: ON		OFF
ASCD CANCEL (SPEED DIFF)	Ignition switch: ON		OFF
G SEN CORRECT ERROR	Ignition switch: ON	G sensor calibration: Completed	ON
		G sensor calibration: Not completed	OFF
INSPCT MODE 2 REQ (E-DIB)	Ignition switch: ON	Inspection mode 2: Operation	ON
		Inspection mode 2: Not operation	OFF
ACCEL START ASSIST REQ	Ignition switch: ON	Accel start assist: Operation	ON
		Accel start assist: Not operation	OFF

Monitor Item	Condition		Values/Status
ACCEL START ASSIST OPE	Ignition switch: ON	Accel start assist: Operation	ON
		Accel start assist: Not operation	OFF
ECO PEDAL CONT PERMIT	READY	ECO pedal control: Permission	ON
		ECO pedal control: Prohibition	OFF
ACCEL POS SELECT (AUTO)	Ignition switch: ON	Drive mode select switch: AUTO	ON
		Except above	OFF
ACCEL POS SELECT (SPORTS)	Ignition switch: ON	Drive mode select switch: SPORT	ON
		Except above	OFF
ACCEL POS SELECT (SNOW)	Ignition switch: ON	Drive mode select switch: SNOW	ON
		Except above	OFF
ACCEL POS SELECT (ECO)	Ignition switch: ON	Drive mode select switch: ECO	ON
		Except above	OFF

TERMINAL LAYOUT



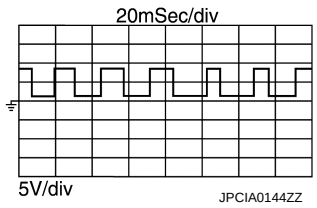
PHYSICAL VALUES

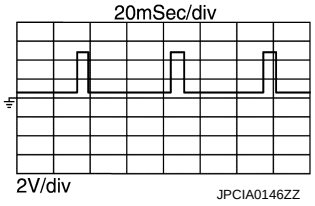
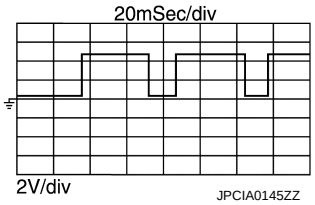
NOTE:

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

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
1 (R)	21 (W)[*1] (L)[*2]	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] Accelerator pedal: Fully depressed	More than 4.0 V
				[Ignition switch: ON] Accelerator pedal: Fully released	Less than 1.0 V
2 (B)	—	Sensor ground (Clutch 1 stroke sensor)	—	—	—
3 (W)	20 (B/R)	DC/DC converter pre-charge signal	Input	DC/DC converter: pre-charge OFF	More than 9.0 V
				DC/DC converter: pre-charge ON	Less than 2.0 - 4.7 V
4 (Y)	—	Sensor ground (ICC steering switch[*1]) (ASCD steering switch[*2])	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
5 (SB)	4 (Y)	ICC steering switch[*1]	Input	[Ignition switch: ON] ICC steering switch: OFF	4.2 V
				[Ignition switch: ON] MAIN switch: Pressed	0 V
				[Ignition switch: ON] CANCEL switch: Pressed	1.9 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	3.7 V
				[Ignition switch: ON] SET/COAST switch: Pressed	3.2 V
				[Ignition switch: ON] DISTANCE switch: Pressed	2.6 V
				[Ignition switch: ON] Dynamic driver assistance switch: Pressed	0 V
		ASCD steering switch[*2]	Input	[Ignition switch: ON] ASCD steering switch: OFF	4.0 V
				[Ignition switch: ON] MAIN switch: Pressed	0 V
				[Ignition switch: ON] CANCEL switch: Pressed	1.0 V
				[Ignition switch: ON] RESUME/ACCELERATE switch: Pressed	3.0 V
				[Ignition switch: ON] SET/COAST switch: Pressed	2.0 V
10 (G)	21 (W)[*1] (L)[*2]	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	4.5 - 5.5 V
11 (W)	2 (B)	Sensor power supply (Clutch 1 stroke sensor)	—	[Ignition switch: ON]	4.5 - 5.5 V
15 (GR)	20 (B/R)	System main relay 2	—	—	—
16 (V)	20 (B/R)	Self shut-OFF relay	Output	[Ignition switch: OFF]	Less than 2.0 V
				[Ignition switch: ON]	More than battery voltage – 2.0 V
17 (BR)	20 (B/R)	Power supply for HPCM	Input	[Ignition switch: ON]	More than 9.5 V
18 (BR)	20 (B/R)	Power supply for HPCM	Input	[Ignition switch: ON]	More than 9.5 V
20 (B/R)	—	HPCM ground	—	—	—
21 (W)[*1] (L)[*2]	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
22 (R)	2 (B)	Clutch 1 stroke sensor	Input	[Engine running] Selector lever: P Clutch 1: Engage	1.0 - 2.5 V
				[Engine stopped] Selector lever: N, R or D Clutch 1: Disengage	More than 1.8 - 3.3 V
24 (LG)	20 (B/R)	DC/DC converter activate signal	Input	DC/DC converter: Not activation	Less than 1.4 V
				DC/DC converter: Activation	More than 5.3 V
27 (B)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
28 (Y)*1 (W)*2	27 (B)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] Accelerator pedal: Fully depressed	More than 2.0 V
				[Ignition switch: ON] Accelerator pedal: Fully released	Less than 0.5 V
30 (BR)	20 (B/R)	DC/DC converter voltage stabilizer signal	Output	[READY]	★ 1.5 - 9.0 V 
31 (L)	27 (B)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	4.5 - 5.5 V
34 (O)	20 (B/R)	System main relay 1	Output	[Ignition switch: OFF]	Less than 2.0 V
				[Ignition switch: ON]	More than battery voltage – 2.0 V
36 (P)	20 (B/R)	IGN signal	Input	[Ignition switch: OFF]	Less than 1.0 V
				[Ignition switch: ON]	More than 9.0 V
37 (R)	20 (B/R)	Battery voltage	—	[Ignition switch: OFF]	More than 9.5 V
39 (B/R)	—	HPCM ground	—	—	—
40 (B/R)	—	HPCM ground	—	—	—
42 (L)	—	HEV system CAN-H	Input/ Output	—	—
43 (L)	—	CAN-H	Input/ Output	—	—
44 (SB)	20 (B/R)	READY signal	Input	[Ignition switch: ON] or [READY]	More than 9.5 V
				[Ignition switch: ON → READY (Start)]	Less than 1.0 V
45 (V)	20 (B/R)	Inter lock switch	Input	Inter lock switch: OFF	Less than 1.0 V
				Inter lock switch: ON	More than 9.0 V
46 (W)	20 (B/R)	Stop lamp switch	Input	Brake pedal: Slightly depressed	More than 9.0 V
				Brake pedal: Fully released	Less than 1.0 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
48 (G)	20 (B/R)	Electric water pump (Feed back)	Input	[Ignition switch: OFF]	0 V
				[READY]	★ More than 1.0 - 4.0 V 
49 (Y)	20 (B/R)	Service Plug	Input	Service Plug: OFF	Less than 1.0 V
				Service Plug: ON	More than 9.0 V
54 (P)	—	HEV system CAN-L	Input/ Output	—	—
55 (P)	—	CAN1-L	Input/ Output	—	—
58 (B)	20 (B/R)	Transmission range switch	Input	[Ignition switch: ON] Selector lever: P or N	More than 9.0 V
				[Ignition switch: ON] Selector lever: Except above	Less than 1.0 V
59 (O)	20 (B/R)	Brake switch	Input	[Ignition switch: ON] Brake pedal: Slightly depressed	Less than 1.0 V
				[Ignition switch: ON] Brake pedal: Fully released	More than 9.0 V
61 (R)	20 (B/R)	Electric water pump	Output	[Ignition switch: OFF]	0 V
				[READY]	★ More than 1.0 - 4.0 V 

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

*1: With ICC models

*2: Without ICC models

Fail-safe

INFOID:0000000008144389

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

DTC	Detection items	Hybrid system operation and vehicle behavior	
U0100 P0510 P314D P314E P31A6	Engine	If engine fuel is cut off or ECM CAN communication are abnormal	The engine is stopped and the vehicle is driven by the traction motor alone.
		If ECM stopped control of the electric throttle control actuator	The drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed.
		If ECM is limiting speed due to fuel cut-off	Engine stop control is prohibited and the vehicle is driven by the engine alone with a limit on the engine speed. For this reason, acceleration performance decreases.

DTC	Detection items	Hybrid system operation and vehicle behavior	
P2857 P2859	Clutch 1	If there is a malfunction on the clutch 1 engaged side	Engine stop control is prohibited.
		If there is a malfunction on the clutch 1 disengaged side	The engine is stopped and the vehicle is driven by the traction motor alone.
U0110 P0A1D P3176 P3177 P317A P317B P31A7	Traction motor inverter	If the CAN communication with the traction motor inverter computing unit or traction motor inverter are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
		If the traction motor inverter stopped control of the traction motor	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.
U0101 P3185 P31A8	Transmission	Transmission malfunction (If clutch 2 is unable to slip)	The engine is stopped and the vehicle is driven by the traction motor alone.
		Transmission malfunction (If clutch 2 is able to slip)	Driving occurs according to the restrictions on transmission gears.
		If CAN communication with the TCM computing unit or TCM are abnormal	• The engine and traction motor are stopped. • Driving is not possible even when the accelerator pedal is depressed.
P3149	Sub electric oil pump	• Engine stop control is prohibited in low vehicle-speed ranges. • If the engine is stopped, driving becomes impossible, and the “Shift P Warning” is displayed on the information display. When the warning instructions are followed and the driver shifts to the P position, the engine starts and driving becomes possible again.	
U0111 P0A1F P317F P3181 P3182 P31A9	Li-ion battery	If there is a Li-ion battery malfunction, or if CAN communication with the Li-ion battery controller computing unit and Li-ion battery controller are abnormal	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
		If the Li-ion battery power usage is restricted by the Li-ion battery controller	Engine stop control is prohibited, and the vehicle is driven by the engine alone. As a result, acceleration performance decreases and the shifting shock becomes larger.
P0AA6 P3117 P3118 P3119 P3120	High-voltage system insulation resistance	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P0A95 P311D P311E	High-voltage power wiring	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0AA0 P0AA1 P0AA4	System main relay	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.	
P0ADB P0ADC		• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0B37	Service plug	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A0A	Interlock switch	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A08 P0A12	DC/DC converter	Vehicle speed is limited according to the drop in 12V battery voltage. After vehicle speed gradually decreases and only creep drive force is output, drive force output stops.	
P0AE2 P0AE6 P0AE7 P311F	Pre-charge relay	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	
P0A1D P3146	HPCM	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.	

DTC	Detection items	Hybrid system operation and vehicle behavior
U1000	CAN Communication	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
P3157	Sensor power supply	• The hybrid system is stopped. • Driving is not possible even when the accelerator pedal is depressed.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	• Engine stop control is prohibited, and the drive force is controlled to a creep force, regardless of the amount the accelerator pedal is depressed. • If the malfunction is detected during motor driving, motor driving continues. When the driver next shifts to the P position, the engine starts and engine stop control is prohibited.
P0A0F P3150	Engine start control	• Hybrid system start is prohibited. • Vehicle does not change to READY state even if the start operation is performed.

DTC Inspection Priority Chart

INFOID:0000000008144390

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

Priority	DTC	Detected items
1	U0100, U0101, U0107, U0110, U0111, U1000	CAN communication
	P0510	Throttle position sensor
	P062F, P0A1D	HPCM
	P0806, P0807, P0808	Clutch 1 stroke sensor
	P0851, P0852	Transmission range switch
	P0A0F	Engine no start
	P0A0A, P0A0C	Inter lock switch
	P0AA6, P3117, P3118, P3119, P3120	Insulation resistance drop
	P0AA7	Insulation resistance sensor
	P0B35, P0B37	Service plug
	P1610, P1611, P1612	Immobilizer
	P2122, P2123, P2127, P2128, P2138	Accelerator pedal position sensor
	P311D	High voltage system
	P3146	Motor resolver
	P3150	Out of gas
	P3157	Sensor power supply
	P3194, P31A6, P31A7, P31A8, P31A9, P31AB, P31AC	Communication circuit
2	P0613, P157A, P3149, P3185	TCM
	P0616	Starter relay
	P0A06, P0A07, P0A93, P3123, P3124	Electric water pump
	P0A08, P0A09, P0A10, P0A12, P0A13	DC/DC converter
	P0A1F, P317F, P3180, P3181, P3182, P3184	Li-ion battery controller
	P0A95, P0AA0, P0AA1, P0AA4, P0ADB, P0ADC, P0ADF, P0AE0	System main relay
	P0AE1, P0AE2, P0AE6, P0AE7, P311F	Pre-charge relay
	P1572	Brake switch
	P1805, P3112, P3113, P3114	Stop lamp switch
	P2857, P2859	Clutch 1
	P3110	IGN relay
	P314D, P314E, P3155	ECM
	P3176, P3177, P3178, P3179, P317A, P317B	Traction motor inverter

Priority	DTC	Detected items
3	P2519	A/C request
	P3103	DC/DC converter cooling system
	P3137, P3138	Car clash
	P3139	Air bag system
	P31F7, P31F8	HPCM
	P31F9, P31FA	ASCD/ICC steering switch
	P31FB, P31FC, P31FD, P31FE	ASCD system
	P31FF	ASCD vehicle speed sensor

DTC Index

INFOID:0000000008144391

×: Applicable —: Not applicable

DTC*1 CONSULT*2	Items (CONSULT screen terms)	Trip	Warning lamp*3 HEV	CHG	MIL	Permanent DTC group*4	Reference
U0100*5	LOST COMM ECM	1	×	—	×	B	HBC-98
U0101*5	LOST COMM TCM	1	×	—	×	B	HBC-100
U0107*5	LOST COMM TAC MODULE	1	—	—	—	—	HBC-102
U0110*5	LOST COMM DMCM	1	×	—	×	B	HBC-103
U0111*5	LOST COMM HV BATT CONT	1	×	—	×	B	HBC-105
U1000*5	CAN COMM CIRCUIT	1	× or —	—	—	—	HBC-107
P0510	CLOSED THROTTLE POSITION SWITCH	1	×	—	—	—	HBC-108
P0613	TCM	1	×	—	—	—	HBC-109
P0616	STARTER RELAY	1	×	—	—	—	HBC-110
P062F	INTERNAL CONTROL MODULE	2	×	—	—	—	HBC-112
P0806	CLUTCH POSITION SENSOR	1	×	—	—	—	HBC-113
P0807	CLUTCH POSITION SENSOR	1	×	—	—	—	HBC-115
P0808	CLUTCH POSITION SENSOR	1	×	—	—	—	HBC-115
P0851	PARK/NEUTRAL SWITCH	1	×	—	—	—	HBC-118
P0852	PARK/NEUTRAL SWITCH	1	—	—	—	—	HBC-118
P0A06	COOLANT PUMP A	1	×	—	—	—	HBC-120
P0A07	COOLANT PUMP A	1	×	—	—	—	HBC-120
P0A08	DC/DC CONVERTER	1	—	×	—	—	HBC-122
P0A09	DC/DC CONVERTER	1	—	×	—	—	HBC-125
P0A0A	HV SYSTEM INTERLOCK ERROR	1	×	—	—	—	HBC-129
P0A0C	HV SYSTEM INTERLOCK ERROR	1	×	—	—	—	HBC-129
P0A0F	ENGINE FAILED TO START	1	×	—	—	—	HBC-132
P0A10	DC/DC CONVERTER	1	—	×	—	—	HBC-125
P0A12	DC/DC CONVERTER	1	—	×	—	—	HBC-133
P0A13	DC/DC CONVERTER	1	—	×	—	—	HBC-133
P0A1D	HPCM	1	×	—	×	B	HBC-137
P0A1F	BATTERY ENERGY CONTROL MODULE	1	×	—	×	B	HBC-139
P0A93	INVERTER A COOLING SYSTEM	1	×	—	—	—	HBC-140
P0A95	HIGH VOLTAGE FUSE	1	×	—	—	—	HBC-143

DTC[*1] CONSULT[*2]	Items (CONSULT screen terms)	Trip	Warning lamp[*3] HEV	CHG	MIL	Permanent DTC group[*4]	Reference
P0AA0	HYBRID BATT POSITIVE CONTACTOR	1	×	—	—	—	HBC-155
P0AA1	HYBRID BATT POSITIVE CONTACTOR	1	×	—	—	—	HBC-162
P0AA4	HYBRID BATT NEGATIVE CONTACTOR	1	×	—	—	—	HBC-167
P0AA6	HYBRID BATT VOLT SYS ISOLATION	1	×	—	—	—	HBC-173
P0AA7	HYBRID BATT VOLT ISOLATION SENSOR	1	×	—	—	—	HBC-178
P0ADB	HYBRID BATT POSITIVE CONTACTOR	1	×	—	—	—	HBC-179
P0ADC	HYBRID BATT POSITIVE CONTACTOR	1	×	—	—	—	HBC-179
P0ADF	HYBRID BATT NEGATIVE CONTACTOR	1	×	—	—	—	HBC-184
P0AE0	HYBRID BATTERY NEGATIVE CONTACTOR	1	×	—	—	—	HBC-184
P0AE1	HYBRID BATT PRECHARGE CONTACTOR	1	×	—	—	—	HBC-189
P0AE2	HYBRID BATT PRECHARGE CONTACTOR	1	×	—	—	—	HBC-192
P0AE6	HYBRID BATT PRECHARGE CONTACTOR	1	×	—	—	—	HBC-195
P0AE7	HYBRID BATT PRECHARGE CONTACTOR	1	×	—	—	—	HBC-200
P0B35	HIGH VOLTAGE SERVICE DISCONNECT	1	×	—	—	—	HBC-205
P0B37	HIGH VOLTAGE SERVICE DISCONNECT	1	×	—	—	—	HBC-205
P1572	ASCD BRAKE SWITCH	1	—	—	—	—	HBC-209
P1610	LOCK MODE	1	—	—	—	—	SEC-39
P1611	ID DISCORD, IMMU-HCM	1	—	—	—	—	SEC-40
P1612	CHAIN OF HCM-IMMU	1	—	—	—	—	SEC-41
P175A	TRANSMISSION SYSTEM	1	×	—	×	B	HBC-215
P1805	BRAKE SWITCH	1	—	—	—	—	HBC-216
P2122	APP SENSOR D	1	×	—	×	B	HBC-221
P2123	APP SENSOR D	1	×	—	×	B	HBC-221
P2127	APP SENSOR E	1	×	—	×	B	HBC-225
P2128	APP SENSOR E	1	×	—	×	B	HBC-225
P2138	APP SENSOR	1	×	—	×	B	HBC-229
P2519	A/C REQUEST A	1	—	×	—	—	HBC-233
P2857	CLUTCH A	1	×	—	×	B	HBC-236
P2859	CLUTCH A	1	×	—	×	B	HBC-236
P3103	DC/DC CONVERTER COOLING SYS	1	—	×	—	—	HBC-239
P3110	IGN RELAY	1	×	—	—	—	HBC-243
P3112	STOP LAMP SWITCH	1	—	—	—	—	HBC-245
P3113	BRAKE SWITCH	1	—	—	—	—	HBC-250

DTC[*1] CONSULT[*2]	Items (CONSULT screen terms)	Trip	Warning lamp[*3] HEV	CHG	MIL	Permanent DTC group[*4]	Reference
P3114	BRAKE SWITCH	1	—	—	—	—	HBC-250
P3117	A/C SYSTEM	1	×	—	—	—	HBC-258
P3118	HYBRID BATTERY ISOLATION	1	—	—	—	—	HBC-260
P3119	MOTOR SYSTEM ISOLATION	1	×	—	—	—	HBC-262
P311D	HIGH VOLTAGE SYSTEM	1	×	—	—	—	HBC-264
P311E	HIGH VOLTAGE SYSTEM	1	×	—	—	—	HBC-264
P311F	PRE CHARGE RELAY	1	×	—	—	—	HBC-277
P3120	HV SYSTEM ISOLATION	1	×	—	—	—	HBC-280
P3123	HV SYSTEM COOLING PUMP	1	—	—	—	—	HBC-284
P3124	HV SYSTEM COOLING PUMP	1	—	—	—	—	HBC-284
P3137	CAR CLASH	1	×	—	—	—	HBC-286
P3138	CAR CLASH	1	×	—	—	—	HBC-286
P3139	AIR BAG SYSTEM	1	×	—	—	—	HBC-287
P3146	MOTOR RESOLVER	1	×	—	×	B	HBC-288
P3149	TRANSMISSION SYSTEM	1	×	—	—	—	HBC-289
P314D	ENGINE SYSTEM	1	×	—	—	—	HBC-290
P314E	ENGINE SYSTEM	1	×	—	—	—	HBC-291
P3150	ENGINE START SYSTEM	1	×	—	—	—	HBC-292
P3155	ENGINE SYSTEM	1	—	—	—	—	HBC-293
P3157	SENSOR POWER SUPPLY	1	×	—	×	B	HBC-294
P3176	MOTOR SYSTEM	1	×	—	—	—	HBC-297
P3177	MOTOR SYSTEM	1	×	—	—	—	HBC-298
P3178	MOTOR SYSTEM	1	×	—	—	—	HBC-299
P3179	MOTOR SYSTEM	1	×	—	—	—	HBC-300
P317A	MOTOR SYSTEM	1	×	—	—	—	HBC-301
P317B	MOTOR SYSTEM	1	×	—	—	—	HBC-302
P317F	HV BATTERY SYSTEM	1	×	—	—	—	HBC-303
P3180	HV BATTERY SYSTEM	1	×	—	—	—	HBC-304
P3181	HV BATTERY SYSTEM	1	×	—	—	—	HBC-305
P3182	HV BATTERY SYSTEM	1	×	—	—	—	HBC-306
P3184	HV BATTERY SYSTEM	1	×	—	—	—	HBC-307
P3185	TRANSMISSION SYSTEM	1	×	—	—	—	HBC-308
P3194	COMMUNICATION ERROR	1	×	—	—	—	HBC-309
P31A6	COMMUNICATION ERROR	1	×	—	×	B	HBC-310
P31A7	COMMUNICATION ERROR	1	×	—	×	B	HBC-311
P31A8	COMMUNICATION ERROR	1	×	—	×	B	HBC-312
P31A9	COMMUNICATION ERROR	1	×	—	×	B	HBC-313
P31AB	COMMUNICATION ERROR	1	—	—	—	—	HBC-314
P31AC	ADAS	1	×	—	—	—	HBC-315
P31F7	HPCM	1	—	—	—	—	HBC-316
P31F8	HPCM	1	—	—	—	—	HBC-316
P31F9	ASCD SWITCH	1	—	—	—	—	HBC-317
P31FA	ASCD SWITCH	1	—	—	—	—	HBC-317

DTC*1 CONSULT*2	Items (CONSULT screen terms)	Trip	Warning lamp*3 HEV	CHG	MIL	Permanent DTC group*4	Reference
P31FB	ASCD SYSTEM	1	—	—	—	—	HBC-316
P31FC	ASCD SYSTEM	1	—	—	—	—	HBC-316
P31FD	ASCD SYSTEM	1	—	—	—	—	HBC-316
P31FE	ASCD SYSTEM	1	—	—	—	—	HBC-322
P31FF	ASCD VEHICLE SPEED SENSOR	1	—	—	—	—	HBC-323

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

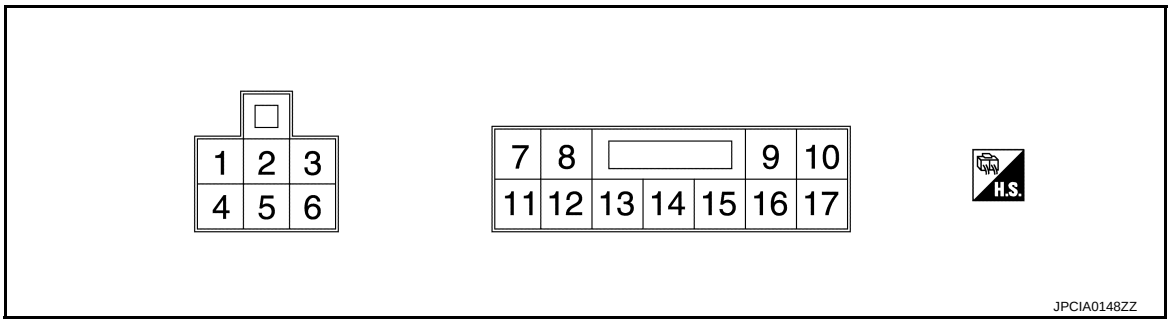
*4: Refer to HBC-45, "DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)".
*5: The trouble diagnosis for this DTC needs CONSULT.

DC/DC CONVERTER

Reference Value

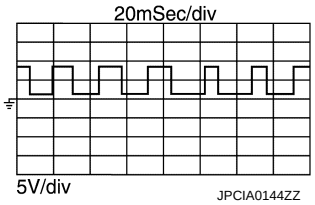
INFOID:0000000008144392

TERMINAL LAYOUT



PHYSICAL VALUES

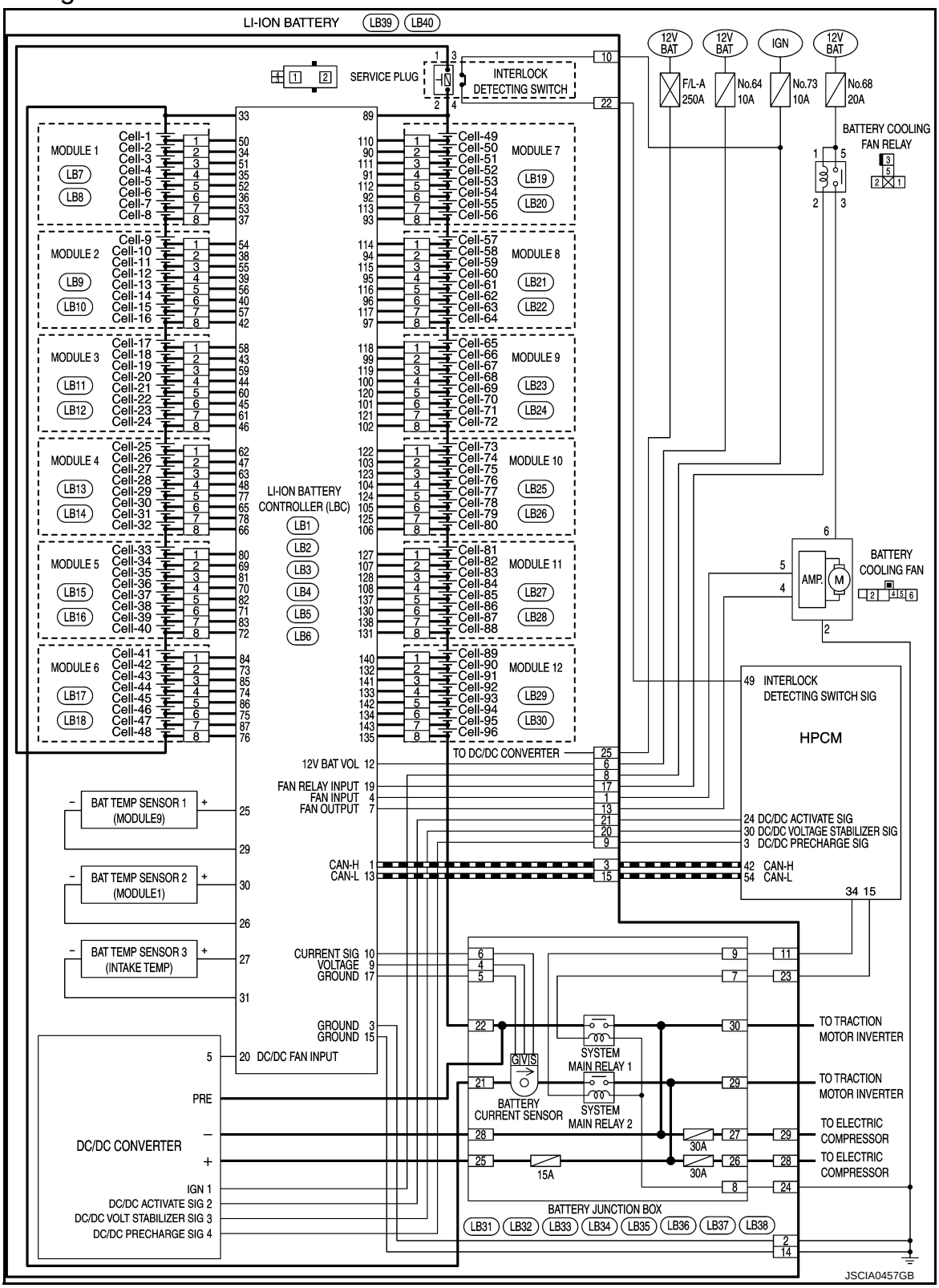
NOTE:
DC/DC converter is located on the Li-ion battery.

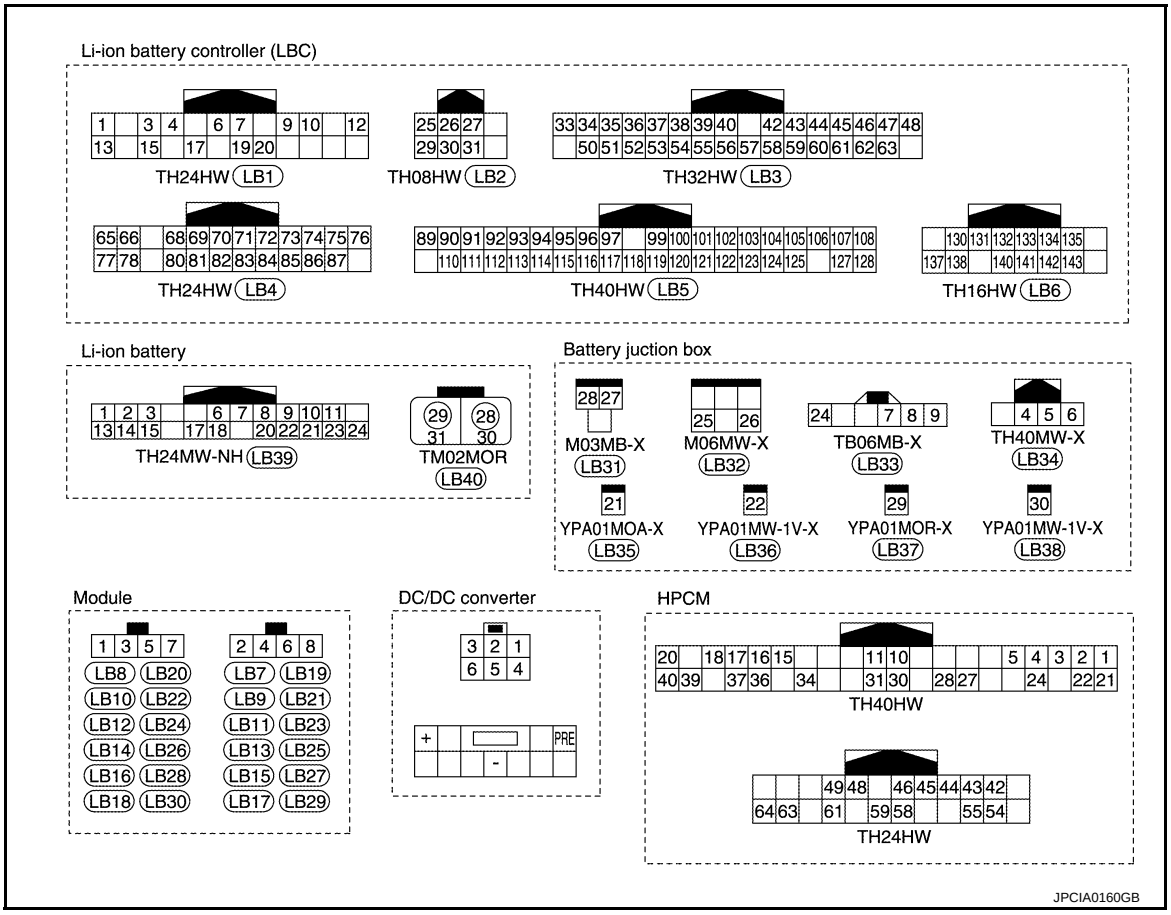
Terminal No. (Wire color)	Description		Condition	Value (Approx.)
	Signal name	Input/ Output		
1 (GR)	Power supply for DC/DC converter	Input	[Ignition switch: OFF]	More than 9.5 V
2 (P)	Activate signal	Input/ Output	DC/DC converter: Not activation	0.1 - 0.5 V
			DC/DC converter: Activation	5.3 - 6.7 V
3 (V)	Voltage stabilizer signal	Input	[READY]	★1.5 - 9.0 V 
4 (SB)	Pre-charge signal	Input/ Output	Pre-charge relay: OFF	9.7 - 10.7 V
			Pre-charge relay: ON	1.3 - 4.7 V
5 (L/Y)	Cooling mode request signal	Output	—	—
6 (W/B)	Air conditioning seat relay	Output	[Ignition switch: ON]	11 - 14 V
7 (O)	High voltage (+)	—	—	—
10 (O)	High voltage for pre-charge (–)	—	—	—
14 (O)	High voltage (–)	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

