HYBRID BATTERY SYSTEM

PRECAUTION

1. PRECAUTIONS FOR INSPECTING HYBRID BATTERY SYSTEM

(a) Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip (see page IN-5). After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.

**NOTICE:** Turning the power switch ON (READY) with the service plug grip removed could cause a malfunction. Therefore, do not turn the power switch ON (READY) unless instructed by the repair manual.

(b) After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.

**HINT:** At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

(c) Since liquid leakage may occur, wear protective goggles when checking inside the HV battery.

(d) Wear insulated gloves, turn the power switch OFF, and disconnect the negative terminal of the auxiliary battery before touching any of the orange-colored wires of the high-voltage system.

(e) Turn the power switch OFF before performing a resistance check.

(f) Turn the power switch OFF before disconnecting or reconnecting any connector.

(g) To install the service plug grip, the lever must be flipped and locked downward. Once it is locked in place, it turns the interlock switch ON. Make sure to lock it securely because if you leave it unlocked, the system will output a DTC related to the interlock switch system.
2. NOTICE FOR INITIALIZATION
When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the cable is reconnected.

<table>
<thead>
<tr>
<th>System Name</th>
<th>See Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Window Control System</td>
<td>IN-32</td>
</tr>
</tbody>
</table>

3. NOTICE FOR HYBRID SYSTEM ACTIVATION
- When the warning light is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first attempt. If so, press the power switch again.
- With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.
HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
*: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

2 CUSTOMER PROBLEM ANALYSIS

3 CONNECT INTELLIGENT TESTER TO DLC3*

HINT:
If the display indicates a communication fault in the tester, inspect the DLC3.

4 CHECK AND RECORD DTC AND FREEZE FRAME DATA*

(a) Refer to the the DTC CHECK / CLEAR (see page HB-17).

HINT:
If a DTC related to the CAN communication system malfunction is output, first troubleshoot and repair the CAN communication system (see page CA-6).

5 CLEAR DTC*

(a) Refer to the the DTC CHECK / CLEAR (see page HB-17).

6 PROBLEM SYMPTOM CONFIRMATION

(a) When a malfunction does not occur, go to A.
(b) When a malfunction occurs, go to B.

B Go to step 8

A
7 SYMPTOM SIMULATION

NEXT

8 CHECK DTC*

(a) Refer to the DTC CHECK / CLEAR (see page HB-17).

NEXT

9 DTC CHART

(a) Refer to the DIAGNOSTIC TROUBLE CODE CHART (see page HB-23).

NEXT

10 CIRCUIT INSPECTION

NEXT

11 IDENTIFICATION OF PROBLEM

NEXT

12 ADJUSTMENT AND/OR REPAIR

NEXT

13 CONFIRMATION TEST

NEXT

END
## 1. DEFINITION OF TERMS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>The minimum time that the battery ECU must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the “typical enabling conditions” are met</td>
</tr>
<tr>
<td>Frequency of operation</td>
<td>The number of times that the battery ECU checks for malfunction per driving cycle. “Once per driving cycle” means that the battery ECU detects malfunction only one time during a single driving cycle. “Continuous” means that the battery ECU detects malfunction every time when enabling condition is met.</td>
</tr>
<tr>
<td>MIL operation</td>
<td>MIL illumination timing after a defect is detected. “Immediate” means that the battery ECU illuminates the MIL the instant the battery ECU determines that there is malfunction. “2 driving cycles” means that the battery ECU illuminates the MIL if the same malfunction is detected again in the 2nd driving cycle.</td>
</tr>
<tr>
<td>Monitor description</td>
<td>Description of what the battery ECU monitors and how it detects malfunction (monitoring purpose and its details)</td>
</tr>
<tr>
<td>Related DTCs</td>
<td>A group of DTCs that is classified by a system and a troubleshooting procedure</td>
</tr>
<tr>
<td>Required sensor/components</td>
<td>The sensors and components that are used by the battery ECU to detect malfunction</td>
</tr>
<tr>
<td>Sequence of operation</td>
<td>The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded</td>
</tr>
<tr>
<td>Typical enabling condition</td>
<td>Preconditions that allow the battery ECU to detect malfunction. With all preconditions satisfied, the battery ECU sets the DTC when the monitored value(s) exceeds the malfunction threshold(s)</td>
</tr>
<tr>
<td>Typical malfunction thresholds</td>
<td>Beyond this value, the battery ECU will conclude that there is malfunction and set a DTC</td>
</tr>
</tbody>
</table>
SYSTEM DIAGRAM

Hybrid Vehicle Control ECU

Power Source Control ECU

Battery ECU

High Voltage

Service Plug Grip

CAN Communication

HV Battery Assembly

No. 1 Battery Blower

Auxiliary Battery

MAIN

P/I

BATT FAN

AM

IGCT

AM2

IGN

IG2

IG2D

CANH

CANL

GBB0

VBB1

VBB8

VBB9

VBB10

VBB11

VBB13

VBB14
Communication System Diagram

Battery ECU

Hybrid Vehicle Control ECU

ECM

A/C Amplifier

Gateway ECU

CAN

BEAN
SYSTEM DESCRIPTION

1. OUTLINE

The principal role of the hybrid battery system is to monitor the condition of the HV battery assembly through the use of the battery ECU and transmit this information to the hybrid vehicle control ECU. Furthermore, this system controls the battery blower motor controller in order to maintain a proper temperature in the HV battery assembly.

The battery ECU uses the CAN (Controller Area Network) to maintain communication with the following devices: the hybrid vehicle control ECU, ECM, and A/C amplifier.*

HINT:

*: Because it the battery ECU connected to the BEAN (Body Electronics Area Network), data is transmitted via the gateway ECU.
2. CONTROL DESCRIPTION

(a) HV battery assembly management and fail-safe function.

(1) When the vehicle is accelerated, the battery assembly is discharged. When the vehicle is decelerated, the battery assembly is charged by converting brake energy. The battery ECU calculates SOC (state of charge) of the HV battery based on voltage, current, and temperature, and then sends the results to the hybrid vehicle control ECU. As a result, charge and discharge control is performed in the hybrid vehicle control ECU depending on the SOC.
(2) If a malfunction occurs, the battery ECU performs a fail-safe function and protects the HV battery assembly in accordance with the extent of the malfunction.

(b) Battery blower motor control.

(1) To control an increase in the temperature of the HV battery assembly while the vehicle is being driven, the battery ECU determines and controls the operating mode of the battery blower in accordance with the temperature of the HV battery assembly.

(c) MIL illumination control.

(1) If the battery ECU detects a malfunction that affects the exhaust gas emissions, it will transmit an MIL illumination request to the hybrid vehicle control ECU. (The battery ECU does not directly illuminate the MIL.)
CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS
   (a) Perform a simulation test (see page IN-36).
       (1) In the simulation test, reproduce the driving condition when the trouble occurred according to the customer's comments and freeze frame data recorded with DTCs.
   (b) Check the connector(s) and terminal(s) (see page IN-45).
   (c) Wiggle the harness and connector(s) (see page IN-45).
1. CHECK BATTERY ECU

(a) Measure the voltage of the battery ECU connector.

HINT: 
Each ECU terminal's standard voltage is shown in the table below. 
In the table, first follow the information under "Condition". Look under "Symbols (Terminal No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition". 
Use the illustration above as a reference for the ECU terminals.

<table>
<thead>
<tr>
<th>Symbols (Terminal No.)</th>
<th>Wiring Color</th>
<th>Terminal Description</th>
<th>Condition</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM (B11-1) - GND (B11-12)</td>
<td>G - W-B</td>
<td>Auxiliary battery (for measuring battery voltage and for battery ECU memory)</td>
<td>Always</td>
<td>9 to 14 V</td>
</tr>
<tr>
<td>IGCT (B11-2) - GND (B11-12)</td>
<td>L - W-B</td>
<td>Control signal</td>
<td>Power switch ON (READY)</td>
<td>9 to 14 V</td>
</tr>
<tr>
<td>VM (B11-9) - GND (B11-12)</td>
<td>V - W-B</td>
<td>Battery blower motor monitoring signal</td>
<td>Battery blower motor mode 1 actuation (at low speed)</td>
<td>10 to 14 V</td>
</tr>
<tr>
<td>VM (B11-9) - GND (B11-12)</td>
<td>V - W-B</td>
<td>Battery blower motor monitoring signal</td>
<td>Battery blower motor mode 6 actuation (at high speed)</td>
<td>2 to 6 V</td>
</tr>
</tbody>
</table>
(b) Using an oscilloscope, check the waveform 1.

**Waveform 1 (HIGH-level CAN bus line)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbols (Terminal No.)</td>
<td>CANH (B11-18) - GND (B11-12)</td>
</tr>
<tr>
<td>Tool Setting</td>
<td>1 V/Div., 2 µsec./Div.</td>
</tr>
<tr>
<td>Condition</td>
<td>Power switch ON (IG)</td>
</tr>
</tbody>
</table>

**HINT:**
The waveform varies depending on the contents of the communication.

(c) Using an oscilloscope, check the waveform 2.

**Waveform 2 (LOW-level CAN bus line)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbols (Terminal No.)</td>
<td>CANL (B11-19) - GND (B11-12)</td>
</tr>
<tr>
<td>Tool Setting</td>
<td>1 V/Div., 2 µsec./Div.</td>
</tr>
<tr>
<td>Condition</td>
<td>Power switch ON (IG)</td>
</tr>
</tbody>
</table>

**HINT:**
The waveform varies depending on the contents of the communication.
(d) Using an oscilloscope, check the waveform 3. Waveform 3 (Battery blower motor actuation signal)

<table>
<thead>
<tr>
<th>Item</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>symbols (Terminal No.)</em></td>
<td>SI (B11-24) - GND (B11-12)</td>
</tr>
<tr>
<td>Tool Setting</td>
<td>1 V/Div., 50 μsec./Div.</td>
</tr>
<tr>
<td>Condition</td>
<td>During vehicle stop</td>
</tr>
</tbody>
</table>

HINT:
Amplitude A and B in the diagram vary by mode.

<table>
<thead>
<tr>
<th>Mode</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>44.4 μsec.</td>
<td>155.6 μsec.</td>
</tr>
<tr>
<td>2</td>
<td>44.4 μsec.</td>
<td>155.6 μsec.</td>
</tr>
<tr>
<td>3</td>
<td>51.6 μsec.</td>
<td>148.4 μsec.</td>
</tr>
<tr>
<td>4</td>
<td>59.0 μsec.</td>
<td>141.0 μsec.</td>
</tr>
<tr>
<td>5</td>
<td>59.0 μsec.</td>
<td>141.0 μsec.</td>
</tr>
<tr>
<td>6</td>
<td>146.4 μsec.</td>
<td>53.6 μsec.</td>
</tr>
</tbody>
</table>

**DIAGNOSIS SYSTEM**

1. **DESCRIPTION**

- The battery ECU has a self-diagnosis system. If the computer, HV battery system or the components are not working properly, the ECU carries out a diagnosis to detect the malfunction, and illuminates the master warning light in the combination meter together with the HV system warning indicator on the multi-information display.