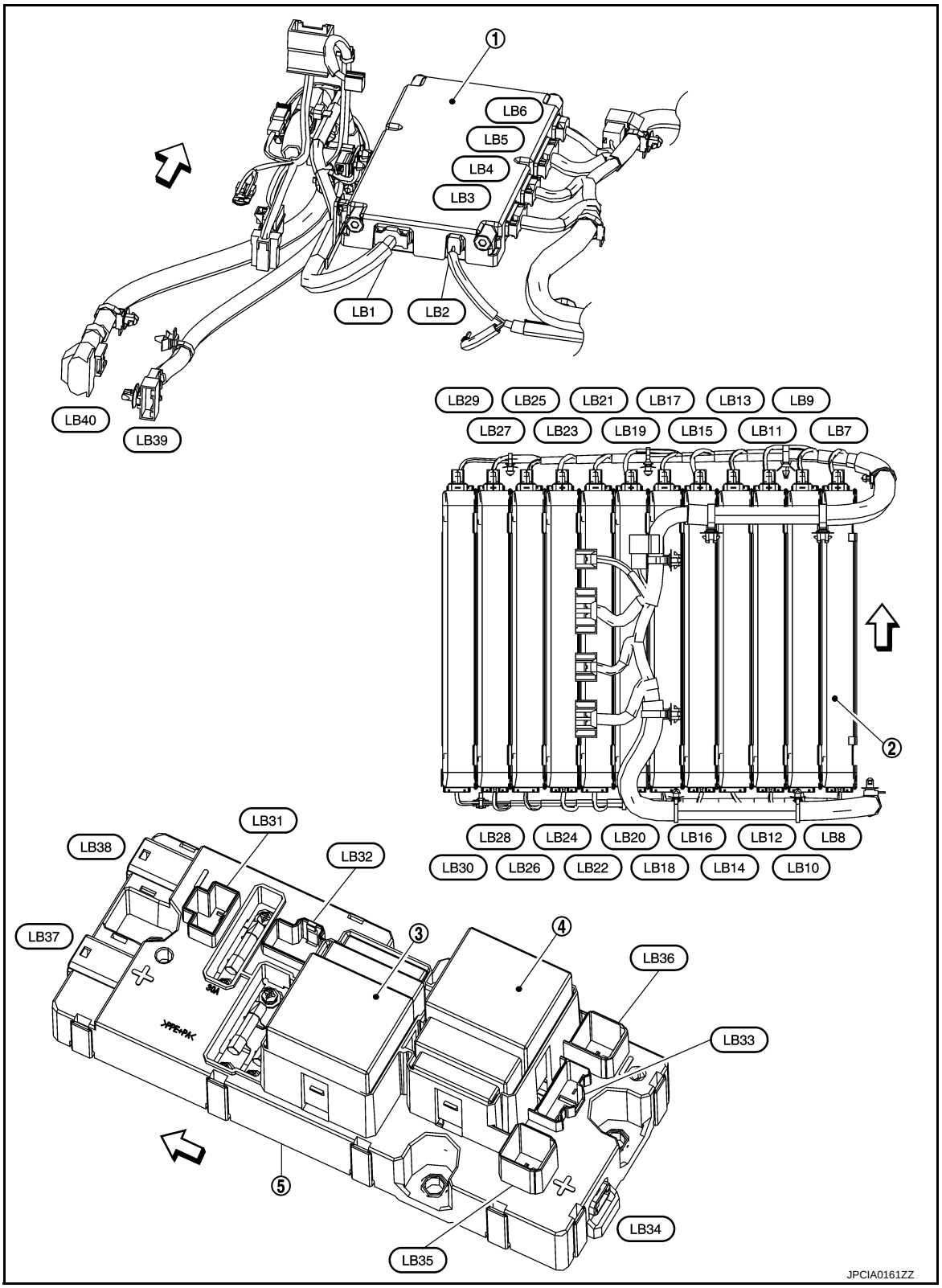
Circuit Diagram

INFOID:0000000008144393





HARNESS LAYOUT



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

⇦ : Vehicle front

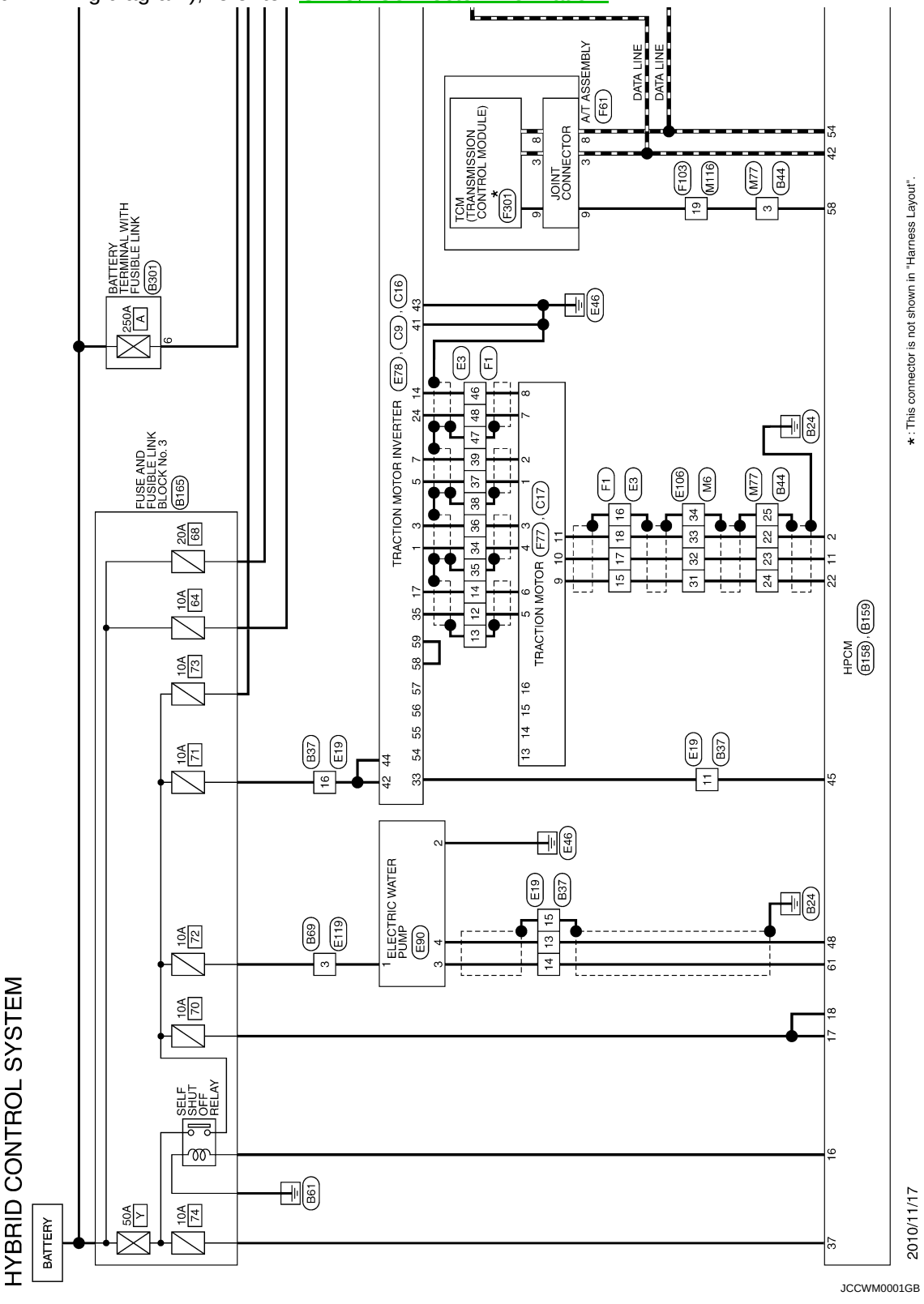
WIRING DIAGRAM

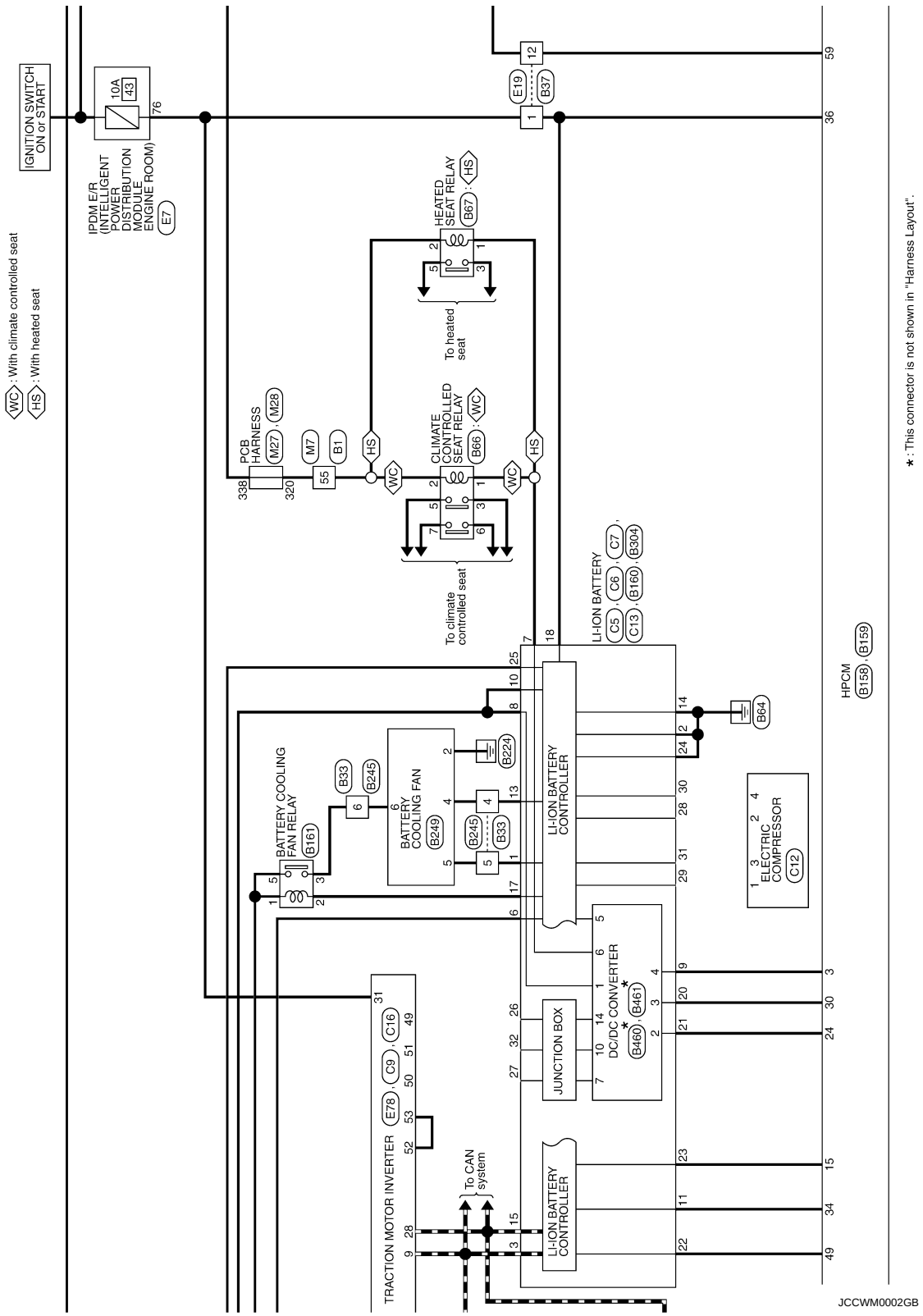
HYBRID CONTROL SYSTEM

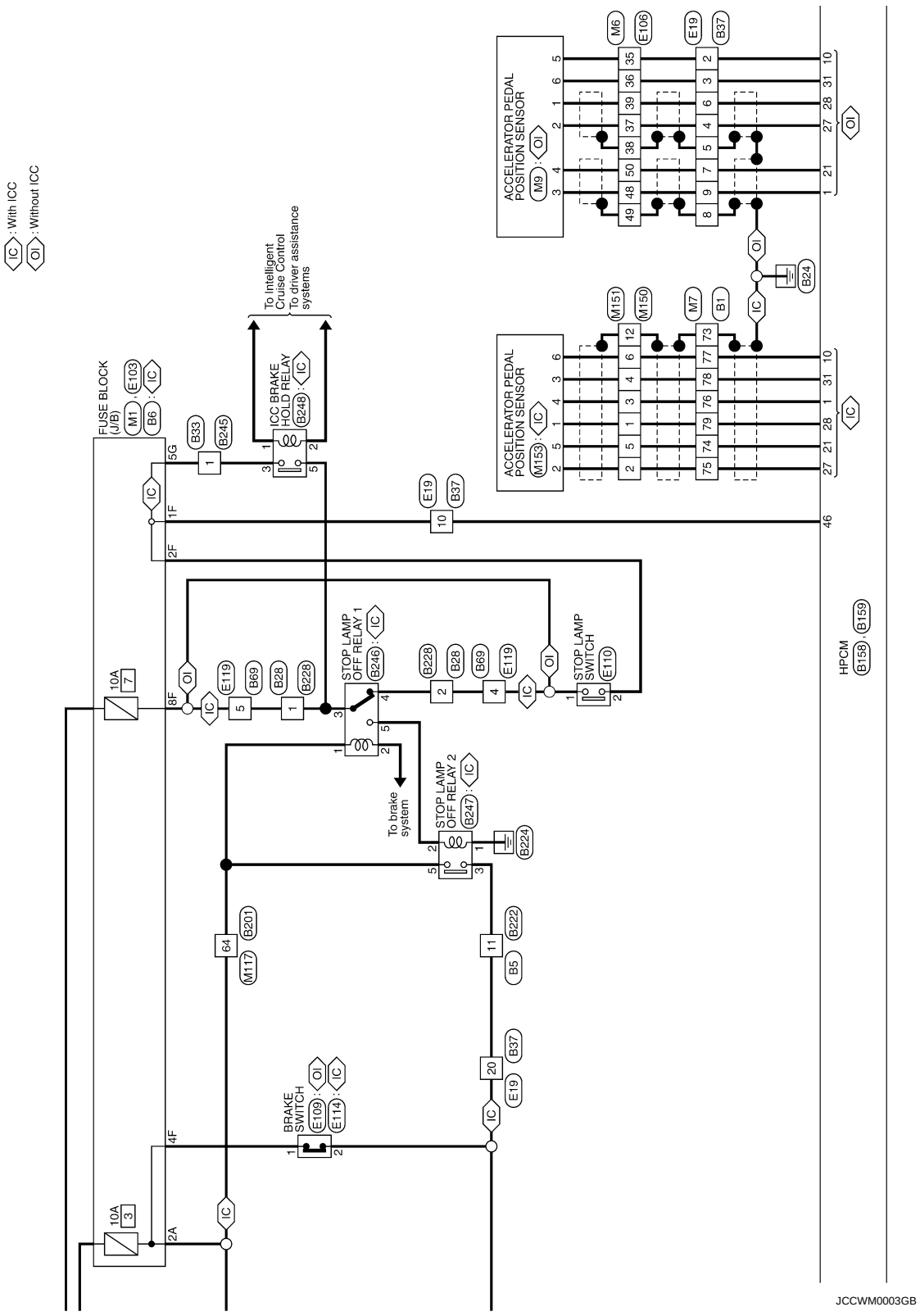
Wiring Diagram

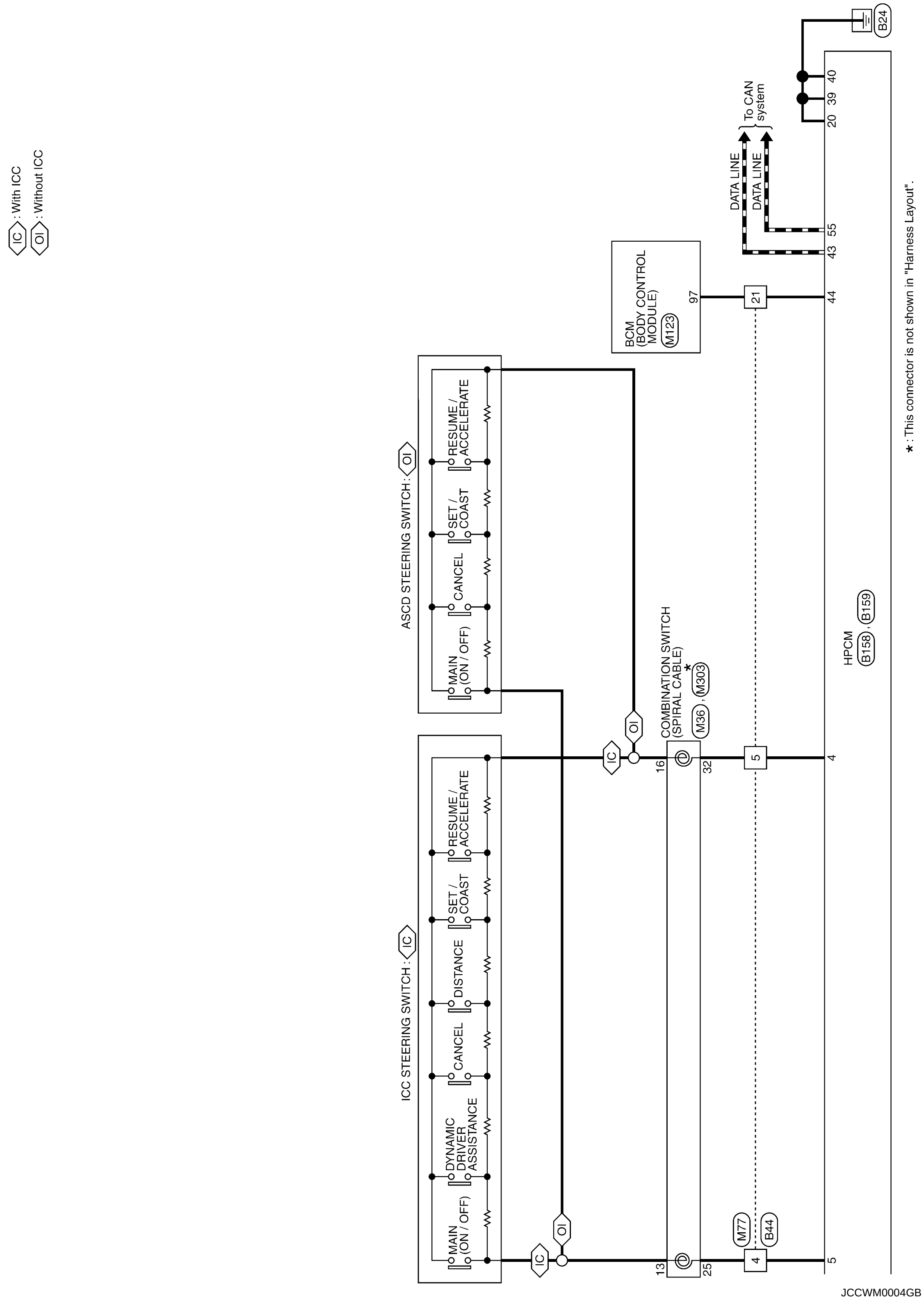
INFOID:0000000008144394

For connector terminal arrangements, harness layouts, and alphabets in a ⬡ (option abbreviation; if not described in wiring diagram), refer to GI-13, "Connector Information".




WC : With climate controlled seat
HS : With heated seat
IGNITION SWITCH ON or START
10A 43
76
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E7
E19 12
B37 1
36
59
HEATED SEAT RELAY B67 HS
To heated seat
PCB HARNESS M27 M28
338
320
M7
55
B1
HS
WC
CLIMATE CONTROLLED SEAT RELAY B66 WC
To climate controlled seat
LI-ION BATTERY C5 C6 C7 C13 B160 B304
HPCM B158 B159
B64
BATTERY COOLING FAN RELAY B161
B33 B245
BATTERY COOLING FAN B249
B224
LI-ION BATTERY CONTROLLER
ELECTRIC COMPRESSOR C12
DC/DC CONVERTER B460 B461
JUNCTION BOX
TRACTION MOTOR INVERTER E78 C9 C16
To CAN system
LI-ION BATTERY CONTROLLER
∗ : This connector is not shown in "Harness Layout".
JCCWM0002GB


IC : With ICC
OI : Without ICC
FUSE BLOCK (J/B)
M1 : E103
B6 : IC
10A 7
10A 3
ICC BRAKE HOLD RELAY
B248 : IC
To Intelligent Cruise Control
To driver assistance systems
STOP LAMP OFF RELAY 1
B246 : IC
STOP LAMP OFF RELAY 2
B247 : IC
To brake system
STOP LAMP SWITCH
E110
BRAKE SWITCH
E109 : OI
E114 : IC
ACCELERATOR PEDAL POSITION SENSOR
M9 : OI
ACCELERATOR PEDAL POSITION SENSOR
M153 : IC
HPCM
B158 : B159
JCCWM0003GB


IC : With ICC
OI : Without ICC
ICC STEERING SWITCH : IC
MAIN (ON / OFF)
DYNAMIC DRIVER ASSISTANCE
CANCEL
DISTANCE
SET / COAST
RESUME / ACCELERATE
ASCD STEERING SWITCH : OI
MAIN (ON / OFF)
CANCEL
SET / COAST
RESUME / ACCELERATE
COMBINATION SWITCH (SPIRAL CABLE)
M36 , M303 ★
16
32
13
25
BCM (BODY CONTROL MODULE)
M123
97
21
5
4
M77
B44
DATA LINE
DATA LINE
To CAN system
B24
HPCM
B158 , B159
40
39
20
55
43
44
4
5
★ : This connector is not shown in "Harness Layout".
JCCWM0004GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Flowchart of Trouble Diagnosis

INFOID:0000000008144395

DETAILS OF TROUBLE DIAGNOSIS FLOWCHART

1.OBTAIN INFORMATION ABOUT SYMPTOM

Refer to HBC-84, "Question Sheet" and interview the customer to obtain the malfunction information (conditions and environment when the malfunction occurred) as much as possible when the customer brings in the vehicle.

>> GO TO 2.

2.CHECK DTC

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

- Record the DTC and freeze frame data. (Print out using CONSULT and affix to the Work Order Sheet.)
- Erase the “EV/HEV” DTC. (Refer to “How to Erase DTC and 1st Trip DTC” in HBC-49, "CONSULT Function".)
- Turn ignition switch OFF.
- Check the relationship between the cause that is clarified with DTC and the malfunction information described by the customer. (HBC-334, "Symptom Table" is effective.)

3. Check the relevant information including STI, etc.

Do malfunction information and DTC exist?

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

3.REPRODUCE MALFUNCTION SYMPTOM

Check the vehicle for malfunctions other than the malfunction indicator lamp (MIL) reported by the customer, the hybrid system warning lamp, and the 12-volt battery charge warning lamp.
Check if the behavior results from fail-safe operation. (Refer to HBC-68, "Fail-safe".)
When a malfunction symptom is reproduced, the question sheet is effective.
Inspect the relation of the symptoms and the condition when the symptoms occur.

>> GO TO 5.

4.REPRODUCE MALFUNCTION SYMPTOM

Check the malfunction described by the customer on the vehicle.
Check if the behavior results from fail-safe operation. (Refer to HBC-68, "Fail-safe".)
When a malfunction symptom is reproduced, the question sheet is effective.
Inspect the relation of the symptoms and the condition when the symptoms occur.

>> GO TO 6.

5.PERFORM “DTC CONFIRMATION PROCEDURE”

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

NOTE:

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

>> GO TO 7.

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

Use HBC-334, "Symptom Table" from the symptom inspection result in step 4. Then identify where to start performing the diagnosis based on possible causes and symptoms.

>> GO TO 7.

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

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

NOTE:

The HBC section “Diagnosis Procedure”. mainly consists of a check for an open circuit. The circuit check in the diagnosis procedure also requires the check for a short circuit. Refer to GI-52, "Circuit Inspection" for details.

Is a malfunctioning part detected?

YES >> GO TO 8.
NO >> Use CONSULT and monitor the output data from the related sensor, or check the voltage at the related HPCM terminal. Refer to HBC-59, "Reference Value".

8. REPAIR OR REPLACE THE MALFUNCTIONING PARTS

Repair or replace the detected malfunctioning parts.

After repairing or replacing, reconnect the parts and connectors that are disconnected in “Diagnosis Procedure”, and then erase the DTC if one is present. (Refer to “How to Erase DTC and 1st Trip DTC” in HBC-49, "CONSULT Function".)

>> GO TO 9.

9. FINAL CHECK

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

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

Is DTC or malfunction symptom reproduced?

YES-1 (DTC is reproduced.)>>GO TO 7.
YES-2 (Malfunction is reproduced.)>>GO TO 6.
NO >> Before delivering the vehicle to the customer, make sure that DTC is erased. (Refer to “DTC at 1st trip and method to read DTC” in HBC-49, "CONSULT Function".)

Question Sheet

INFOID:0000000008144396

DESCRIPTION

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

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

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

KEY POINTS

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

SEF907L

EXAMPLE OF QUESTION SHEET

Question sheet						
Customer's name	MR/MS	Registration number		Initial year registration	Year Month Day	
		Vehicle type		Chassis No.		
Storage date	Year Month Day	Engine		Mileage	km	
Symptom	☐Warning lamp activated ( ) ☐Vehicle not READY ☐Poor starting ☐Engine stall ☐Rough idle ☐Idling stop does not occur. ☐Poor driving control ☐Overheating ☐Abnormal noise, gear noise ☐Shock ☐Vibration (judder) ☐Slipping ☐Poor shifting ☐Fixed shift position ☐Poor operating feel ☐Does not shift. ☐Shifting is heavy. ☐Gear slipout ☐Switch malfunction ☐Driving not possible ☐Other					
Details of problem						
Noise description						
Date of malfunction	☐>From when car is new ☐Recent (approx. date: , km)					
Frequency of occurrence	☐Always ☐Once only ☐Occasionally (times in past) ☐Other ( )					
Location of malfunction	☐Not applicable ☐Ordinary road ☐Expressway ☐Mountain road (ascending / descending) ☐Rough road ☐Flat road ☐Turning (right / left) ☐Other ( )					
Engine speed	☐Not applicable ☐Cold ☐During warm-up ☐Warm ☐Other ( )					
Climate conditions	☐Not applicable					
Weather	☐Clear ☐Overcast ☐Rain ☐Snow ☐Other ( )					
Temperature	_☐Hot ☐Warm ☐Cool ☐Cold ☐Temp. (approx. °C)					
Relative humidity	☐ High ☐ Medium ☐ Low					
Selector lever position	☐Not applicable ☐P ☐ R ☐N ☐D ☐L ☐S ☐3 ☐2 ☐1 ☐ M mode ( ) ☐1st ☐2nd ☐3rd ☐4th ☐5th ☐6th ☐ 7th					
Condition of shift lever operation	☐Not applicable ☐ AT select ( ) → ( ) ☐ MT shift operation ( ) → ( ) ☐Shift-up ( ) → ( ) ☐Shift down ( ) → ( ) ☐Other ( )					
Driving pattern	☐Not applicable ☐At engine start ☐Idling ☐ Stopped, D position ☐Starting from stop ☐Accelerating ☐Constant-speed driving ☐Decelerating ☐Just before stopping ☐Just after stopping ☐Engine stopped ☐ A/C ON ☐ P/S turned ☐Engine driving ☐Motor driving ☐Shifting ( ) → ( ) ☐Cruise control ON ☐ ECO mode ON ☐ SPORT mode ON ☐ SNOW mode ON ☐Other ( )					
	☐ ENG speed: rpm ☐Vehicle speed: km/h ☐TH position:					
When is malfunction corrected?	☐Is not corrected. ☐While idling ☐While engine is running ☐During motor driving ☐When ignition is turned OFF ☐When shift lever is operated ☐When clutch pedal is operated ☐Other ( )					
Other conditions						
Customer comments						

ADDITIONAL SERVICE WHEN REPLACING HPCM

Description

INFOID:0000000008144397

When replacing HPCM, the following work must be performed.
- Initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs
- Accelerator Pedal Released Position Learning
- Clutch 1 position learning

Work Procedure

INFOID:0000000008144398

1.PERFORM INITIALIZATION OF IVIS (NATS) SYSTEM AND REGISTRATION OF ALL IVIS (NATS) IGNITION KEY IDS

Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs.
Refer to SEC-37, "HPCM : Work Procedure".

>> GO TO 2.

2.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Perform “Accelerator Pedal Released Position Learning“.
Refer to HBC-87, "Work Procedure".

>> GO TO 3.

3.PERFORM CLUTCH 1 POSITION LEARNING

Perform “Clutch 1 position learning”.
Refer to HBC-88, "Work Procedure".

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:0000000008144399

"Accelerator Pedal Released Position Learning" is a function of HPCM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time the harness connector of the accelerator pedal position sensor or HPCM is disconnected.

Work Procedure

INFOID:0000000008144400

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEANING

1. Check that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait least 10 seconds.
4. Repeat step 2 and 3 for 3 times.

>> END

CLUTCH 1 POSITION LEARNING

Description

INFOID:0000000008144401

“Clutch 1 Position Learning” is a function of HPCM to learn the initial position of the clutch 1 by monitoring the clutch 1 stroke sensor out put signal. It must be performed as per the following conditions:

- HPCM is replaced.
- Clutch 1 and clutch cover is replaced.

Work Procedure

INFOID:0000000008144402

CAUTION:

- **Check that the “HV BATTERY LEVEL” in “DATA MONITOR” mode of “EV/HEV” using CONSULT is 50% or more, or else use the “Li-ion battery state of charge” in the information display on the combination meter and check that the battery level is 50% or more.**
- **Check that the engine coolant temperature is 70 °C (158 °F) or more before using inspection mode 1.**

1. PERFORM CLUTCH 1 POSITION LEARNING

With CONSULT

1. Turn ignition switch ON.
2. Select “CLUTCH 1 POSITION LEARNING” in “WORK SUPPORT” mode of “EV/HEV” using CONSULT.
3. Clear clutch 1 position learning value by touching “START”.
4. Set the vehicle to READY .
5. Shift the selector lever position N and check that an engine stops.
6. Fully depress accelerator pedal and start an engine.
7. Fully release accelerator pedal and stop an engine.
8. Repeat step 6 and 7 for 20 times.

CAUTION:

Never turn ignition switch OFF during step 1 to 8.
When ignition switch is turned OFF, start again from step 1.

>> END

INSPECTION MODE

Description

INFOID:0000000008144403

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

Inspection mode*1	Primary purpose	Control	Combination meter		Reference
			Hybrid system warning lamp	12-volt battery charge warning lamp	
Inspection mode 1*2, *3	Example: inspections that are performed with no load on the engine	• Disengage clutch 1 to eliminate any load on the engine. (P position only) • Operate the engine continuously.	Blink	—	HBC-89
Inspection mode 2	Example: driving on a 2-axle chassis dynamometer	Change the balance of the regenerative brake at the front and rear wheels.	—	Blink	HBC-90
Inspection mode 3	Example: driving on a 4-axle chassis dynamometer	Prohibit slope estimation.	Blink	Blink	HBC-90
Inspection mode 5*3	Example: driving using the engine only	Operate the engine continuously.	Blink	—	HBC-91

CAUTION:

- ***1: Inspection mode is canceled when the ignition switch is turned OFF. It is not canceled when the mode changed from CONSULT "EV/HEV" "ACTIVE TEST" mode to another mode. However, inspection mode 1 is temporarily canceled when the select lever is shifted from P position to D position.**
- ***2: Check the conditions listed below before using inspection mode 1.**
- **If maintenance mode 1 is engaged when the Li-ion battery level is low, then in order to engage clutch 1 and charge the battery from the engine, use CONSULT "EV/HEV" "DATA MONITOR" mode and check that the "HV BATTERY LEVEL" reading is 50% or more, or else use the "Li-ion battery state of charge" in the information display on the combination meter and check that the battery level is 50% or more.**
- **Check that the engine coolant temperature is 70 °C (158 °F) or more.**
- ***3: When the select lever is in the P or N position, adjustments to the throttle position prevent the engine speed from exceeding 3,000 rpm.**

Work Procedure (Inspection Mode 1)

INFOID:0000000008144404

CAUTION:

- **Before using inspection mode 1 when the Li-ion battery level is low, in order to engage clutch 1 and charge the battery from the engine, use CONSULT "EV/HEV" "DATA MONITOR" mode and check that the "HV BATTERY LEVEL" reading is 50% or more, or else use the "Li-ion battery state of charge" in the information display on the combination meter and check that the battery level is 50% or more.**
- **Check that the engine coolant temperature is 70 °C (158 °F) or more before using inspection mode 1.**

INSPECTION MODE 1

1. CHANGING TO INSPECTION MODE

With CONSULT

1. Turn ignition switch ON with the selector lever at the P position.
2. Select "INSPECTION MODE 1" in "ACTIVE TEST" mode of "EV/HEV".
3. Touch "ON".
4. The system changes to inspection mode 1, and the hybrid system warning lamp on the combination meter blinks.
5. Set the vehicle to READY.

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

>> END

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

Work Procedure (Inspection Mode 2)

INFOID:0000000008144405

INSPECTION MODE 2
1.CHANGING TO INSPECTION MODE

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

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

>> END

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

Work Procedure (Inspection Mode 3)

INFOID:0000000008144406

INSPECTION MODE 3
1.CHANGING TO INSPECTION MODE

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

Without CONSULT

1. Perform the following steps within 60 seconds.
- Turn ignition switch ON with the selector lever at the P position.
- Fully depress the accelerator pedal, then fully release it 4 times.
- While depressing the brake pedal, shift the select lever to the N position.
- Fully depress the accelerator pedal, then fully release it 4 times.
- While depressing the brake pedal, shift the select lever to the P position.
- Fully depress the accelerator pedal, then fully release it 4 times.
2. The system changes to inspection mode 3, and both the hybrid system warning lamp and the 12-volt battery charge warning lamp on the combination meter blinks.
3. Set the vehicle to READY.

>> END

CANCELING INSPECTION MODE 3

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

Work Procedure (Inspection Mode 5)

INFOID:0000000008144407

INSPECTION MODE 5

1.CHANGING TO INSPECTION MODE

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

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

>> END

CANCELING INSPECTION MODE 5

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

HOW TO ERASE PERMANENT DTC

Description

INFOID:0000000008144408

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

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

HPCM

HPCM : Diagnosis Procedure

INFOID:0000000008144409

1.CHECK FUSE

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

Location	Fuse No.	Capacity
IPDM E/R	#43	10 A
Fuse and fusible link block No.3	#70	10 A
	#74	10 A

Is the fuse fusing?

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

2.CHECK HPCM POWER SUPPLY-1

Check the voltage between HPCM harness connector terminals.

HPCM			Voltage
Connector	+	–	
	Terminal		
B158	37	20	Battery voltage

Is the inspection result normal?

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

3.CHECK HPCM POWER SUPPLY-2

1. Disconnect HPCM harness connector.
2. Check the voltage between HPCM harness connector and ground.

+		–	Voltage
HPCM			
Connector	Terminal		
B158	37	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK HPCM POWER SUPPLY-3

Check the voltage between HPCM harness connector terminals as per the following condition.

HPCM			Condition	Voltage
Connector	+	–		
	Terminal			
B158	17	20	Ignition switch: ON → OFF	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0 V.
	18			

Is the inspection result normal?

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

5.CHECK SELF SHUT-OFF RELAY SIGNAL

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

HPCM			Voltage
Connector	+	–	
	Terminal		
B158	16	20	Battery voltage

Is the inspection result normal?

YES >> Replace self shut-OFF relay.
NO >> GO TO 6.

6.CHECK SELF SHUT-OFF RELAY SIGNAL

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

+		–	Continuity
HPCM			
Connector	Terminal		
B158	16	Self shut-OFF relay	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 IGNITION POWER SUPPLY

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

+		–	Voltage
HPCM			
Connector	Terminal		
B158	36	Ground	Battery voltage

Is the inspection result normal?

YES >> Replace HPCM. Refer to HBC-339, "Removal and Installation".
NO >> GO TO 8.

8.CHECK IGNITION POWER SUPPLY CIRCUIT

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

+		–		Continuity
HPCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
B158	36	E7	76	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
NO >> Repair or replace error-detected parts.

9.CHECK GROUND CONNECTION

Check the ground connection B24. Refer to GI-52, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace ground connection.

10.CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
B158	20	Ground	Existed
	39		
	40		

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

DC/DC CONVERTER

DC/DC CONVERTER : Diagnosis Procedure

INFOID:0000000008144410

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.PRECONDITIONING

WARNING:

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

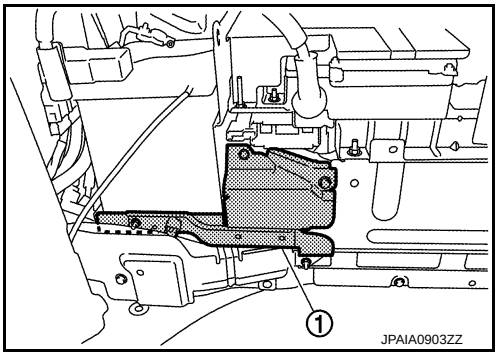
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-54, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

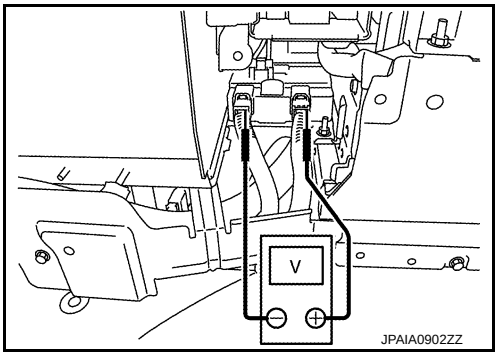
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 2.

2.CHECK FUSE

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

Location	Fuse No.	Capacity
Fuse and fusible link block No.3	#73	10 A

Is the fuse fusing?

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

3.CHECK DC/DC CONVERTER POWER SUPPLY

1. Disconnect Li-ion battery harness connector.
2. Turn ignition switch ON.
3. Check the voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B160	8	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Check the continuity between Li-ion battery harness connector and fuse and fusible link block No.3 harness connector.

+		–		Continuity
Li-ion battery		Fuse and fusible link block No.3		
Connector	Terminal	Connector	Fuse No.	
B160	8	B165	#73	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

5. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect DC/DC converter harness connector.
3. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
B160	8	B460	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

6. PERFORM INTERMITTENT INCIDENT

Perform GI-49, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

U0100 ECM

Description

INFOID:0000000008144411

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

DTC Logic

INFOID:0000000008144412

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0100	LOST COMM ECM (Lost communication with ECM)	When HPCM is not receiving CAN communication signal with ECM for 2 seconds or more in a row.	Harness or connectors (CAN communication line is open or shorted.)
		When HPCM is not receiving CAN communication signal with ECM for a short period of less than 2 seconds	Harness or connectors (Intermittent malfunction in the CAN communication circuit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

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

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111 or U0293 is stored in “Motor Control” at the time of receiving.)>>>>GO TO 3.
NO-2 (Repaired after performing HBC-98, "Diagnosis Procedure".)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

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

>> Proceed to HBC-98, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144413

CAUTION:
- **To perform diagnosis, observe LAN-9, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-9, "Precautions for Harness Repair".**

1.INSPECTION START

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

Is there any malfunction at present or a malfunction history?

YES >> Proceed to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2. DETECT THE ROOT CAUSE

With CONSULT
Check DTC of “MOTOR CONTROL”.

Detected DTC	Root cause
DTC U0100, U0101, U0111 and U0293	• HEV system CAN line (Short circuit or traction motor inverter branch line*) • ECM • HPCM • TCM • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch line • ECM
DTC U0101	• TCM branch line • TCM
DTC U0111	• Li-ion battery controller branch line • Li-ion battery controller
DTC U0293	• HPCM branch line • HPCM and battery junction box
DTC U0101, U0111 and U0293	Main line between traction motor inverter and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

NOTE:
*: If “EV/HEV” detects DTC U0110, check the traction motor inverter branch line first.

>> Intermittent malfunction. Check malfunctioning parts, according to the intermittent Incident. Refer to GI-49, "Intermittent Incident".

U0101 TCM

Description

INFOID:0000000008144414

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

DTC Logic

INFOID:0000000008144415

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0101	LOST COMM TCM (Lost communication with TCM)	When HPCM is not receiving CAN communication signal with TCM for 2 seconds or more in a row.	Harness or connectors (CAN communication line is open or shorted.)
		When HPCM is not receiving CAN communication signal with TCM for a short period of less than 2 seconds	Harness or connectors (Intermittent malfunction in the CAN communication circuit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

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

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111 or U0293 is stored in “Motor Control” at the time of receiving.)>>>>GO TO 3.
NO-2 (Repaired after performing HBC-100, "Diagnosis Procedure".)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

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

>> Proceed to HBC-100, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144416

CAUTION:
- **To perform diagnosis, observe LAN-9, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-9, "Precautions for Harness Repair".**

1.INSPECTION START

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

Is there any malfunction at present or a malfunction history?

YES >> Proceed to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2. DETECT THE ROOT CAUSE

With CONSULT
Check DTC of “MOTOR CONTROL”.

Detected DTC	Root cause
DTC U0100, U0101, U0111 and U0293	• HEV system CAN line (Short circuit or traction motor inverter branch line*) • ECM • HPCM • TCM • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch line • ECM
DTC U0101	• TCM branch line • TCM
DTC U0111	• Li-ion battery controller branch line • Li-ion battery controller
DTC U0293	• HPCM branch line • HPCM and battery junction box
DTC U0101, U0111 and U0293	Main line between traction motor inverter and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

NOTE:
*: If “EV/HEV” detects DTC U0110, check the traction motor inverter branch line first.

>> Intermittent malfunction. Check malfunctioning parts, according to the intermittent Incident. Refer to GI-49, "Intermittent Incident".

U0107 ADAS

Description

INFOID:0000000008144417

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

DTC Logic

INFOID:0000000008144418

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0107	LOST COMM TAC MODULE (lost communication with ADAS control unit)	When HPCM is not transmitting or receiving CAN communication signal with ADS control unit for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-102, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144419

1.PERFORM THE TROUBLE DIAGNOSIS FOR CAN COMMUNICATION SYSTEM

Perform the trouble diagnosis for CAN communication system. Refer to LAN-19, "Trouble Diagnosis Flow Chart".

>> INSPECTION END

U0110 DRIVE MOTOR CONTROL MODULE

Description

INFOID:0000000008144420

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

DTC Logic

INFOID:0000000008144421

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0110	LOST COMM DMCM (Lost communication with traction motor inverter)	When HPCM is not receiving CAN communication signal with traction motor inverter for 2 seconds or more in a row.	Harness or connectors (CAN communication line is open or shorted.)
		When HPCM is not receiving CAN communication signal with traction motor inverter for a short period of less than 2 seconds	Harness or connectors (Intermittent malfunction in the CAN communication circuit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

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

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111 or U0293 is stored in “Motor Control” at the time of receiving.)>>>>GO TO 3.
NO-2 (Repaired after performing HBC-103, "Diagnosis Procedure".)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

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

>> Proceed to HBC-103, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144422

CAUTION:
- **To perform diagnosis, observe LAN-9, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-9, "Precautions for Harness Repair".**

1.INSPECTION START

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

Is there any malfunction at present or a malfunction history?

YES >> Proceed to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2. DETECT THE ROOT CAUSE

With CONSULT
Check DTC of “MOTOR CONTROL”.

Detected DTC	Root cause
DTC U0100, U0101, U0111 and U0293	• HEV system CAN line (Short circuit or traction motor inverter branch line*) • ECM • HPCM • TCM • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch line • ECM
DTC U0101	• TCM branch line • TCM
DTC U0111	• Li-ion battery controller branch line • Li-ion battery controller
DTC U0293	• HPCM branch line • HPCM and battery junction box
DTC U0101, U0111 and U0293	Main line between traction motor inverter and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

NOTE:
*: If “EV/HEV” detects DTC U0110, check the traction motor inverter branch line first.

>> Intermittent malfunction. Check malfunctioning parts, according to the intermittent Incident. Refer to GI-49, "Intermittent Incident".

U0111 BATTERY ENERGY CONTROL MODULE

Description

INFOID:0000000008144423

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

DTC Logic

INFOID:0000000008144424

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0111	LOST COMM HV BATT CONT (Lost communication with Li-ion battery controller)	When HPCM is not receiving CAN communication signal with Li-ion battery controller for 2 seconds or more in a row.	Harness or connectors (CAN communication line is open or shorted.)
		When HPCM is not receiving CAN communication signal with Li-ion battery controller for a short period of less than 2 seconds	Harness or connectors (Intermittent malfunction in the CAN communication circuit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

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

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111 or U0293 is stored in “Motor Control” at the time of receiving.)>>>>GO TO 3.
NO-2 (Repaired after performing HBC-105, "Diagnosis Procedure".)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

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

>> Proceed to HBC-105, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144425

CAUTION:
- **To perform diagnosis, observe LAN-9, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-9, "Precautions for Harness Repair".**

1.INSPECTION START

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

Is there any malfunction at present or a malfunction history?

YES >> Proceed to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2. DETECT THE ROOT CAUSE

With CONSULT
Check DTC of “MOTOR CONTROL”.

Detected DTC	Root cause
DTC U0100, U0101, U0111 and U0293	• HEV system CAN line (Short circuit or traction motor inverter branch line*) • ECM • HPCM • TCM • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch line • ECM
DTC U0101	• TCM branch line • TCM
DTC U0111	• Li-ion battery controller branch line • Li-ion battery controller
DTC U0293	• HPCM branch line • HPCM and battery junction box
DTC U0101, U0111 and U0293	Main line between traction motor inverter and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

NOTE:
*: If “EV/HEV” detects DTC U0110, check the traction motor inverter branch line first.

>> Intermittent malfunction. Check malfunctioning parts, according to the intermittent Incident. Refer to GI-49, "Intermittent Incident".

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000008144426

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

DTC Logic

INFOID:0000000008144427

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1000	CAN COMM CIRCUIT (CAN communication circuit)	When HPCM is not transmitting or receiving CAN communication signal for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-107, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144428

1.PERFORM TROUBLE DIAGNOSIS FOR CAN COMMUNICATION SYSTEM

Perform the trouble diagnosis for CAN communication system. Refer to LAN-19, "Trouble Diagnosis Flow Chart".

>> INSPECTION END

P0510 THROTTLE POSITION SENSOR

DTC Logic

INFOID:0000000008144429

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0510	CLOSED THROTTLE POSITION SWITCH [Throttle control motor circuit (ECM)]	When HPCM detects self-diagnosis signal from ECM.	ECM-detected DTC Refer to EC-86, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH ECM

Check the DTC which detected with ECM. Refer to EC-86, "Index of HPCM-detected DTC".

>> Proceed to HBC-108, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144430

Check the DTC which detected with ECM. Refer to EC-86, "Index of HPCM-detected DTC".

P0613 TCM

DTC Logic

INFOID:0000000008144431

DTC DETECTION LOGIC

NOTE:
If DTC P0613 is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D. Refer to HBC-137, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0613	TCM (TCM-HPCM aspect each other monitor is abnormal)	When HPCM detects communication data error between HPCM and TCM.	TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-109, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144432

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-64, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to TM-80, "DTC Index".

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-109, "DTC Logic".

Is the DTC P0613 displayed again?

YES >> Replace TCM. Refer to TM-190, "Exploded View".
NO >> Perform GI-49, "Intermittent Incident".

P0616 STARTER RELAY

DTC Logic

INFOID:0000000008144433

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0616	STARTER RELAY (READY signal circuit)	When HPCM detects the READY signal transmitted from the BCM for 0.1 seconds or more with Ignition switch OFF condition.	• Harness or connectors (READY signal circuit is shorted.) • HPCM • BCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-110, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144434

1.CHECK READY SIGNAL

1. Turn ignition switch OFF.
2. Disconnect BCM harness connector.
3. Turn ignition switch ON.
4. Check the voltage BCM harness connector and ground.

+		–	Voltage
BCM			
Connector	Terminal		
M123	97	Ground	Battery voltage

Is the inspection result normal?

YES >> Replace BCM. Refer to BCS-80, "Removal and Installation".
NO >> GO TO 2.

2.CHECK READY SIGNAL CIRCUIT

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

+		–		Continuity
HPCM		BCM		
Connector	Terminal	Connector	Terminal	
B159	44	M123	97	Existed

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-110, "DTC Logic".

Is DTC P0616 displayed again?

YES >> Replace HPCM. Refer to HBC-339, "Removal and Installation".
NO >> Perform GI-49, "Intermittent Incident".

P062F CONTROL MODULE

DTC Logic

INFOID:0000000008144435

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062F	INTERNAL CONTROL MODULE (HPCM EEP-ROM data error)	HPCM EEP-ROM system is malfunctioning.	• 12V battery • HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat step 1 and 2 for 2 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to HBC-112, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144436

1.CHECK 12V BATTERY

Check 12V battery. Perform PG-135, "Work Flow".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Charge or replace 12V battery. Refer to PG-141, "Removal and Installation".

2.CHECK INTERMITTENT INCIDENT

Perform GI-49, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-112, "DTC Logic".

Is DTC P062F detected again?

YES >> Replace HPCM. Refer to HBC-339, "Removal and Installation".
NO >> INSPECTION END

P0806 CLUTCH 1 STROKE SENSOR

DTC Logic

INFOID:0000000008144437

DTC DETECTION LOGIC

NOTE:
If DTC P0806 is displayed with DTC P0807, P0808, P175A, P2857, P2859 or P3149, perform the trouble diagnosis for DTC P0807, P0808, P175A, P2857, P2859 or P3149. Refer to HBC-71, "DTC Index" .

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0806	CLUTCH POSITION SENSOR (Clutch 1 stroke sensor characteristic abnormality)	HPCM detects the following status continuously for 4 seconds or more: The difference between clutch 1 stroke and clutch 1 target stroke exceeds 20 mm.	• Clutch 1 stroke sensor • Clutch 1 disc • CSC (concentric slave cylinder) • Sub Electric Oil Pump • Mechanical Oil Pump • Clutch 1 solenoid valve • A/T fluid line

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PER FORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Start engine, and warm engine coolant temperature to 70 °C (158 °F).
3. Drive the vehicle.
   CAUTION:
   Always drive the vehicle at a safe speed.
4. Drive the vehicle with a motor.
   CAUTION:
   Always drive the vehicle at a safe speed.
5. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-113, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144438

1.CHECK CLUTCH 1 STROKE SENSOR FUNCTION

With CONSULT
1. Select “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Set the vehicle to READY and engine stop state.
3. Check that the “CLUTCH 1 STROKE SENSOR” indication voltage as per the following condition.

Monitor item	Condition		Indication
CLUTCH 1 STROKE SENSOR	Clutch 1	Engaged (P position)	Approx. less than 2.7 V
		Released (N position)	Above more than +0.8 V

Without CONSULT
1. Set the vehicle to READY and engine stop state.
2. Check the voltage between HPCM terminals as per the following condition.

HPCM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
B158	22	21	Clutch 1	Engaged (P position)	Less than 2.7 V
				Released (N position)	Above more than +0.8 V

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK SUB ELECTRIC OIL PUMP

Refer to TM-152, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ATF LINE

Check ATF line for clogging.

Is the inspection result normal?

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

4.CHECK CLUTCH 1 DISC

Check clutch 1 disc thickness. Refer to CL-8, "Inspection".

Is the inspection result normal?

YES >> Replace transmission assembly. Refer to TM-190, "Removal and Installation".
NO >> Replace clutch disc and cover. Refer to CL-7, "Removal and Installation".

P0807, P0808 CLUTCH 1 STROKE SENSOR

DTC Logic

INFOID:0000000008144439

DTC DETECTION LOGIC

NOTE:
If DTC P0807 or P0808 is displayed with DTC P3157, perform the trouble diagnosis for DTC P3157. Refer to HBC-294, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0807	CLUTCH POSITION SENSOR (Clutch 1 stroke sensor circuit low input)	Signal voltage from the clutch 1 stroke sensor remains at less than 0.2 V for 1 seconds or more.	• Harness or connectors (Clutch 1 stroke sensor circuit is open or shorted.) • Clutch 1 stroke sensor
P0808	CLUTCH POSITION SENSOR (Clutch 1 stroke sensor circuit high input)	Signal voltage from the Clutch 1 stroke sensor remains at more than 4.3 V for 1 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-115, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144440

1.CHECK CLUTCH 1 STROKE SENSOR FUNCTION

With CONSULT
1. Select “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Set the vehicle to READY and engine stop state.
3. Check that the “CLUTCH 1 STROKE SENSOR” indication voltage as per the following condition.

Monitor item	Condition		Indication
CLUTCH 1 STROKE SENSOR	Clutch 1	Engaged (P position)	Approx. less than 2.7 V
		Released (N position)	Above more than +0.8 V

Without CONSULT
1. Set the vehicle to READY and engine stop state.
2. Check the voltage between HPCM terminals as per the following condition.

HPCM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
B158	22	21	Clutch 1	Engaged (P position)	Less than 2.7 V
				Released (N position)	Above more than +0.8 V

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK HPCM GROUND

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

+		–	Continuity
HPCM			
Connector	Terminal		
B158	20	Ground	Existed
	39		
	40		

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK CLUTCH 1 STROKE SENSOR SIGNAL CIRCUIT

1. Disconnect traction motor harness connector.
2. Check the continuity between HPCM harness connector and traction motor harness connector.

+		–		Continuity
HPCM		Traction motor		
Connector	Terminal	Connector	Terminal	
B158	11	F77	10	Existed

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

Is the inspection result normal?

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

4.CHECK CLUTCH 1 STROKE SENSOR GROUND CIRCUIT

Check the continuity between HPCM harness connector and traction motor harness connector.

+		–		Continuity
HPCM		Traction motor		
Connector	Terminal	Connector	Terminal	
B158	2	F77	11	Existed

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Perform GI-49, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace transmission assembly. Refer to TM-190, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0851, P0852 PARK/NEUTRAL SWITCH

DTC Logic

INFOID:0000000008144441

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0851	PARK/NEUTRAL SWITCH (Transmission range switch is stuck OFF.)	HPCM detects the signal from the transmission range switch remains at OFF for 0.2 seconds or more with selector lever position is P or N.	• Harness or connectors (Transmission range switch circuit is open or shorted.) • Transmission range switch • TCM
P0852	PARK/NEUTRAL SWITCH (Transmission range switch is stuck ON.)	When the vehicle speed is above 6 km/h (3.73 MPH), HPCM detects the signal from the transmission range switch remains at ON for 0.2 seconds or more with selector lever position is except for P or N.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

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

Is DTC detected?

YES >> Proceed to HBC-118, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

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

Is DTC detected?

YES >> Proceed to HBC-118, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144442

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-64, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to TM-80, "DTC Index".

2.CHECK TRANSMISSION RANGE SWITCH INPUT SIGNAL

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

HPCM				Condition		Voltage (Approx.)
+		–				
Connector	Terminal	Connector	Terminal			
B159	58	B158	20	Selector lever	P or N	Battery voltage
					Except above	0 V

Is the inspection result normal?

YES >> Per form GI-49, "Intermittent Incident".
NO >> GO TO 3.

3. CHECK TRANSMISSION RANGE SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect A/T assembly harness connector.
4. Check the continuity between HPCM harness connector and A/T assembly harness connector.

+		–		Continuity
HPCM		A/T assembly		
Connector	Terminal	Connector	Terminal	
B159	58	F61	9	Existed

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

Is the inspection result normal?

YES >> Per form GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P0A06, P0A07 ELECTRIC WATER PUMP

DTC Logic

INFOID:0000000008144443

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A06	COOLANT PUMP A (Electric water pump is stuck OFF)	When the electric water pump operation order signal which HPCM output detected a state of the LO adherence (less than 4%) for 3 seconds.	• Harness or connectors (Electric water pump circuit is open or shorted.) • Electric water pump
P0A07	COOLANT PUMP A (Electric water pump is stuck ON)	When the electric water pump operation order signal which HPCM output detected a state of the HI adherence (more than 96%) for 3 seconds.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-120, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144444

1.CHECK ELECTRIC WATER PUMP OPERATION

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

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

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

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK ELECTRIC WATER PUMP POWER SUPPLY-1

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

Electric water pump			Voltage
Connector	+	–	
	Terminal		
E90	1	2	Battery voltage

Is the inspection result normal?

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

3. CHECK ELECTRIC WATER PUMP POWER SUPPLY-2

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

+		–	Voltage
Electric water pump			
Connector	Terminal		
E90	1	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK ELECTRIC WATER PUMP GROUND CIRCUIT

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

+		–	Continuity
Electric water pump			
Connector	Terminal		
E90	2	Ground	Existed

Is the inspection result normal?

YES >> Per form GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC WATER PUMP SIGNAL CIRCUIT

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

+		–		Continuity
HPCM		Electric water pump		
Connector	Terminal	Connector	Terminal	
B159	48	E90	4	Existed
	61		3	

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

YES >> Replace electric water pump. Refer to HCO-13, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0A08 DC/DC CONVERTER

DTC Logic

INFOID:0000000008144445

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A08	DC/DC CONVERTER (DC/DC converter performance)	DC/DC converter activate signal remains at more than 4.5 V/less than 1.85 V for 0.1 seconds or more.	• Harness or connectors (DC/DC converter circuit is open or shorted.) • Air duct • DC/DC converter • 12V battery • Fusible link (250 A)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-122, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144446

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK INTAKE GRILLE OF REAR PARCEL SHELF FINISHER

Check whether there is blocking in the intake grille of rear parcel shelf finisher. Refer to INT-40, "Exploded View".

Is there blocking in the intake grill?

YES >> Remove foreign matter.
NO >> GO TO 2.

2.CHECK INTAKE DUCT

Check whether there is blocking the foreign matter in the intake ducts and state of the installation of all the intake ducts. Refer to HBB-186, "Exploded View".

Is the installation normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK FUSIBLE LINK

1. Turn ignition switch OFF.
2. Check that the following fusible link is not fusing.

Location		Fusible link No.	Capacity
B301	Battery terminal with fusible link	A	250 A

Is the fusible link fusing?

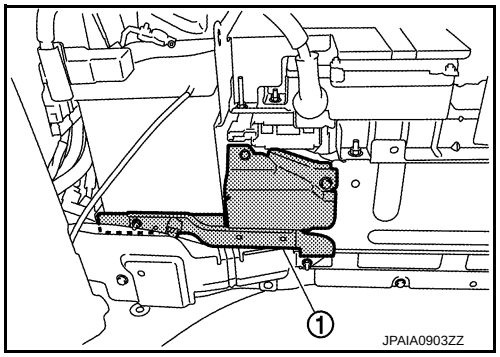
YES >> Replace the fusible link after repairing the applicable circuit. Refer to PG-142, "Exploded View".
NO >> GO TO 4.

4.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

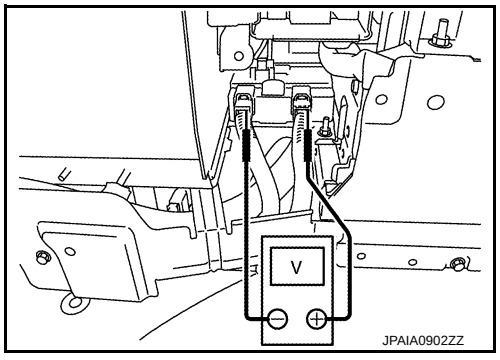


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 5.

5.CHECK HIGH VOLTAGE FUSE

Check the high voltage fuse (15 A) on battery junction box. Refer to HBC-76, "Circuit Diagram".

Is the inspection result normal?

YES >> GO TO 6.

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

6. REPLACE DC/DC CONVERTER

Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".

>> GO TO 7.

7. CHECK 12V BATTERY

1. Set the vehicle to READY and wait at least 5 minutes.
2. Check the battery voltage.

Battery voltage : More than 10.5 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Charge or replace 12V battery. Refer to PG-142, "Exploded View".

P0A09, P0A10 DC/DC CONVERTER

DTC Logic

INFOID:0000000008144447

DTC DETECTION LOGIC

NOTE:
If DTC P0A09 is displayed with DTC P0AE6, perform the trouble diagnosis for DTC P0AE6. Refer to HBC-195, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A09	DC/DC CONVERTER (DC/DC converter signal is stuck ON)	DC/DC converter voltage stabilizer signal remains at more than 4.5 V for 10 seconds or more.	• Harness or connectors (DC/DC converter circuit is open or shorted.) • DC/DC converter
P0A10	DC/DC CONVERTER (DC/DC converter signal is stuck OFF)	DC/DC converter voltage stabilizer signal remains at less than 0.5 V for 10 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-122, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144448

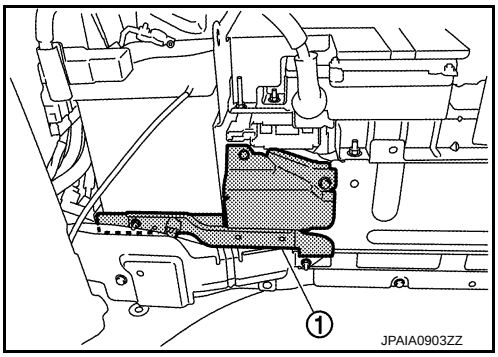
WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

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

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

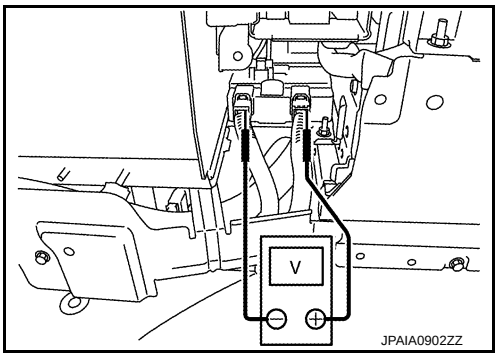


DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less



DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2.CHECK FUSE

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

Location	Fuse No.	Capacity
Fuse and fusible link block No.3	#73	10 A

Is the fuse fusing?

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

3.CHECK DC/DC CONVERTER POWER SUPPLY

1. Disconnect Li-ion battery harness connector.
2. Turn ignition switch ON.
3. Check the voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B160	8	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.

2. Check the continuity between Li-ion battery harness connector and fuse and fusible link block No. 3 harness connector.

+		–		Continuity
Li-ion battery		Fuse and fusible link block No. 3		
Connector	Terminal	Connector	Fuse No.	
B160	8	B165	#73	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

5. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect DC/DC converter harness connector.
3. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	8	B460	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

6. DC/DC CONVERTER VOLTAGE STABILIZER SIGNAL CIRCUIT-1

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

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	30	B160	20	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

7. DC/DC CONVERTER VOLTAGE STABILIZER SIGNAL CIRCUIT-2

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

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	20	B460	3	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK INTERMITTENT INCIDENT

Per form GI-49, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".

NO >> Repair or replace error-detected parts.

P0A0A, P0A0C HV SYSTEM

DTC Logic

INFOID:0000000008144449

DTC DETECTION LOGIC

NOTE:
If DTC P0A0A or P0A0C is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D. Refer to HBC-137, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A0A	HV SYSTEM INTERLOCK ERROR (Inter lock switch operation)	When HPCM detects state of inter lock switch OFF for more than 1 second when vehicle speed is less than 5 km/h (3.1 MPH).	• Harness or connectors (Inter lock switch circuit is open.) • Traction motor inverter installation • Traction motor inverter (Inter lock switch)
P0A0C	HV SYSTEM INTERLOCK ERROR (Inter lock switch open circuit)	When HPCM detects state of inter lock switch OFF for more than 3 seconds when vehicle speed is more than 5 km/h (3.1 MPH).	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

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

Is DTC detected?

YES >> Proceed to HBC-122, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Set the vehicle to READY.
2. Drive the vehicle at more than 5 km/h (3.1 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-122, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144450

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**

- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

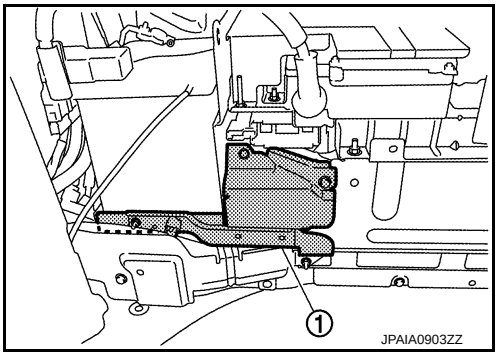
CAUTION:
There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

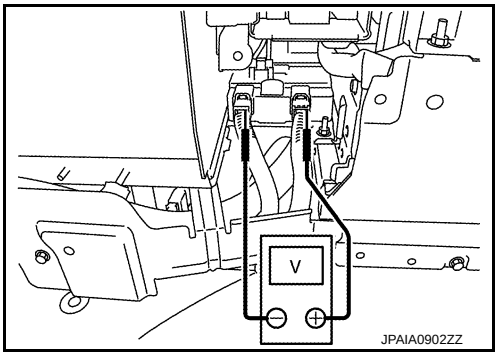


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 2.

2.CHECK TRACTION MOTOR INVERTER AND HARNESS CONNECTOR INSTALLATION

Check traction motor inverter and harness connector installation. Refer to TMS-120, "Exploded View".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair traction motor inverter or harness connector installation.

3.CHECK INTER LOCK SWITCH SIGNAL

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

+		–	Voltage
HPCM			
Connector	Terminal		
B159	45	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK INTER LOCK SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect traction motor inverter harness connector.
4. Check the continuity between traction motor inverter harness connector and HPCM harness connector.

+		–		Continuity
Traction motor inverter		HPCM		
Connector	Terminal	Connector	Terminal	
F78	33	B159	45	Existed

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

Is the inspection result normal?

YES >> Replace traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Repair or replace error-detected parts.

5. CHECK INTER LOCK SWITCH

1. Turn ignition switch OFF.
2. Check the continuity between traction motor inverter terminals.

Traction motor inverter			Continuity
Connector	+	–	
	Terminal		
C9	52	53	Existed
C16	58	59	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0A0F ENGINE NO START

DTC Logic

INFOID:0000000008144451

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A0F	ENGINE NO START (Impossible of an engine start)	When the engine is consecutive 5 times and it doesn't start.	• ECM • Engine • Clutch 1 thickness

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Start the engine.

Does the engine start?

YES >> INSPECTION END
NO >> Proceed to HBC-132, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144452

1.CHECK FUEL LEVEL

Check that the fuel level is enough.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refuel.

2.CHECK DTC WITH ECM

Perform self-diagnosis of ECM. Refer to EC-53, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to EC-81, "DTC Index".

3.CHECK ENGINE CONTROL SYSTEM

According to the symptom table of ENGINE CONTROL SYSTEM, check the root cause. Refer to “HARD/NO START/RESTART” in EC-434, "Symptom Table".

Is the inspection result normal?

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

4.CHECK CLUTCH 1 DISC

Check clutch 1 disc thickness. Refer to CL-8, "Inspection".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace clutch and clutch cover. Refer to CL-7, "Removal and Installation".

P0A12, P0A13 DC/DC CONVERTER

DTC Logic

INFOID:0000000008144453

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A12	DC/DC CONVERTER (DC/DC converter activate signal performance)	DC/DC converter activate signal remains at less than 1.85 V for 0.1 seconds or more.	• Harness or connectors (DC/DC converter circuit is open or shorted.) • DC/DC converter
P0A13	DC/DC CONVERTER (DC/DC converter activate signal performance)	DC/DC converter activate signal remains at more than 7.8 V for 0.1 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-133, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144454

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DC/DC CONVERTER ACTIVATE SIGNAL CIRCUIT

1. Turn ignition switch ON.
2. Select “DC/D converter voltage” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that the monitor indication as per the following condition.

Monitor item	Condition	Indication
DC/D converter voltage	Ignition switch: ON	0 - 1.3 V
	READY	4.5 - 7.8 V

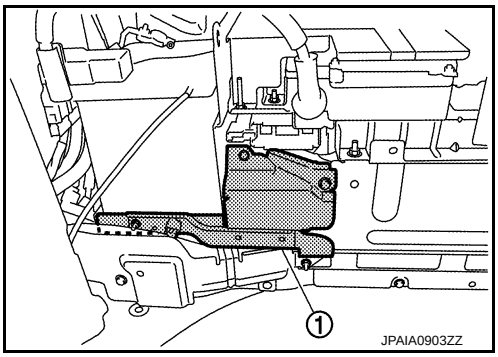
Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

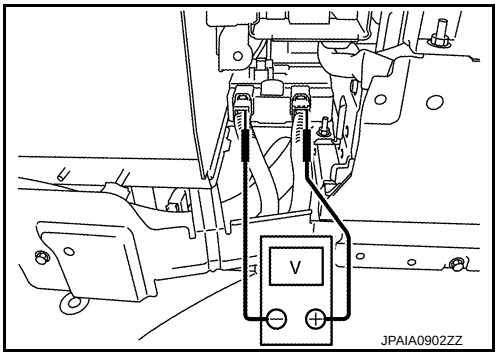
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).



DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less



DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 3.

3.CHECK DC/DC CONVERTER ACTIVATE SIGNAL CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect Li-ion battery harness connector.
4. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	24	B160	21	Existed

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

Is the inspection result normal?

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

4. CHECK DC/DC CONVERTER ACTIVATE SIGNAL CIRCUIT-2

1. Disconnect DC/DC converter harness connector.
2. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	21	B460	2	Existed

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

Is the inspection result normal?

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

5. CHECK FUSE

Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
Fuse and fusible link block No. 3	#73	10 A

Is the fuse fusing?

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

6. CHECK DC/DC CONVERTER POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B160	8	Ground	BAttery voltage

Is the inspection result normal?

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

7. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Check the continuity between Li-ion battery harness connector and fuse and fusible link block No. 3 harness connector.

+		–		Continuity
Li-ion battery		Fuse and fusible link block No. 3		
Connector	Terminal	Connector	Fuse No.	
B160	8	B165	#73	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

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

8. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-2

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

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	8	B460	1	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

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

9.CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
B158	20	Ground	Existed
	39		
	40		

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

P0A1D HPCM

DTC Logic

INFOID:0000000008144455

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0A1D	HPCM (HPCM abnormality)	A	HPCM is malfunctioning.	• HPCM • 12V battery
		B	When HPCM detects signal abnormality from traction motor inverter.	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Turn ignition switch OFF.
3. Repeat step 1 and 2 for 10 times slowly.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-137, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Set the vehicle to READY and start the engine.
2. Shift the selector lever to D and release brake pedal slowly.
3. Drive the vehicle at creep speed.
4. Stop the vehicle.
5. Shift the selector lever to P and stop the engine.
6. Perform “All DTC Reading” using CONSULT.
7. Check the DTC of “MOTOR CONTROL” and “EV/HEV”.

Is DTC detected?

YES >> Proceed to HBC-137, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144456

1.CHECK DTC WITH TRACTION MOTOR INVERTER

CHECK DTC WITH TRACTION MOTOR INVERTER. Refer to TMS-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-31, "DTC Index".

2. CHECK 12V BATTERY

Check 12V battery. Refer to PG-135, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Charge or replace 12V battery. Refer to PG-142, "Removal and Installation".

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to HBC-137, "DTC Logic".
4. Perform “All DTC Reading” using CONSULT.
5. Check DTC.

Is DTC U0293 detected in DTC P0A1D and an other control unit?

YES-1 >> Only DTC P0A1D detects it: Replace HPCM. Refer to HBC-339, "Removal and Installation".
YES-2 >> Detect DTC U0293 at an other control unit at the same time: Replace HPCM and battery junction box. Refer to HBC-339, "Removal and Installation" and HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".
NO >> INSPECTION END

P0A1F BATTERY ENERGY CONTROL MODULE

DTC Logic

INFOID:0000000008144457

DTC DETECTION LOGIC

NOTE:
If DTC P0A1F is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D. Refer to HBC-137, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A1F	HV BATT CONT MODULE (Li-ion battery controller -HPCM aspect each other monitor is abnormal)	When HPCM detects CAN communication data error between HPCM and Li-ion battery controller.	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-139, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144458

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check dtc with Li-ion battery controller. Refer to HBB-32, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to HBB-39, "DTC Index".

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-139, "DTC Logic".

Is DTC P0A1F detected again?