HINT:
The master warning light illuminates when the HV battery system fails and it blinks when in inspection mode.

- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect the OBD II scan tool (complying with ISO 15031-4) or the intelligent tester to the vehicle, and read various data output from the vehicle's ECUs.
- OBD II regulations require that the vehicle's on-board computer illuminate the MIL in the instrument panel when the computer detects a malfunction in: 1) the emission control systems/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computers. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the battery ECU memory (see page HB-23).

If the malfunction does not recur in 3 consecutive trips, the MIL will turn off automatically. However the DTCs remain recorded in the battery ECU memory.

- To check the DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) with the CAN vehicle interface module (CAN VIM). Or, connect the OBD II scan tool to the DLC3. The intelligent tester or OBD II scan tool also enables you to erase DTCs and check the freeze frame data and various forms of the HV battery system data (for operating instructions, refer to their respective instruction manuals). The DTCs include SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while manufacturer controlled codes can be set by a manufacturer within the prescribed limits (see page HB-23).

- Freeze frame data:
The freeze frame data records the driving condition when a malfunction is detected. When troubleshooting, it can help determine if the vehicle was moving forward, braking, stationary, or moving in reverse.

### 2. CHECK DLC3

The battery ECU uses the ISO 15765-4. The terminal arrangement of the DLC3 complies with ISO 15031-3 and matches the ISO 15765-4 format.

<table>
<thead>
<tr>
<th>Symbols (Terminal No.)</th>
<th>Terminal Description</th>
<th>Condition</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIL (7) - SG (5)</td>
<td>Bus &quot;*&quot; line</td>
<td>During transmission</td>
<td>Pulse generation</td>
</tr>
<tr>
<td>CG (4) - Body ground</td>
<td>Chassis ground</td>
<td>Always</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>SG (5) - Body ground</td>
<td>Signal ground</td>
<td>Always</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>BAT (16) - Body ground</td>
<td>Battery positive</td>
<td>Always</td>
<td>9 to 14 V</td>
</tr>
<tr>
<td>CANH (6) - CANL (14)</td>
<td>HIGH-level CAN bus line</td>
<td>Ignition switch OFF</td>
<td>54 to 69 Ω</td>
</tr>
<tr>
<td>CANH (6) - Battery positive</td>
<td>HIGH-level CAN bus line</td>
<td>Ignition switch OFF</td>
<td>1 MΩ or higher</td>
</tr>
<tr>
<td>CANH (6) - CG (4)</td>
<td>HIGH-level CAN bus line</td>
<td>Ignition switch OFF</td>
<td>200 Ω or higher</td>
</tr>
<tr>
<td>CANL (14) - Battery positive</td>
<td>LOW-level CAN bus line</td>
<td>Ignition switch OFF</td>
<td>1 MΩ or higher</td>
</tr>
<tr>
<td>CANL (14) - CG (4)</td>
<td>LOW-level CAN bus line</td>
<td>Ignition switch OFF</td>
<td>200 Ω or higher</td>
</tr>
</tbody>
</table>
HINT:
*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, other switches or doors.
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.
HINT:
Connect the cable of the intelligent tester or the OBD II scan tool to the DLC3, turn the power switch ON (IG) and attempt to use the tester. If the display indicates UNABLE TO CONNECT TO VEHICLE has occurred, there is a problem either with the vehicle or with the tester.
- If communication is normal when the tester or scan tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester or scan tool is connected to another vehicle, the problem is probably in the tester or scan tool itself, so consult the Service Department listed in its instruction manual.

3. INSPECT AUXILIARY BATTERY
(a) Measure the voltage of the auxiliary battery.
   **Standard voltage:**
   - 11 to 14 V
(b) Inspect the auxiliary battery, fuses, fusible links, wiring harness, connectors and ground.

4. CHECK MIL
(a) The MIL illuminates when the power switch is turned ON (IG) and the "READY" light is OFF.
   If the MIL is not illuminated, troubleshoot the MIL circuit (see page ES-428).
(b) When the "READY" light turns illuminated, the MIL should turn off.
   If the MIL remains on, the diagnosis system has detected a malfunction or abnormality in the system.
DTC CHECK / CLEAR

1. CHECK DTC (HV BATTERY)
   (a) Connect the intelligent tester to the DLC3.
   (b) Turn the power switch ON (IG) and the tester ON.
   (c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
   (d) Confirm the details of the DTCs (see page HB-23).

2. CHECK FREEZE FRAME DATA
   (a) If a DTC is present, select that DTC in order to display its freeze frame data.
   (b) Read freeze frame data recorded when the DTC was set.

3. CHECK DTC (SYSTEMS OTHER THAN HV BATTERY)
   HINT:
The battery ECU maintains mutual communication with the computers, including the ECM, hybrid vehicle control ECU and others. Therefore, if the battery ECU outputs a warning, it is necessary to check and record the DTCs of all the systems.
   (a) Connect the intelligent tester to the DLC3.
   (b) Turn the power switch ON (IG) and the tester ON.
   (c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / CODES (All).
   (d) If DTCs output, check the relevant system.
   HINT:
   If DTCs for the CAN communication system are present in addition to other DTCs, first troubleshoot and repair any malfunctions in the CAN communication (see page CA-6).

4. CLEAR DTC
   (a) Connect the intelligent tester to the DLC3.
   (b) Turn the power switch ON (IG) and the tester ON.
   (c) Check that the shift position is in the P position.
   (d) Clear DTCs and freeze frame data.
      (1) Enter the following menus: DIAGNOSIS / OBD/ MOBD / HV BATTERY / DTC INFO / CLEAR CODES.
      (2) Press YES.
FREEZE FRAME DATA

HINT:
The freeze frame data records the operating conditions of the HV battery system and components when the DTC was set. It is used for estimating or simulating the condition of the vehicle when a malfunction occurred.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
(d) Select a DTC in order to display its freeze frame data.
(e) Check the freeze frame data of the DTC that has been detected.

Freeze frame data

<table>
<thead>
<tr>
<th>Intelligent Tester Display</th>
<th>Measurement Item/Range</th>
<th>Suspected Vehicle Status When Malfunction Occurs</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATTERY SOC</td>
<td>State of charge (SOC) of HV battery Min.: 0%, Max.: 100%</td>
<td>-</td>
</tr>
<tr>
<td>DELTA SOC</td>
<td>SOC variance/ Min.: 0%, Max.: 100%</td>
<td>Difference between maximum and minimum values of SOC at every battery block</td>
</tr>
<tr>
<td>IB BATTERY</td>
<td>Current value of battery pack/ Min.: -327.68 A, Max.: 327.67 A</td>
<td>Charging/discharging condition of HV battery • Discharging amperage indicated by a positive value • Charging amperage indicated by a negative value</td>
</tr>
<tr>
<td>BATT INSIDE AIR</td>
<td>Temperature of intake ambient air to battery pack/ Min.: -327.68°C, Max.: 327.67°C</td>
<td>-</td>
</tr>
<tr>
<td>VMF FAN VOLTAGE</td>
<td>Battery blower motor voltage/ Min.: 0 V, Max.: 25.4 V</td>
<td>Actuation condition of battery blower motor</td>
</tr>
<tr>
<td>AUX. BATT V</td>
<td>Auxiliary battery voltage/ Min.: 0 V, Max.: 25.4 V</td>
<td>Condition of auxiliary battery</td>
</tr>
<tr>
<td>WIN</td>
<td>Charge wattage of HV battery/ Min.: -64 kW, Max.: 0 kW</td>
<td>Charge control wattage which is sent from battery ECU to hybrid vehicle control ECU</td>
</tr>
<tr>
<td>WOUT</td>
<td>Discharge wattage of HV battery/ Min.: 0 kW, Max.: 63.5 kW</td>
<td>Discharge control wattage which is sent from battery ECU to hybrid vehicle control ECU</td>
</tr>
<tr>
<td>COOLING FAN SPD</td>
<td>Battery blower motor drive mode/ Min.: 0, Max.: 6</td>
<td>Stopped: 0 Low to high speed actuation: 1 to 6</td>
</tr>
<tr>
<td>ECU CTRL MODE</td>
<td>ECU control mode/ Min.: 0, Max.: 4</td>
<td>Operating condition of HV battery</td>
</tr>
<tr>
<td>SBLW RQST</td>
<td>Battery blower motor stop control request (standby blower)</td>
<td>-</td>
</tr>
<tr>
<td>BATT TEMP 1 to 3</td>
<td>Temperature of HV battery/ Min.: -327.68°C, Max.: 327.67°C</td>
<td>-</td>
</tr>
<tr>
<td>V1 to V14 BATT BLOCK</td>
<td>Battery block voltage/ Min.: -327.68 V, Max.: 327.67 V</td>
<td>Voltage variance among battery blocks</td>
</tr>
</tbody>
</table>
## FAIL-SAFE CHART

### 1. FAIL-SAFE CHART

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Detection Item</th>
<th>Driving Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0560</td>
<td>System Voltage</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0A1F</td>
<td>Battery Energy Control Module</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P0A7F</td>
<td>Hybrid Battery Pack Deterioration</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0A80</td>
<td>Replace Hybrid Battery Pack</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0A81</td>
<td>Hybrid Battery Pack Cooling Fan 1</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0A82</td>
<td>Hybrid Battery Pack Cooling Fan 1 Performance or Stuck OFF</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0A84</td>
<td>Hybrid Battery Pack Cooling Fan 1 Control Circuit Low</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0A85</td>
<td>Hybrid Battery Pack Cooling Fan 1 Control Circuit High</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0A95</td>
<td>High Voltage Fuse</td>
<td>Turns on READY light and drives in fail-safe mode (while the engine is running) Turns off READY light and stops the HV control system (while the engine stops)</td>
</tr>
<tr>
<td>P0A9C</td>
<td>Hybrid Battery Temperature Sensor &quot;A&quot; Range/Performance</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0A9D</td>
<td>Hybrid Battery Temperature Sensor &quot;A&quot; Circuit Low</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0A9E</td>
<td>Hybrid Battery Temperature Sensor &quot;A&quot; Circuit High</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0AAC</td>
<td>Hybrid Battery Pack Air Temperature Sensor &quot;A&quot; Circuit</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0ABF</td>
<td>Hybrid Battery Pack Current Sensor Circuit</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0AC0</td>
<td>Hybrid Battery Pack Current Sensor Circuit Range/Performance</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0AC1</td>
<td>Hybrid Battery Pack Current Sensor Circuit Low</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0AC2</td>
<td>Hybrid Battery Pack Current Sensor Circuit High</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P0AFA</td>
<td>Hybrid Battery System Voltage</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>P3011</td>
<td>Battery Block 1 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3012</td>
<td>Battery Block 2 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3013</td>
<td>Battery Block 3 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3014</td>
<td>Battery Block 4 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3015</td>
<td>Battery Block 5 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3016</td>
<td>Battery Block 6 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3017</td>
<td>Battery Block 7 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3018</td>
<td>Battery Block 8 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3019</td>
<td>Battery Block 9 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3020</td>
<td>Battery Block 10 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3021</td>
<td>Battery Block 11 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>DTC No.</td>
<td>Detection Item</td>
<td>Driving Condition</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>P3022</td>
<td>Battery Block 12 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3023</td>
<td>Battery Block 13 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>P3024</td>
<td>Battery Block 14 Becomes Weak</td>
<td>Turns on READY light and drives in fail-safe mode</td>
</tr>
<tr>
<td>U0100</td>
<td>Lost Communication with ECM/PCM &quot;A&quot;</td>
<td>Turns on READY light and drives normally</td>
</tr>
<tr>
<td>U0293</td>
<td>Lost Communication with HV ECU</td>
<td>Turns on READY light and drives normally</td>
</tr>
</tbody>
</table>
DATA LIST / ACTIVE TEST

1. READ DATA LIST

NOTICE:

- The DATA LIST values may vary significantly if there are slight differences in measurement, differences in the environment in which the measurements are obtained, or the aging of the vehicle. Thus, definite standards or judgment values are unavailable. There may be a malfunction even if a measured value is within the reference range.