YES >> Replace Li-ion battery controller. Refer to HBB-200, "LI-ION BATTERY CONTROLLER : Disassembly and Assembly".
NO >> Per form GI-49, "Intermittent Incident".

P0A93 INVERTER COOLING SYSTEM

DTC Logic

INFOID:0000000008144459

DTC DETECTION LOGIC

NOTE:
If DTC P0A93 is displayed with DTC P0A06, P0A07, P3123 or P3124, perform the trouble diagnosis for DTC P0A06, P0A07, P3123 or P3124. Refer to HBC-120, "DTC Logic" or HBC-284, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A93	INVERTER A COOLING SYSTEM (Electric water pump performance)	When the feedback signal from electric water pump detects the state of 15% to 19% or 83% to 91% for 10 seconds.	• Electric water pump • High voltage cooling system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-140, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144460

1.CHECK HIGH VOLTAGE COOLING SYSTEM FOR LEAKAGE

Check high voltage cooling system for leakage. Refer to HCO-7, "Inspection".

Is there a leakage?

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

2.CHECK HIGH VOLTAGE COOLING SYSTEM FOR CLOGGING

Check the following for clogging.
- Sub radiator
- Water hose
- Water pipe

Is there a clogging?

YES >> Repair or replace error-detected parts.
NO >> GO TO 3.

3.CHECK ELECTRIC WATER PUMP OPERATION

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

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

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

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 4.

4. CHECK ELECTRIC WATER PUMP POWER SUPPLY-1

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

Electric water pump			Voltage
Connector	+	–	
	Terminal		
E90	1	2	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 5.

5. CHECK ELECTRIC WATER PUMP POWER SUPPLY-2

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

+		–	Voltage
Electric water pump			
Connector	Terminal		
E90	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform the trouble diagnosis for power supply circuit.

6. CHECK ELECTRIC WATER PUMP GROUND CIRCUIT

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

+		–	Continuity
Electric water pump			
Connector	Terminal		
E90	2	Ground	Existed

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7. CHECK ELECTRIC WATER PUMP SIGNAL CIRCUIT

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

+		–		Continuity
HPCM		Electric water pump		
Connector	Terminal	Connector	Terminal	
B159	48	E90	4	Existed
	61		3	

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

Is the inspection result normal?

YES >> Replace electric water pump. Refer to HCO-13, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0A95 HIGH VOLTAGE FUSE

DTC Logic

INFOID:0000000008144461

DTC DETECTION LOGIC

NOTE:

- If DTC P0A95 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P0A95 is displayed with DTC P0A1F, P0ADB, P0ADC, P0AE6, P0AE7, P311D, P311E, P311F, P3179, P317A, P317B, P317F, P3180, P3181 or P3182, perform the trouble diagnosis for DTC P0A1F, P0ADB, P0ADC, P0AE6, P0AE7, P311D, P311E, P311F, P3179, P317A, P317B, P317F, P3180, P3181 or P3182. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A95	HIGH VOLTAGE FUSE (High voltage circuit open circuit)	When HPCM detects Li-ion battery current is more than –3A and traction motor inverter input voltage is less than 25 V for 0.45 second during pre-charge.	• Harness or connectors (High voltage direct current circuit is open.) • System main relay 1, 2 • Traction motor inverter • Li-ion battery controller • High voltage fuse • DC/DC converter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-143, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144462

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check DTC with Li-ion battery controller. Refer to HBB-32, "CONSULT Function".

Is DTC detected?

YES >> Perform diagnosis procedure corresponding to DTC indicated. Refer to HBB-39, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH TRACTION MOTOR INVERTER

Check DTC with traction motor inverter. Refer to TMS-22, "CONSULT Function".

Is DTC detected?

YES >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-31, "DTC Index".
NO >> GO TO 3.

3.CHECK SYSTEM MAIN RELAY OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV P MAIN RLY ACTIV” and “HV N MAIN RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON

Without CONSULT

Check the voltage between HPCM harness connector and ground.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	15	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V
	34		Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 15.
YES-2 >> Without CONSULT: GO TO 16.
NO >> GO TO 4.

4.CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” and “HV PRE CHG RLY ACTIV VOLT” in DATA MONITOR mode of EV/HEV using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON
HV PRE CHG RLY ACTIV VOLT	Ignition switch: ON	More than 9.0 V
	Just after READY	1.3 - 4.7 V

Without CONSULT

Check the voltage between HPCM harness connector and ground.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	3	Ground	Ignition switch: ON	More than 9.0 V
			Just after READY	1.3 - 4.7 V

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 5.

5.CHECK DC/DC CONVERTER ACTIVATE SIGNAL

With CONSULT
1. Select “DC/DC CONV SIG VOLT” in DATA MONITOR mode of EV/HEV using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
DC/DC CONV SIG VOLT	Ignition switch: ON	0 - 1.3 V
	READY	4.5 - 7.8 V

Without CONSULT
Check the voltage between HPCM harness connector and ground.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	21	Ground	Ignition switch: ON	0 - 1.3 V
			READY	4.5 - 7.8 V

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 6.

6.CHECK FUSE

Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
Fuse and fusible link block No. 3	#73	10 A

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 7.

7.CHECK DC/DC CONVERTER POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B160	8	Ground	BAttery voltage

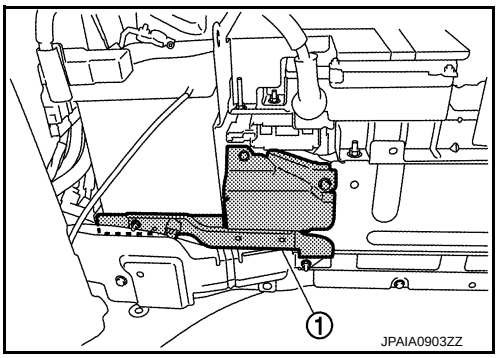
Is the inspection result normal?

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

8.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

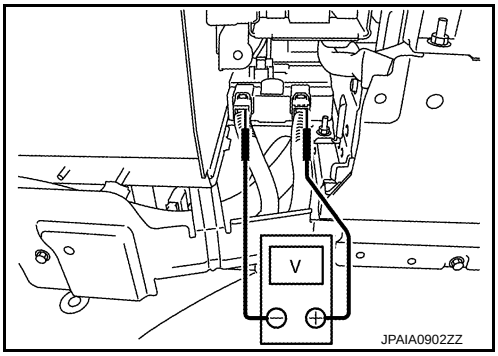


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 9.

9.CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between Li-ion battery harness connector and fuse and fusible link block No. 3 harness connector.

+		–		Continuity
Li-ion battery		Fuse and fusible link block No. 3		
Connector	Terminal	Connector	Fuse No.	
B160	8	B165	#73	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

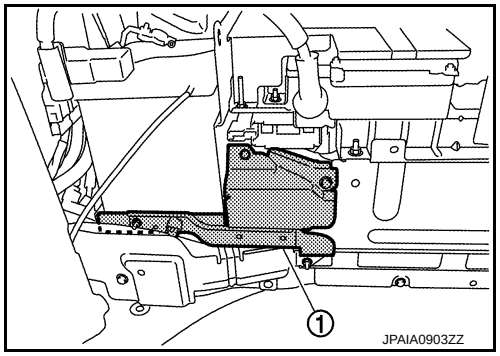
10.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

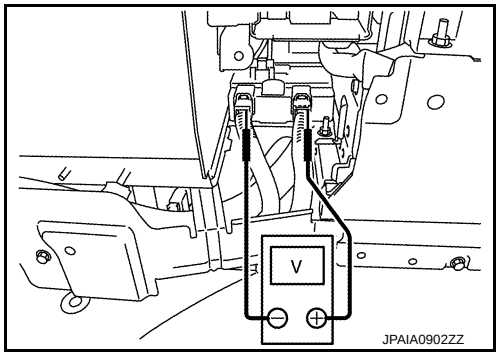
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 11.

11. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Disconnect DC/DC converter harness connector.
4. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	8	B460	1	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".

NO >> Repair or replace error-detected parts.

12. PRECONDITIONING

WARNING:

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

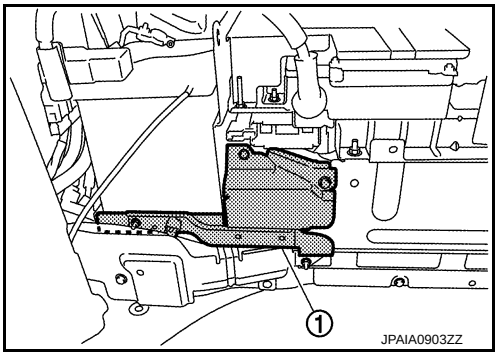
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

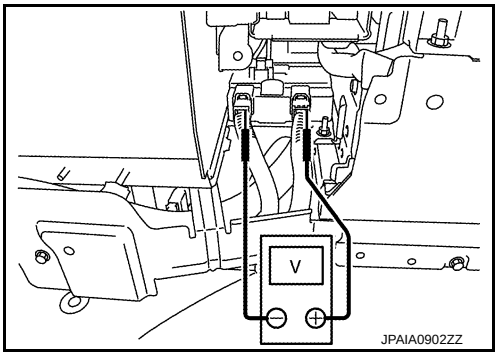
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 13.

13. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect Li-ion battery harness connector.
4. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	3	B160	9	Existed

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

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace error-detected parts.

14. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT-2

1. Disconnect DC/DC converter harness connector.
2. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	9	B460	4	Existed

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

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

15. SYSTEM MAIN RELAY OPERATION

With CONSULT

1. Select “HV P MAIN RLY ACTIV”, “HV N MAIN RLY ACTIV”, “HV P MAIN RLY ACTIV MONI” and “HV N MAIN RLY ACTIV MONI” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF

Is the inspection result normal?

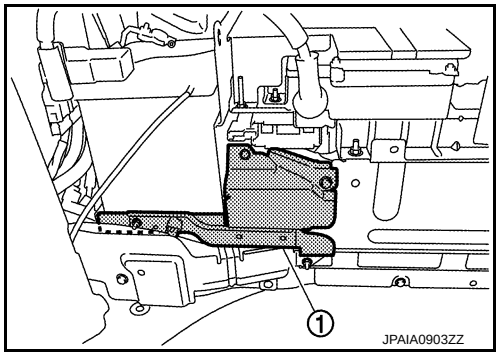
YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 16.

16. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

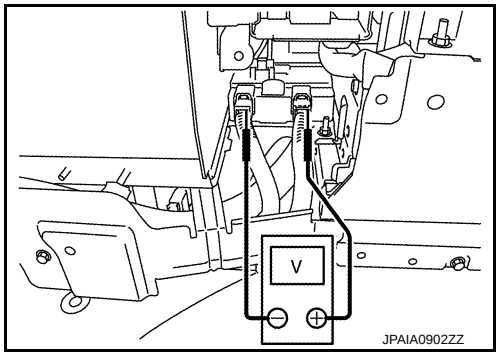


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 17.

17. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-1

1. Disconnect HPCM harness connector.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	34	B160	11	Existed

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

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace error-detected parts.

18. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-1

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	15	B160	23	Existed

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

Is the inspection result normal?

YES >> GO TO 19.
NO >> Repair or replace error-detected parts.

19. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	11	24	Existed

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

Is the inspection result normal?

YES >> GO TO 20.
NO >> GO TO 24.

20. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	23	24	Existed

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

Is the inspection result normal?

YES >> GO TO 21.
NO >> GO TO 27.

21. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-1

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

+		–	Continuity
Li-ion battery			
Connector	Terminal		
LB39	24	Ground	Existed

Is the inspection result normal?

YES >> GO TO 22.
NO >> Repair or replace error-detected parts.

22. CHECK SYSTEM MAIN RELAY 1

1. Disconnect battery junction box harness connector.
2. Check system main relay 1. Refer to HBC-153, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

YES >> GO TO 23.
NO >> Repair or replace error-detected parts.

23. CHECK SYSTEM MAIN RELAY 2

Check system main relay 2. Refer to HBC-154, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

24. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-3

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

+		–		Continuity
Li-ion battery		Battery junction box		
Connector	Terminal	Connector	Terminal	
LB39	11	LB33	9	Existed

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

Is the inspection result normal?

YES >> GO TO 25.
NO >> Repair or replace error-detected parts.

25. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 26.
NO >> Repair or replace error-detected parts.

26. CHECK SYSTEM MAIN RELAY 1

Check system main relay 1. Refer to HBC-153, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

27. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 28.
NO >> Repair or replace error-detected parts.

28. CHECK SYSTEM MAIN RELAY 2

Check system main relay 2. Refer to HBC-154, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair or replace error-detected parts.

29. CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

Check loose or poor connection for traction motor inverter high voltage harness connector. Refer to TMS-120, "Exploded View".

Is the inspection result normal?

YES >> GO TO 30.
NO >> Repair or replace error-detected parts.

30. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE CIRCUIT

1. Disconnect traction motor inverter high voltage harness connector.
2. Check the continuity between traction motor inverter high voltage harness connector and battery junction box high voltage harness connector.

+		–		Continuity
Traction motor inverter		Battery junction box		
Connector	Terminal	Connector	Terminal	
C9	49	LB37	29	Existed
	50	LB38	30	

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 31.
NO >> Repair or replace error-detected parts.

31. CHECK BATTERY JUNCTION BOX HIGH VOLTAGE CIRCUIT

1. Check the continuity between battery junction box harness connector terminals.

Battery junction box			Continuity
Connector	+	–	
	Terminal		
LB32	27	28	Existed
LB31	25	26	

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 32.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

32. CHECK DC/DC CONVERTER HIGH VOLTAGE CIRCUIT

1. Check the continuity between DC/DC converter high voltage harness connector and battery junction box high voltage harness connector.

+		–		Continuity
DC/DC converter		Battery junction box		
Connector	Terminal	Connector	Terminal	
B461	7	LB32	25	Existed
	10	LB36	22	
	14	LB31	28	

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (System Main Relay 1)

INFOID:0000000008144463

1. CHECK SYSTEM MAIN RELAY 1-1

1. Disconnect battery junction box harness connector.
2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
9	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2. CHECK SYSTEM MAIN RELAY 1-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
21	29	12 V direct current supply between terminals 9 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

Component Inspection (System Main Relay 2)

INFOID:0000000008144464

1. CHECK SYSTEM MAIN RELAY 2-1

1. Disconnect battery junction box harness connector.
2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
7	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2. CHECK SYSTEM MAIN RELAY 2-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
22	30	12 V direct current supply between terminals 7 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

P0AA0 HYBRID BATTERY POSITIVE CONTACTOR

DTC Logic

INFOID:0000000008144465

DTC DETECTION LOGIC

NOTE:

- If DTC P0AA0 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P0AA0 is displayed with DTC P0A12, P0A13, P0A1D, P0AA1, P0AA4, P31A7, P31A9, P3179, P317A, P317B, P317F, P3180, P3181 or P3182, perform the trouble diagnosis for DTC P0A12, P0A13, P0A1D, P0AA1, P0AA4, P31A7, P31A9, P3179, P317A, P317B, P317F, P3180, P3181 or P3182. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA0	HYBRID BATT POSITIVE CONTACTOR (System main relay welding)	When the traction motor inverter voltage was more than 100V, in ignition switch ON, the voltage that attracted a Li-ion battery voltage from the traction motor inverter voltage detected the state that did not exceed 50V within 3.5 seconds.	• Harness or connectors (System main relay circuit is open or shorted.) • System main relay 1, 2 • Traction motor inverter • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

Set the vehicle to READY.

Is vehicle set to READY?

YES >> Proceed to HBC-155, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

Check DTC.

Is DTC detected?

YES >> Proceed to HBC-155, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144466

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

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

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check DTC with traction motor inverter. Refer to TMS-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-31, "DTC Index".

2.CHECK SYSTEM MAIN RELAY OUTPUT SIGNAL CIRCUIT

With CONSULT
1. Select “HV P MAIN RLY ACTIV” and “HV N MAIN RLY ACTIV” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON

Without CONSULT
Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	15	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V
	34		Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.
YES-2 >> Without CONSULT: GO TO 4.
NO >> Perform trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-93, "HPCM : Diagnosis Procedure".

3.CHECK SYSTEM MAIN RELAY OPERATION

With CONSULT
1. Select “HV P MAIN RLY ACTIV” , “HV N MAIN RLY ACTIV”, “HV P MAIN RLY ACTIV MONI” and “HV N MAIN RLY ACTIV MONI” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF

Is the inspection result normal?

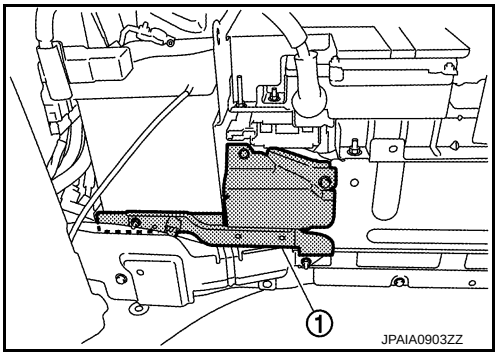
YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 4.

4. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

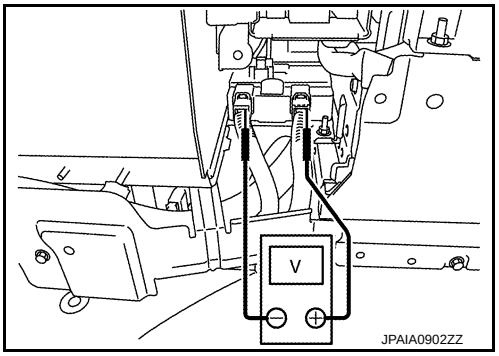


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 5.

5. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-1

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

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	34	B160	11	Existed

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

Is the inspection result normal?

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

6. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-1

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	15	B160	23	Existed

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

Is the inspection result normal?

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

7. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	11	24	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 12.

8. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	23	24	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 15.

9. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-1

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

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B160	24	Ground	Existed

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10. CHECK SYSTEM MAIN RELAY 1

1. Disconnect battery junction box harness connector.
2. Check system main relay 1. Refer to HBC-160, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

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

11. CHECK SYSTEM MAIN RELAY 2

Check system main relay 2. Refer to HBC-161, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

12. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-3

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

+		–		Continuity
Li-ion battery		Battery junction box		
Connector	Terminal	Connector	Terminal	
LB39	11	LB33	9	Existed

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace error-detected parts.

13. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace error-detected parts.

14. CHECK SYSTEM MAIN RELAY 1

Check system main relay 1. Refer to HBC-160, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

15. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-3

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

+		–		Continuity
Li-ion battery		Battery junction box		
Connector	Terminal	Connector	Terminal	
LB39	23	LB33	7	Existed

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

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair or replace error-detected parts.

16. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace error-detected parts.

17. CHECK SYSTEM MAIN RELAY 2

Check system main relay 2. Refer to HBC-161, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (System Main Relay 1)

INFOID:0000000008144467

1. CHECK SYSTEM MAIN RELAY 1-1

1. Disconnect battery junction box harness connector.
2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
9	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2. CHECK SYSTEM MAIN RELAY 1-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
21	29	12 V direct current supply between terminals 9 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

Component Inspection (System Main Relay 2)

INFOID:0000000008144468

1. CHECK SYSTEM MAIN RELAY 2-1

1. Disconnect battery junction box harness connector.
2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
7	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2. CHECK SYSTEM MAIN RELAY 2-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
22	30	12 V direct current supply between terminals 7 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

P0AA1 HYBRID BATTERY POSITIVE CONTACTOR

DTC Logic

INFOID:0000000008144469

DTC DETECTION LOGIC

NOTE:

- If DTC P0AA1 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P0AA1 is displayed with DTC P0ADB, P0ADC, P0A12, P0A13, P0AE6, P0AE7, P3179, P317A, P317B, P317F, P3180, P3181, P3182 or P31A7, perform the trouble diagnosis for DTC P0ADB, P0ADC, P0A12, P0A13, P0AE6, P0AE7, P3179, P317A, P317B, P317F, P3180, P3181, P3182 or P31A7. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA1	HYBRID BATT POSITIVE CONTACTOR (System main relay 1 welding)	When the pre-charge relay was turned ON after discharge, and the voltage of traction motor inverter rises.	• Harness or connectors (System main relay 1circuit is shorted.) • System main relay 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

Set the vehicle to READY.

Is vehicle set to READY?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-2

Check DTC.

Is DTC detected?

YES >> Proceed to HBC-162, "Diagnosis Procedure".
NO >> INSPECTION END

4.PERFORM DTC CONFIRMATION PROCEDURE-3

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Turn ignition switch ON.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-162, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144470

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**

- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK SYSTEM MAIN RELAY 1 OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV P MAIN RLY ACTIV” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	34	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-93, "HPCM : Diagnosis Procedure".

2.CHECK SYSTEM MAIN RELAY 1 OPERATION

With CONSULT

1. Select “HV P MAIN RLY ACTIV” and “HV P MAIN RLY ACTIV MONI” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

3.PRECONDITIONING

WARNING:

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

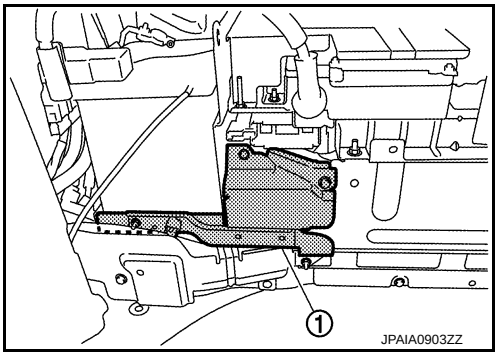
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

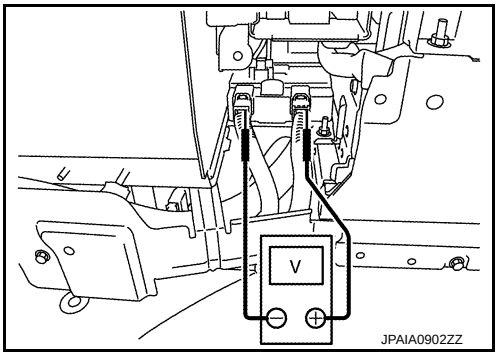
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 4.

4. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-1

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

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	34	B160	11	Existed

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

Is the inspection result normal?

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

5. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	11	24	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 8.

6. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-1

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

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B160	24	Ground	Existed

Is the inspection result normal?

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

7.CHECK SYSTEM MAIN RELAY 1

1. Disconnect battery junction box harness connector.
2. Check system main relay 1. Refer to HBC-165, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

8.CHECK SYSTEM MAIN RELAY 1 CIRCUIT-3

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

+		–		Continuity
Li-ion battery		Battery junction box		
Connector	Terminal	Connector	Terminal	
LB39	11	LB33	9	Existed

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

Is the inspection result normal?

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

9.CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10.CHECK SYSTEM MAIN RELAY 1

Check system main relay 1. Refer to HBC-165, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (System Main Relay 1)

INFOID:0000000008144471

1.CHECK SYSTEM MAIN RELAY 1-1

1. Disconnect battery junction box harness connector.
2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
9	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2.CHECK SYSTEM MAIN RELAY 1-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
21	29	12 V direct current supply between terminals 9 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

P0AA4 HYBRID BATTERY NEGATIVE CONTACTOR

DTC Logic

INFOID:0000000008144472

DTC DETECTION LOGIC

NOTE:

- If DTC P0AA4 is displayed with DTC UXXXX, perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P0AA4 is displayed with DTC P0ADB, P0ADC, P0A12, P0A13, P0AE6, P0AE7, P3179, P317A, P317B, P317F, P3180, P3181, P3182 or P31A7, perform the trouble diagnosis for DTC P0ADB, P0ADC, P0A12, P0A13, P0AE6, P0AE7, P3179, P317A, P317B, P317F, P3180, P3181, P3182 or P31A7. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA4	HYBRID BATT NEGATIVE CONTACTOR (System main relay 2 welding)	When system main relay 2 is intercepted and the voltage of traction motor inverter doesn't drop even if it is discharge.	• Harness or connectors (System main relay 2 circuit is shorted.) • System main relay 2 • DC/DC converter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

Set the vehicle to READY.

Is vehicle set to READY?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-2

Check DTC.

Is DTC detected?

YES >> Proceed to HBC-167, "Diagnosis Procedure".
NO >> INSPECTION END

4.PERFORM DTC CONFIRMATION PROCEDURE-3

1. Turn ignition switch OFF and wait at least 30 seconds.
2. Turn ignition switch ON.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-167, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144473

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**

- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL INPUT CIRCUIT

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	3	Ground	Ignition switch: ON	More than 9.0 V
			Just after READY	1.3 - 4.7 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-93, "HPCM : Diagnosis Procedure".

2.CHECK SYSTEM MAIN RELAY 2 OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV N MAIN RLY ACTIV” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	15	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-93, "HPCM : Diagnosis Procedure".

3. CHECK DC/DC CONVERTER PRE-CHARGE RELAY OPERATION

With CONSULT
1. Select “HV PRE CHG RLY ACTIV” and “HV PRE CHG RLY ACTIV VOLT” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON
HV PRE CHG RLY ACTIV VOLT	Ignition switch: ON	More than 9.0 V
	Just after READY	1.3 - 4.7 V

Is the inspection result normal?

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

4. CHECK SYSTEM MAIN RELAY 2 OPERATION

With CONSULT
1. Select “HV N MAIN RLY ACTIV” and “HV N MAIN RLY ACTIV MONI” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF

Is the inspection result normal?

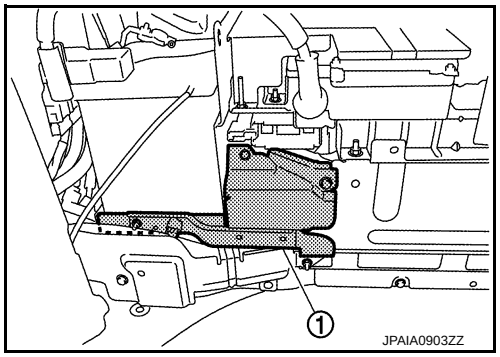
YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 5.

5. PRECONDITIONING

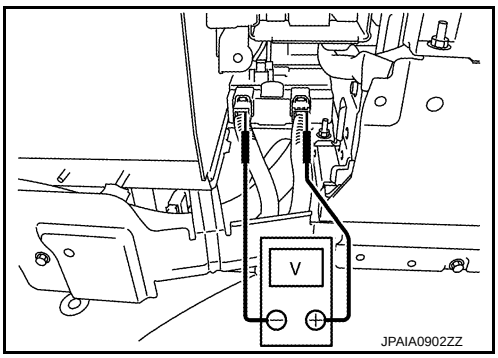
WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.



Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 6.

6. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT-1

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

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	3	B160	9	Existed

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

Is the inspection result normal?

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

7. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-1

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	15	B160	23	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT-2

1. Disconnect DC/DC converter harness connector.
2. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	9	B460	4	Existed

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

Is the inspection result normal?

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

9. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	23	24	Existed

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

Is the inspection result normal?

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

10. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-1

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

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B160	24	Ground	Existed

Is the inspection result normal?

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

11. CHECK SYSTEM MAIN RELAY 2

1. Disconnect battery junction box harness connector.
2. Check system main relay 2. Refer to HBC-172, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

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

12. CHECK DC/DC CONVERTER

Check the DC/DC converter input and output signals. Refer to HBC-75, "Reference Value".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

13. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-3

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

+		–		Continuity
Li-ion battery		Battery junction box		
Connector	Terminal	Connector	Terminal	
LB39	23	LB33	7	Existed

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

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace error-detected parts.

14. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

2. Also check harness for short to power.

Is the inspection result normal?

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

15. CHECK SYSTEM MAIN RELAY 2

Check system main relay 2. Refer to HBC-172, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair or replace error-detected parts.

16. CHECK DC/DC CONVERTER

Check the DC/DC converter input and output signals. Refer to HBC-75, "Reference Value".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (System Main Relay 2)

INFOID:0000000008144474

1. CHECK SYSTEM MAIN RELAY 2-1

1. Disconnect battery junction box harness connector.
2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
7	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2. CHECK SYSTEM MAIN RELAY 2-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
22	30	12 V direct current supply between terminals 7 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

P0AA6 HYBRID BATTERY SYSTEM

DTC Logic

INFOID:0000000008144475

DTC DETECTION LOGIC

NOTE:

- If DTC P0AA6 is displayed with DTC P0AA7, perform the trouble diagnosis for DTC P0AA7. Refer to HBC-178, "DTC Logic".
- If DTC P0AA6 is displayed with DTC P3117, P3118, P3119 or P3120, perform the trouble diagnosis for DTC P3117, P3118, P3119 or P3120. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA6	HYBRID BATT SYSTEM ISOLATION (Insulation resistance drop)	When HPCM detects insulation resistance drop detection signal is less than 3.15 V more than 30 seconds.	High voltage circuit insulation resistance drop.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Set the vehicle as the following condition and wait at least 1 minute.

A/C switch	ON
Accelerator pedal	Depressed
Selector lever	P position

3. Turn ignition switch OFF and wait at least 1minute.
4. Turn ignition switch ON.
5. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-173, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144476

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

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

1. ERASE DTC

Erase DTC.

>> GO TO 2.

2. INSULATION RESISTANCE DROP PARTS IDENTIFICATION-1

1. Turn ignition switch ON and wait at least 1 minute.
2. Check the hybrid system warning lamp.

Does the hybrid system warning lamp turn ON?

YES >> Perform self-diagnostic and check DTC. Refer to HBC-71, "DTC Index".
NO >> GO TO 3.

3. INSULATION RESISTANCE DROP PARTS IDENTIFICATION-2

1. Set the vehicle to READY.
2. Set the vehicle to following condition.

Engine	After warming up
Li-ion battery remaining energy	More than 50 %

3. Check the hybrid system warning lamp.

Does the hybrid system warning lamp turn ON?

YES >> Erase self diagnostic result, And then GO TO 4.
NO >> GO TO 4.

4. INSULATION RESISTANCE DROP PARTS IDENTIFICATION-3

1. Turn ignition switch OFF.
2. Set the vehicle to READY and wait at least 1 minute as following condition.

Air conditioning	OFF
Selector lever	P position

CAUTION:
Never depress an accelerator pedal.

Does the engine start?

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

5. INSULATION RESISTANCE DROP PARTS IDENTIFICATION-4

Check the hybrid system warning lamp.

Does the hybrid system warning lamp turn ON?

YES >> Perform self-diagnostic and check DTC. Refer to HBC-71, "DTC Index".
NO >> GO TO 6.

6. INSULATION RESISTANCE DROP PARTS IDENTIFICATION-5

1. Set the vehicle to following condition.

Air conditioning	OFF
Selector lever	P position

2. Rev engine and keep the engine speed for at least 1 minute under no load.
3. Check the hybrid system warning lamp.

Does the hybrid system warning lamp turn ON?

YES >> Perform self-diagnostic and check DTC. Refer to HBC-71, "DTC Index".
NO >> GO TO 7.

7. INSULATION RESISTANCE DROP PARTS IDENTIFICATION-6

1. Release accelerator pedal.
2. Set the vehicle to following condition and wait at least 1 minute.

Air conditioning	ON
	Air flow volume is maximum
	Cooling is maximum
Accelerator pedal	Fully released
Selector lever	P position

3. Check the hybrid system warning lamp.

Does the hybrid system warning lamp turn ON?

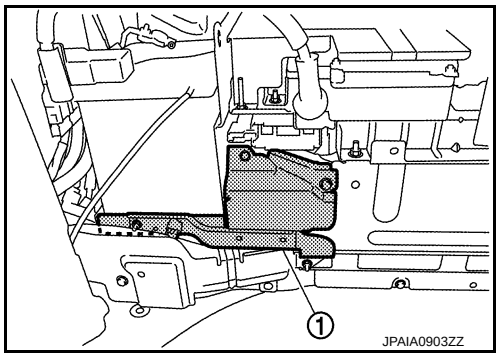
YES >> Perform self-diagnostic and check DTC. Refer to HBC-71, "DTC Index".
NO >> GO TO 8.

8. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

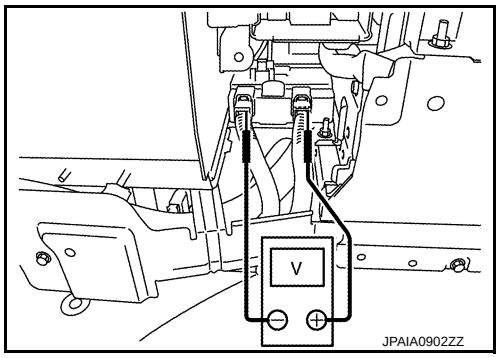


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 9.

9. CHECK LI-ION BATTERY INSULATION RESISTANCE

1. Remove Li-ion battery. Refer to HBB-188, "Removal and Installation".
2. Remove component parts of Li-ion battery. Refer to HBB-188, "Exploded View".
3. Check the insulation resistance of component parts. Refer to HBB-182, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace error-detect parts. Refer to HBB-188, "Exploded View".

10. CHECK LI-ION BATTERY HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-1

Check the insulation resistance of Li-ion battery high voltage harness connector. Refer to HBC-332, "Insulation Resistance".

Li-ion battery	
Connector	LB40

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 14.

11. CHECK LI-ION BATTERY HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-2

Check the insulation resistance of battery junction box high voltage harness connector. Refer to HBC-332, "Insulation Resistance".

Battery junction box	
Connector	LB31
	LB32

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace high voltage harness connector.

12. CHECK LI-ION BATTERY HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-3

Check the insulation resistance of battery junction box high voltage harness connector. Refer to HBC-332, "Insulation Resistance".

Battery junction box	
Connector	LB37
	LB38

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 15.

13. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE

1. Disconnect electric compressor high voltage harness connector.
2. Check the insulation resistance of electric compressor high voltage harness connector . Refer to HBC-332, "Insulation Resistance".

Electric compressor	
Connector	C12

3. Check whether there are neither a water infiltration mark nor a defective seal in the high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace high voltage harness connector.

14. CHECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

Check electric compressor insulation resistance. Refer to HAC-170, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace electric compressor. Refer to HA-30, "Removal and Installation".

15. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE

1. Disconnect traction motor inverter high voltage harness connector.
2. Check the insulation resistance traction motor inverter high voltage harness connector. Refer to HBC-332, "Insulation Resistance".

Traction motor inverter	
Connector	C9

3. Check whether there are neither a water infiltration mark nor a defective seal in the high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace high voltage harness connector.

16. CHECK TRACTION MOTOR INVERTER INSULATION RESISTANCE

Check traction motor inverter insulation resistance. Refer to TMS-117, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace traction motor inverter. Refer to TMS-121, "Removal and Installation".

17. CHECK 3-PHASE HARNESS INSULATION RESISTANCE

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to TMS-121, "Removal and Installation".
2. Check the insulation resistance. Refer to TMS-117, "Component Inspection".

3-phase harness	
Connector	C16

3. Check whether there are neither a water infiltration mark nor a defective seal in the 3-phase harness connector.

Is the inspection result normal?

YES >> GO TO 18.
NO >> Replace the transmission assembly due to malfunction in the 3-phase harness. Refer to TM-190, "Removal and Installation".