- In the event of intricate symptoms, collect sample data from another vehicle of the same model operating under identical conditions, in order to reach an overall judgment by comparing all the items of the DATA LIST.

HINT:
Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST as the first step of troubleshooting is one method to shorten diagnostic time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / HV BATTERY / DATA LIST.
(d) Check the results by referring to the following table.

<table>
<thead>
<tr>
<th>Intelligent Tester Display</th>
<th>Measurement Item/Range (Display)</th>
<th>Reference Range</th>
<th>Diagnostic Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIL status</td>
<td>MIL status/ ON or OFF</td>
<td>MIL ON: ON</td>
<td>Constant ON: Repair in accordance with detected DTCs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRIVING MILEAGE</td>
<td>Accumulated driving mileage after the malfunction occurrence/ Min.: 0 km, Max.: 65,535 km</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BATTERY SOC</td>
<td>Battery state of charge/ Min.: 0%, Max.: 100%</td>
<td>Always: 0 to 100%</td>
<td>-</td>
</tr>
<tr>
<td>DELTA SOC</td>
<td>Difference between maximum and minimum values of SOC/ Min.: 0%, Max.: 100%</td>
<td>READY light ON, engine stopped and no electrical load: 0 to 60%</td>
<td>-</td>
</tr>
</tbody>
</table>
| IB BATTERY                | Current value of battery pack/ Min.: -327.68 A, Max.: 327.67 A | • Soon after a full-load acceleration with the engine stopped: Maximum 140 A (room temperature)  
  • When shifting into N position, 1 second has elapsed after engine started with P position, engine stopped, head light ON, A/C fan high, and READY light ON: Maximum 30 A | -               |
| BATT INSIDE AIR           | Temperature of intake ambient air to battery pack/ Min.: -327.68°C, Max.: 327.67°C | Undisturbed for 1 day: Same as ambient air temperature | -               |
| VMF FAN VOLTAGE           | Battery blower motor monitoring voltage/ Min.: -25.6 V, Max.: 25.4 V | Fan mode 1 with READY light ON and P position: 9.5 to 11.5 V | -               |
## 2. PERFORM ACTIVE TEST

**NOTICE:**
Beware that if the connector to the intelligent tester becomes disconnected or a communication error occurs during the ACTIVE TEST, the vehicle could become inoperative (READY light OFF).

**HINT:**
Performing an ACTIVE TEST using the intelligent tester enables components including the relay, VSV, and actuator, to be operated without removing any parts.
Performing an ACTIVE TEST as the first step of troubleshooting is one method to shorten diagnostic time.
It is possible to display items in the DATA LIST during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.

<table>
<thead>
<tr>
<th>Intelligent Tester Display</th>
<th>Measurement Item/Range (Display)</th>
<th>Reference Range</th>
<th>Diagnostic Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUX. BATT V</td>
<td>Auxiliary battery voltage/</td>
<td>Equivalent to auxiliary battery voltage</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min.: 0 V, Max.: 25.4 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIN</td>
<td>Charge control wattage which is</td>
<td>-25 kW or more</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>sent from battery ECU to hybrid</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>vehicle control ECU/</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Min.: -64 kW, Max.: 0 kW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WOUT</td>
<td>Discharge control wattage which</td>
<td>21 kW or less</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>is sent from battery ECU to hybrid vehicle control ECU/</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Min.: 0 kW, Max.: 63.5 kW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COOLING FAN SPD</td>
<td>Battery blower motor actuation</td>
<td>Stopped: 0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>mode/</td>
<td>Low to high speed actuation: 1 to 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Min.: 0, Max.: 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECU CTRL MODE</td>
<td>ECU control mode/</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min.: 0, Max.: 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBLW RQST</td>
<td>Battery blower motor stop control request (standby blower)</td>
<td>ON/OFF</td>
<td>-</td>
</tr>
<tr>
<td>BAT TEMP 1 to 3</td>
<td>Temperature of HV battery/</td>
<td>Undisturbed for 1 day: Same as ambient air temperature</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min.: -327.68°C, Max.: 327.67°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NUM OF BATT</td>
<td>The number of battery blocks/</td>
<td>Always: 14</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min.: 0, Max.: 255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAT BLOCK MIN V</td>
<td>Battery block minimum voltage/</td>
<td>SOC 50 to 60%; 12 V or more</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min.: -327.68 V, Max.: 327.67 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIN BAT BLOCK #</td>
<td>Battery block number with</td>
<td>One of numbers 0 to 13</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>minimum voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAT BLOCK MAX V</td>
<td>Battery block maximum voltage/</td>
<td>SOC 55 to 60%; 23 V or less</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min.: -327.68 V, Max.: 327.67 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAX BAT BLOCK #</td>
<td>Battery block number with</td>
<td>One of numbers 0 to 13</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>maximum voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1 to V14 BATT BLOCK</td>
<td>Battery block voltage/</td>
<td>SOC 60%; 12 to 20 V</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min.: -327.68 V, Max.: 327.67 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 to 14 INTNL RESIST</td>
<td>Internal resistance of each battery block/</td>
<td>Alway</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min.: 0 Ω, Max.: 0.255 Ω</td>
<td>0.01 to 0.1 Ω</td>
<td></td>
</tr>
<tr>
<td>REGULATION</td>
<td>Compliance regulation</td>
<td>OBD2 (CARB)</td>
<td>-</td>
</tr>
<tr>
<td>#CODES</td>
<td>The number of emission related</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>powertrain DTCs/</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Min.: 0, Max.: 127</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DTC</td>
<td>The number of stored DTCs/</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Min.: 0, Max.: 255</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / HV BATTERY / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

<table>
<thead>
<tr>
<th>Intelligent Tester Display</th>
<th>Purpose</th>
<th>Test Details</th>
<th>Test Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOLING FAN SPD</td>
<td>To check the operation and the speed</td>
<td>Stops the battery blower motor in mode 0 or</td>
<td>Disabled when a DTC is detected</td>
</tr>
<tr>
<td></td>
<td>of the battery blower motor</td>
<td>operates it in modes 1 to 6</td>
<td></td>
</tr>
</tbody>
</table>
# DIAGNOSTIC TROUBLE CODE CHART

**HINT:**
- *1: "Comes on" means that the MIL is illuminated. "-" means that the MIL is not illuminated.
- *2: "Comes on" means that the master warning light is illuminated.
- *3: Warning shown on the multi-information display.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Detection Item</th>
<th>Trouble Area</th>
<th>MIL</th>
<th>Master Warning Light</th>
<th>Warning</th>
<th>Memory</th>
<th>See page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0560</td>
<td>System Voltage</td>
<td>- Wire harness or connector</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- HEV fuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery ECU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0A1F</td>
<td>Battery Energy Control Module</td>
<td>Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-31</td>
</tr>
<tr>
<td>P0A7F</td>
<td>Hybrid Battery Pack Deterioration</td>
<td>- HV battery assembly</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery ECU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0A80</td>
<td>Replace Hybrid Battery Pack</td>
<td>- HV battery assembly</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery ECU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0A81</td>
<td>Hybrid Battery Pack Cooling Fan 1</td>
<td>- Quarter vent duct (blower motor controller)</td>
<td>-</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery ECU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0A82</td>
<td>Hybrid Battery Pack Cooling Fan 1</td>
<td>- Quarter vent duct</td>
<td>-</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-39</td>
</tr>
<tr>
<td></td>
<td>Performance or Stuck OFF</td>
<td>- No. 2 quarter vent duct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No. 2 quarter vent duct inner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Ventilator inner duct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery blower</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery ECU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0A84</td>
<td>Hybrid Battery Pack Cooling Fan 1</td>
<td>- Wire harness or connector</td>
<td>-</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-41</td>
</tr>
<tr>
<td></td>
<td>Control Circuit Low</td>
<td>- BATT FAN fuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No. 1 battery blower relay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery blower</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Quarter vent duct (blower motor controller)</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery ECU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P0A85</td>
<td>Hybrid Battery Pack Cooling Fan 1</td>
<td>- Wire harness or connector</td>
<td>-</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-41</td>
</tr>
<tr>
<td></td>
<td>Control Circuit High</td>
<td>- BATT FAN fuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No. 1 battery blower relay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery blower</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Quarter vent duct (blower motor controller)</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Battery ECU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DTC No.</td>
<td>Detection Item</td>
<td>Trouble Area</td>
<td>MIL</td>
<td>Master Warning Light</td>
<td>Warning</td>
<td>Memory</td>
<td>See page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>--------------</td>
<td>-----</td>
<td>----------------------</td>
<td>---------</td>
<td>--------</td>
<td>----------</td>
</tr>
</tbody>
</table>
| P0A95   | High Voltage Fuse | - High voltage fuse  
- Service plug grip  
- Battery plug  
- Battery ECU | - | Comes on | HV system | DTC Stored | HB-52 |
| P0A9C   | Hybrid Battery Temperature Sensor "A" | - HV battery assembly  
(battery temperature sensor)  
- Battery ECU | Comes on | Comes on | HV system | DTC Stored | HB-55 |
| P0A9D   | Hybrid Battery Temperature Sensor "A" Circuit Low | - HV battery assembly  
(battery temperature sensor)  
- Battery ECU | Comes on | Comes on | HV system | DTC Stored | HB-55 |
| P0A9E   | Hybrid Battery Temperature Sensor "A" Circuit High | - HV battery assembly  
(battery temperature sensor)  
- Battery ECU | Comes on | Comes on | HV system | DTC Stored | HB-55 |
| P0AAC   | Hybrid Battery Pack Air Temperature Sensor "A" Circuit | - HV battery assembly  
(intake air temperature sensor)  
- Battery ECU | Comes on | Comes on | HV system | DTC Stored | HB-59 |
| P0ABF   | Hybrid Battery Pack Current Sensor Circuit | - HV battery assembly (wire harness or connector)  
- Battery current sensor  
- Battery ECU | Comes on | Comes on | HV system | DTC Stored | HB-62 |
| P0AC0   | Hybrid Battery Pack Current Sensor Circuit Range/ Performance | - HV battery assembly (wire harness or connector)  
- Battery current sensor  
- Battery ECU | Comes on | Comes on | HV system | DTC Stored | HB-62 |
| P0AC1   | Hybrid Battery Pack Current Sensor Circuit Low | - HV battery assembly (wire harness or connector)  
- Battery current sensor  
- Battery ECU | Comes on | Comes on | HV system | DTC Stored | HB-62 |
| P0AC2   | Hybrid Battery Pack Current Sensor Circuit High | - HV battery assembly (wire harness or connector)  
- Battery current sensor  
- Battery ECU | Comes on | Comes on | HV system | DTC Stored | HB-62 |
<table>
<thead>
<tr>
<th>DTC No.</th>
<th>Detection Item</th>
<th>Trouble Area</th>
<th>MIL</th>
<th>Master Warning Light</th>
<th>Warning</th>
<th>Memory</th>
<th>See page</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0AFA</td>
<td>Hybrid Battery System Voltage Low</td>
<td>- Junction block assembly (busbar module) - No. 2 frame wire (busbar and wire harness) Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-67</td>
</tr>
<tr>
<td>P3011</td>
<td>Battery Block 1 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3012</td>
<td>Battery Block 2 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3013</td>
<td>Battery Block 3 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3014</td>
<td>Battery Block 4 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3015</td>
<td>Battery Block 5 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3016</td>
<td>Battery Block 6 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3017</td>
<td>Battery Block 7 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3018</td>
<td>Battery Block 8 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3019</td>
<td>Battery Block 9 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3020</td>
<td>Battery Block 10 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3021</td>
<td>Battery Block 11 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3022</td>
<td>Battery Block 12 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3023</td>
<td>Battery Block 13 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>P3024</td>
<td>Battery Block 14 Becomes Weak</td>
<td>- HV battery assembly - Battery ECU</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-72</td>
</tr>
<tr>
<td>U0100</td>
<td>Lost Communication with ECM/PCM &quot;A&quot;</td>
<td>CAN communication system</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-75</td>
</tr>
<tr>
<td>U0293</td>
<td>Lost Communication with HV ECU</td>
<td>CAN communication system</td>
<td>Comes on</td>
<td>Comes on</td>
<td>HV system</td>
<td>DTC Stored</td>
<td>HB-75</td>
</tr>
</tbody>
</table>
DESCRIPTION
Battery power is constantly supplied to the AM terminal of the battery ECU for the purpose of maintaining the DTCs and freeze frame data in memory. This voltage is supplied as a backup even if the power switch is turned OFF.

MONITOR DESCRIPTION
If 1 or more seconds have elapsed with a voltage of 1 V or less at the AM terminal at the battery ECU, the battery ECU will determine that malfunction has occurred in the back-up power supply system, illuminate the MIL, and set a DTC.

MONITOR STRATEGY

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>P0560: Battery ECU/Range check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required sensors/components</td>
<td>Main: Back-up power source circuit&lt;br&gt;Sub: Battery ECU</td>
</tr>
<tr>
<td>Frequency of operation</td>
<td>Continuous</td>
</tr>
<tr>
<td>Duration</td>
<td>1 second</td>
</tr>
<tr>
<td>MIL operation</td>
<td>Immediate after next power switch ON (IG)</td>
</tr>
<tr>
<td>Sequence of operation</td>
<td>None</td>
</tr>
</tbody>
</table>

TYPICAL ENABLING CONDITIONS
The monitor will run whenever the following DTCs are not present<br>Other conditions belong to TOYOTA's intellectual property

TYPICAL MALFUNCTION_THRESHOLDS
| Stand-by RAM back-up voltage | 1 V or less |

COMPONENT OPERATING RANGE
| Auxiliary battery voltage | 9 to 14 V |
INSTRUCTION PROCEDURE

1. CHECK FUSE (HEV)

(a) Remove the HEV fuse from the engine room relay block.
(b) Measure the resistance of the HEV fuse.
   **Standard resistance:**
   Below 1 Ω
(c) Reinstall the HEV fuse.

NG → Go to step 3

OK
2 CHECK WIRE HARNESS (BATTERY ECU - AUXILIARY BATTERY)

(a) Disconnect the negative auxiliary battery terminal.
(b) Disconnect the positive auxiliary battery terminal.
(c) Remove the HEV fuse from the engine room relay block.
(d) Disconnect the B11 battery ECU connector.
(e) Measure the resistance of the wire harness side connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B11-1 (AM) - HEV fuse terminal 2</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>HEV fuse terminal 1 - Positive auxiliary</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>

**NOTICE:**
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(f) Reconnect the battery ECU connector.
(g) Reinstall the HEV fuse.
(h) Reconnect the positive auxiliary battery terminal.
(i) Reconnect the negative auxiliary battery terminal.

**NG** REPAIR OR REPLACE HARNESS AND CONNECTOR

**CHECK AND REPAIR CONNECTOR CONNECTION**
3 CHECK WIRE HARNESS (BATTERY ECU - HEV FUSE)

(a) Disconnect the B11 battery ECU connector.
(b) Remove the HEV fuse from the engine room relay block.
(c) Measure the resistance of the wire harness side connector.
   **Standard resistance**
   
<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B11-1 (AM) or HEV fuse terminal 2 - Body ground</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

   **NOTICE:**
   When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Reconnect the battery ECU connector.
(e) Reinstall the HEV fuse.

NG AFTER REPAIRING OR REPLACING HARNESS AND CONNECTOR, REPLACE FUSE (HEV)

OK REPLACE FUSE (HEV)
DESCRIPTION
For the purpose of calculating the SOC (state of charge) of the HV battery and ensuring safety in the event of a malfunction in the HV battery assembly, the battery ECU provides the following control functions:
- SOC calculation
  The battery ECU calculates the SOC by estimating the charging and discharging amperage and monitoring other values.
- Cooling fan control
  The battery ECU controls the battery blower in order to protect the HV battery assembly from heat that is generated during charging and discharging. By maintaining a stable temperature, it promotes the effective operation of the HV battery assembly.
- HV battery assembly malfunction monitoring
  If the battery ECU detects a malfunction, it protects the HV battery assembly by limiting or stopping the charging or discharging of the HV battery in accordance with the temperature or voltage of the HV battery assembly.

MONITOR DESCRIPTION
If the battery ECU detects an internal malfunction in the ECU itself, it illuminates the MIL and sets a DTC.

MONITOR STRATEGY

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0A1F</td>
<td>Battery ECU internal error (1 trip detection logic)</td>
<td>Battery ECU</td>
</tr>
</tbody>
</table>

TYPICAL ENABLING CONDITIONS
The monitor will run whenever the following DTCs are not present TOYOTA's intellectual property
Other conditions belong to TOYOTA's intellectual property -

TYPICAL MALFUNCTION THRESHOLDS
| Battery ECU | Abnormal |

COMPONENT OPERATING RANGE
| Battery ECU | DTC P0A1F is not detected |
INSPECTION PROCEDURE

1. REPLACE BATTERY ECU

NEXT

COMPLETED
DESCRIPTION

The battery ECU calculates the SOC (state of charge) of the HV battery by estimating the amperage that flows into the HV battery and monitoring other values. The battery ECU sends the calculated SOC to the hybrid vehicle control ECU. The hybrid vehicle control ECU charges and discharges the HV battery depending on driving patterns based on the information sent by the battery ECU.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| P0A7F   | When either condition below is met:  
• Resistance of HV battery assembly is higher than standard (1 trip detection logic)  
• When the capacity difference between battery modules exceeds the specified value (2 trip detection logic) |  
• HV battery assembly  
• Battery ECU |

MONITOR DESCRIPTION

The battery ECU calculates the resistance of the HV battery through amperage and voltage, and uses this resistance to determine the extent of deterioration of the HV battery. If the battery ECU detects that the resistance of the HV battery has exceeded the standard, it determines that malfunction has occurred. In addition, the battery ECU monitors the SOC, and if the difference between the maximum and minimum SOC values exceeds the standard, it determines that malfunction has occurred. When either of the malfunction detection conditions is met, the battery ECU illuminates the MIL and sets a DTC.

MONITOR STRATEGY

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>P0A7F: HV battery/Rationality</th>
</tr>
</thead>
</table>
| Required sensors/components | Main: Battery voltage sensor inside battery ECU, battery current sensor  
Sub: Battery temperature sensor |
| Frequency of operation | Continuous |
| Duration | TOYOTA's intellectual property |
| MIL operation | Immediate or 2 driving cycles |
| Sequence of operation | None |
TYPICAL ENABLING CONDITIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>TOYOTA's intellectual property</th>
</tr>
</thead>
<tbody>
<tr>
<td>The monitor will run whenever the following DTCs are not present</td>
<td></td>
</tr>
<tr>
<td>Other conditions belong to TOYOTA's intellectual property</td>
<td>-</td>
</tr>
</tbody>
</table>

TYPICAL MALFUNCTION THRESHOLDS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Either of the following condition</td>
<td>(1) or (2)</td>
</tr>
<tr>
<td>(1) Internal resistance</td>
<td>Exceeds the standard level</td>
</tr>
<tr>
<td>(2) The difference between the maximum SOC and the minimum SOC</td>
<td>Exceeds the standard level</td>
</tr>
</tbody>
</table>

COMPONENT OPERATING RANGE

| TOYOTA's intellectual property                                          | -                                |

INSPECTION PROCEDURE

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>READ DTC OUTPUT (DTC P0A1F IS OUTPUT)</td>
</tr>
<tr>
<td></td>
<td>(a) Connect the intelligent tester to the DLC3.</td>
</tr>
<tr>
<td></td>
<td>(b) Turn the power switch ON (IG) and the tester ON.</td>
</tr>
<tr>
<td></td>
<td>(c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.</td>
</tr>
<tr>
<td></td>
<td>(d) Read DTCs.</td>
</tr>
<tr>
<td></td>
<td><strong>Result:</strong> DTC P0A1F is output</td>
</tr>
<tr>
<td></td>
<td><strong>YES</strong> REPLACE BATTERY ECU</td>
</tr>
<tr>
<td></td>
<td><strong>NO</strong> REPLACE HV SUPPLY BATTERY ASSEMBLY</td>
</tr>
</tbody>
</table>
DESCRIPTION
The HV battery assembly consists of nickel hydride batteries. Nickel hydride batteries do not require external charging. The SOC (state of charge) of the HV battery is maintained at a constant voltage level by the hybrid vehicle control ECU while the vehicle is being driven. In the HV battery assembly, 28 modules are connected in series, and each module has six 1.2 V cells that are connected in series. Thus, the HV battery assembly contains a total of 168 cells which produce 201.6 V.

The battery ECU, which monitors two modules as a single battery block, detects the battery block voltage at a total of 14 locations.

MONITOR DESCRIPTION
The battery ECU, which monitors the voltage of the battery blocks, determines that malfunction has occurred if a voltage difference between the battery blocks exceeds the standard. When the malfunction detection condition is satisfied, the battery ECU illuminates the MIL and sets a DTC.