18. CHECK TRACTION MOTOR INSULATION RESISTANCE

Check traction motor insulation resistance. Refer to TMS-117, "Component Inspection".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace the transmission assembly due to malfunction in the traction motor. Refer to TM-190, "Removal and Installation".

P0AA7 HYBRID BATTERY VOLT INSULATION SENSOR

DTC Logic

INFOID:0000000008144477

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA7	HYBRID BATT VOLT ISOLATION SENSOR (Insulation resistance sensor)	When HPCM receives self-diagnosis signal from Li-ion battery controller.	• Insulation resistance drop detection monitoring system • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE WITH LI-ION BATTERY CONTROLLER

1. Perform DTC confirmation procedure of detected DTC in Li-ion battery controller which displayed with DTC P0AA7.Refer to HBB-39, "DTC Index".
2. Perform “All DTC Reading”.
3. Check DTC of “HV BATTERY”.

Is DTC detected?

YES >> Proceed to HBC-178, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144478

1.PERFORM DIAGNOSIS PROCEDURE

Perform the diagnosis procedure which detected with HPCM. Refer to HBB-39, "DTC Index".

Is the inspection result normal?

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

P0ADB, P0ADC HYBRID BATTERY POSITIVE CONTACTOR

DTC Logic

INFOID:0000000008144479

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0ADB	HYBRID BATT POSITIVE CONTACTOR (System main relay 1 circuit)	When HPCM detects short circuit to ground of system main relay 1 circuit.	• Harness or connectors (System main relay 1 circuit is open or shorted.) • Battery junction box (System main relay) • HPCM
P0ADC	HYBRID BATT POSITIVE CONTACTOR (System main relay 1 circuit)	When HPCM detects open circuit or short circuit to power supply of system main relay 1 circuit.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

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

Is DTC detected?

YES >> Proceed to HBC-179, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-179, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144480

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK SYSTEM MAIN RELAY 1 OUTPUT SIGNAL CIRCUIT

With CONSULT
1. Select “HV P MAIN RLY ACTIV” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON

Without CONSULT
Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	34	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage–2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Perform the trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-93, "HPCM : Diagnosis Procedure".

2.CHECK SYSTEM MAIN RELAY 1 OPERATION

With CONSULT
1. Select “HV P MAIN RLY ACTIV” and “HV P MAIN RLY ACTIV MONI” in“ DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

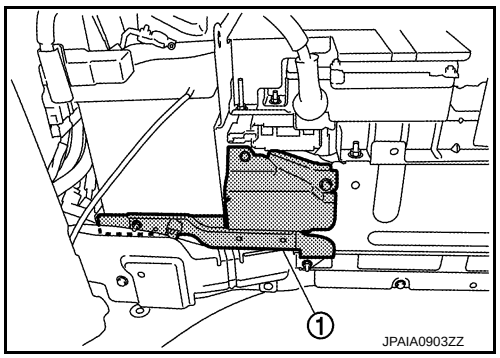
3.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

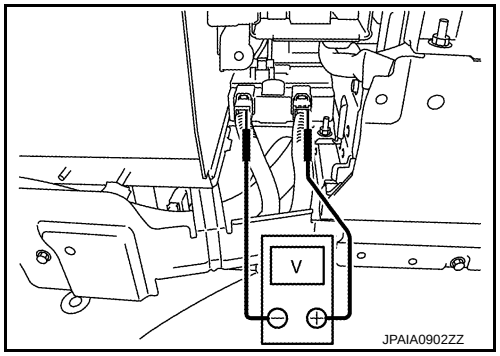
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 4.

4. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-1

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

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	34	B160	11	Existed

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

Is the inspection result normal?

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

5. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	11	24	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 8.

6. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-1

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

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B160	24	Ground	Existed

Is the inspection result normal?

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

7.CHECK SYSTEM MAIN RELAY 1

1. Disconnect battery junction box harness connector.
2. Check system main relay 1. Refer to HBC-165, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

8.CHECK SYSTEM MAIN RELAY 1 CIRCUIT-3

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

+		–		Continuity
Li-ion battery		Battery junction box		
Connector	Terminal	Connector	Terminal	
LB39	11	LB33	9	Existed

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

Is the inspection result normal?

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

9.CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10.CHECK SYSTEM MAIN RELAY 1

Check system main relay 1. Refer to HBC-165, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (System Main Relay 1)

INFOID:0000000008144481

1.CHECK SYSTEM MAIN RELAY 1-1

1. Disconnect battery junction box harness connector.
2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
9	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2.CHECK SYSTEM MAIN RELAY 1-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
21	29	12 V direct current supply between terminals 9 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

P0ADF, P0AE0 HYBRID BATTERY NEGATIVE CONTACTOR

DTC Logic

INFOID:0000000008144482

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0ADF	HYBRID BATT NEGATIVE CONTACTOR (System main relay 2 circuit)	When HPCM detects short circuit to ground of system main relay 2 circuit.	• Harness or connectors (System main relay 2 circuit is open or shorted.) • Battery junction box (System main relay)
P0AE0	HYBRID BATT NEGATIVE CONTACTOR (System main relay 2 circuit)	When HPCM detects open circuit or short circuit to power supply of system main relay 2 circuit.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

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

Is DTC detected?

YES >> Proceed to HBC-184, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-184, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144483

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK SYSTEM MAIN RELAY 2 OUTPUT SIGNAL CIRCUIT

With CONSULT
1. Select “HV N MAIN RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON

Without CONSULT
Check the voltage between HPCM harness connector and ground as per the following condition.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	15	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage−2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Perform trouble diagnosis for power supply and ground circuit of HPCM. Refer to HBC-93, "HPCM : Diagnosis Procedure".

2.CHECK SYSTEM MAIN RELAY 2 OPERATION

With CONSULT
1. Select “HV N MAIN RLY ACTIV” and “HV N MAIN RLY ACTIV MONI” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

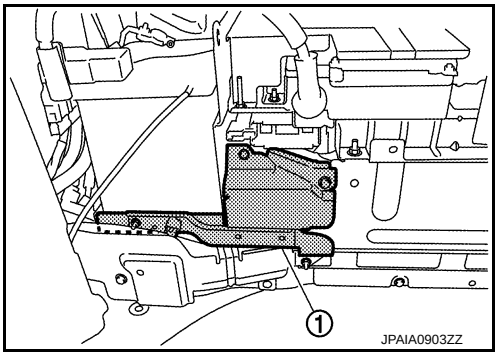
3.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

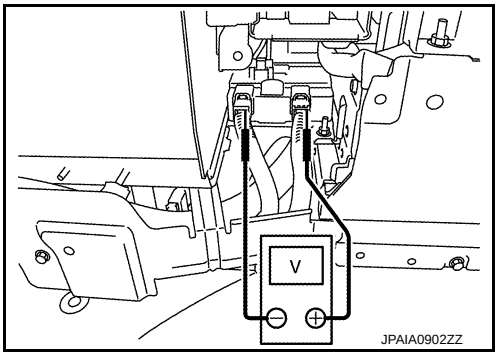
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 4.

4. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-1

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	15	B160	23	Existed

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

Is the inspection result normal?

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

5. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	23	24	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 8.

6. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-1

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

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B160	24	Ground	Existed

Is the inspection result normal?

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

7.CHECK SYSTEM MAIN RELAY 2

1. Disconnect battery junction box harness connector.
2. Check system main relay 2. Refer to HBC-187, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

8.CHECK SYSTEM MAIN RELAY 2 CIRCUIT-3

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

+		–		Continuity
Li-ion battery		Battery junction box		
Connector	Terminal	Connector	Terminal	
LB39	23	LB33	7	Existed

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

Is the inspection result normal?

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

9.CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10.CHECK SYSTEM MAIN RELAY 2

Check system main relay 2. Refer to HBC-187, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (System Main Relay 2)

INFOID:0000000008144484

1.CHECK SYSTEM MAIN RELAY 2-1

1. Disconnect battery junction box harness connector.

2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
7	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2.CHECK SYSTEM MAIN RELAY 2-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
22	30	12 V direct current supply between terminals 7 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

P0AE1 HYBRID BATTERY PRE-CHARGE CONTACTOR

DTC Logic

INFOID:0000000008144485

DTC DETECTION LOGIC

NOTE:

- If DTC P0AE1 is displayed with DTC P0ADC or P0AE0, perform the trouble diagnosis for DTC P0ADC or P0AE0. Refer to HBC-179, "DTC Logic" or HBC-184, "DTC Logic".
- If DTC P0AE1 is displayed with DTC P0AE6 or P0AE7, perform the trouble diagnosis for DTC P0AE6 or P0AE7. Refer to HBC-195, "DTC Logic" or HBC-200, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AE1	HYBRID BATT PRECHARGE CONTACTOR (Pre-charge relay is shorted)	Pre-charge signal detects the state from 6.2 to 7.8V for 3 seconds when the vehicle is READY.	• Harness or connectors (DC/DC converter circuit is shorted.) • DC/DC converter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that Li-ion battery voltage is 200 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-189, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144486

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” and “HV PRE CHG RLY ACTIV VOLT” in DATA MONITOR mode of EV/HEV using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON
HV PRE CHG RLY ACTIV VOLT	Ignition switch: ON	More than 9.0 V
	Just after READY	1.3 - 4.7 V

⊗Without CONSULT
Check the voltage between HPCM harness connector and ground.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	3	Ground	Ignition switch: ON	More than 9.0 V
			Just after READY	1.3 - 4.7 V

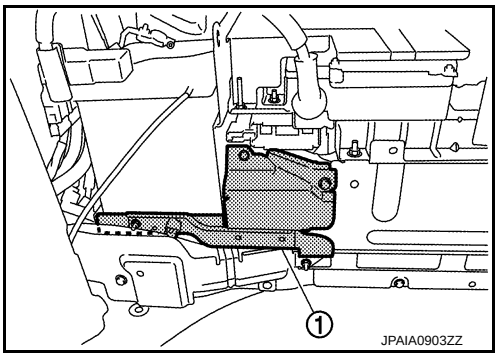
Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 2.

2.PRECONDITIONING

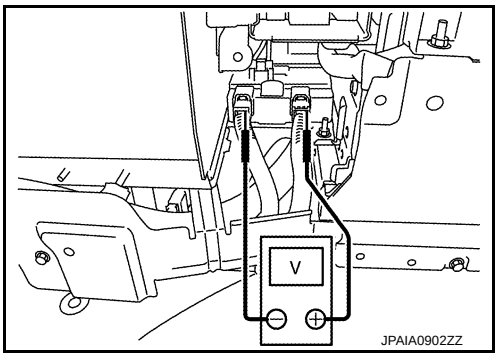
WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).



DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

3. Measure voltage between high voltage harness terminals.



Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 3.

3. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect Li-ion battery harness connector.
4. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	3	B160	9	Existed

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

Is the inspection result normal?

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

4. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

1. Disconnect DC/DC converter harness connector.
2. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	9	B460	4	Existed

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

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

P0AE2 HYBRID BATTERY PRE-CHARGE CONTACTOR

DTC Logic

INFOID:0000000008144487

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AE2	HYBRID BATT PRECHARGE CONTACTOR (Pre-charge relay is shorted)	The traction motor inverter voltage is more than 100 V for 0.1 second and the traction motor inverter voltage does not change for more than 0.05 second.	• Harness or connectors (DC/DC converter circuit is shorted.) • DC/DC converter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-192, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144488

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” and “HV PRE CHG RLY ACTIV VOLT” in DATA MONITOR mode of EV/HEV using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON
HV PRE CHG RLY ACTIV VOLT	Ignition switch: ON	More than 9.0 V
	Just after READY	1.3 - 4.7 V

Without CONSULT
Check the voltage between HPCM harness connector and ground.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	3	Ground	Ignition switch: ON	More than 9.0 V
			Just after READY	1.3 - 4.7 V

Is the inspection result normal?

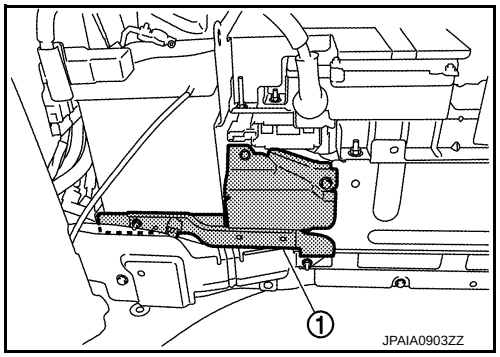
YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

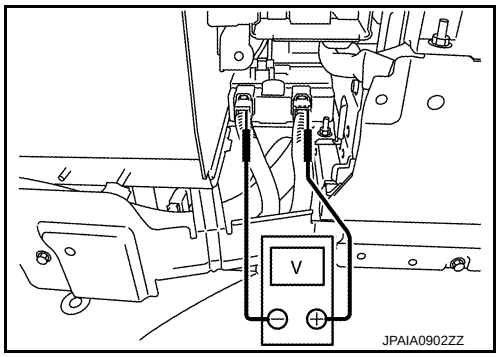


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 3.

3.CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.

3. Disconnect Li-ion battery harness connector.
4. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	3	B160	9	Existed

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

Is the inspection result normal?

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

4. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

1. Disconnect DC/DC converter harness connector.
2. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	9	B460	4	Existed

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

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

P0AE6 HYBRID BATTERY PRE-CHARGE CONTACTOR

DTC Logic

INFOID:0000000008144489

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AE6	HYBRID BATT PRECHARGE CONTACTOR (Pre-charge relay ground is shorted)	Pre-charge signal detects the state less than 1.3V for 0.05 second when the vehicle is except the READY.	• Harness or connectors (DC/DC converter circuit is open or shorted.) • DC/DC converter • HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-192, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144490

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” and “HV PRE CHG RLY ACTIV VOLT” in DATA MONITOR mode of EV/HEV using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON
HV PRE CHG RLY ACTIV VOLT	Ignition switch: ON	More than 9.0 V
	Just after READY	1.3 - 4.7 V

⊗Without CONSULT
Check the voltage between HPCM harness connector and ground.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	3	Ground	Ignition switch: ON	More than 9.0 V
			Just after READY	1.3 - 4.7 V

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK FUSE

Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
Fuse and fusible link block No.3	#73	10 A

Is the fuse fusing?

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

3.CHECK DC/DC CONVERTER POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B160	8	Ground	Battery voltage

Is the inspection result normal?

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

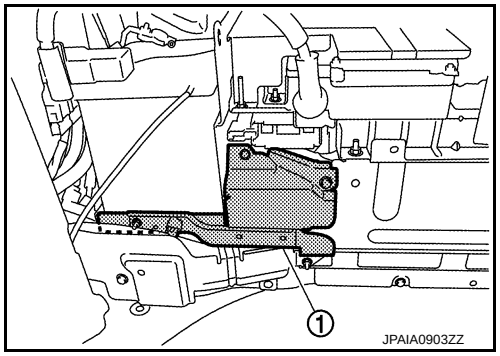
4.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

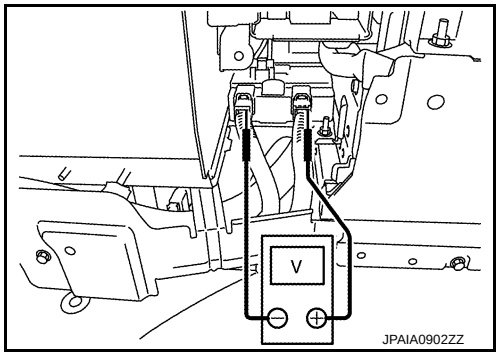
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 5.

5. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between Li-ion battery harness connector and fuse and fusible link block No.3 harness connector.

+		–		Continuity
Li-ion battery		Fuse and fusible link block No.3		
Connector	Terminal	Connector	Fuse No.	
B160	8	B165	#73	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

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

6. PRECONDITIONING

WARNING:

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

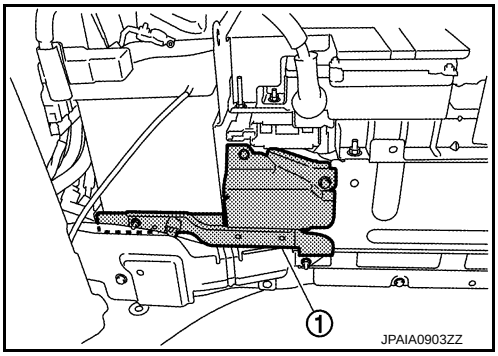
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

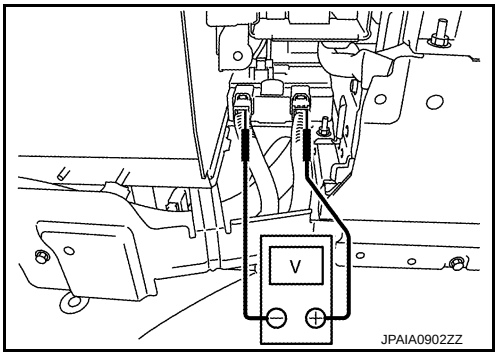
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 7.

7. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Disconnect DC/DC converter harness connector.
4. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	8	B460	1	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

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

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	3	B160	9	Existed

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

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

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	9	B460	4	Existed

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10. CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
B158	20	Ground	Existed
	39		
	40		

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

P0AE7 HYBRID BATTERY PRE-CHARGE CONTACTOR

DTC Logic

INFOID:0000000008144491

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AE7	HYBRID BATT PRECHARGE CONTACTOR (Pre-charge relay power supply is shorted)	When HPCM detects DC/DC converter activate signal is more than 12 V for 0.05 second.	• Harness or connectors (DC/DC converter circuit is shorted.) • DC/DC converter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-192, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144492

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” and “HV PRE CHG RLY ACTIV VOLT” in DATA MONITOR mode of EV/HEV using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON
HV PRE CHG RLY ACTIV VOLT	Ignition switch: ON	More than 9.0 V
	Just after READY	1.3 - 4.7 V

Without CONSULT
Check the voltage between HPCM harness connector and ground.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	3	Ground	Ignition switch: ON	More than 9.0 V
			Just after READY	1.3 - 4.7 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 6.

2.CHECK DC/DC CONVERTER ACTIVATE SIGNAL

With CONSULT
1. Select “DC/DC CONV SIG VOLT” in DATA MONITOR mode of EV/HEV using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
DC/DC CONV SIG VOLT	Ignition switch: ON	0 - 1.3 V
	READY	4.5 - 7.8 V

Without CONSULT
Check the voltage between HPCM harness connector and ground.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	21	Ground	Ignition switch: ON	0 - 1.3 V
			READY	4.5 - 7.8 V

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

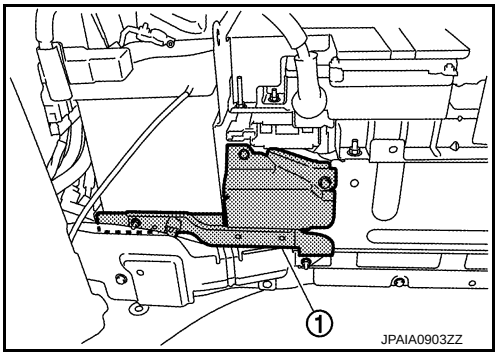
3.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

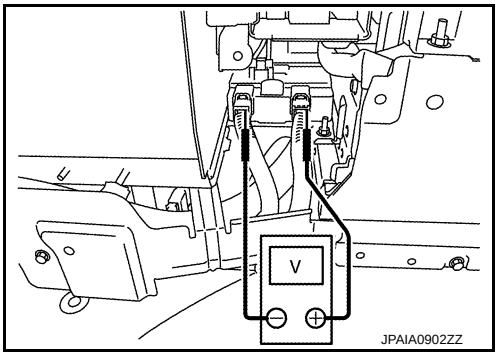
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 4.

4. CHECK DC/DC CONVERTER ACTIVATE SIGNAL-1

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect Li-ion battery harness connector.
4. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	24	B160	21	Existed

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

Is the inspection result normal?

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

5. CHECK DC/DC CONVERTER ACTIVATE SIGNAL-2

1. Disconnect DC/DC converter harness connector.
2. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	21	B460	2	Existed

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

Is the inspection result normal?

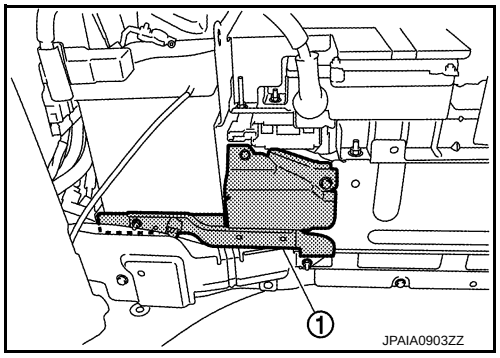
YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

6. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

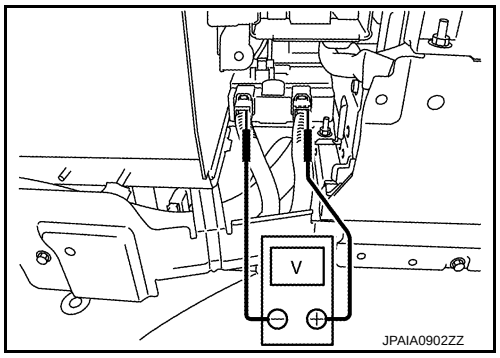


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 7.

7. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	3	B160	9	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT-2

1. Disconnect DC/DC converter harness connector.
2. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	9	B460	4	Existed

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

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".

NO >> Repair or replace error-detected parts.

P0B35, P0B37 SDSW

DTC Logic

INFOID:0000000008144493

DTC DETECTION LOGIC

NOTE:
If DTC P0B35 or P0B37 is displayed with DTC P0A1D, perform the trouble diagnosis for DTC P0A1D. Refer to HBC-137, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0B35	SDSW (Service plug open)	When HPCM detects the state of service plug OFF for 3 seconds while driving at the vehicle speed 5 km/h (3.1 MPH) or more.	• Harness or connectors (Service plug circuit is open or shorted.) • Service plug
P0B37	SDSW (Service plug operation)	When HPCM detects the state of service plug OFF for 0.04 second at the vehicle speed 5 km/h (3.1 MPH) or less.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

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

Is DTC detected?

YES >> Proceed to HBC-205, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Set the vehicle to READY.
2. Drive the vehicle at more than 5 km/h (3.1 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-205, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144494

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**

• **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK SERVICE PLUG INSTALLATION

Check whether service plug is installed normally.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair service plug installation.

2.CHECK SERVICE PLUG SIGNAL-1

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

HPCM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
B159	49	B158	20	Battery voltage

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK SERVICE PLUG SIGNAL-2

Check the voltage between HPCM harness connector and ground.

+		–	Voltage
HPCM			
Connector	Terminal		
B159	49	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 4.

4.PRECONDITIONING

WARNING:

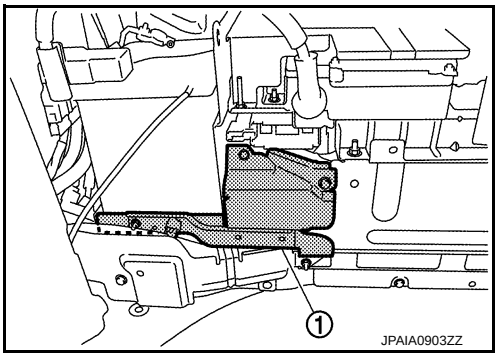
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

Check voltage in high voltage circuit. (Check that condenser are discharged.)

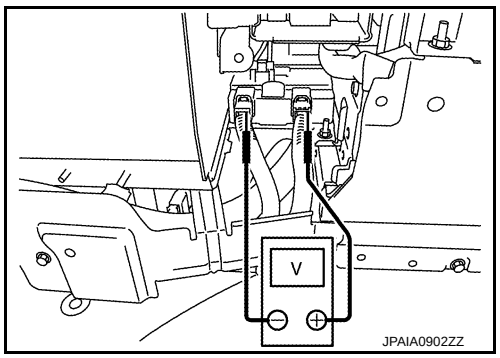
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.



Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 5.

5. CHECK SERVICE PLUG SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B159	49	B160	22	Existed

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

Is the inspection result normal?

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

6. CHECK FUSE

Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
Fuse and fusible link block No. 3	#73	10 A

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 7.

7. CHECK SERVICE PLUG POWER SUPPLY CIRCUIT

1. Check the continuity between Li-ion battery harness connector and fuse and fusible link block No. 3 harness connector.

+		–		Continuity
Li-ion battery		Fuse and fusible link block No. 3		
Connector	Terminal	Connector	Fuse No.	
B160	8	B165	#73	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

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

8. CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
B158	2	Ground	Existed
	14		Continuity
	24		

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P1572 BRAKE SWITCH

DTC Logic

INFOID:0000000008144495

DTC DETECTION LOGIC

NOTE:
If DTC P1572 is displayed with DTC P0A1D, P31F7, P31FB, P31F8, P31FC or P31FD, perform the trouble diagnosis for DTC P0A1D, P31F7, P31FB, P31F8, P31FC or P31FD. Refer to HBC-71, "DTC Index" .

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1572	ASCD BRAKE SWITCH (Brake switch malfunction)	Brake switch signal is not sent to HPCM for extremely long time while the vehicle is being driven.	Without ICC models • Harness or connectors (Brake switch circuit is shorted.) • Brake switch • Brake switch installation With ICC models • Harness or connectors (Brake switch circuit is shorted.) • Brake switch • Brake switch installation • Stop lamp OFF relay 1 • Stop lamp OFF relay 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to HBC-209, "Component Function Check".

NOTE:
Use component function check to check the overall function of the brake switch circuit. During this check, a DTC might not to be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-210, "Diagnosis Procedure".

Component Function Check

INFOID:0000000008144496

1.PERFORM COMPONENT FUNCTION CHECK

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage HPCM harness connector terminals as per the following condition.

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
B159	59	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-210, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144497

1.INSPECTION START

Check which type the vehicle is equipped with.

Which type?

Without ICC models>>GO TO 2.
With ICC models>>GO TO 6.

2.CHECK BRAKE SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT

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

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
B159	59	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake switch harness connector and ground.

+		–	Voltage
Brake switch			
Connector	Terminal		
E109	1	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK BRAKE SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Brake switch		HPCM		
Connector	Terminal	Connector	Terminal	
E109	2	B159	59	Existed

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

Is the inspection result normal?

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

5. CHECK BRAKE SWITCH

Check brake switch. Refer to HBC-213, "Component Inspection (Brake Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace brake switch. Refer to BR-280, "Removal and Installation".

6. CHECK DTC WITH ELECTRICALLY-DRIVEN INTELLIGENT BRAKE UNIT

Check DTC with electrically-driven intelligent brake unit. Refer to BR-30, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to BR-38, "DTC Index".

7. CHECK BRAKE SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT

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

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
B159	59	Ground	Brake pedal	Slightly de-pressed	0 V
				Fully re-leased	Battery voltage

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 8.

8.CHECK BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake switch harness connector and ground.

+		–	Voltage
Brake switch			
Connector	Terminal		
E114	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> Perform the trouble diagnosis for power supply circuit.

9.CHECK STOP LAMP OFF RELAY 1

Check stop lamp OFF relay 1. Refer to HBC-213, "Component Inspection (Stop Lamp OFF Relay 1)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace stop lamp OFF relay 1.

10.CHECK STOP LAMP OFF RELAY 2

Check stop lamp OFF relay 2. Refer to HBC-214, "Component Inspection (Stop Lamp OFF Relay 2)".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace stop lamp OFF relay 2.

11.CHECK BRAKE SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Brake switch		HPCM		
Connector	Terminal	Connector	Terminal	
E114	2	B159	59	Existed

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

Is the inspection result normal?

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

12.CHECK BRAKE SWITCH

Check brake switch. Refer to HBC-213, "Component Inspection (Brake Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace brake switch. Refer to BR-280, "Removal and Installation".

Component Inspection (Brake Switch)

INFOID:0000000008144498

1.CHECK BRAKE SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect brake switch harness connector.
3. Check the continuity between brake switch terminals as per the following condition.

Brake switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Existed
			Fully released	Not existed

Is the inspection result normal?

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

2.CHECK BRAKE SWITCH-2

1. Adjust brake switch installation. Refer to BR-281, "Inspection and Adjustment".
2. Check the continuity between brake switch terminals as per the following condition.

Brake switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Existed
			Fully released	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake switch. Refer to BR-280, "Removal and Installation".

Component Inspection (Stop Lamp OFF Relay 1)

INFOID:0000000008144499

1.CHECK STOP LAMP OFF RELAY 1

1. Turn ignition switch OFF.
2. Remove stop lamp OFF relay 1.
3. Check the continuity between stop lamp OFF relay 1 terminals as per the following condition.

Stop lamp OFF relay 1		Condition	Continuity
+	–		
Terminal			
3	4	12 V direct current supply between terminals 1 and 2	Not existed
		No current supply	Existed
	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp OFF relay 1.

Component Inspection (Stop Lamp OFF Relay 2)

INFOID:0000000008144500

1.CHECK STOP LAMP OFF RELAY 2

1. Turn ignition switch OFF.
2. Remove stop lamp OFF relay 2.
3. Check the continuity between stop lamp OFF relay 2 terminals as per the following condition.

Stop lamp OFF relay 2		Condition	Continuity
+	–		
Terminal			
5	3	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp OFF relay 2.

P175A TRANSMISSION SYSTEM

DTC Logic

INFOID:0000000008144501

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P175A	TRANSMISSION SYSTEM (Clutch 1 solenoid valve)	When HPCM detects self-diagnosis signal from TCM.	TCM-detected DTC Refer to TM-82, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TCM

Check the DTC which detected with TCM. Refer to TM-82, "Index of HPCM-detected DTC".

>> Proceed to HBC-215, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144502

Check the DTC which detected with TCM. Refer to TM-80, "DTC Index".

P1805 BRAKE SWITCH

DTC Logic

INFOID:0000000008144503

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1805	BRAKE SWITCH (Stop lamp switch malfunction)	Stop lamp switch signal is not sent to HPCM for extremely long time while the vehicle is being driven.	Without ICC models • Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch With ICC models • Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch • Stop lamp OFF relay 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to HBC-216, "Component Function Check".

NOTE:

Use component function check to check the overall function of the stop lamp switch circuit. During this check, a DTC might not to be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-217, "Diagnosis Procedure" .

Component Function Check

INFOID:0000000008144504

1.PERFORM COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. Select “STOP LAMP SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
STOP LAMP SW	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT

1. Turn ignition switch OFF.
2. Check for stop lamp illumination as per the following condition.

Brake pedal	Stop lamp
Slightly depressed	Illuminated
Fully released	Not illuminated

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-217, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144505

1.INSPECTION START

Check which type the vehicle is equipped with.

Which type?

Without ICC models>>GO TO 2.
With ICC models>>GO TO 6.

2.CHECK STOP LAMP SWITCH OPERATION

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK STOP LAMP SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between stop lamp switch harness connector and HPCM harness connector.

+		–		Continuity
Stop lamp switch		HPCM		
Connector	Terminal	Connector	Terminal	
E110	2	B159	46	Existed

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

Is the inspection result normal?

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

5.CHECK STOP LAMP SWITCH

Refer to HBC-219, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".

NO >> Replace stop lamp switch. Refer to BR-280, "Exploded View".

6.CHECK STOP LAMP SWITCH OPERATION

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 7.

7.CHECK DTC WITH ELECTRICALLY-DRIVEN INTELLIGENT BRAKE UNIT

Perform self-diagnosis of electrically-driven intelligent brake unit. Refer to BR-30, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to BR-38, "DTC Index".

8.CHECK STOP LAMP OFF RELAY 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check the voltage between stop lamp OFF relay 1 harness connector and ground.

+		–	Voltage
Stop lamp OFF relay 1			
Connector	Terminal		
B246	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> Perform trouble diagnosis for power supply circuit.

9.CHECK STOP LAMP SWITCH POWER SUPPLY

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 10.

10.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.
2. Disconnect stop lamp OFF relay 1 harness connector.
3. Check the continuity between stop lamp switch harness connector and stop lamp OFF relay 1 harness connector.

+		–		Continuity
Stop lamp OFF relay 1		Stop lamp switch		
Connector	Terminal	Connector	Terminal	
B46	4	E110	1	Existed

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

Is the inspection result normal?

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

11. CHECK STOP LAMP OFF RELAY 1

Refer to HBC-220, "Component Inspection (Stop Lamp OFF Relay 1)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace stop lamp OFF relay 1.

12. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between stop lamp switch harness connector and HPCM harness connector.

+		–		Continuity
Stop lamp switch		HPCM		
Connector	Terminal	Connector	Terminal	
E110	2	B159	46	Existed

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or replace error-detected parts.

13. CHECK STOP LAMP SWITCH

Refer to HBC-219, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-280, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000008144506

1. CHECK STOP LAMP SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

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

2. CHECK STOP LAMP SWITCH-2

1. Adjust stop lamp switch installation. (Refer to BR-281, "Inspection and Adjustment".)

2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-280, "Exploded View".

Component Inspection (Stop Lamp OFF Relay 1)

INFOID:0000000008144507

1. CHECK STOP LAMP OFF RELAY 1

1. Turn ignition switch OFF.
2. Remove stop lamp OFF relay 1.
3. Check the continuity between stop lamp OFF relay 1 terminals as per the following condition.

Stop lamp OFF relay 1		Condition	Continuity
+	–		
Terminal			
3	4	12 V direct current supply between terminals 1 and 2	Not existed
		No current supply	Existed
	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp OFF relay 1.

P2122, P2123 APP SENSOR

DTC Logic

INFOID:0000000008144508

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157. Refer to HBC-294, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2122	APP SENSOR D (Accelerator pedal position sensor 1 circuit low input)	An excessively low voltage from the APP sensor 1 is sent to HPCM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	APP SENSOR D (Accelerator pedal position sensor 1 circuit high input)	An excessively high voltage from the APP sensor 1 is sent to HPCM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 2.

2.DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-221, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144509

1.CHECK APP SENSOR 1 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector terminals.

Without ICC

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M9	5	4	5 V

With ICC

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M153	6	5	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY-2

Check the voltage between APP sensor harness connector and ground.

Without ICC

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
M9	5	Ground	5 V

With ICC

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
M153	6	Ground	5 V

Is the inspection result normal?

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

3.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M9	5	B158	10	Existed

With ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M153	6	B158	10	Existed

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

Is the inspection result normal?

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

4.CHECK APP SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M9	4	B158	21	Existed

With ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M153	5	B158	21	Existed

Is the inspection result normal?

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

5.CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
B158	20	Ground	Existed
	39		
	40		

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.CHECK APP SENSOR 1 SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M9	3	B158	1	Existed

With ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M153	4	B158	1	Existed

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

Is the inspection result normal?

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

7.CHECK APP SENSOR 1

Refer to HBC-223, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace accelerator pedal. Refer to ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (without distance control assist system) or ACC-4, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (with distance control assist system).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000008144510

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

With CONSULT

1. Select “ACCEL SENSOR 1 VOLTAGE”, “APP SENSOR 1”“ACCEL SENSOR 2 VOLTAGE” and “APP SENSOR 2” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

APP sensor1

Monitor item	Conditions		Indication
ACCEL SENSOR 1 VOLTAGE	Accelerator pedal	Fully released	0.45 - 1.0 V
		Fully depressed	4.4 - 4.8 V
APP SENSOR 1	Accelerator pedal	Fully released	9 - 20 %
		Fully depressed	88 - 97 %

APP sensor 2

Monitor item	Conditions		Indication
ACCEL SENSOR 2 VOLTAGE	Accelerator pedal	Fully released	0.22 - 0.48 V
		Fully depressed	2.1 - 2.4 V
APP SENSOR 2	Accelerator pedal	Fully released	8.8 - 19.2 %
		Fully depressed	84 - 96 %

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal. Refer to ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (without distance control assist system) or ACC-4, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (with distance control assist system).