MONITOR STRATEGY

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0A80</td>
<td>Voltage difference between battery blocks is higher than standard (2 trip detection logic)</td>
<td>• HV battery assembly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Battery ECU</td>
</tr>
</tbody>
</table>

Related DTCs: P0A80: HV battery/Rationality

Required sensors/components:
- Main: Battery voltage sensor inside battery ECU
- Sub: Battery current sensor, battery temperature sensor

Frequency of operation: Continuous

Duration: TOYOTA's intellectual property

MIL operation: 2 driving cycles

Sequence of operation: None

TYPICAL ENABLING CONDITIONS

- The monitor will run whenever the following DTCs are not present: TOYOTA's intellectual property
- Other conditions belong to TOYOTA's intellectual property: -
TYPICAL MALFUNCTION THRESHOLDS

<table>
<thead>
<tr>
<th>Component</th>
<th>Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery voltage difference</td>
<td>Exceeds the standard level</td>
</tr>
</tbody>
</table>

COMPONENT OPERATING RANGE

<table>
<thead>
<tr>
<th>Component</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOYOTA's intellectual property</td>
<td>-</td>
</tr>
</tbody>
</table>

INSPECTION PROCEDURE

1. READ DTC OUTPUT (DTC P0A1F IS OUTPUT)

   (a) Connect the intelligent tester to the DLC3.
   (b) Turn the power switch ON (IG) and the tester ON.
   (c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
   (d) Read DTCs.

   Result:
   - DTC P0A1F is output

   **YES** REPLACE BATTERY ECU

   **NO**

   REPLACE HV SUPPLY BATTERY ASSEMBLY
DESCRIPTION
Refer to DTC P0A84 (see page HB-41).

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| P0A81   | Voltage at motor is out of predetermined range in proportion to target control voltage (1 trip detection logic) | • Quarter vent duct (blower motor controller)  
• Battery ECU |

WIRING DIAGRAM
Refer to DTC P0A84 (see page HB-42).

INSPECTION PROCEDURE

1. **READ DTC OUTPUT (DTC P0A1F IS OUTPUT)**
   - (a) Connect the intelligent tester to the DLC3.
   - (b) Turn the power switch ON (IG) and the tester ON.
   - (c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
   - (d) Read DTCs.
   - **Result**
     - Display (DTC Output) | Proceed to
     - P0A81 | A
     - P0A81 and P0A1F | B
     - P0A81 and P0A84 | C

2. **REPLACE QUARTER VENT DUCT (BATTERY BLOWER MOTOR CONTROLLER)**
   - (a) Replace the quarter vent duct (blower motor controller).
   - (b) Connect the intelligent tester to the DLC3.
   - (c) Turn the power switch ON (IG) and the tester ON.
   - (d) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / CLEAR CODES.
   - (e) Perform a simulation test.

3. **READ DTC OUTPUT (DTC P0A81 IS OUTPUT AGAIN)**
   - (a) Connect the intelligent tester to the DLC3.
   - (b) Turn the power switch ON (IG) and the tester ON.
   - (c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
(d) Read DTCs.
Result:
DTC P0A81 is output again

YES  REPLACE BATTERY ECU

NO  

SYSTEM IS OK
**DESCRIPTION**

The cooling air flows into the inlet on the right of the rear seat and travels through an intake duct to the battery blower on the right surface of the luggage compartment. Furthermore, the cooling air travels through an intake duct (which connects the battery blower to the upper right surface of the HV battery assembly) and flows to the HV battery assembly.

The cooling air flows from the top to the bottom between the HV battery modules. After it has cooled the modules, it is discharged from the bottom right surface of the HV battery assembly.

The exhaust air travels through an exhaust duct on the right surface of the luggage compartment and is discharged into the cabin as well as outside of the vehicle.

The battery ECU uses battery temperature sensors in order to detect the temperature of the HV battery assembly. Based on the results of this detection, the battery ECU controls the battery blower. (Thus, the battery blower starts when the HV battery temperature rises to a predetermined level.)

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| P0A82   | Difference between estimated battery temperature based on blower fan cooling performance and actual temperature is excessive (2 trip detection logic) | • Quarter vent duct  
• No. 2 quarter vent duct  
• No. 2 quarter vent duct inner  
• Ventilator inner duct  
• Battery inner duct  
• Battery blower  
• Battery ECU |
### INSPECTION PROCEDURE

<table>
<thead>
<tr>
<th></th>
<th>READ DTC OUTPUT (DTC P0A1F IS OUTPUT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) Connect the intelligent tester to the DLC3.</td>
</tr>
<tr>
<td></td>
<td>(b) Turn the power switch ON (IG) and the tester ON.</td>
</tr>
<tr>
<td></td>
<td>(c) Enter the following menus: DIAGNOSIS / OBD/MOBD /</td>
</tr>
<tr>
<td></td>
<td>HV BATTERY / DTC INFO / TROUBLE CODES.</td>
</tr>
<tr>
<td></td>
<td>(d) Read DTCs.</td>
</tr>
<tr>
<td></td>
<td><strong>Result:</strong></td>
</tr>
<tr>
<td></td>
<td>DTC P0A1F is output</td>
</tr>
<tr>
<td></td>
<td><strong>YES</strong> REPLACE BATTERY ECU</td>
</tr>
<tr>
<td></td>
<td><strong>NO</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>CHECK DUCT AND BLOWER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) Check the ducts and the blower listed below for</td>
</tr>
<tr>
<td></td>
<td>disconnection and damage. Also, check that they are</td>
</tr>
<tr>
<td></td>
<td>not clogged up with foreign substances.</td>
</tr>
<tr>
<td></td>
<td>(1) Quarter vent duct</td>
</tr>
<tr>
<td></td>
<td>(2) No. 2 quarter vent duct</td>
</tr>
<tr>
<td></td>
<td>(3) No. 2 quarter vent duct inner</td>
</tr>
<tr>
<td></td>
<td>(4) Ventilator inner duct</td>
</tr>
<tr>
<td></td>
<td>(5) Battery blower</td>
</tr>
<tr>
<td></td>
<td><strong>NG</strong> REMOVE FOREIGN SUBSTANCES OR REPLACE AFFECTED</td>
</tr>
<tr>
<td></td>
<td>PARTS</td>
</tr>
<tr>
<td></td>
<td><strong>OK</strong></td>
</tr>
</tbody>
</table>

REPLACE BATTERY ECU
DESCRIPTION
The blower motor controller regulates the voltage of the battery blower. The blower motor controller has fins made of aluminum. The exhaust air from the HV battery assembly that flows through the quarter vent duct cools the blower motor controller, which is installed in the quarter vent duct.
The current flows from the FCTL1 terminal of the battery ECU to the relay coil of the No. 1 battery blower relay and as the contact point of the relay closes, the power is supplied to the battery blower. When a fan actuation signal is transmitted from the battery ECU, the blower motor controller adjusts voltage (VM) which is applied to the battery blower in order to get the requested fan speed. The adjusted voltage is also transmitted to the VM terminal of the battery ECU in the form of a monitoring signal. The blower motor controller corrects the voltage at the blower motor by monitoring voltage at the +B terminal of the battery blower.

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0A84</td>
<td>Battery blower voltage is lower than malfunction threshold at constant vehicle speed</td>
<td>• Wire harness or connector&lt;br&gt;• BATT FAN fuse&lt;br&gt;• No. 1 battery blower relay&lt;br&gt;• Battery blower&lt;br&gt;• Quarter vent duct (battery blower motor controller)&lt;br&gt;• Battery ECU</td>
</tr>
<tr>
<td>P0A85</td>
<td>Battery blower voltage is higher than malfunction threshold at constant vehicle speed</td>
<td>• Wire harness or connector&lt;br&gt;• BATT FAN fuse&lt;br&gt;• No. 1 battery blower relay&lt;br&gt;• Battery blower&lt;br&gt;• Quarter vent duct (battery blower motor controller)&lt;br&gt;• Battery ECU</td>
</tr>
</tbody>
</table>
**INSPECTION PROCEDURE**

1. **CHECK FUSE (BATT FAN)**

   **Engine Room Relay Block**

   - **BATT FAN Fuse**

   (a) Remove the BATT FAN fuse from the engine room relay block.
   (b) Measure the resistance of the BATT FAN fuse.
       **Standard resistance:**
       Below 1 Ω
   (c) Reinstall the BATT FAN fuse.

   **OK**

   **NG**

   Go to step 14
2 INSPECT NO. 1 BATTERY BLOWER RELAY

(a) Remove the No. 1 battery blower relay.
(b) Measure the resistance of the terminals of the relay.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 5</td>
<td>10 kΩ or higher</td>
</tr>
<tr>
<td>3 - 5</td>
<td>Below 1 Ω (Apply battery voltage to terminals 1 and 2)</td>
</tr>
</tbody>
</table>

(c) Reinstall the No. 1 battery blower relay.

**OK**

**NG**  
REPLACE NO. 1 BATTERY BLOWER RELAY

3 INSPECT BATTERY BLOWER

(a) Disconnect the B9 battery blower connector.
(b) Connect the positive terminal of the battery to terminal 2 of the battery blower connector, and the negative battery terminal to terminal 1 of the connector.
(c) Check that the blower fan rotates when voltage is applied.

**OK:**

Blower fan rotates

**NG**  
REPLACE BATTERY BLOWER

OK

4 CHECK BATTERY BLOWER MOTOR CONTROLLER

(a) Check the battery blower motor controller (see page HB-159).

**NG**  
REPLACE QUARTER VENT DUCT (BATTERY BLOWER MOTOR CONTROLLER)

OK
5 CHECK WIRE HARNESS (NO. 1 BATTERY BLOWER RELAY - BATT FAN FUSE)

(a) Remove the B14 No. 1 battery blower relay.
(b) Remove the BATT FAN fuse from the engine room relay block.
(c) Measure the resistance of the wire harness side connectors.
   **Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B14-1 and 3 - BATT FAN fuse terminal 2</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>

**NOTICE:**
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.
(d) Reinstall the No. 1 battery blower relay.
(e) Reinstall the BATT FAN fuse.

**NG** REPAIR OR REPLACE HARNESS AND CONNECTOR
6 CHECK WIRE HARNESS (NO. 1 BATTERY BLOWER RELAY - BATTERY BLOWER)

(a) Remove the B14 No. 1 battery blower relay.
(b) Disconnect the B9 battery blower connector.
(c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B14-5 - B9-2</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>

**NOTICE:**
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.
(d) Reinstall the No. 1 battery blower relay.
(e) Reconnect the battery blower connector.

NG ➞ REPAIR OR REPLACE HARNESS AND CONNECTOR

---

7 CHECK WIRE HARNESS (BATTERY BLOWER - BATTERY BLOWER MOTOR CONTROLLER)

(a) Disconnect the B9 battery blower connector.
(b) Disconnect the B10 battery blower motor controller connector.
(c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B9-2 - B10-3 (+B)</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>

(d) Reconnect the battery blower connector.
(e) Reconnect the battery blower motor controller connector.