P2127, P2128 APP SENSOR

DTC Logic

INFOID:0000000008144511

DTC DETECTION LOGIC

NOTE:
If DTC P2127 or P2128 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157. Refer to HBC-294, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2127	APP SENSOR E (Accelerator pedal position sensor 2 circuit low input)	An excessively low voltage from the APP sensor 2 is sent to HPCM.	• Harness or connectors (Accelerator pedal position sensor 2 circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2)
P2128	APP SENSOR E (Accelerator pedal position sensor 2 circuit high input)	An excessively high voltage from the APP sensor 2 is sent to HPCM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 2.

2.DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-225, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144512

1.CHECK APP SENSOR 2 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector terminals.

Without ICC

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M9	6	2	5 V

With ICC

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M153	3	2	5 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 2.

2.CHECK APP SENSOR 2 POWER SUPPLY-2

Check the voltage between APP sensor harness connector and ground.

Without ICC

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
M9	6	Ground	5 V

With ICC

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
M153	3	Ground	5 V

Is the inspection result normal?

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

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M9	6	B158	31	Existed

With ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M153	3	B158	31	Existed

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

Is the inspection result normal?

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

4.CHECK APP SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M9	2	B158	27	Existed

With ICC

+		–		
APP sensor		HPCM		Continuity
Connector	Terminal	Connector	Terminal	
M153	2	B158	27	Existed

Is the inspection result normal?

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

5.CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
B158	20	Ground	Existed
	39		
	40		

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.CHECK APP SENSOR 2 SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+		–		
APP sensor		HPCM		Continuity
Connector	Terminal	Connector	Terminal	
M9	1	B158	28	Existed

With ICC

+		–		
APP sensor		HPCM		Continuity
Connector	Terminal	Connector	Terminal	
M153	1	B158	28	Existed

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

Is the inspection result normal?

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

7.CHECK APP SENSOR 2

Refer to HBC-223, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace accelerator pedal. Refer to ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (without distance control assist system) or ACC-4, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (with distance control assist system).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000008144513

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

With CONSULT

1. Select “ACCEL SENSOR 1 VOLTAGE”, “APP SENSOR 1”“ACCEL SENSOR 2 VOLTAGE” and “APP SENSOR 2” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

APP sensor1

Monitor item	Conditions		Indication
ACCEL SENSOR 1 VOLTAGE	Accelerator pedal	Fully released	0.45 - 1.0 V
		Fully depressed	4.4 - 4.8 V
APP SENSOR 1	Accelerator pedal	Fully released	9 - 20 %
		Fully depressed	88 - 97 %

APP sensor 2

Monitor item	Conditions		Indication
ACCEL SENSOR 2 VOLTAGE	Accelerator pedal	Fully released	0.22 - 0.48 V
		Fully depressed	2.1 - 2.4 V
APP SENSOR 2	Accelerator pedal	Fully released	8.8 - 19.2 %
		Fully depressed	84 - 96 %

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal. Refer to ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (without distance control assist system) or ACC-4, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (with distance control assist system).

P2138 APP SENSOR

DTC Logic

INFOID:0000000008144514

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P3157, first perform the trouble diagnosis for DTC P3157. Refer to HBC-294, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2138	APP SENSOR (Accelerator pedal position sensor circuit range/performance)	Rationally incorrect voltage is sent to HPCM compared with the signals from APP sensor 1and APP sensor 2.	• Harness or connectors (APP sensor 1 or 2 circuit is open or shorted.) • Accelerator pedal position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 8 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Depressed accelerator pedal and maintain it more than 2 seconds.
3. Released accelerator pedal.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-229, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144515

1.CHECK APP SENSOR 1 AND 2 POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector terminals.

Without ICC

APP sensor				Voltage (Approx.)
Connector		+	–	
		Terminal		
Sensor 1	M9	5	4	5 V
Sensor 2		6	2	

With ICC

APP sensor				Voltage (Approx.)
Connector		+	–	
		Terminal		
Sensor 1	M153	6	5	5 V
Sensor 2		3	2	

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK APP SENSOR 1 AND 2 POWER SUPPLY-2

Check the voltage between APP sensor harness connector and ground.

Without ICC

+			–	Voltage (Approx.)
APP sensor				
Connector		Terminal		
Sensor 1	M9	5	Ground	5 V
Sensor 2		6		

With ICC

+			–	Voltage (Approx.)
APP sensor				
Connector		Terminal		
Sensor 1	M153	6	Ground	5 V
Sensor 2		3		

Is the inspection result normal?

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

3.CHECK APP SENSOR 1 AND 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+			–		Continuity
APP sensor			HPCM		
Connector		Terminal	Connector	Terminal	
Sensor 1	M9	5	B158	10	Existed
Sensor 2		6		31	

With ICC

+			–		Continuity
APP sensor			HPCM		
Connector		Terminal	Connector	Terminal	
Sensor 1	M153	6	B158	10	Existed
Sensor 2		3		31	

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

Is the inspection result normal?

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

4.CHECK APP SENSOR 1 AND 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+			–		Continuity
APP sensor			HPCM		
Connector		Terminal	Connector	Terminal	
Sensor 1	M9	4	B158	21	Existed
Sensor 2		2		27	

With ICC

+			–		Continuity
APP sensor			HPCM		
Connector		Terminal	Connector	Terminal	
Sensor 1	M153	5	B158	21	Existed
Sensor 2		2		27	

Is the inspection result normal?

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

5. CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
B158	20	Ground	Existed
	39		
	40		

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6. CHECK APP SENSOR 1 AND 2 SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+			–		Continuity
APP sensor			HPCM		
Connector		Terminal	Connector	Terminal	
Sensor 1	M9	3	B158	1	Existed
Sensor 2		1		28	

With ICC

+			–		Continuity
APP sensor			HPCM		
Connector		Terminal	Connector	Terminal	
Sensor 1	M153	4	B158	1	Existed
Sensor 2		1		28	

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

Is the inspection result normal?

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

7.CHECK APP SENSOR

Refer to HBC-223, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace accelerator pedal. Refer to ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (without distance control assist system) or ACC-4, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (with distance control assist system).

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000008144516

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

With CONSULT

1. Select “ACCEL SENSOR 1 VOLTAGE”, “APP SENSOR 1”“ACCEL SENSOR 2 VOLTAGE” and “APP SENSOR 2” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

APP sensor1

Monitor item	Conditions		Indication
ACCEL SENSOR 1 VOLTAGE	Accelerator pedal	Fully released	0.45 - 1.0 V
		Fully depressed	4.4 - 4.8 V
APP SENSOR 1	Accelerator pedal	Fully released	9 - 20 %
		Fully depressed	88 - 97 %

APP sensor 2

Monitor item	Conditions		Indication
ACCEL SENSOR 2 VOLTAGE	Accelerator pedal	Fully released	0.22 - 0.48 V
		Fully depressed	2.1 - 2.4 V
APP SENSOR 2	Accelerator pedal	Fully released	8.8 - 19.2 %
		Fully depressed	84 - 96 %

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-3, "MODELS WITHOUT DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (without distance control assist system) or ACC-4, "MODELS WITH DISTANCE CONTROL ASSIST SYSTEM : Removal and Installation" (with distance control assist system).

P2519 A/C REQUEST

DTC Logic

INFOID:0000000008144517

DTC DETECTION LOGIC

NOTE:

- If DTC P2519 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-294, "DTC Logic".
- If DTC P2519 is displayed with DTC P31A9, first perform the trouble diagnosis for DTC P31A9. Refer to HBC-294, "DTC Logic".

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2519	A/C REQUEST A (DC/DC converter cooling request signal circuit)	When Li-ion battery controller detects malfunction of DC/DC converter cooling request signal circuit.	• Harness or connectors (DC/DC converter circuit is shorted.) • DC/DC converter • Li-ion battery controller • HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-233, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144518

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Perform self-diagnosis of Li-ion battery controller. Refer to HBB-32, "CONSULT Function".

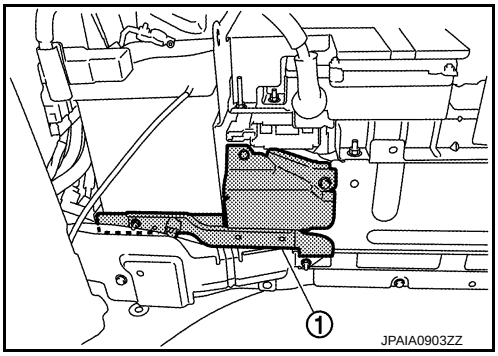
Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated. Refer to HBB-39, "DTC Index".

2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

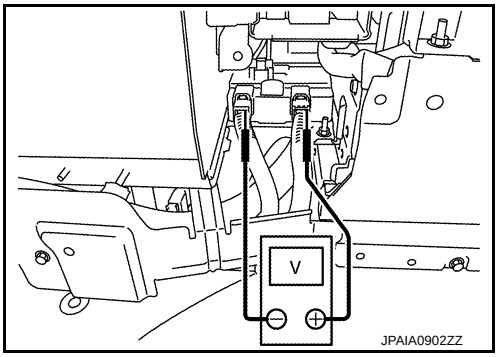
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).



DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

3. Measure voltage between high voltage harness terminals.



Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 3.

3.CHECK FUSE

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

Location	Fuse No.	Capacity
Fuse and fusible link block No. 3	#73	10 A

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 4.

4.CHECK DC/DC CONVERTER POWER SUPPLY

1. Disconnect Li-ion battery harness connector.
2. Turn ignition switch ON.
3. Check the voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B160	8	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Check the continuity between Li-ion battery harness connector and fuse and fusible link block No. 3.

+		–		Continuity
Li-ion battery		Fuse and fusible link block No. 3		
Connector	Terminal	Connector	Fuse No.	
B160	8	B165	#73	Existed

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

Is the inspection result normal?

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

6. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect DC/DC converter harness connector.
3. Check the continuity between Li-ion battery controller harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	8	B460	1	Existed

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

Is the inspection result normal?

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

7. CHECK DC/DC CONVERTER COOLING REQUEST SIGNAL CIRCUIT

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

+		–		Continuity
Li-ion battery controller		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB1	20	B460	5	Existed

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

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P2857, P2859 CLUTCH 1

DTC Logic

INFOID:0000000008144519

DTC DETECTION LOGIC

NOTE:
If DTC P2857 or P2859 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-294, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2857	CLUTCH A (Clutch 1 disengage and stuck)	When HPCM detects the state of 500 rpm or more in difference between traction motor speed and the engine speed for 1.1 seconds when the clutch 1 is engaged.	• Harness or connectors (Clutch 1 stroke sensor circuit is open or shorted.) • Clutch 1 stroke sensor • CSC (Concentric slave cylinder) • Clutch 1 • Crankshaft position sensor (POS) • Sub electric oil pump • TCM • Traction motor resolver
P2859	CLUTCH A (Clutch 1 engage and stuck)	When HPCM detects the state of less than 500 rpm in difference between traction motor speed and the engine speed for 3 seconds when clutch 1 is disengaged.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

Set the vehicle to READY with engine cool condition.

Does the engine start?

YES >> GO TO 3.
NO >> Proceed to HBC-236, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE-2

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

Is DTC detected?

YES >> Proceed to HBC-236, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144520

1.CHECK DTC WITH ECM

Perform self-diagnosis of ECM. Refer to EC-53, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated. Refer to EC-81, "DTC Index".

2.CHECK DTC WITH TCM

Perform self-diagnosis of TCM. Refer to TM-64, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated. Refer to TM-80, "DTC Index".

3. CHECK DTC WITH TRACTION MOTOR INVERTER

Perform self-diagnosis of traction motor inverter. Refer to TMS-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble shooting relevant to DTC indicated. Refer to TMS-31, "DTC Index".

4. CHECK CLUTCH 1 STROKE SENSOR FUNCTION

With CONSULT

1. Select “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Set the vehicle to READY and engine stop state.
3. Check that the “CLUTCH 1 STROKE SENSOR” indication voltage as per the following condition.

Monitor item	Condition		Indication
CLUTCH 1 STROKE SENSOR	Clutch 1	Engaged (P position)	Approx. less than 2.7 V
		Released (N position)	Above more than +0.8 V

Without CONSULT

1. Set the vehicle to READY and engine stop state.
2. Check the voltage between HPCM terminals as per the following condition.

HPCM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
B158	22	21	Clutch 1	Engaged (P position)	Less than 2.7 V
				Released (N position)	Above more than +0.8 V

Is the inspection result normal?

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

5. CHECK HPCM GROUND

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

+		–	Continuity
HPCM			
Connector	Terminal		
B158	20	Ground	Existed
	39		
	40		

Is the inspection result normal?

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

6. CHECK CLUTCH 1 STROKE SENSOR SIGNAL CIRCUIT

1. Disconnect traction motor connector.
2. Check the continuity between HPCM harness connector and traction motor harness connector.

+		–		Continuity
HPCM		Traction motor		
Connector	Terminal	Connector	Terminal	
B158	11	F77	10	Existed

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

Is the inspection result normal?

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

7.CHECK CLUTCH 1 STROKE SENSOR GROUND CIRCUIT

Check the continuity between HPCM harness connector and traction motor harness connector.

+		–		Continuity
HPCM		Traction motor		
Connector	Terminal	Connector	Terminal	
B158	2	F77	11	Existed

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK CLUTCH 1 DISC

Check clutch 1 disc thickness. Refer to CL-8, "Inspection".

Is the inspection result normal?

YES >> Replace transmission assembly. Refer to TM-190, "Removal and Installation".
NO >> Replace clutch disc and cover. Refer to CL-7, "Removal and Installation".

P3103 DC/DC CONVERTER COOLING SYSTEM

DTC Logic

INFOID:0000000008144521

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3103	DC/DC CONVERTER COOLING SYS (DC/DC converter cooling system performance)	When HPCM detects the state of less than 11V in the DC/DC converter output voltage for 2 seconds or more after the DC/DC converter becomes an output limit for 2 seconds or more.	• Duct • Battery cooling fan

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Refer to HBC-239, "Component Function Check".

NOTE:

Use component function check to check the overall function of the battery cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-239, "Diagnosis Procedure".

Component Function Check

INFOID:0000000008144522

1.PERFORM COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch ON.
2. Select “ACTIVE TEST” mode of “HV BATTERY” using CONSULT.
3. Perform “HV BATTERY COOLING FAN”, and check that the battery cooling fan operation.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-239, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144523

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK INTAKE GRILLE OF REAR PARCEL SHELF FINISHER

Check whether there is blocking in the intake grille of rear parcel shelf finisher. Refer to INT-40, "Exploded View".

Is there blocking in the intake grill?

YES >> Remove foreign matter.
NO >> GO TO 2.

2.CHECK INTAKE DUCT

Check whether there is blocking the foreign matter in the intake ducts and state of the installation of all the intake ducts. Refer to HBB-186, "Exploded View".

Is the installation normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY COOLING FAN POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect battery cooling fan harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery cooling fan harness connector terminals as follows.

Battery cooling fan			Voltage
Connector	+	–	
	Terminal		
B249	6	2	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 4.

4.CHECK BATTERY COOLING FAN POWER SUPPLY-2

Check the voltage between battery cooling fan harness connector and ground.

+		–	Voltage
Battery cooling fan			
Connector	Terminal		
B249	6	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 6.

5.CHECK BATTERY COOLING FAN GROUND CIRCUIT

Check the continuity between battery cooling fan harness connector and ground.

+		–	Continuity
Battery cooling fan			
Connector	Terminal		
B249	2	Ground	Existed

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.CHECK BATTERY COOLING FAN RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Remove battery cooling fan relay.
3. Turn ignition switch ON.
4. Check the continuity between battery cooling fan relay harness connector and ground.

+		–	Voltage
Battery cooling fan relay			
Connector	Terminal		
B161	1	Ground	Battery voltage
	5		

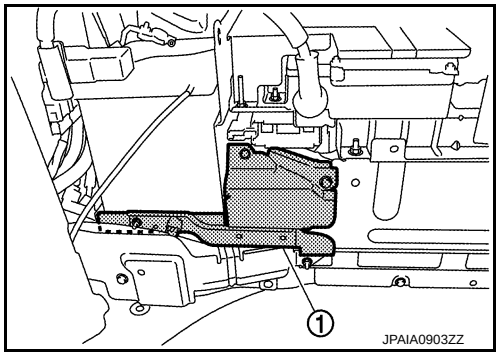
Is the inspection result normal?

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

7. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

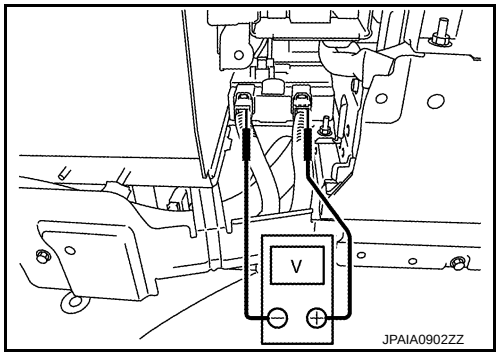
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).



DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less



DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 8.

8. CHECK BATTERY COOLING FAN RELAY CONTROL SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between Li-ion battery harness connector and battery cooling fan relay harness connector.

+		–		Continuity
Li-ion battery		Battery cooling fan relay		
Connector	Terminal	Connector	Terminal	
B160	17	B161	2	Existed

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

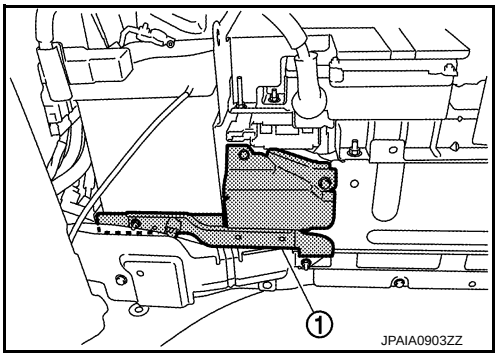
Is the inspection result normal?

YES >> Check battery cooling fan relay.
NO >> Repair or replace error-detected parts.

9. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

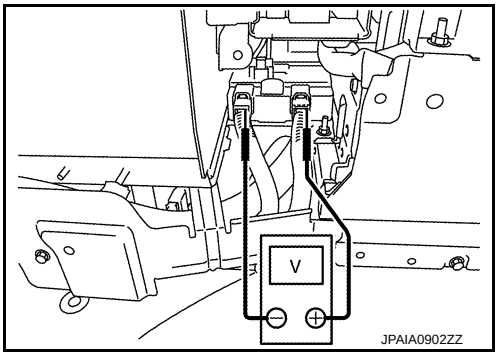
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).



DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

3. Measure voltage between high voltage harness terminals.



Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 10.

10. CHECK BATTERY COOLING FAN CONTROL SIGNAL CIRCUIT

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

+		–		Continuity
Li-ion battery		Battery cooling fan		
Connector	Terminal	Connector	Terminal	
B160	1	B249	5	Existed
	13		4	

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

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P3110 IGNITION RELAY

DTC Logic

INFOID:0000000008144524

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3110	IGN RELAY (Ignition circuit)	When HPCM detects self shut-OFF hold command of HPCM is turn OFF and IGN signal from IPDM E/R is turn OFF for 1 minute.	• Harness or connectors (Self shut-OFF relay circuit is shorted.) • Self shut-OFF relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 2 minutes.
3. Turn ignition switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-243, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144525

1.CHECK SELF SHUT-OFF RELAY OUTPUT SIGNAL CIRCUIT

Check the voltage between HPCM harness connector and ground as per the following conditions.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	16	Ground	Ignition switch: ON	More than battery voltage–2.0 V
			Ignition switch: OFF	Less than2.0 V
	17		Ignition switch: ON	More than 9.5 V
			Ignition switch: ON → OFF	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0 V.

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK SELF SHUT-OFF RELAY CIRCUIT-1

1. Disconnect 12 V battery negative cable terminal.
2. Remove fuse.
3. Check the continuity between fuse terminals.

+	–	Continuity
Fuse and fusible link block No. 3		
Fuse No.		
Y	70	Not existed

Refer to PG-14, "Wiring Diagram - BATTERY POWER SUPPLY -"

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK SELF SHUT-OFF RELAY CIRCUIT-2

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

+		–	Continuity
HPCM			
Connector	Terminal		
B158	16	Self shut-OFF relay	Existed

Refer to PG-14, "Wiring Diagram - BATTERY POWER SUPPLY -"

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

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P3112 STOP LAMP SWITCH

DTC Logic

INFOID:0000000008144526

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3112	STOP LAMP SWITCH (Stop lamp switch stuck ON)	Stop lamp switch is ON state for extremely long time.	Without ICC models • Harness or connectors (Stop lamp switch circuit is shorted.) • Stop lamp switch With ICC models • Harness or connectors (Stop lamp switch circuit is shorted.) • Stop lamp switch • ICC brake hold relay

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Refer to HBC-245, "Component Function Check".

NOTE:

Use component function check to check the overall function of the stop lamp switch circuit. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> Proceed to HBC-245, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000008144527

1.PERFORM COMPONENT FUNCTION CHECK

With CONSULT

1. Select “STOP LAMP SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
STOP LAMP SW	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT

1. Turn ignition switch OFF.
2. Check for stop lamp illumination as per the following condition.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-245, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144528

1.INSPECTION START

Check which type the vehicle is equipped with.

Which type?

Without ICC models>>GO TO 2.
With ICC models>>GO TO 6.

2.CHECK STOP LAMP SWITCH OPERATION

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK STOP LAMP SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between stop lamp switch harness connector and HPCM harness connector.

+		–		Continuity
Stop lamp switch		HPCM		
Connector	Terminal	Connector	Terminal	
E110	2	B159	46	Existed

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

Is the inspection result normal?

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

5.CHECK STOP LAMP SWITCH

Refer to HBC-219, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-280, "Exploded View".

6.CHECK STOP LAMP SWITCH OPERATION-1

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

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

7. CHECK STOP LAMP SWITCH OPERATION-2

1. Turn ignition switch ON.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 9.

8. CHECK STOP LAMP SWITCH INPUT SIGNAL

Check the voltage HPCM harness connector terminals and ground as per the following conditions.

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
B159	46	Ground	Brake pedal	Fully released	0 V
				Slightly depressed	Battery voltage

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 10.

9. CHECK ICC BRAKE HOLD RELAY

Check the voltage between ICC brake hold relay harness connector and ground.

+		–	Voltage (Approx.)
ICC brake hold relay			
Connector	Terminal		
B248	3	Ground	0 V

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Stop lamp switch		HPCM		
Connector	Terminal	Connector	Terminal	
E110	2	B159	46	Existed

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

Is the inspection result normal?

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

11. CHECK ICC BRAKE HOLD RELAY

Refer to HBC-249, "Component Inspection (Brake Hold Relay)".

Is the inspection result normal?

YES >> Check the harness between ICC brake hold relay and ADAS control unit. Refer to CCS-86, "Diagnosis Procedure".
NO >> Replace ICC brake hold relay.

12. CHECK STOP LAMP SWITCH

Refer to HBC-219, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-280, "Removal and Installation".

Component Inspection (Stop Lamp Switch)

INFOID:0000000008144529

1. CHECK STOP LAMP SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

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

2. CHECK STOP LAMP SWITCH-2

1. Adjust stop lamp switch installation. (Refer to BR-281, "Inspection and Adjustment".)
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

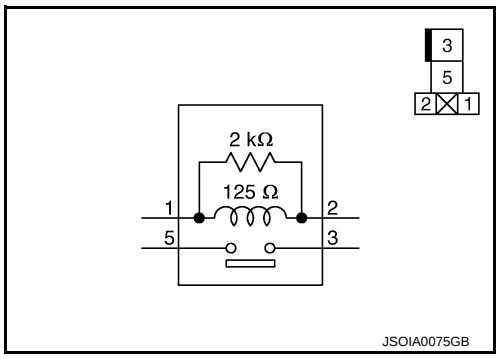
YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-280, "Exploded View".

Component Inspection (Brake Hold Relay)

INFOID:0000000008144530

1. CHECK ICC BRAKE HOLD RELAY

Check the continuity between ICC brake hold relay terminals as per the following conditions.



ICC brake hold relay		Condition	Continuity
+	–		
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ICC brake hold relay.

P3113, P3114 BRAKE SWITCH

DTC Logic

INFOID:0000000008144531

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3113	BRAKE SWITCH (Stop lamp switch signal)	When depressed brake pedal, stop lamp switch signal is OFF state for more than 5 seconds while the vehicle is driving.	Without ICC models • Harness or connectors (Stop lamp switch circuit is open.) (Brake switch circuit is open.) • Stop lamp switch • Brake switch With ICC models • Harness or connectors (Stop lamp switch circuit is open.) (Brake switch circuit is open.) • Stop lamp switch • Brake switch • Stop lamp OFF relay 1 • Stop lamp OFF relay 2
P3114	BRAKE SWITCH (Brake switch signal)	When depressed brake pedal, brake switch signal is ON state for more than 5 seconds while the vehicle is driving.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-250, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144532

1.INSPECTION START

Check which type the vehicle is equipped with.

Which type?

Without ICC models>>GO TO 2.
With ICC models>>GO TO 10.

2.CHECK BRAKE SWITCH OPERATION

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD brake SW	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT

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

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
B159	59	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

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

3. CHECK STOP LAMP SWITCH OPERATION

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 7.

4. CHECK BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake switch harness connector and ground.

+		–	Voltage
Brake switch			
Connector	Terminal		
E114	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform the trouble diagnosis for power supply circuit.

5. CHECK BRAKE SWITCH SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between brake switch harness connector and HPCM harness connector.

+		–		Continuity
Brake switch		HPCM		
Connector	Terminal	Connector	Terminal	
E114	2	B159	59	Existed

Is the inspection result normal?

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

6. CHECK BRAKE SWITCH

Refer to HBC-255, "Component Inspection (Brake Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace brake switch. Refer to BR-280, "Removal and Installation".

7. CHECK STOP LAMP SWITCH POWER SUPPLY

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for power supply circuit.

8. CHECK STOP LAMP SWITCH SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between stop lamp switch harness connector and HPCM harness connector.

+		–		Continuity
Stop lamp switch		HPCM		
Connector	Terminal	Connector	Terminal	
E110	2	B159	46	Existed

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

Is the inspection result normal?

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

9. CHECK STOP LAMP SWITCH

Refer to HBC-256, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-280, "Removal and Installation".

10. CHECK DTC WITH “ELECTRICALLY-DRIVEN INTELLIGENT BRAKE UNIT”

Perform self-diagnosis of electrically-driven intelligent brake unit. Refer to BR-30, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Perform diagnosis procedure corresponding to DTC indicated.

11. CHECK BRAKE SWITCH OPERATION

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD brake SW	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT

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

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
B159	59	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 13.

12. CHECK STOP LAMP SWITCH OPERATION

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 17.

13. CHECK STOP LAMP OFF RELAY 1

Refer to HBC-256, "Component Inspection (Stop Lamp OFF Relay 1)".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace stop lamp OFF relay 1.

14. CHECK STOP LAMP OFF RELAY 2

Refer to HBC-257, "Component Inspection (Stop Lamp OFF Relay 2)".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace stop lamp OFF relay 2.

15. CHECK BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake switch harness connector and ground.

+		–	Voltage
Brake switch			
Connector	Terminal		
E114	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 16.

NO >> Perform the trouble diagnosis for power supply circuit.

16. CHECK BRAKE SWITCH SIGNAL CIRCUIT

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

+		–		Continuity
Brake switch		HPCM		
Connector	Terminal	Connector	Terminal	
E114	2	B159	59	Existed

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace error-detected parts.

17. CHECK STOP LAMP OFF RELAY 1 POWER SUPPLY

Check the voltage between stop lamp OFF relay 1 harness connector and ground.

+		–	Voltage
Stop lamp OFF relay 1			
Connector	Terminal		
B246	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 18.
NO >> Perform the trouble diagnosis for power supply circuit.

18. CHECK STOP LAMP SWITCH POWER SUPPLY

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E110	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 20.
NO >> GO TO 19.

19. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp OFF relay 1 harness connector.
2. Check the continuity between stop lamp switch harness connector and stop lamp OFF relay 1 harness connector.

+		–		Continuity
Stop lamp OFF relay 1		Stop lamp switch		
Connector	Terminal	Connector	Terminal	
B246	4	E110	1	Existed

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

Is the inspection result normal?

YES >> GO TO 23.

NO >> Repair or replace error-detected parts.

20. CHECK STOP LAMP SWITCH SIGNAL CIRCUIT

1. Disconnect HPCM harness connector.
2. Check the continuity between stop lamp switch harness connector and HPCM harness connector.

+		–		Continuity
Stop lamp switch		HPCM		
Connector	Terminal	Connector	Terminal	
E110	2	B159	46	Existed

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

Is the inspection result normal?

YES >> GO TO 22.
NO >> Repair or replace error-detected parts.

21. CHECK BRAKE SWITCH

Refer to HBC-255, "Component Inspection (Brake Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace brake switch. Refer to BR-280, "Removal and Installation".

22. CHECK STOP LAMP SWITCH

Refer to HBC-256, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-280, "Removal and Installation".

23. CHECK STOP LAMP OFF RELAY 1

Refer to HBC-214, "Component Inspection (Stop Lamp OFF Relay 2)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace stop lamp OFF relay 1.

Component Inspection (Brake Switch)

INFOID:0000000008144533

1. CHECK BRAKE SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect brake switch harness connector.
3. Check the continuity between brake switch terminals as per the following condition.

Brake switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Existed
			Fully released	Not existed

Is the inspection result normal?

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

2. CHECK BRAKE SWITCH-2

1. Adjust brake switch installation. Refer to BR-281, "Inspection and Adjustment".
2. Check the continuity between brake switch terminals as per the following condition.

Brake switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Existed
			Fully released	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake switch. Refer to BR-280, "Removal and Installation".

Component Inspection (Stop Lamp Switch)

INFOID:0000000008144534

1.CHECK STOP LAMP SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH-2

1. Adjust stop lamp switch installation. (Refer to BR-281, "Inspection and Adjustment".)
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Conditions		Continuity
+	–			
Terminal				
1	2	Brake pedal	Fully released	Not existed
			Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-280, "Exploded View".

Component Inspection (Stop Lamp OFF Relay 1)

INFOID:0000000008144535

1.CHECK STOP LAMP OFF RELAY 1

1. Turn ignition switch OFF.
2. Remove stop lamp OFF relay 1.
3. Check the continuity between stop lamp OFF relay 1 terminals as per the following condition.

Stop lamp OFF relay 1		Condition	Continuity
+	–		
Terminal			
3	4	12 V direct current supply between terminals 1 and 2	Not existed
		No current supply	Existed
	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp OFF relay 1.

Component Inspection (Stop Lamp OFF Relay 2)

INFOID:0000000008144536

1. CHECK STOP LAMP OFF RELAY 2

1. Turn ignition switch OFF.
2. Remove stop lamp OFF relay 2.
3. Check the continuity between stop lamp OFF relay 2 terminals as per the following condition.

Stop lamp OFF relay 2		Condition	Continuity
+	–		
Terminal			
5	3	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp OFF relay 2.

P3117 A/C SYSTEM

DTC Logic

INFOID:0000000008144537

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3117	A/C SYSTEM (A/C area short circuit)	When HPCM detects A/C system insulation resistance drop.	• Electric compressor insulation resistance drop. • High voltage harness connector insulation resistance drop.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Touch A/C switch ON and wait at least 1 hour.
3. Turn ignition switch OFF and wait at least 1 minute.
4. Turn ignition switch ON.
5. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-258, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144538

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.PRECONDITIONING

WARNING:

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

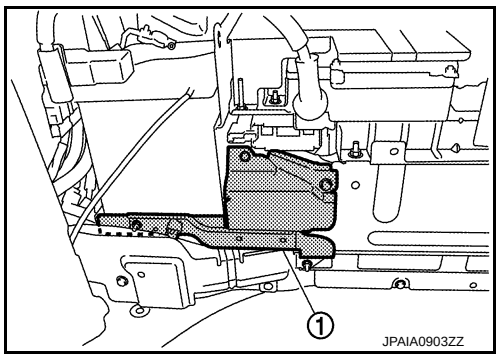
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

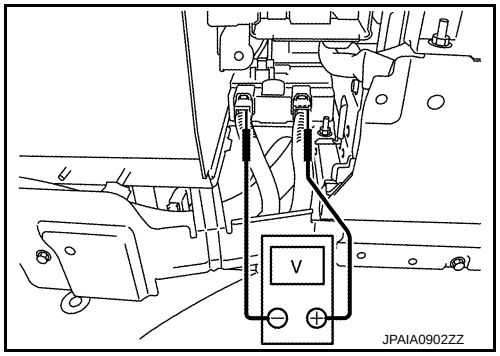
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 2.

2. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE

1. Disconnect following electric compressor harness connector.
2. Check the insulation resistance of high voltage harness connector. Refer to HBC-332, "Insulation Resistance".

Electric compressor	
Connector	C3

3. Check whether there are neither a water infiltration mark nor a defective seal in the high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace high voltage harness connector.

3. CHECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

Check insulation resistance of electric compressor. Refer to HAC-170, "Component Inspection".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace electric compressor. Refer to HA-30, "Removal and Installation".

P3118 HYBRID BATTERY

DTC Logic

INFOID:0000000008144539

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3118	HYBRID BATTERY ISOLATION (Li-ion battery area short circuit)	When HPCM detects Li-ion battery insulation resistance drop.	Li-ion battery insulation resistance drop.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 minutes.
2. Turn ignition switch OFF wait at least 1 minutes.
3. Turn ignition switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-260, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144540

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.PRECONDITIONING

WARNING:

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

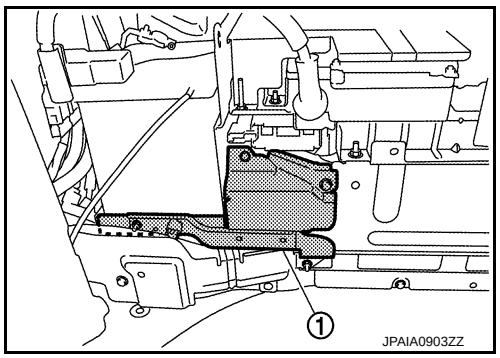
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

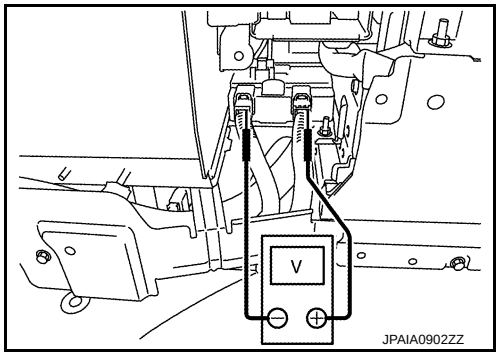


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2. CHECK LI-ION BATTERY INSULATION RESISTANCE

1. Disconnect Li-ion battery harness connector. Refer to HBB-188, "Removal and Installation".
2. Remove component parts of Li-ion battery. Refer to HBB-195, "Exploded View".
3. Check the component parts insulation resistance. Refer to HBB-182, "Component Inspection".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts. Refer to HBB-195, "Exploded View".