NG ➞ REPAIR OR REPLACE HARNESS AND CONNECTOR
8 CHECK WIRE HARNESS (BATTERY BLOWER - BATTERY ECU)

(a) Disconnect the B9 battery blower connector.
(b) Disconnect the B11 battery ECU connector.
(c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B9-1 - B11-9 (VM)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B9-1 or B11-9 (VM) - Body ground</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

(d) Reconnect the battery blower connector.
(e) Reconnect the battery ECU connector.

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

9 CHECK WIRE HARNESS (BATTERY BLOWER - BATTERY BLOWER MOTOR CONTROLLER)

(a) Disconnect the B9 battery blower connector.
(b) Disconnect the B10 battery blower motor controller connector.
(c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B9-1 - B10-4 (VM)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B9-1 or B10-4 (VM) - Body ground</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

(d) Reconnect the battery blower connector.
(e) Reconnect the battery blower motor controller connector.

NG REPAIR OR REPLACE HARNESS AND CONNECTOR
10 CHECK WIRE HARNESS (NO. 1 BATTERY BLOWER RELAY - BATTERY ECU)

(a) Remove the B14 No. 1 battery blower relay.
(b) Disconnect the B11 battery ECU connector.
(c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B14-2 - B11-10 (FCTL1)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B14-2 or B11-10 (FCTL1) - Body ground</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

**NOTICE:**
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Reinstall the No. 1 battery blower relay.
(e) Reconnect the battery ECU connector.

NG  REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

11 CHECK WIRE HARNESS (BATTERY BLOWER MOTOR CONTROLLER - BATTERY ECU)

(a) Disconnect the B10 battery blower motor controller connector.
(b) Disconnect the B11 battery ECU connector.
(c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B10-2 (SI) - B11-24 (SI)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B10-2 (SI) or B11-24 (SI) - Body ground</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

(d) Reconnect the battery blower motor controller connector.
(e) Reconnect the battery ECU connector.

NG  REPAIR OR REPLACE HARNESS AND CONNECTOR
12 CHECK WIRE HARNESS (BATTERY BLOWER MOTOR CONTROLLER - BODY GROUND)

(a) Disconnect the B10 battery blower motor controller connector.
(b) Measure the resistance of the wire harness side connector.
   **Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B10-1 (GND) - Body ground</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>

(c) Reconnect the battery blower motor controller connector.

NG  REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

13 CHECK WIRE HARNESS (NO. 1 BATTERY BLOWER RELAY)

(a) Remove the B14 No. 1 battery blower relay.
(b) Measure the resistance of the wire harness side connectors.
   **Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B14-1 - B14-3</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>

**NOTICE:**
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.
(c) Reinstall the No. 1 battery blower relay.

NG  REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE BATTERY ECU
14 CHECK WIRE HARNESS (NO. 1 BATTERY BLOWER RELAY - BATT FAN FUSE)

(a) Remove the B14 No. 1 battery blower relay.
(b) Remove the BATT FAN fuse from the engine room relay block.
(c) Measure the resistance of the wire harness side connector.
   **Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B14-3 or BATT FAN fuse terminal 2</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

**NOTICE:**
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Reinstall the No. 1 battery blower relay.
(e) Reinstall the BATT FAN fuse.

**NG** REPAIR OR REPLACE HARNESS AND CONNECTOR AND REPLACE FUSE (BATT FAN)
15  CHECK WIRE HARNESS (NO. 1 BATTERY BLOWER RELAY - BATTERY BLOWER)

(a) Remove the B14 No. 1 battery blower relay.
(b) Disconnect the B9 battery blower connector.
(c) Disconnect the B10 battery blower motor controller connector.
(d) Measure the resistance of the wire harness side connector.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B14-5, B9-2 or B10-3 (+B) - Body ground</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

**NOTICE:**
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(e) Reinstall the No. 1 battery blower relay.
(f) Reconnect the battery blower connector.
(g) Reconnect the battery blower motor controller connector.

**NG**  REPAIR OR REPLACE HARNESS AND CONNECTOR AND REPLACE FUSE (BATT FAN)

**OK**
16 CHECK WIRE HARNESS (NO. 1 BATTERY BLOWER RELAY - BATTERY ECU)

(a) Remove the B14 No. 1 battery blower relay.
(b) Disconnect the B11 battery ECU connector.
(c) Measure the resistance of the wire harness side connectors.
   **Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B14-1, B14-3 or B11-10 (FCTL1) - Body ground</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

**NOTICE:**
When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.
(d) Reinstall the No. 1 battery blower relay.
(e) Reconnect the battery ECU connector.

NG  REPAIR OR REPLACE HARNESS AND CONNECTOR AND REPLACE FUSE (BATT FAN)

OK

17 CHECK BATTERY BLOWER MOTOR CONTROLLER

(a) Check the battery blower motor controller (see page HB-159).

NG  REPLACE QUARTER VENT DUCT (BATTERY BLOWER MOTOR CONTROLLER)

OK

REPLACE BATTERY ECU
CAUTION:

- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.
- After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.

HINT:
At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

1 READ DTC OUTPUT (DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
(d) Read DTCs.
Result:
DTC P0A1F is output

YES  REPLACE BATTERY ECU

NO

2 INSPECT SERVICE PLUG GRIP

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page HB-153).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause a malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Measure the resistance of the service plug grip.
   Standard resistance:
   Below 1 Ω

NG  Go to step 4

OK

3 INSPECT BATTERY PLUG

CAUTION:
Wear insulated gloves and goggles before performing the following operation.
(a) Remove the HV battery assembly (see page HB-88).
(b) Remove the battery plug (see page HB-112).
(c) Measure the resistance of the battery plug.
   Standard resistance
   - A - C Below 1 Ω
   - B - D Below 1 Ω

(d) Reinstall the battery plug (see page HB-112).
(e) Reinstall the HV battery assembly (see page HB-88).

NG  REPLACE BATTERY PLUG

OK

REPLACE BATTERY ECU
CAUTION:
Wear insulated gloves before performing the following operation.
(a) Remove the high voltage fuse (see page HB-153).
   HINT:
   The high voltage fuse is enclosed in the service plug grip.
(b) Measure the resistance of the high voltage fuse.
   **Standard resistance:**
   Below 1 Ω
(c) Reinstall the high voltage fuse.

OK

NG

REPLACE HIGH VOLTAGE FUSE

REPLACE SERVICE PLUG GRIP
### Description

3 battery temperature sensors are located on the bottom of the HV battery assembly. The resistance of the thermistor, which is enclosed in each battery temperature sensor, changes in accordance with the changes in the temperature of the HV battery assembly. The lower the battery temperature, the higher the resistance of the thermistor. Conversely, the higher the temperature, the lower the resistance.

The battery ECU uses the battery temperature sensors to detect the temperature of the HV battery assembly. Based on the results of this detection, the battery ECU controls the battery blower. (Thus, the blower fan starts when the HV battery temperature rises to a predetermined level.)

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0A9C</td>
<td>Battery temperature sensor malfunction</td>
<td>• HV battery assembly (HV battery temperature sensor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Battery ECU</td>
</tr>
<tr>
<td>P0A9D</td>
<td>Low resistance in battery temperature sensor</td>
<td>• HV battery assembly (HV battery temperature sensor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Battery ECU</td>
</tr>
<tr>
<td>P0A9E</td>
<td>High resistance in battery temperature sensor</td>
<td>• HV battery assembly (HV battery temperature sensor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Battery ECU</td>
</tr>
</tbody>
</table>

### Sensor Characteristic Diagram

Reference: Sensor Characteristic Diagram

<table>
<thead>
<tr>
<th>Resistance kΩ</th>
<th>Battery Temperature °C (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>200</td>
</tr>
<tr>
<td>200</td>
<td>150</td>
</tr>
<tr>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>-40</td>
</tr>
<tr>
<td>(-40)</td>
<td>(-32)</td>
</tr>
<tr>
<td>(68)</td>
<td>(104)</td>
</tr>
<tr>
<td>(140)</td>
<td>(176)</td>
</tr>
<tr>
<td>(212)</td>
<td></td>
</tr>
</tbody>
</table>

---

P112 HYBRID BATTERY CONTROL – HYBRID BATTERY SYSTEM

HB-59
HINT:
After confirming DTC P0A9C, P0A9D and P0A9E, enter the following menus on the intelligent tester: DIAGNOSIS / OBD/MOBD / HV BATTERY / DATA LIST. Then, confirm the temperature of the HV battery by checking "BATT TEMP 1 to 3".

<table>
<thead>
<tr>
<th>Temperature Displayed</th>
<th>Malfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>-45°C (-49°F) or less</td>
<td>Open or +B short circuit</td>
</tr>
<tr>
<td>95°C (203°F) or more</td>
<td>GND short circuit</td>
</tr>
</tbody>
</table>

MONITOR DESCRIPTION
If the temperature indicated by the battery temperature sensors is lower than the standard level (open), or is higher than the standard level (short), the battery ECU interprets this as a sensor malfunction. If the battery ECU detects that HV battery temperature is out of a normal range or its value is abnormal, it illuminates the MIL and sets a DTC.

MONITOR STRATEGY

Case 1: Battery temperature sensor malfunction

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>P0A9C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Sensor/Components (Main)</td>
<td>Battery temperature sensor</td>
</tr>
<tr>
<td>Related Sensor/Components (Related)</td>
<td>None</td>
</tr>
<tr>
<td>Frequency of Operation</td>
<td>Continuous</td>
</tr>
<tr>
<td>Duration</td>
<td>TOYOTA's intellectual property</td>
</tr>
<tr>
<td>MIL Operation</td>
<td>Immediate</td>
</tr>
<tr>
<td>Sequence of Operation</td>
<td>None</td>
</tr>
</tbody>
</table>

Case 2: Battery temperature sensor low resistance

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>P0A9D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Sensor/Components (Main)</td>
<td>Battery temperature sensor</td>
</tr>
<tr>
<td>Related Sensor/Components (Related)</td>
<td>None</td>
</tr>
<tr>
<td>Frequency of Operation</td>
<td>Continuous</td>
</tr>
<tr>
<td>Duration</td>
<td>TOYOTA's intellectual property</td>
</tr>
<tr>
<td>MIL Operation</td>
<td>Immediate</td>
</tr>
<tr>
<td>Sequence of Operation</td>
<td>None</td>
</tr>
</tbody>
</table>

Case 3: Battery temperature high resistance

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>P0A9E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Sensor/Components (Main)</td>
<td>Battery temperature sensor</td>
</tr>
<tr>
<td>Related Sensor/Components (Related)</td>
<td>None</td>
</tr>
<tr>
<td>Frequency of Operation</td>
<td>Continuous</td>
</tr>
<tr>
<td>Duration</td>
<td>TOYOTA's intellectual property</td>
</tr>
<tr>
<td>MIL Operation</td>
<td>Immediate</td>
</tr>
<tr>
<td>Sequence of Operation</td>
<td>None</td>
</tr>
</tbody>
</table>

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present: TOYOTA's intellectual property

Other conditions belong to TOYOTA's intellectual property

TYPICAL MALFUNCTION THRESHOLDS

Case 1: Battery temperature sensor malfunction

| Temperature deviation among batteries (Maximum temperature - minimum temperature) | Exceeds standard level |
Case 2: Battery temperature sensor low resistance
Resistance of battery temperature sensor 1.108 kΩ or less

Case 3: Battery temperature high resistance
Resistance of battery temperature sensor 247.7 kΩ or more

COMPONENT OPERATING RANGE
Battery temperature sensor 9 to 11 kΩ (at 25°C (77°F))

WIRING DIAGRAM

INSPECTION PROCEDURE
CAUTION:
- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.
- After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.