P3119 MOTOR SYSTEM

DTC Logic

INFOID:0000000008144541

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3119	MOTOR SYSTEM ISOLATION (Traction motor area short circuit)	When HPCM detects traction motor interchange area insulation resistance drop.	• Traction motor insulation resistance drop. • 3-phase harness insulation resistance drop. • High voltage harness connector insulation resistance drop.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Set the vehicle as the following condition and wait at least 1 minute.

A/C switch	ON
Accelerator pedal	Depressed
Selector lever	P position

3. Turn ignition switch OFF and wait at least 60 seconds.
4. Turn ignition switch ON.
5. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-262, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144542

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.PRECONDITIONING

WARNING:

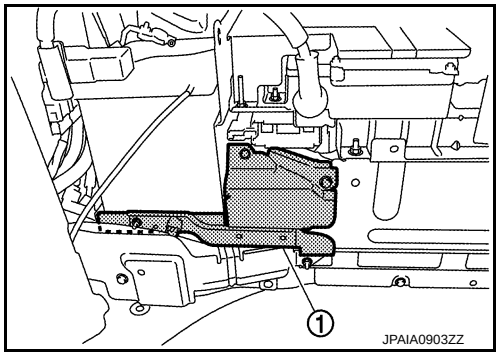
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



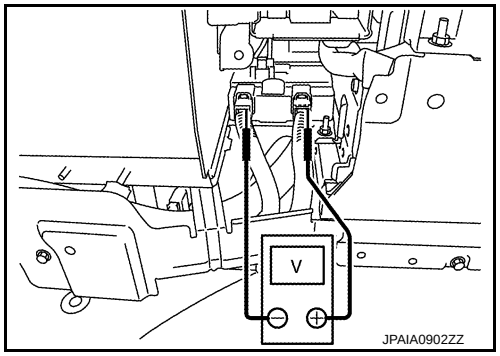
3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 2.

2. CHECK 3-PHASE HARNESS CONNECTOR INSULATION RESISTANCE

1. Disconnect 3-phase harness connector of traction motor inverter.
2. Check 3-phase harness connector insulation resistance. Refer to TMS-117, "Component Inspection".

3-phase harness connector	
Connector	C16

3. Check whether there are neither a water infiltration mark nor a defective seal in the 3-phase harness connector.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the transmission assembly due to malfunction in the 3-phase harness connector. Refer to TM-190, "Removal and Installation".

3. CHECK TRACTION MOTOR INSULATION RESISTANCE

Check traction motor insulation resistance. Refer to TMS-117, "Component Inspection".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace the transmission assembly due to malfunction in the traction motor. Refer to TM-190, "Removal and Installation".

P311D, P311E HIGH VOLTAGE SYSTEM

DTC Logic

INFOID:0000000008144543

DTC DETECTION LOGIC

NOTE:

- If DTC P311D or P311E is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P311D or P311E is displayed with DTC P0A12, P0A13, P3179, P317A, P317B, P317F, P3180, P3181 or P3182, first perform the trouble diagnosis for DTC P0A12, P0A13, P3179, P317A, P317B, P317F, P3180, P3181 or P3182. Refer to HBC-133, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P311D	HIGH VOLTAGE SYSTEM (High voltage system over-current)	When the current of the Li-ion battery detects the state whose –3 A or less and traction motor inverter input voltage are less than 25 V in pre-charge for 0.35 second or more.	• Harness or connectors (High voltage circuit is shorted) • DC/DC converter • Li-ion battery controller • Traction motor inverter
P311E	HIGH VOLTAGE SYSTEM (High voltage system load carrying out)	When HPCM detects the state whose difference between the voltage of the Li-ion battery and traction motor inverter input voltage is 22 V or more when pre-charge is completed.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

   NOTE:

   When perform DTC confirmation procedure, there is the case that DTC P0A95 is detected.

Is DTC detected?

YES >> Proceed to HBC-264, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144544

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Perform self-diagnosis of Li-ion battery controller. Refer to HBB-32, "CONSULT Function".

Is DTC detected?

YES >> Perform diagnosis procedure corresponding to DTC indicated. Refer to HBB-39, "DTC Index".
NO >> GO TO 2.

2.CHECK DTC WITH TRACTION MOTOR INVERTER

Perform self-diagnosis of traction motor inverter. Refer to TMS-22, "CONSULT Function".

Is DTC detected?

YES >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-31, "DTC Index".
NO >> GO TO 3.

3.CHECK SYSTEM MAIN RELAY OUTPUT SIGNAL CIRCUIT

With CONSULT

1. Select “HV P MAIN RLY ACTIV” and “HV N MAIN RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor Item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON

Without CONSULT

Check the voltage between HPCM harness connector and ground as per the following conditions.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	15	Ground	Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage−2.0 V
	34		Ignition switch: ON	Less than 2.0 V
			READY	More than battery voltage−2.0 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 15.
YES-2 >> Without CONSULT: GO TO 16.
NO >> GO TO 4.

4.CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL INPUT CIRCUIT

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” and “HV PRE CHG RLY ACTIV VOL”T in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor Item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON

Monitor Item	Condition	Indication
HV PRE CHG RLY ACTIV VOLT	Ignition switch: ON	More than 9.0 V
	Just after READY	1.3 - 4.7 V

Without CONSULT
Check the voltage between HPCM harness connector and ground as per the following conditions.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	3	Ground	Ignition switch: ON	More than 9.0 V
			Just after READY	1.3 - 4.7 V

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 5.

5.CHECK DC/DC CONVERTER ACTIVATE SIGNAL CIRCUIT

With CONSULT
1. Select “DC/DC CONV SIG VOLT” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor Item	Condition	Indication
DC/DC CONV SIG VOLT	Ignition switch: ON	0 - 1.3 V
	READY	4.5 - 7.8 V

Without CONSULT
Check the voltage between HPCM harness connector and ground as per the following conditions.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	21	Ground	Ignition switch: ON	0 - 1.3 V
			READY	4.5 - 7.8 V

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 6.

6.CHECK FUSE

Check that the following fuse is not fusing.

Location	Fuse No.	Capacity
Fuse and fusible link block No. 3	#73	10 A

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 7.

7.CHECK DC/DC CONVERTER POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between Li-ion battery harness connector and ground.

+		–	Voltage
Li-ion battery			
Connector	Terminal		
B160	8	Ground	Battery voltage

Is the inspection result normal?

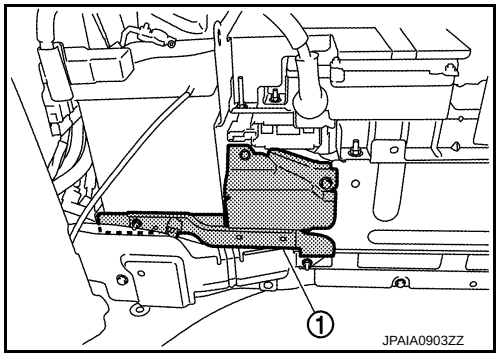
YES >> GO TO 10.
NO >> GO TO 8.

8. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

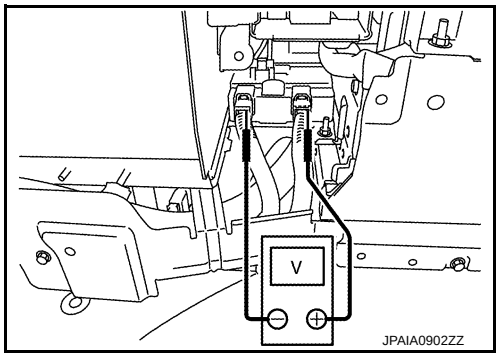


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 9.

9. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between Li-ion battery harness connector and fuse and fusible link block No.3 harness.

+		–		Continuity
Li-ion battery		Fuse and fusible link block No. 3		
Connector	Terminal	Connector	Fuse No.	
B160	8	B165	#73	Existed

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

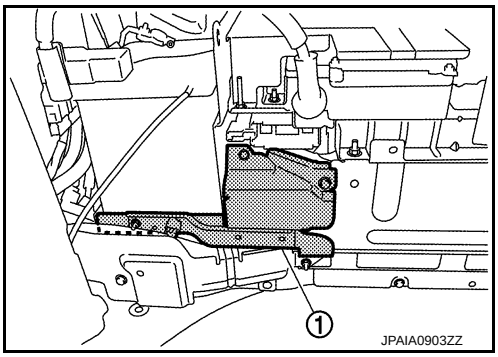
Is the inspection result normal?

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

10. PRECONDITIONING

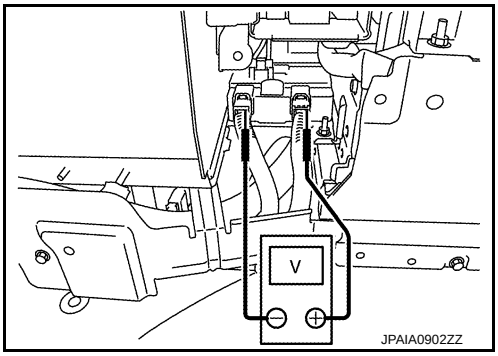
WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).



DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

3. Measure voltage between high voltage harness terminals.



Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 11.

11. CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Disconnect DC/DC converter harness connector.
4. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	8	B460	1	Existed

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

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

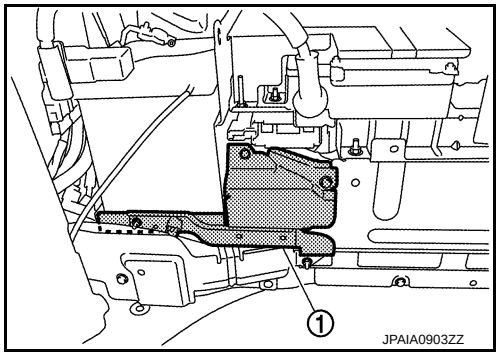
12. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

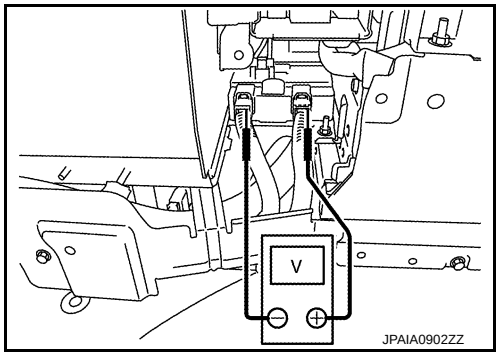
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 13.

13. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Disconnect Li-ion battery harness connector.
4. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	3	B160	9	Existed

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

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace error-detected parts.

14. CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL CIRCUIT-2

1. Disconnect DC/DC converter harness connector.
2. Check the continuity between Li-ion battery harness connector and DC/DC converter harness connector.

+		–		Continuity
Li-ion battery		DC/DC converter		
Connector	Terminal	Connector	Terminal	
LB39	9	B460	4	Existed

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

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

15. SYSTEM MAIN RELAY OPERATION

With CONSULT
1. Select “HV P MAIN RLY ACTIV”, “HV N MAIN RLY ACTIV”, “HV P MAIN RLY ACTIV MONI” and “HV N MAIN RLY ACTIV MONI” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor item	Condition	Indication
HV P MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV N MAIN RLY ACTIV	Ignition switch: ON	OFF
	READY	ON
HV P MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF
HV N MAIN RLY ACTIV MONI	Ignition switch: ON	ON
	READY	OFF

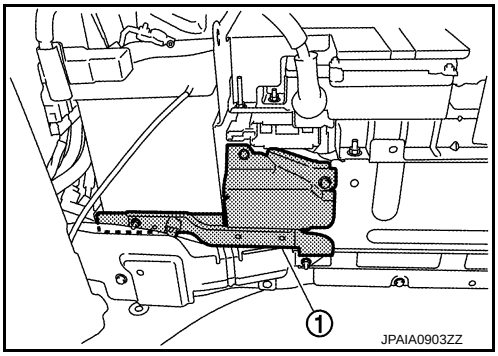
Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 16.

16. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

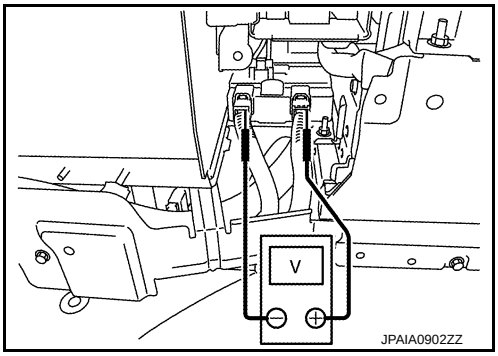


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 17.

17. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-1

1. Disconnect HPCM harness connector.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	34	B160	11	Existed

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

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace error-detected parts.

18. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-1

1. Check the continuity between HPCM harness connector and Li-ion battery harness connector.

+		–		Continuity
HPCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
B158	15	B160	23	Existed

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

Is the inspection result normal?

YES >> GO TO 19.
NO >> Repair or replace error-detected parts.

19. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	11	24	Existed

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

Is the inspection result normal?

YES >> GO TO 20.
NO >> GO TO 24.

20. CHECK SYSTEM MAIN RELAY 2 CIRCUIT-2

1. Check the continuity between Li-ion battery harness connector terminals.

Li-ion battery			Continuity
Connector	+	–	
	Terminal		
LB39	23	24	Existed

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

Is the inspection result normal?

YES >> GO TO 21.
NO >> GO TO 27.

21. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-1

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

+		–	Continuity
Li-ion battery			
Connector	Terminal		
LB39	24	Ground	Existed

Is the inspection result normal?

YES >> GO TO 22.
NO >> Repair or replace error-detected parts.

22. CHECK SYSTEM MAIN RELAY 1

1. Disconnect battery junction box harness connector.
2. Check system main relay 1. Refer to HBC-275, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

YES >> GO TO 23.
NO >> Repair or replace error-detected parts.

23. CHECK SYSTEM MAIN RELAY 2

Check system main relay 2. Refer to HBC-275, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

24. CHECK SYSTEM MAIN RELAY 1 CIRCUIT-3

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

+		–		Continuity
Li-ion battery		Battery junction box		
Connector	Terminal	Connector	Terminal	
LB39	11	LB33	9	Existed

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

Is the inspection result normal?

YES >> GO TO 25.
NO >> Repair or replace error-detected parts.

25. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

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

Is the inspection result normal?

YES >> GO TO 26.
NO >> Repair or replace error-detected parts.

26. CHECK SYSTEM MAIN RELAY 1

Check system main relay 1. Refer to HBC-275, "Component Inspection (System Main Relay 1)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

27. CHECK SYSTEM MAIN RELAY GROUND CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB33	8	LB39	24	Existed

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

Is the inspection result normal?

YES >> GO TO 28.
NO >> Repair or replace error-detected parts.

28. CHECK SYSTEM MAIN RELAY 2

Check system main relay 2. Refer to HBC-275, "Component Inspection (System Main Relay 2)".

Is the inspection result normal?

YES >> GO TO 29.
NO >> Repair or replace error-detected parts.

29. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR

Check loose or poor connection for traction motor inverter high voltage harness connector. Refer to TMS-120, "Exploded View".

Is the inspection result normal?

YES >> GO TO 30.
NO >> Repair or replace error-detected parts.

30. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE CIRCUIT

1. Disconnect traction motor inverter high voltage harness connector.
2. Check the continuity between traction motor inverter high voltage harness connector and battery junction box high voltage harness connector.

+		–		Continuity
Traction motor inverter		Battery junction box		
Connector	Terminal	Connector	Terminal	
C9	49	LB37	29	Existed
	50	LB38	30	

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

Is the inspection result normal?

YES >> GO TO 31.
NO >> Repair or replace error-detected parts.

31. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE CIRCUIT-1

1. Disconnect electric compressor high voltage harness connector.
2. Check the continuity between electric compressor high voltage harness connector and battery junction box high voltage harness connector.

+		–		Continuity
Electric compressor		Battery junction box		
Connector	Terminal	Connector	Terminal	
C12	1	LB31	27	Existed
	2	LB32	26	

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

Is the inspection result normal?

YES >> GO TO 33.
NO >> GO TO 32.

32. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE CIRCUIT-2

1. Check the continuity between battery junction box harness connector and Li-ion battery harness connector.

+		–		Continuity
Battery junction box		Li-ion battery		
Connector	Terminal	Connector	Terminal	
LB31	27	LB40	29	Existed
LB32	26		28	

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

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

33. CHECK ELECTRIC COMPRESSOR

Check electric compressor. Refer to HA-33, "Inspection".

Is the inspection result normal?

YES >> GO TO 34.
NO >> Replace electric compressor. Refer to HA-30, "Removal and Installation".

34. CHECK BATTERY JUNCTION BOX HIGH VOLTAGE CIRCUIT

1. Check the continuity between battery junction box harness connector terminals.

Battery junction box			Continuity
Connector	+	–	
	Terminal		
LB32	27	28	Existed
LB31	25	26	

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

Is the inspection result normal?

YES >> GO TO 35.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

35. CHECK DC/DC CONVERTER HIGH VOLTAGE CIRCUIT

1. Check the continuity between DC/DC converter harness connector and battery junction box harness connector.

+		–		Continuity
DC/DC converter		battery junction box		
Connector	Terminal	Connector	Terminal	
B461	7	LB32	25	Existed
	10	LB36	22	
	14	LB31	28	

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

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (System Main Relay 1)

INFOID:0000000008144545

1.CHECK SYSTEM MAIN RELAY 1-1

1. Disconnect battery junction box harness connector.
2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
9	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2.CHECK SYSTEM MAIN RELAY 1-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
21	29	12 V direct current supply between terminals 9 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

Component Inspection (System Main Relay 2)

INFOID:0000000008144546

1.CHECK SYSTEM MAIN RELAY 2-1

1. Disconnect battery junction box harness connector.
2. Check the continuity between battery junction box harness connector terminals.

Battery junction box		Continuity
Terminal		
7	8	Existed

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace battery junction box. Refer to HBB-198, "BATTERY JUNCTION BOX : Disassembly and Assembly".

2.CHECK SYSTEM MAIN RELAY 2-2

Check the continuity between battery junction box harness connector terminals as per the following condition.

Battery junction box		Condition	Continuity
Terminal			
22	30	12 V direct current supply between terminals 7 and 8 of battery junction box harness connector	Existed
		No current supply	Not existed

Is the inspection result normal?

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

P311F PRE-CHARGE RELAY

DTC Logic

INFOID:0000000008144547

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P311F	PRE CHARGE RELAY (Pre-charge voltage abnormality)	When HPCM detects traction motor inverter voltage is more than 100V during pre-charge.	• DC/DC converter • Lithium ion battery ground circuit is open

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

NOTE:
When perform DTC confirmation procedure, there is the case that DTC P0A95 is detected.

Is DTC detected?

YES >> Proceed to HBC-277, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144548

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.CHECK DC/DC CONVERTER PRE-CHARGE SIGNAL INPUT CIRCUIT

With CONSULT

1. Select “HV PRE CHG RLY ACTIV” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor Item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON

Without CONSULT
Check the voltage between HPCM harness connector and ground as per the following conditions.

+		–	Condition	Voltage (Approx.)
HPCM				
Connector	Terminal			
B158	3	Ground	Ignition switch: ON	More than 9.0 V
			Just after READY	1.3 - 4.7 V

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Perform trouble diagnosis for HPCM power supply and ground circuit. Proceed to HBC-93, "HPCM : Diagnosis Procedure".

2.CHECK DC/DC CONVERTER PRE-CHARGE RELAY OPERATION

With CONSULT
1. Select “HV PRE CHG RLY ACTIV” and “HV PRE CHG RLY ACTIV VOLT” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
2. Check that monitor indication as per the following condition.

Monitor Item	Condition	Indication
HV PRE CHG RLY ACTIV	Ignition switch: ON	OFF
	Just after READY	ON
HV PRE CHG RLY ACTIV VOLT	Ignition switch: ON	More than 9.0 V
	Just after READY	1.3 - 4.7 V

Is the inspection result normal?

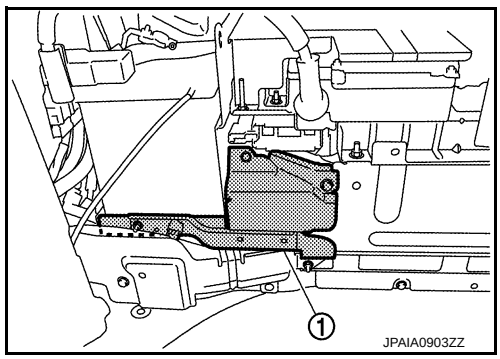
YES >> GO TO 5.
NO >> GO TO 3.

3.PRECONDITIONING

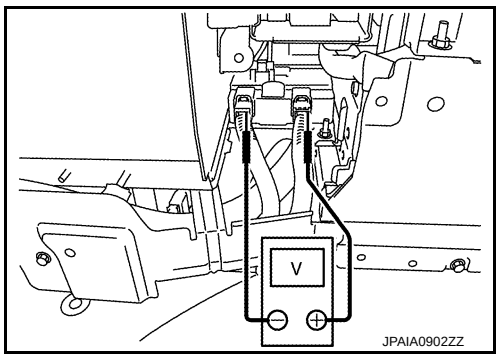
WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.



Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 4.

4. CHECK LI-ION BATTERY GROUND CIRCUIT

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

+		–	Continuity
Li-ion battery			
Connector	Terminal		
B160	2	Ground	Existed
	14		
	24		

Is the inspection result normal?

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

5. CHECK DC/DC CONVERTER

Check the Reference Value of DC/DC converter. Refer to HBC-75, "Reference Value".

Is the inspection result normal?

YES >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".
NO >> Repair or replace error-detected parts.

P3120 HIGH VOLTAGE SYSTEM

DTC Logic

INFOID:0000000008144549

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3120	HV SYSTEM ISOLATION (High Voltage direct current area short circuit)	When HPCM detects the high voltage system insulation resistance drop.	High voltage direct current area insulation resistance drop.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 1 minutes.
2. Turn ignition switch OFF and wait at least 1 minutes.
3. Turn ignition switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-280, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144550

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1.PRECONDITIONING

WARNING:

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

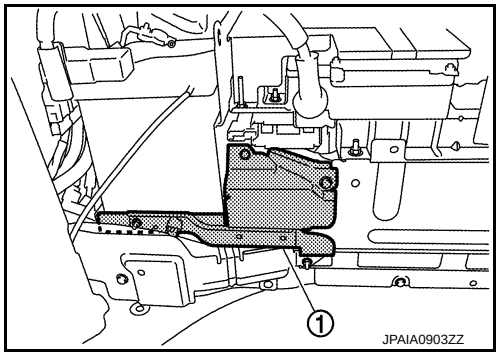
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".

2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

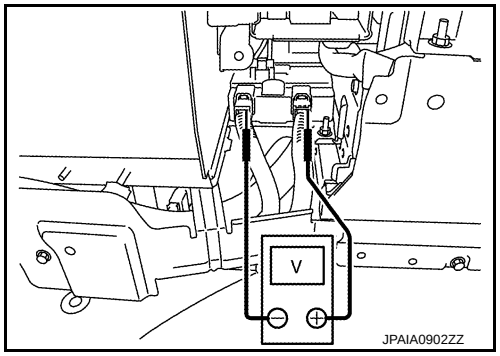
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 2.

2. CHECK LI-ION BATTERY HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-1

1. Disconnect Li-ion battery harness connector.
2. Check the insulation resistance of the following Li-ion battery harness connector. Refer to HBC-332, "Insulation Resistance".

Li-ion battery	
Connector	LB40

Is the inspection result normal?

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

3. CHECK LI-ION BATTERY HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-2

1. Disconnect following battery junction box harness connector.
2. Check the insulation resistance of battery junction box harness connector. Refer to HBC-332, "Insulation Resistance".

Battery junction box	
Connector	LB31
	LB32

Is the inspection result normal?

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

4. CHECK LI-ION BATTERY HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE-3

1. Disconnect following battery junction box harness connector.
2. Check the insulation resistance of battery junction box harness connector. Refer to HBC-332, "Insulation Resistance".

Battery junction box	
Connector	LB37
	LB38

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 8.

5.CHECK DC/DC CONVERTER INSULATION RESISTANCE

1. Disconnect DC/DC converter harness connector.
2. Check the insulation resistance of DC/DC converter. Refer to HBB-182, "Component Inspection".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace DC/DC converter. Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".

6.CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CONNECTOR INSULATION RESISTANCE

1. Disconnect following electric compressor harness connector.
2. Check the insulation resistance of high voltage harness connector. Refer to HBC-332, "Insulation Resistance".

Electric compressor	
Connector	C12

3. Check whether there are neither a water infiltration mark nor a defective seal in the high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace high voltage harness connector.

7.CHECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

Check insulation resistance of electric compressor. Refer to HAC-170, "Component Inspection".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace electric compressor. Refer to HA-30, "Removal and Installation".

8.CHECK INSULATION RESISTANCE OF TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR

1. Disconnect following traction motor inverter harness connector.
2. Check the insulation resistance of high voltage harness connector. Refer to HBC-332, "Insulation Resistance".

Traction motor inverter	
Connector	C9

3. Check whether there are neither a water infiltration mark nor a defective seal in the high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace high voltage harness connector.

9.CHECK TRACTION MOTOR INSULATION RESISTANCE

Check insulation resistance of traction motor inverter. Refer to TMS-117, "Component Inspection".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".

NO >> Replace traction motor inverter. Refer to TMS-121, "Removal and Installation".

P3123, P3124 HV SYSTEM COOLING PUMP

DTC Logic

INFOID:0000000008144551

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3123	HV SYSTEM COOLING PUMP (Electric water pump is stuck ON)	When HPCM detects feedback signal from an electric water pump is stuck in HI side (more than 96%) for 3 seconds.	• Harness or connectors (Electric water pump circuit is open or shorted.) • Electric water pump
P3124	HV SYSTEM COOLING PUMP (Electric water pump is stuck OFF)	When HPCM detects feedback signal from an electric water pump is stuck in LOW side (less than 4%) for 3 seconds.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-284, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144552

1.CHECK ELECTRIC WATER PUMP OPERATION

With CONSULT

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

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

Without CONSULT

1. Set the vehicle to READY.
2. Touch in the main body of pump and check the operation vibration of the electric water pump.

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK ELECTRIC WATER PUMP POWER SUPPLY-1

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

Electric water pump			Voltage
Connector	+	–	
	Terminal		
E90	1	2	Battery voltage

Is the inspection result normal?

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

3. CHECK ELECTRIC WATER PUMP POWER SUPPLY-2

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

+		–	Voltage
Electric water pump			
Connector	Terminal		
E90	1	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK ELECTRIC WATER PUMP GROUND CIRCUIT

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

+		–	Continuity
Electric water pump			
Connector	Terminal		
E90	2	Ground	Existed

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5. CHECK ELECTRIC WATER PUMP SIGNAL CIRCUIT

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

+		–		Continuity
HPCM		Electric water pump		
Connector	Terminal	Connector	Terminal	
B159	48	E90	4	Existed
	61		3	

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

Is the inspection result normal?

YES >> Replace electric water pump. Refer to HCO-13, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P3137, P3138 CAR CLASH

DTC Logic

INFOID:0000000008144553

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3137	CAR CLASH (Front and side collision judgment)	When HPCM receives car crush information signal from air bag diagnosis sensor unit.	• Car clash • Air bag inflated • Air bag diagnosis sensor unit
P3138	CAR CLASH (Rear collision judgment)		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-286, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144554

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-286, "DTC Logic".

Is DTC P3137 or P3138 detected again?

YES >> Replace air bag diagnosis sensor unit.
NO >> INSPECTION END

P3139 AIR BAG SYSTEM

DTC Logic

INFOID:0000000008144555

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3139	AIR BAG SYSTEM (Air bag diagnosis sensor unit signal error)	When HPCM detects abnormality to a signal transmitted from an air bag diagnosis sensor unit for 2 seconds.	Air bag diagnosis sensor unit

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-287, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144556

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-287, "DTC Logic".

Is DTC P3139 detected again?

YES >> Replace air bag diagnosis sensor unit.
NO >> INSPECTION END

P3146 MOTOR RESOLVER

DTC Logic

INFOID:0000000008144557

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3146	MOTOR RESOLVER (Difference of the speed)	When a traction motor and the difference of speed of the input shaft detected a state of 1,000 rpm for 3 seconds.	• Traction motor inverter • TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Drive the vehicle as per the following condition.

Monitor Item	Condition
Vehicle speed	More than 10 km/h (6.2 MPH)
Selector lever position	M mode (M1 range)

CAUTION:
Always drive the vehicle at a safe speed.

3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-288, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144558

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Perform self-diagnosis of traction motor inverter. Refer to TMS-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TMS-31, "DTC Index".

2.CHECK DTC WITH TCM

Perform self-diagnosis of TCM. Refer to TM-64, "CONSULT Function".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to TM-80, "DTC Index".

P3149 TRANSMISSION SYSTEM

DTC Logic

INFOID:0000000008144559

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3149	TRANSMISSION SYSTEM (Sub oil pump system malfunction)	When HPCM detects self-diagnosis signal from TCM.	TCM-detected DTC Refer to TM-82, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TCM

Check the DTC which detected with TCM. Refer to TM-82, "Index of HPCM-detected DTC".

>> Proceed to HBC-289, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144560

Check the DTC which detected with TCM. Refer to TM-80, "DTC Index".

P314D ENGINE SYSTEM

DTC Logic

INFOID:0000000008144561

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P314D	ENGINE SYSTEM (Fail-safe request)	When HPCM detects self-diagnosis signal from ECM.	ECM-detected DTC Refer to EC-86, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH ECM

Check the DTC which detected with ECM. Refer to EC-86, "Index of HPCM-detected DTC".

>> Proceed to HBC-290, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144562

Check the DTC which detected with ECM. Refer to EC-86, "Index of HPCM-detected DTC".

P314E ENGINE SYSTEM

DTC Logic

INFOID:0000000008144563

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P314E	ENGINE SYSTEM (Engine speed limit)	When HPCM detects self-diagnosis signal from ECM.	ECM-detected DTC Refer to EC-86, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH ECM

Check the DTC which detected with ECM. Refer to EC-86, "Index of HPCM-detected DTC".

>> Proceed to HBC-291, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144564

Check the DTC which detected with ECM. Refer to EC-86, "Index of HPCM-detected DTC".

P3150 ENGINE START SYSTEM

DTC Logic

INFOID:0000000008144565

DTC DETECTION LOGIC

NOTE:
This diagnosis result is detected when the fuel level of the fuel tank is extremely low and the engine does not run normally.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3150	ENGINE START SYSTEM (Out of gas)	When the fuel level gauge is few, the engine is consecutive 5 times, and it doesn't start.	• Out of gas • Fuel system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that fuel level is enough.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

Set the vehicle to READY with engine cool condition.

Does the engine start?

YES >> INSPECTION END
NO >> Proceed to HBC-292, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144566

1.CHECK FUEL LEVEL

Check that the fuel level is enough.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refuel.

2.CHECK DTC WITH ECM

Perform self-diagnosis of ECM. Refer to EC-53, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to EC-81, "DTC Index".

3.CHECK ENGINE CONTROL SYSTEM

According to the symptom table of ENGINE CONTROL SYSTEM, check the root cause. Refer to “HARD/NO START/RESTART” in EC-434, "Symptom Table".

Is the inspection result normal?

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

4.CHECK CLUTCH 1 DISC

Check clutch 1 disc thickness. Refer to CL-8, "Inspection".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace clutch and clutch cover. Refer to CL-7, "Removal and Installation".

P3155 ENGINE SYSTEM

DTC Logic

INFOID:0000000008144567

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3155	ENGINE SYSTEM (EGVR malfunction)	When HPCM detects self-diagnosis signal from ECM.	ECM-detected DTC Refer to EC-86, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH ECM

Check the DTC which detected with ECM. Refer to EC-86, "Index of HPCM-detected DTC".

>> Proceed to HBC-293, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144568

Check the DTC which detected with ECM. Refer to EC-86, "Index of HPCM-detected DTC".

P3157 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000008144569

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3157	SENSOR POWER SUPPLY (Sensor power supply circuit short)	When HPCM detects sensor power supply voltage is 5.6 V or more/4.6 V or less for 0.05 second.	• Harness or connectors (APP sensor circuit is shorted.) (Clutch 1 stroke sensor circuit is shorted.) • APP sensor 1, 2 • Clutch 1 stroke sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 8 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-294, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144570

1.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Check the voltage between APP sensor harness connector terminals.

Without ICC

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M9	5	4	5 V

With ICC

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
M153	6	5	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK ACCELERA.TOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT-2

Check the voltage between APP sensor harness connector and ground.

Without ICC

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
M9	5	Ground	5 V

With ICC

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
M153	6	Ground	5 V

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

Without ICC

HPCM		Sensor		
Connector	Terminal	Name	Connector	Terminal
B158	10	APP sensor	M9	5
	31			6
	11	Traction motor inverter (Clutch 1 stroke sensor)	F77	10

With ICC

HPCM		Sensor		
Connector	Terminal	Name	Connector	Terminal
B158	10	APP sensor	M153	6
	31			3
	11	Traction motor inverter (Clutch 1 stroke sensor)	F77	10

Is the inspection result normal?

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

4.CHECK COMPONENTS

Check the following.

- Accelerator pedal position (APP) sensor (Refer to HBC-223, "Component Inspection (Accelerator Pedal Position Sensor)".)
- Clutch 1 stroke sensor (Proceed to HBC-115, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5.CHECK HPCM GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect HPCM harness connector.
3. Check the continuity between APP sensor harness connector and HPCM harness connector.

Without ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M9	4	B158	21	Existed

With ICC

+		–		Continuity
APP sensor		HPCM		
Connector	Terminal	Connector	Terminal	
M153	5	B158	21	Existed

Is the inspection result normal?

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

6. CHECK HPCM GROUND CIRCUIT

Check the continuity between HPCM harness connector and ground.

+		–	Continuity
HPCM			
Connector	Terminal		
B158	20	Ground	Existed
	39		
	40		

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Repair or replace ground connection.