HINT:
At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

1 READ DTC OUTPUT (DTC P0A1F IS OUTPUT)
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
(d) Read DTCs.
Result:
DTC P0A1F is output

YES  REPLACE BATTERY ECU

NO

2  CHECK CONNECTION OF BATTERY TEMPERATURE SENSOR CONNECTOR

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page HB-153).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause a malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Check the connection condition of the B13 battery ECU connector.

OK:
Connector has been connected securely and there is no poor connection.

HINT:
Since the battery temperature sensor is not available by itself, if replacement is required, replace the entire HV battery assembly.

NG  CONNECT SECURELY

OK

REPLACE HV SUPPLY BATTERY ASSEMBLY
DESCRIPTION
The intake air temperature sensor is provided on the HV battery assembly. Its resistance value varies with the changes in the intake air temperature. The characteristics of the intake air temperature sensor are the same as the battery temperature sensors (see page HB-55). The battery ECU uses the signals from the intake air temperature sensor for adjusting the air flow speed of the battery blower.

HINT:
After confirming DTC P0AAC, enter the following menus on the intelligent tester: DIAGNOSIS / OBD/ MOBD / HV BATTERY / DATA LIST. Then, confirm the temperature of the intake ambient air to the battery pack by checking "BATT INSIDE AIR".

MONITOR DESCRIPTION
If the temperature indicated by the intake air temperature sensor is lower than the standard level (open), or is higher than the standard level (short), the battery ECU determines that a malfunction has occurred. If the battery ECU detects an abnormal intake air temperature, it will illuminate the MIL and set a DTC.

MONITOR STRATEGY

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>P0AAC: Intake cooling air temperature sensor/Range check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required sensors/components</td>
<td>Intake air temperature sensor</td>
</tr>
<tr>
<td>Frequency of operation</td>
<td>Continuous</td>
</tr>
<tr>
<td>Duration</td>
<td>TOYOTA's intellectual property</td>
</tr>
<tr>
<td>MIL operation</td>
<td>Immediate</td>
</tr>
<tr>
<td>Sequence of operation</td>
<td>None</td>
</tr>
</tbody>
</table>

TYPICAL ENABLING CONDITIONS
The monitor will run whenever the following DTCs are not present. Other conditions belong to TOYOTA's intellectual property.

TYPICAL MALFUNCTION THRESHOLDS

| Resistance of intake air temperature sensor | 1.108 kΩ or less or 247.7 kΩ or more |

COMPONENT OPERATING RANGE

| Intake air temperature sensor | 9 to 11 kΩ (at 25°C (77°F)) |
INSPECTION PROCEDURE

**CAUTION:**
- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.
- After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.

**HINT:**
At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

1. **READ DTC OUTPUT (DTC P0A1F IS OUTPUT)**
   
   (a) Connect the intelligent tester to the DLC3.
   (b) Turn the power switch ON (IG) and the tester ON.
   (c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
   (d) Read DTCs.

   **Result:**
   DTC P0A1F is output

   **YES**  **REPLACE BATTERY ECU**

   **NO**

2. **CHECK CONNECTION OF INTAKE AIR TEMPERATURE SENSOR CONNECTOR**

   **CAUTION:**
   Wear insulated gloves before performing the following operation.
   (a) Turn the power switch OFF.
   (b) Remove the service plug grip (see page HB-153).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause a malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Check the connection condition of the B13 battery ECU connector.

OK:
Connector has been connected securely and there is no poor connection.

HINT:
Since the intake air temperature sensor is not available it self, if replacement is required, replace the entire HV battery assembly.

REPLACE HV SUPPLY BATTERY ASSEMBLY
**DESCRIPTION**

The battery current sensor, which is mounted on the negative cable side of the HV battery assembly, detects the amperage that flows into the HV battery. The battery current sensor inputs a voltage (which varies between 0 to 5 V in proportion to the amperage) into the IB terminal of the battery ECU. An output voltage of the battery current sensor below 2.5 V indicates that the HV battery assembly is being charged, and above 2.5 V indicates that the HV battery assembly is being discharged.

The battery ECU determines the charging and discharging amperage of the HV battery assembly based on the signals that are input to its IB terminal, and calculates the SOC (state of charge) of the HV battery through the estimation of the amperage.

<table>
<thead>
<tr>
<th>DTC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P0ABF</strong></td>
<td>Hybrid Battery Pack Current Sensor Circuit</td>
</tr>
<tr>
<td><strong>P0AC0</strong></td>
<td>Hybrid Battery Pack Current Sensor Circuit Range/Performance</td>
</tr>
<tr>
<td><strong>P0AC1</strong></td>
<td>Hybrid Battery Pack Current Sensor Circuit Low</td>
</tr>
<tr>
<td><strong>P0AC2</strong></td>
<td>Hybrid Battery Pack Current Sensor Circuit High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| P0ABF   | Power source of battery current sensor | • HV battery assembly (wire harness or connector)  
|         |                          | • Battery current sensor  
|         |                          | • Battery ECU                                                   |
| P0AC0   | Battery current sensor malfunction | • HV battery assembly (wire harness or connector)  
|         |                          | • Battery current sensor  
|         |                          | • Battery ECU                                                   |

![Battery Current Sensor Output Voltage (V)](image)

- **HV Battery Amperage (A)**
- **Output Voltage (V)**
- **Battery ECU**
- **VIB**
- **IB**
- **GIB**

- **Discharging Amperage**
- **Charging Amperage**

![Battery current sensor diagram](image)
MONITOR DESCRIPTION
If the battery ECU detects malfunction in the battery current sensor, it will illuminate the MIL and set a DTC.

MONITOR STRATEGY
Case 1: Power source of battery current sensor

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>Related Sensor/Components (Main)</th>
<th>Related Sensor/Components (Related)</th>
<th>Frequency of Operation</th>
<th>Duration</th>
<th>MIL Operation</th>
<th>Sequence of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0ABF</td>
<td>Battery temperature sensor</td>
<td>None</td>
<td>Continuous</td>
<td>TOYOTA's intellectual property</td>
<td>Immediate</td>
<td>None</td>
</tr>
</tbody>
</table>

Case 2: Battery current sensor malfunction

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>Related Sensor/Components (Main)</th>
<th>Related Sensor/Components (Related)</th>
<th>Frequency of Operation</th>
<th>Duration</th>
<th>MIL Operation</th>
<th>Sequence of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0AC0</td>
<td>Battery temperature sensor</td>
<td>None</td>
<td>Continuous</td>
<td>TOYOTA's intellectual property</td>
<td>2 driving cycles</td>
<td>None</td>
</tr>
</tbody>
</table>

Case 3: Battery current sensor low voltage

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>Related Sensor/Components (Main)</th>
<th>Related Sensor/Components (Related)</th>
<th>Frequency of Operation</th>
<th>Duration</th>
<th>MIL Operation</th>
<th>Sequence of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0AC1</td>
<td>Battery temperature sensor</td>
<td>None</td>
<td>Continuous</td>
<td>TOYOTA's intellectual property</td>
<td>Immediate</td>
<td>None</td>
</tr>
</tbody>
</table>

Case 4: Battery current sensor high voltage

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>Related Sensor/Components (Main)</th>
<th>Related Sensor/Components (Related)</th>
<th>Frequency of Operation</th>
<th>Duration</th>
<th>MIL Operation</th>
<th>Sequence of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0AC2</td>
<td>Battery temperature sensor</td>
<td>None</td>
<td>Continuous</td>
<td>TOYOTA's intellectual property</td>
<td>Immediate</td>
<td>None</td>
</tr>
</tbody>
</table>
### TYPICAL ENABLING CONDITIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The monitor will run whenever the following DTCs are not present</td>
<td>TOYOTA’s intellectual property</td>
</tr>
<tr>
<td>Other conditions</td>
<td>-</td>
</tr>
</tbody>
</table>

### TYPICAL MALFUNCTION THRESHOLDS

#### Case 1: Power source of battery current sensor

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power-supply voltage for current sensor</td>
<td>Exceeds standard level</td>
</tr>
</tbody>
</table>

#### Case 2: Battery current sensor malfunction

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor current</td>
<td>Exceeds standard level</td>
</tr>
</tbody>
</table>

#### Case 3: Battery current sensor low voltage

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor voltage</td>
<td>Exceeds standard level</td>
</tr>
</tbody>
</table>

#### Case 4: Battery current sensor high voltage

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor voltage</td>
<td>Exceeds standard level</td>
</tr>
</tbody>
</table>

### COMPONENT OPERATING RANGE

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery current sensor</td>
<td>DTC P0ABF, P0AC0, P0AC1 and P0AC2 are not detected</td>
</tr>
</tbody>
</table>

### WIRING DIAGRAM

![Wiring Diagram](image)

### INSPECTION PROCEDURE

**CAUTION:**
- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.
- After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.
HINT:
At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

1 READ DTC OUTPUT (DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
(d) Read DTCs.

Result:
DTC P0A1F is output

YES REPLACE BATTERY ECU

NO

2 CHECK WIRE HARNESS (BATTERY ECU - BATTERY CURRENT SENSOR)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (see page HB-153).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause a malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Disconnect the B13 battery ECU connector.
(d) Disconnect the battery current sensor connector.
(e) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with the service plug grip removed.

(f) Measure the voltage of the battery ECU connector.

Standard voltage

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B13-16 (IB) - Body ground</td>
<td>Below 1 V</td>
</tr>
<tr>
<td>B13-14 (GIB) - Body ground</td>
<td>Below 1 V</td>
</tr>
<tr>
<td>B13-15 (VIB) - Body ground</td>
<td>Below 1 V</td>
</tr>
</tbody>
</table>

(g) Turn the power switch OFF.
(h) Measure the resistance of the wire harness side connectors.

Standard resistance

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B13-16 (IB) - 3 (battery current sensor)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B13-14 (GIB) - 2 (battery current sensor)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B13-15 (VIB) - 1 (battery current sensor)</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>
(i) Reconnect the battery current sensor connector.
(j) Reconnect the battery ECU connector.
(k) Reinstall the service plug grip (see page HB-153).
   HINT:
   Since the wire harness is not available by itself, if
   replacement is required, replace the entire HV battery
   assembly.

NG  REPAIR HARNESS AND CONNECTOR, OR
     REPLACE HV SUPPLY BATTERY ASSEMBLY

OK

3  REPLACE BATTERY CURRENT SENSOR

(a) Replace the battery current sensor (see page HB-141).
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch ON (IG) and the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD /
   HV BATTERY / DTC INFO / TROUBLE CODES.
(e) Perform a simulation test.
   HINT:
   Some of the steps involve the detection of 2 trips.
   Therefore, after performing a simulation test, turn the
   power switch OFF, and perform the simulation test again.