P3176 MOTOR SYSTEM

DTC Logic

INFOID:0000000008144571

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3176	MOTOR SYSTEM (Traction motor inverter charge malfunction)	When HPCM detects self-diagnosis signal from traction motor inverter.	Taction motor inverter-detected DTC Refer to TMS-32, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

>> Proceed to HBC-297, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144572

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

P3177 MOTOR SYSTEM

DTC Logic

INFOID:0000000008144573

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3177	MOTOR SYSTEM (Traction motor inverter control preparations error)	When HPCM detects self-diagnosis signal from traction motor inverter.	Taction motor inverter-detected DTC Refer to TMS-32, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

>> Proceed to HBC-298, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144574

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

P3178 MOTOR SYSTEM

DTC Logic

INFOID:0000000008144575

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3178	MOTOR SYSTEM (Traction motor inverter pre-charge permission error)	When HPCM detects self-diagnosis signal from traction motor inverter.	Taction motor inverter-detected DTC Refer to TMS-32, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

>> Proceed to HBC-299, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144576

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

P3179 MOTOR SYSTEM

DTC Logic

INFOID:0000000008144577

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3179	MOTOR SYSTEM (Warning lamp illuminate request)	When HPCM detects self-diagnosis signal from traction motor inverter.	Taction motor inverter-detected DTC Refer to TMS-32, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

>> Proceed to HBC-300, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144578

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

P317A MOTOR SYSTEM

DTC Logic

INFOID:0000000008144579

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P317A	MOTOR SYSTEM (Traction motor inverter PWM OFF request)	When HPCM detects self-diagnosis signal from traction motor inverter.	Taction motor inverter-detected DTC Refer to TMS-32, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

>> Proceed to HBC-301, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144580

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

P317B MOTOR SYSTEM

DTC Logic

INFOID:0000000008144581

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P317B	MOTOR SYSTEM (Traction motor inverter relay cut-off request)	When HPCM detects self-diagnosis signal from traction motor inverter.	Taction motor inverter-detected DTC Refer to TMS-32, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TRACTION MOTOR INVERTER

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

>> Proceed to HBC-302, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144582

Check the DTC which detected with traction motor inverter. Refer to TMS-32, "Index of HPCM-detected DTC".

P317F HV BATTERY SYSTEM

DTC Logic

INFOID:0000000008144583

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P317F	HV BATTERY SYSTEM (Traction motor torque OFF request)	When HPCM detects self-diagnosis signal from Li-ion battery controller.	Li-ion battery controller-detected DTC Refer to HBB-42, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

>> Proceed to HBC-303, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144584

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

P3180 HV BATTERY SYSTEM

DTC Logic

INFOID:0000000008144585

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3180	HV BATTERY SYSTEM (Warning lamp illuminate request)	When HPCM detects self-diagnosis signal from Li-ion battery controller.	Li-ion battery controller-detected DTC Refer to HBB-42, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

>> Proceed to HBC-304, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144586

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

P3181 HV BATTERY SYSTEM

DTC Logic

INFOID:0000000008144587

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3181	HV BATTERY SYSTEM (Battery less driving request)	When HPCM detects self-diagnosis signal from Li-ion battery controller.	Li-ion battery controller-detected DTC Refer to HBB-42, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

>> Proceed to HBC-305, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144588

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

P3182 HV BATTERY SYSTEM

DTC Logic

INFOID:0000000008144589

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3182	HV BATTERY SYSTEM (System main relay cut request)	When HPCM detects self-diagnosis signal from Li-ion battery controller.	Li-ion battery controller-detected DTC Refer to HBB-42, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

>> Proceed to HBC-306, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144590

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

P3184 HV BATTERY SYSTEM

DTC Logic

INFOID:0000000008144591

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3184	HV BATTERY SYSTEM (Li-ion battery controller response error)	When HPCM detects self-diagnosis signal from Li-ion battery controller.	Li-ion battery controller-detected DTC Refer to HBB-42, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH LI-ION BATTERY CONTROLLER

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

>> Proceed to HBC-307, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144592

Check the DTC which detected with Li-ion battery controller. Refer to HBB-42, "Index of HPCM-detected DTC".

P3185 TRANSMISSION SYSTEM

DTC Logic

INFOID:0000000008144593

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3185	TRANSMISSION SYSTEM (A/T malfunction)	When HPCM detects self-diagnosis signal from TCM.	TCM-detected DTC Refer to TM-82, "Index of HPCM-detected DTC".

DTC CONFIRMATION PROCEDURE

1.CHECK DTC WITH TCM

Check the DTC which detected with TCM. Refer to TM-82, "Index of HPCM-detected DTC".

>> Proceed to HBC-308, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144594

Check the DTC which detected with TCM. Refer to TM-80, "DTC Index".

P3194 CAN ERROR

DTC Logic

INFOID:0000000008144595

DTC DETECTION LOGIC

NOTE:

- If DTC P3194 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P3194 is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1D. Refer to HBC-137, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3194	COMMUNICATION ERROR [Lost communication with ABS actuator and electric unit (control unit)]	When HPCM is not transmitting or receiving CAN communication signal with ABS actuator and electric unit (control unit).	ABS actuator and electric unit (control unit).

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-309, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144596

1. CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-45, "CONSULT Function".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for CAN communication system. Refer to LAN-19, "Trouble Diagnosis Flow Chart"
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to BRC-57, "DTC Index".

P31A6 CAN ERROR

DTC Logic

INFOID:0000000008144597

DTC DETECTION LOGIC

NOTE:
If DTC P31A5 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31A6	COMMUNICATION ERROR (CAN communication data error)	When HPCM detected data error of CAN communication.	• ECM • Traction motor inverter • HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-310, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144598

1.PERFORM ALL DTC READING

With CONSULT
1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC No.	DTC detection control module	Malfunctioning part
P31A6	“MOTOR CONTROL” only	• ECM • Traction motor inverter
	“EV/HEV” only	HPCM
	• “MOTOR CONTROL” • “EV/HEV”	ECM

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A6.

P31A7 CAN ERROR

DTC Logic

INFOID:0000000008144599

DTC DETECTION LOGIC

NOTE:
If DTC P31A7 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31A7	COMMUNICATION ERROR (CAN communication data error)	When HPCM detected data error of CAN communication.	• HPCM • Traction motor inverter • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-311, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144600

1.PERFORM ALL DTC READING

With CONSULT
1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC No.	DTC detection control module	Malfunctioning part
P31A7	“EV/HEV” only	• HPCM • Traction motor inverter
	“HV BATTERY” only	Li-ion battery controller
	• “EV/HEV” • “HV BATTERY”	Traction motor inverter

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A7.

P31A8 CAN ERROR

DTC Logic

INFOID:0000000008144601

DTC DETECTION LOGIC

NOTE:
If DTC P31A8 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31A8	COMMUNICATION ERROR (CAN communication data error)	When HPCM detected data error of CAN communication.	• HPCM • TCM • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-312, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144602

1.PERFORM ALL DTC READING

With CONSULT
1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC No.	DTC detection control module	Malfunctioning part
P31A8	“MOTOR CONTROL” only	• Traction motor inverter • TCM
	“EV/HEV” only	HPCM
	• “MOTOR CONTROL” • “EV/HEV”	TCM

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A8.

P31A9 CAN ERROR

DTC Logic

INFOID:0000000008144603

DTC DETECTION LOGIC

NOTE:
If DTC P31A9 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31A9	COMMUNICATION ERROR (CAN communication data error)	When HPCM detected data error of CAN communication.	• HPCM • Traction motor inverter • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn ignition switch ON and wait at least 5 seconds.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-313, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144604

1.PERFORM ALL DTC READING

With CONSULT
1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC No.	DTC detection control module	Malfunctioning part
P31A9	“MOTOR CONTROL” only	• Traction motor inverter • Li-ion battery controller
	“EV/HEV” only	• HPCM • Li-ion battery controller
	• “MOTOR CONTROL” • “EV/HEV”	Li-ion battery controller

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A9.

P31AB CAN ERROR

DTC Logic

INFOID:0000000008144605

DTC DETECTION LOGIC

NOTE:

- If DTC P31AB is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P31AB is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1. Refer to HBC-137, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31AB	COMMUNICATION ERROR (Lost communication with electrically-driven intelligent brake unit)	When HPCM is not transmitting or receiving CAN communication signal with electrically-driven intelligent brake unit.	Electrically-driven intelligent brake unit

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-314, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144606

1.CHECK DTC WITH ELECTRICALLY-DRIVEN INTELLIGENT BRAKE UNIT

Check DTC with electrically-driven intelligent brake unit. Refer to BR-30, "CONSULT Function".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for CAN communication system. Refer to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to BR-38, "DTC Index".

P31AC CAN ERROR

DTC Logic

INFOID:0000000008144607

DTC DETECTION LOGIC

NOTE:

- If DTC P31AC is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P31AC is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1. Refer to HBC-137, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31AC	COMMUNICATION ERROR (Lost communication with ADAS control unit)	When HPCM is not transmitting or receiving CAN communication signal with ADAS control unit.	ADAS control unit

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to HBC-315, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144608

1.CHECK DTC WITH ADAS CONTROL UNIT

Check DTC with ADAS control unit. Refer to CCS-28, "CONSULT Function (ICC/ADAS)".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for CAN communication system. Refer to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to CCS-50, "DTC Index".

P31F7, P31F8, P31FB, P31FC, P31FD ASCD SYSTEM

DTC Logic

INFOID:0000000008144609

DTC DETECTION LOGIC

NOTE:
If DTC P31F7, P31F8, P31FB, P31FC or P31FD is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31F7	HPCM (Output shaft request torque unmatch)	HPCM calculation function is malfunctioning.	HPCM
P31F8	HPCM (ASCD cruise request unmatch)		
P31FB	ASCD SYSTEM (ASCD commission)		
P31FC	ASCD SYSTEM (ASCD RAM)		
P31FD	ASCD SYSTEM (ASCD alignment)		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Press MAIN switch on ASCD/ICC steering switch for 1.5 seconds or more, and operate ASCD system.
3. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
4. Press SET/COAST switch.
5. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-316, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144610

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to HBC-316, "DTC Logic".

Is DTC P31F7, P31F8, P31FB, P31FC or P31FD detected again?

YES >> Replace HPCM. Refer to HBC-339, "Removal and Installation".
NO >> INSPECTION END

P31F9, P31FA ASCD STEERING SWITCH

DTC Logic

INFOID:0000000008144611

DTC DETECTION LOGIC

NOTE:
If DTC P31F9 or P31FA is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1D. Refer to HBC-137, "DTC Logic".

Without ICC models

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31F9	ASCD SWITCH (ASCD steering switch)	When the input signal system from ASCD steering switch is abnormal	• Harness or connectors (ASCD steering switch circuit is open or shorted.) • ASCD steering switch
P31FA	ASCD SWITCH (ASCD steering switch)		

With ICC models

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31F9	ASCD SWITCH (ICC steering switch)	When the input signal system from ICC steering switch is abnormal	• Harness or connectors (ICC steering switch circuit is open or shorted.) • ICC steering switch
P31FA	ASCD SWITCH (ICC steering switch)		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

Which type?

Without ICC models>>GO TO 2.
With ICC models>>GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-318, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press dynamic driver assistance switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-318, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144612

1.INSPECTION START

Check which type the vehicle is equipped with.

Which type?

Without ICC models>>GO TO 2.
With ICC models>>GO TO 6.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select “ASCD SET SW”, “RESUME/ACC SW”, “CANCEL SW” and “MAIN SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check each item indication as per the following conditions.

Monitor item	Condition		Indication
ASCD SET SW	SET/COAST switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF

Without CONSULT

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

HPCM			Condition	Voltage (Approx.)
Connector	+	—		
	Terminal			
B158	5	4	MAIN switch: Pressed	0 V
			CANCEL switch: Pressed	1.0 V
			SET/COAST switch: Pressed	2.0 V
			RESUME/ACCELERATE switch: Pressed	3.0 V
			All steering switches: Released	4.0 V

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

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

+		–		Continuity
Combination switch		HPCM		
Connector	Terminal	Connector	Terminal	
M36	32	B158	4	Existed

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

Is the inspection result normal?

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

4. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch and HPCM harness connector.

+		–		Continuity
Combination switch		HPCM		
Connector	Terminal	Connector	Terminal	
M36	25	B158	5	Existed

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

Is the inspection result normal?

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

5. CHECK ASCD STEERING SWITCH

Refer to HBC-320, "Component Inspection (ASCD Steering Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace ASCD steering switch. Refer to ST-29, "Exploded View".

6. CHECK ICC STEERING SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select “ASCD SET SW”, “RESUME/ACC SW”, “CANCEL SW”, “MAIN SW” and “DISTANCE SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check each item indication as per the following conditions.

Monitor item	Condition		Indication
ASCD SET SW	SET/COAST switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
DISTANCE SW	DISTANCE switch	Pressed	ON
		Released	OFF

Without CONSULT

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

HPCM			Condition	Voltage (Approx.)
Connector	+	−		
	Terminal			
B158	5	4	MAIN switch: Pressed	0 V
			Dynamic driver assistance switch: Pressed	1.0 V
			CANCEL switch: Pressed	1.9 V
			SET/COAST switch: Pressed	2.6 V
			RESUME/ACCELERATE switch: Pressed	3.2 V
			DISTANCE switch: Pressed	3.7 V
			All steering switches: Released	4.2 V

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 7.

7.CHECK ICC STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

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

+		−		Continuity
Combination switch		HPCM		
Connector	Terminal	Connector	Terminal	
M36	32	B158	4	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK ICC STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch and HPCM harness connector.

+		−		Continuity
Combination switch		HPCM		
Connector	Terminal	Connector	Terminal	
M36	25	B158	5	Existed

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

Is the inspection result normal?

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

9.CHECK ICC STEERING SWITCH

Refer to HBC-321, "Component Inspection (ICC Steering Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace ICC steering switch. Refer to ST-29, "Exploded View".

Component Inspection (ASCD Steering Switch)

INFOID:0000000008144613

1.CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Ω)
Connector	+	–		
	Terminal			
M303	13	16	MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 250
			SET/COAST switch: Pressed	Approx. 660
			RESUME/ACCELERATE switch: Pressed	Approx. 1,480
			All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch. Refer to ST-29, "Exploded View".

Component Inspection (ICC Steering Switch)

INFOID:0000000008144614

1. CHECK ICC STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Ω)
Connector	+	–		
	Terminal			
M303	13	16	MAIN switch: Pressed	Approx. 0
			Dynamic driver assistance switch: Pressed	Approx. 267
			CANCEL switch: Pressed	Approx. 615
			DISTANCE switch: Pressed	Approx. 1,090
			SET/COAST switch: Pressed	Approx. 1,805
			RESUME/ACCELERATE switch: Pressed	Approx. 2,985
			All ICC steering switches: Released	Approx. 5,415

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ICC steering switch. Refer to CCS-169, "Exploded View".

P31FE ICC FUNCTION

DTC Logic

INFOID:0000000008144615

DTC DETECTION LOGIC

NOTE:

- If DTC P31FE is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P31FE is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1D. Refer to HBC-137, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31FE	ASCD SYSTEM (ICC function)	HPCM detects a difference between signals from ADAS control unit is out of specified range.	ADAS control unit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Press MAIN switch on ICC steering switch.
3. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
4. Press SET/COAST switch.
5. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-322, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144616

1.REPLACE ADAS CONTROL UNIT

1. Replace ADAS control unit. Refer to DAS-56, "Removal and Installation".
2. Perform CCS-68, "Work Procedure (Vehicle-To-Vehicle Distance Control Mode)".
3. Check DTC of ADAS control unit. Refer to CCS-28, "CONSULT Function (ICC/ADAS)".

>> INSPECTION END

P31FF ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000008144617

The ECM receives two vehicle speed signals via the CAN communication line. One is sent from “combination meter”, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to HBC-35, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" for ASCD functions.

DTC Logic

INFOID:0000000008144618

DTC DETECTION LOGIC

NOTE:

- If DTC P31FF is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
- If DTC P31FF is displayed with DTC P0A1D, first perform the trouble diagnosis for DTC P0A1D. Refer to HBC-137, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31FF	ASCD VEHICLE SPEED SENSOR (ASCD vehicle speed sensor)	Vehicle speed signal for ASCD is out of the specified range.	• Harness or connectors (CAN communication line is open or shorted.) • Combination meter • Wheel sensor • ABS actuator and electric unit (control unit) • TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY.
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Proceed to HBC-323, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008144619

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-64, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to TM-80, "DTC Index".

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit. Refer to BRC-45, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to BRC-57, "DTC Index".

3. CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-36, "CONSULT Function".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to MWI-51, "DTC Index".

BRAKE SWITCH

Component Function Check

INFOID:0000000008144620

1.CHECK BRAKE SWITCH FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “ENGINE” using CONSUL
3. Check “ASCD BRAKE SW” indication as per the following conditions.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between HPCM harness connector and ground as per the following.

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
B159	59	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-325, "Diagnosis Procedure"

Diagnosis Procedure

INFOID:0000000008144621

1.INSPECTION START

Check which type the vehicle is equipped with.

Which type?

Without ICC models>>GO TO 2.
With ICC models>>GO TO 6.

2.CHECK BRAKE SWITCH CIRCUIT

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage HPCM harness connector terminals as per the following condition.

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
B159	59	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake switch harness connector and ground.

+		–	Voltage
Brake switch			
Connector	Terminal		
E109	1	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK BRAKE SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Brake switch		HPCM		
Connector	Terminal	Connector	Terminal	
E109	2	B159	59	Existed

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

Is the inspection result normal?

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

5.CHECK BRAKE SWITCH

Check brake switch. Refer to HBC-328, "Component Inspection (Brake Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace brake switch. Refer to BR-280, "Removal and Installation".

6.CHECK DTC WITH ELECTRICALLY-DRIVEN INTELLIGENT BRAKE UNIT

Check DTC with electrically-driven intelligent brake unit. Refer to BR-30, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Perform diagnosis procedure corresponding to DTC indicated. Refer to BR-38, "DTC Index".

7.CHECK BRAKE SWITCH CIRCUIT

With CONSULT
1. Turn ignition switch ON.
2. Select “ASCD BRAKE SW” in “DATA MONITOR” mode of “EV/HEV” using CONSULT.
3. Check that monitor indication as per the following condition.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage HPCM harness connector terminals as per the following condition.

+		–	Condition		Voltage (Approx.)
HPCM					
Connector	Terminal				
B159	59	Ground	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> GO TO 8.

8. CHECK BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake switch harness connector and ground.

+		–	Voltage
Brake switch			
Connector	Terminal		
E114	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> Perform the trouble diagnosis for power supply circuit.

9. CHECK STOP LAMP OFF RELAY 1

Check stop lamp OFF relay 1. Refer to HBC-328, "Component Inspection (Stop Lamp OFF Relay 1)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace stop lamp OFF relay 1.

10. CHECK STOP LAMP OFF RELAY 2

Check stop lamp OFF relay 2. Refer to HBC-329, "Component Inspection (Stop Lamp OFF Relay 2)".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace stop lamp OFF relay 2.

11. CHECK BRAKE SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Brake switch		HPCM		
Connector	Terminal	Connector	Terminal	
E114	2	B159	59	Existed

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

Is the inspection result normal?

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

12. CHECK BRAKE SWITCH

Check brake switch. Refer to HBC-328, "Component Inspection (Brake Switch)".

Is the inspection result normal?

YES >> Perform GI-49, "Intermittent Incident".
NO >> Replace brake switch. Refer to BR-280, "Removal and Installation".

Component Inspection (Brake Switch)

INFOID:0000000008144622

1. CHECK BRAKE SWITCH-1

1. Turn ignition switch OFF.
2. Disconnect brake switch harness connector.
3. Check the continuity between brake switch terminals as per the following condition.

Brake switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Existed
			Fully released	Not existed

Is the inspection result normal?

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

2. CHECK BRAKE SWITCH-2

1. Adjust brake switch installation. Refer to BR-281, "Inspection and Adjustment".
2. Check the continuity between brake switch terminals as per the following condition.

Brake switch		Condition		Continuity
+	–			
Terminal				
1	2	Brake pedal	Slightly depressed	Existed
			Fully released	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake switch. Refer to BR-280, "Removal and Installation".

Component Inspection (Stop Lamp OFF Relay 1)

INFOID:0000000008144623

1. CHECK STOP LAMP OFF RELAY 1

1. Turn ignition switch OFF.
2. Remove stop lamp OFF relay 1.
3. Check the continuity between stop lamp OFF relay 1 terminals as per the following condition.

Stop lamp OFF relay 1		Condition	Continuity
+	–		
Terminal			
3	4	12 V direct current supply between terminals 1 and 2	Not existed
		No current supply	Existed
	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp OFF relay 1.

Component Inspection (Stop Lamp OFF Relay 2)

INFOID:0000000008144624

1. CHECK STOP LAMP OFF RELAY 2

1. Turn ignition switch OFF.
2. Remove stop lamp OFF relay 2.
3. Check the continuity between stop lamp OFF relay 2 terminals as per the following condition.

Stop lamp OFF relay 2		Condition	Continuity
+	–		
Terminal			
5	3	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp OFF relay 2.

INDICATOR LAMP

Component Function Check

INFOID:0000000008144625

1.CHECK HYBRID SYSTEM WARNING LAMP AND 12-VOLT BATTERY CHARGE WARNING LAMP FUNCTION

1. Turn ignition switch ON.
2. Check that hybrid system warning lamp and 12-volt battery charge warning lamp lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-330, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144626

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-36, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis relevant to DTC indicated. Refer to MWI-51, "DTC Index".

3.CHECK INTERMITTENT INCIDENT

Perform GI-49, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-81, "Removal and Installation".
NO >> Repair or replace error-detected parts.

INFORMATION DISPLAY (ASCD)

Component Function Check

INFOID:0000000008144627

1.CHECK INFORMATION DISPLAY (ASCD)

1. Set the vehicle to READY.
2. Press MAIN switch on ASCD steering switch.
3. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive the vehicle at a safe speed.
4. Press SET/COAST switch.
5. Check that the reading of the speedmeter shows the same value as the set speed indicated in the information display while driving the vehicle on a flat road.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to HBC-331, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008144628

1.CHECK DTC

1. Perform self- diagnosis.
2. Check that DTC UXXXX or P31FF is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO-1 >> Perform trouble diagnosis for DTC UXXXX. Refer to HBC-71, "DTC Index".
NO-2 >> Perform trouble diagnosis for DTC P31FF. Refer to HBC-323, "Diagnosis Procedure".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-36, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis relevant to DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-49, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-81, "Removal and Installation".
NO >> Repair or replace error-detected parts.

INSULATION RESISTANCE

Insulation Resistance

INFOID:0000000008144629

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to HBC-7, "High Voltage Precautions".**

CAUTION:

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

1. PRECONDITIONING

WARNING:

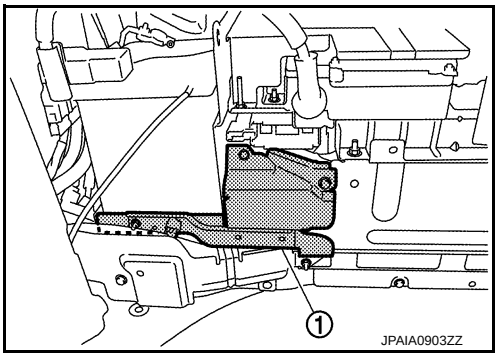
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

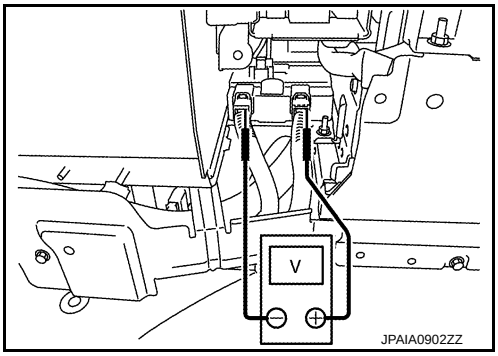
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 2.

2. CHECK HIGH VOLTAGE HARNESS INSULATION RESISTANCE

Check insulation resistance of the high voltage harness with an insulation resistance tester (multi tester).

Measurement point

Vehicle installation state
- Resistance between the harness connector terminal and body

Only as for the harness
- Resistance between the harness connector terminal and harness connector plastic
- Resistance between the harness connector terminal and harness coating (a shield)

CAUTION:
- **Be sure to check that a harness connector and harness coating (a shield) do not have a wound or the damage such as cracks, and change it when there is a wound or a crack.**
- **Be sure to set the insulation resistance tester to 500V when performing this test. Using a setting higher than 500V can result in damage to the component being inspected.**
- **Wait for 30 seconds until the value becomes stable.**

- Li-ion battery

High voltage harness connector		Resistance
Connector	Terminal	
LB40	28	More than 100 MΩ
	29	

- Battery junction box

High voltage harness connector		Resistance
Connector	Terminal	
LB31	27	More than 100 MΩ
LB32	26	
LB37	29	
LB38	30	

- Electric compressor

High voltage harness connector		Resistance
Connector	Terminal	
C12	1	More than 100 MΩ
	2	
	3	
	4	

- Traction motor inverter

High voltage harness connector		Resistance
Connector	Terminal	
C9	49	More than 100 MΩ
	50	
	51	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high voltage harness with the malfunction.

SYMPTOM DIAGNOSIS

HYBRID CONTROL SYSTEM

Symptom Table

INFOID:0000000008144630

Engine, Motor

×: Applicable

	SYMPTOM														Refer-ence page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	EXCESSIVE FUEL CONSUMPTION	WARNING LIGHT ON/HYBRID SYSTEM WARNING LAMP	OTHERS/DOES NOT ACTIVATE HYBRID SYSTEM	OTHERS/IMPOSSIBLE OF ACCELERATION	OTHERS/IMPOSSIBLE OF DRIVING	OTHERS/DOES NOT SET TO READY	OTHERS/ENGINE STARTING SHOCK	
Warranty symptom code	AA	AB	AC	AE	AF	AG	AH	AL	HC	ZZ	ZZ	ZZ	ZZ	ZZ	
HPCM power supply and ground circuit	×	×	×	×	×	×	×			×	×	×	×	×	HBC-93
Self shut-OFF relay circuit										×	×	×	×		HBC-243
Ignition signal circuit		×	×	×					×	×	×	×	×		HBC-110
Starter switch signal circuit										×			×		HBC-110
Electric water pump circuit															HBC-120 HBC-140
ASCD/ICC steering switch circuit															HBC-318
Accelerator pedal position sensor 1 circuit			×	×											HBC-221 HBC-229 HBC-294
Accelerator pedal position sensor 2 circuit			×	×											HBC-225 HBC-229 HBC-294
Sensor power supply and ground circuit	×	×	×	×	×	×								×	HBC-294
Brake switch circuit															HBC-210 HBC-250 HBC-325
CAN system circuit									×	×	×	×	×		HBC-102 HBC-107
HEV system CAN circuit	×	×	×	×	×	×	×	×	×	×	×	×	×	×	HBC-98 HBC-100 HBC-103 HBC-105

	SYMPTOM														Refer-ence page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	EXCESSIVE FUEL CONSUMPTION	WARNING LIGHT ON/HYBRID SYSTEM WARNING LAMP	OTHERS/DOES NOT ACTIVATE HYBRID SYSTEM	OTHERS/IMPOSSIBLE OF ACCELERATION	OTHERS/IMPOSSIBLE OF DRIVING	OTHERS/DOES NOT SET TO READY	OTHERS/ENGINE STARTING SHOCK	
Warranty symptom code	AA	AB	AC	AE	AF	AG	AH	AL	HC	ZZ	ZZ	ZZ	ZZ	ZZ	
Inter lock switch circuit										×	×	×	×		HBC-129
Clutch 1 stroke sensor circuit	×		×	×	×	×								×	HBC-113 HBC-115 HBC-236 HBC-294
Service plug circuit										×	×	×	×		HBC-205
System main relay 1 signal circuit										×	×	×	×		HBC-143 HBC-155 HBC-162 HBC-179
System main relay 2 signal circuit										×	×	×	×		HBC-143 HBC-167 HBC-184
DC/DC converter signal circuit										×	×	×	×		HBC-122 HBC-125 HBC-133
Pre-charge signal circuit										×	×	×	×		HBC-189 HBC-192 HBC-195 HBC-200
HPCM		×	×	×	×	×	×		×	×	×	×	×	×	HBC-112 HBC-137 HBC-294

TM/CLUTCH, CHASSIS/BRAKE/STEERING, AIR CONDITIONING, ELECTRICAL

×: Applicable

	TM/CLUTCH		CHASSIS/BRAKE/ STEERING		AIR CONDITION-ING		ELEC-TRICAL	
	SYMPTOM							
	A/T SHIFT SHOCK	JUDDER	POOR BRAKING	WARNING LIGHT ON/ABS, VDC etc.	POOR HEATING	POOR COOLING	NO OR OMPROPER OPERATION	Reference page
Warranty symptom code	BE	ZP	DA	HC	GA	GB	ZE	
HPCM power supply and ground circuit	×	×	×					HBC-93
Self shut-OFF relay circuit					×	×		HBC-243
Ignition signal circuit				×	×	×		HBC-110
Starter switch signal circuit								HBC-110
Electric water pump circuit							×	HBC-120 HBC-140
ASCD/ICC steering switch circuit							×	HBC-318
Accelerator pedal position sensor 1 circuit								HBC-221 HBC-229 HBC-294
Accelerator pedal position sensor 2 circuit								HBC-225 HBC-229 HBC-294
Sensor power supply and ground circuit	×	×	×					HBC-294
Brake switch circuit							×	HBC-210 HBC-250 HBC-325
CAN system circuit							×	HBC-102 HBC-107
HEV system CAN circuit	×	×			×	×	×	HBC-98 HBC-100 HBC-103 HBC-105
Inter lock switch circuit								HBC-129
Clutch 1 stroke sensor circuit	×	×						HBC-113 HBC-115 HBC-236 HBC-294
Service plug circuit								HBC-205
System main relay 1 signal circuit					×	×		HBC-143 HBC-155 HBC-162 HBC-179
System main relay 2 signal circuit					×	×		HBC-143 HBC-167 HBC-184

	TM/CLUTCH		CHASSIS/BRAKE/ STEERING		AIR CONDITION-ING		ELEC-TRICAL	
	SYMPTOM							
	A/T SHIFT SHOCK	JUDDER	POOR BRAKING	WARNING LIGHT ON/ABS, VDC etc.	POOR HEATING	POOR COOLING	NO OR OMPROPER OPERATION	Reference page
Warranty symptom code	BE	ZP	DA	HC	GA	GB	ZE	
DC/DC converter signal circuit								HBC-122 HBC-125 HBC-133
Pre-charge signal circuit								HBC-189 HBC-192 HBC-195 HBC-200
HPCM	×	×	×	×	×	×		HBC-112 HBC-137 HBC-294

INFINITI DRIVE MODE SELECTOR

Symptom Table

INFOID:0000000008144631

SYSTEM — DRIVE MODE SELECTOR —

<table>
<tr><th>Malfunction</th><th colspan="2">Check item</th><th>Probable malfunctioning part/ Action</th></tr>
<tr><td rowspan="3">ECO pedal reaction force is not generated when in ECO mode.</td><td rowspan="2">Only ECO pedal reaction force is not generated.
[Intelligent pedal (distance control assist) operates normally.]</td><td>The central switch of the navigation system operates normally.</td><td>Perform self-diagnosis of the hybrid control system.
Refer to HBC-71, "DTC Index".</td></tr>
<tr><td>The central switch of the navigation system malfunctions.</td><td>Perform self-diagnosis of the navigation system.
Refer to AV-97, "Symptom Table" (BASE AUDIO WITHOUT NAVIGATION) or AV-253, "Symptom Table" (BOSE AUDIO WITH NAVIGATION)</td></tr>
<tr><td colspan="2">Intelligent pedal (distance control assist) reaction force is not generated as well.</td><td>Perform self-diagnosis of the ADAS control unit, ICC sensor, and Accelerator pedal actuator.
• ADAS control unit: Refer to CCS-50, "DTC Index".
• ICC SENSOR: Refer to CCS-55, "DTC Index".
• ACCELERATOR PEDAL ACTUATOR: Refer to HBC-71, "DTC Index".</td></tr>
<tr><td rowspan="3">When in ECO mode, settings of ECO pedal reaction force cannot be changed or vehicle behavior does not agree to the settings.</td><td colspan="2">Intelligent pedal (distance control assist) reaction force has a malfunction as well.</td><td>Perform self-diagnosis of the ADAS control unit, ICC sensor, and Accelerator pedal actuator.
• ADAS control unit: Refer to CCS-50, "DTC Index".
• ICC SENSOR: Refer to CCS-55, "DTC Index".
• ACCELERATOR PEDAL ACTUATOR: Refer to HBC-71, "DTC Index".</td></tr>
<tr><td rowspan="2">Intelligent pedal (distance control assist) reaction force is normal.</td><td>The central switch of the navigation system operates normally.</td><td>Perform self-diagnosis of the hybrid control system.
Refer to HBC-71, "DTC Index".</td></tr>
<tr><td>The central switch of the navigation system malfunctions.</td><td>Perform self-diagnosis of the navigation system.
Refer to AV-97, "Symptom Table" (BASE AUDIO WITHOUT NAVIGATION) or AV-253, "Symptom Table" (BOSE AUDIO WITH NAVIGATION)</td></tr>
</table>

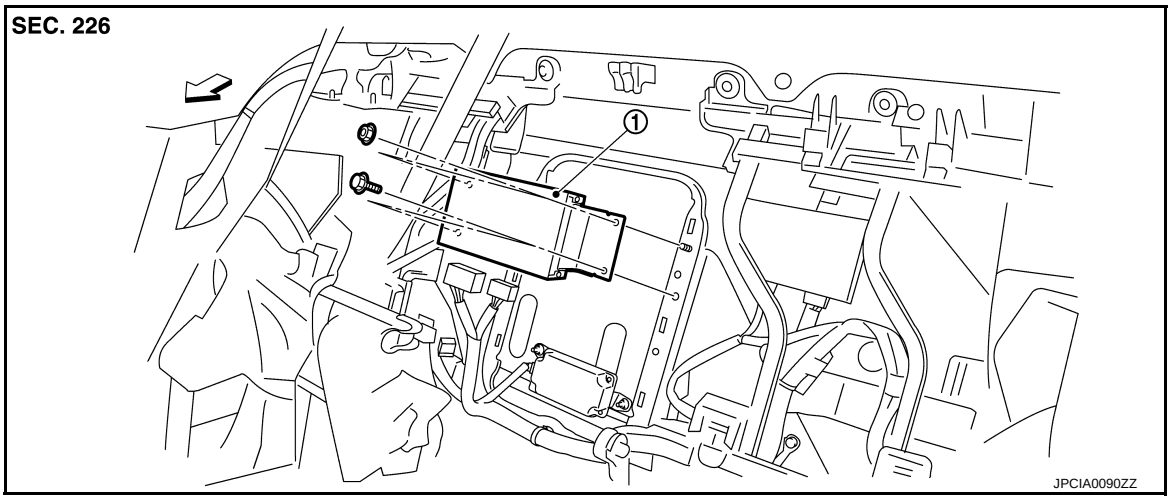
REMOVAL AND INSTALLATION

HPCM

Removal and Installation

INFOID:0000000008144632

EXPLODED VIEW



1. HPCM

⇦ : Vehicle front

REMOVAL

1. Remove rear seat. Refer to SE-93, "Removal and Installation".
2. Disconnect HPCM harness connector.
3. Remove HPCM mounting nuts, and then remove HPCM from vehicle.

INSTALLATION

Installation in the reverse order of removal.

CAUTION:

Must be perform additional service when replacing HPCM. Refer to HBC-86, "Work Procedure".

DC/DC CONVERTER

Exploded View

INFOID:0000000008144633

DC/DC converter is a component parts of the Li-ion battery. Refer to HBB-195, "Exploded View".

Disassembly & Assembly

Refer to HBB-197, "DC/DC CONVERTER : Disassembly and Assembly".