NEXT

4  READ DTC OUTPUT (DTC P0ABF, P0AC0, P0AC1 AND P0AC2 IS NOT OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/MOBD /
   HV BATTERY / DTC INFO / TROUBLE CODES.
(d) Read DTCs.
   Result:
   DTC P0ABF, P0AC0, P0AC1 and P0AC2 is not
   output again

NO  REPLACE BATTERY ECU

YES

SYSTEM IS OK
**DESCRIPTION**

Refer to DTC P0A80 (see page HB-35).

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| P0AFA   | Either of the following conditions occurs (1 trip detection logic)  
  • Voltage at each battery block is below 2 V  
  • Voltage of all the battery blocks is -24 to 2 V |  
  • Junction block assembly (busbar module)  
  • No. 2 frame wire (busbar and wire harness)  
  • Battery ECU |

**MONITOR DESCRIPTION**

The battery ECU monitors a voltage of the battery blocks to detect an open malfunction in internal battery voltage sensor circuits of the battery ECU and the wire harness between each battery block and battery ECU. If a voltage at one of the battery blocks is below a standard level or of all the battery blocks is within a specified range, the battery ECU judges that there is an open in the internal sensor circuit(s) or wire harness. The battery ECU then illuminates the MIL and sets a DTC.

**MONITOR STRATEGY**

- **Related DTCs**: P0AFA: Battery voltage sensor/Range check
- **Required sensors/components**: The wire harness from each battery block to the battery ECU
- **Frequency of operation**: Continuous
- **Duration**: TOYOTA's intellectual property
- **MIL operation**: Immediate
- **Sequence of operation**: None

**TYPICAL ENABLING CONDITIONS**

- The monitor will run whenever the following DTCs are not present: TOYOTA's intellectual property
- Other conditions belong to TOYOTA's intellectual property: -

**TYPICAL MALFUNCTION THRESHOLDS**

- Either of the following conditions is satisfied: (a) or (b)
- (a) Voltage at single battery block: Below 2 V
- (b) Voltage of all battery blocks: -24 to 2 V

**COMPONENT OPERATING RANGE**

- Battery ECU: No open malfunction
CAUTION:
• Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.
• After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.

HINT:
At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

1 READ DTC OUTPUT (DTC P0A1F IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
(d) Read DTCs.
Result:
DTC P0A1F is output

YES → REPLACE BATTERY ECU

NO

2 READ VALUE OF INTELLIGENT TESTER (BATTERY BLOCK VOL-V01 TO V14)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DATA LIST.
(d) Read "V1 to V14 BATTERY BLOCK" on the tester.

Standard voltage:
2 V or more

OK → Go to step 5

NG

3 CHECK JUNCTION BLOCK ASSEMBLY (BUSBAR MODULE)

CAUTION:
Wear insulated gloves and goggles before performing the following operation.

(a) Remove the battery assembly (see page HB-88).
(b) Remove the battery cover (see page HB-88).
(c) Check that the nuts of the junction block are tightened to the specified torque.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → TIGHTEN NUTS TO SPECIFIED TORQUE

OK

4 CHECK NO. 2 FRAME WIRE (BUSBAR MODULE)

CAUTION:
Wear insulated gloves and goggles before performing the following operation.
(a) Check that the nuts of the No. 2 frame wire are tightened to the specified torque.  
**Torque:** 5.4 N·m (55 kgf·cm, 48 in.·lbf)

NG  
TIGHTEN NUTS TO SPECIFIED TORQUE

---

### 5 CHECK CONNECTION OF NO. 2 FRAME WIRE CONNECTOR

**CAUTION:**
Wear insulated gloves before performing the following operation.

(a) Check the connection condition of the B12 battery ECU connector.  
OK:  
Connector has been connected securely and there is no poor connection.

NG  
CONNECT SECURELY

---

### 6 INSPECT NO. 2 FRAME WIRE (BUSBAR MODULE)

**CAUTION:**
Wear insulated gloves and goggles before performing the following operation.  
(a) Remove the No. 2 frame wire (see page HB-108).  
(b) Measure the resistance of each connector and the metal portions of the No. 2 frame wire.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B12-22 (GBB0) - #1</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-11 (VBB1) - #2</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-21 (VBB2) - #3</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-10 (VBB3) - #4</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-20 (VBB4) - #5</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-9 (VBB5) - #6</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-19 (VBB6) - #7</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-8 (VBB7) - #8</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-18 (VBB8) - #9</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-7 (VBB9) - #10</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B12-17 (VBB10) - #11</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>
(c) Reinstall the No. 2 frame wire.

OK

NG

REPLACE NO. 2 FRAME WIRE

REPLACE BATTERY ECU
## DESCRIPTION
Refer to DTC P0A80 (see page HB-35).

<table>
<thead>
<tr>
<th>DTC No.</th>
<th>DTC Detection Condition</th>
<th>Trouble Area</th>
</tr>
</thead>
</table>
| P0A80   | Presence of a malfunctioning block is determined based on the voltages from the battery blocks (1 trip detection logic) | • HV battery assembly  
• Battery ECU |
MONITOR DESCRIPTION
If there is an abnormal internal resistance or electromotive voltage in the battery blocks, the battery ECU determines that a malfunction has occurred. When the malfunction detection condition is satisfied, the battery ECU illuminates the MIL and sets a DTC.

MONITOR STRATEGY

<table>
<thead>
<tr>
<th>Related DTCs</th>
<th>P3011 to P3024: HV battery/Rationality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required sensors/components</td>
<td>HV battery</td>
</tr>
<tr>
<td>Frequency of operation</td>
<td>Continuous</td>
</tr>
<tr>
<td>Duration</td>
<td>TOYOTA's intellectual property</td>
</tr>
<tr>
<td>MIL operation</td>
<td>Immediate</td>
</tr>
<tr>
<td>Sequence of operation</td>
<td>None</td>
</tr>
</tbody>
</table>

TYPICAL ENABLING CONDITIONS
The monitor will run whenever the following DTCs are not present. Other conditions belong to TOYOTA's intellectual property.

TYPICAL MALFUNCTION THRESHOLDS

<table>
<thead>
<tr>
<th>Component</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV battery</td>
<td></td>
</tr>
</tbody>
</table>

COMPONENT OPERATING RANGE

<table>
<thead>
<tr>
<th>Component</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV battery</td>
<td>DTCs P3011 to P3024 are not detected</td>
</tr>
</tbody>
</table>

WIRING DIAGRAM
Refer to DTC P0AFA (see page HB-68).

INSPECTION PROCEDURE

1. READ DTC OUTPUT (DTC P0A1F IS OUTPUT)
   (a) Connect the intelligent tester to the DLC3.
   (b) Turn the power switch ON (IG) and the tester ON.
   (c) Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DTC INFO / TROUBLE CODES.
   (d) Read DTCs.
      Result:
      DTC P0A1F is output

   YES → REPLACE BATTERY ECU

   NO

2. CHECK BATTERY BLOCK VOLTAGE
   (a) Depress the brake pedal and turn the power switch ON (IG).
   (b) Depress the brake pedal and accelerator pedal to charge with the HV battery.
(c) Read the battery block voltage in the DATA LIST. Enter the following menus: DIAGNOSIS / OBD/MOBD / HV BATTERY / DATA LIST. Read the values of "V1 BATT BLOCK" to "V14 BATT BLOCK".

(d) Compare the voltages as listed below.
- V1 BATT BLOCK and V2 BATT BLOCK
- V3 BATT BLOCK and V4 BATT BLOCK
- V5 BATT BLOCK and V6 BATT BLOCK
- V7 BATT BLOCK and V8 BATT BLOCK
- V9 BATT BLOCK and V10 BATT BLOCK
- V11 BATT BLOCK and V12 BATT BLOCK
- V13 BATT BLOCK and V14 BATT BLOCK

Result:
All of the battery voltage differences are 0.3 V or more.

YES → REPLACE BATTERY ECU

NO

REPLACE HV SUPPLY BATTERY ASSEMBLY
DESCRIPTION
The battery ECU receives signals from the hybrid vehicle control ECU, ECM, and gateway ECU via CAN (Controller Area Network) communication.

MONITOR DESCRIPTION
If the battery ECU detects malfunction in the CAN communication with the ECM or hybrid vehicle control ECU, it illuminates the MIL and sets a DTC.

MONITOR STRATEGY

U0100:
Related DTCs | U0100: Communication between ECM and battery ECU/Non-received check
---|---
Required sensors/components | Main: ECM  
Sub: CAN bus line
Frequency of operation | Continuous
Duration | 0.68 seconds or more
MIL operation | Immediate or 1 driving cycle
Sequence of operation | None

U0293:
Related DTCs | U0293: Communication between hybrid vehicle control and battery ECU/Non-received check
---|---
Required sensors/components | Main: Hybrid vehicle control ECU  
Sub: CAN bus line
Frequency of operation | Continuous
Duration | 0.68 seconds or more
MIL operation | Immediate
Sequence of operation | None

TYPICAL ENABLING CONDITIONS
The monitor will run whenever the following DTCs are not present
TOYOTA's intellectual property
Other conditions belong to TOYOTA's intellectual property -

TYPICAL MALFUNCTION THRESHOLDS
Receiving data | No reception

COMPONENT OPERATING RANGE
<table>
<thead>
<tr>
<th>Component</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECM</td>
<td>DTC U0100 is not detected</td>
</tr>
<tr>
<td>Hybrid vehicle control ECU</td>
<td>DTC U0293 is not detected</td>
</tr>
</tbody>
</table>
INSPECTION PROCEDURE

1 READ DTC OUTPUT (CODES ALL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG) and the tester ON.
(c) Enter the following menus: DIAGNOSIS / OBD/MOBD / CODES (ALL).
(d) Read and record DTCs.

HINT:
When DTCs other than CAN communication malfunction DTCs are output simultaneously, first correct the CAN communication problem, and then perform troubleshooting for other DTCs.

NEXT

GO TO CAN COMMUNICATION SYSTEM
CAUTION:
The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (e.g. installing or removing the parts, inspection, replacing the parts), be sure to follow the procedures below.

1. **DISCONNECT POWER SOURCE WHEN PERFORMING WORK ON HIGH VOLTAGE SYSTEM**
   - (a) Ensure that the power switch is OFF.
   - (b) Disconnect the negative terminal cable from the auxiliary battery (see page HB-153).
   - (c) Always wear insulating gloves (see item 2 below).
     NOTICE: DTCs will also be erased, so if necessary check DTCs before disconnecting the power source OFF.
   - (d) Remove the service plug grip (see page HB-153).
     NOTICE:
     • After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.
     • Keep the removed service plug grip in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
   - (e) Leave the vehicle for 5 minutes.
     HINT: It takes 5 minutes for the high voltage condenser in the inverter to discharge its electricity.

2. **PRECAUTIONS FOR INSULATING GLOVES**
   - (a) Before wearing, ensure that the insulating gloves are not damaged with tears, holes or cracks.
   - (b) Do not wear wet gloves.

3. **PRECAUTIONS FOR WIRE HARNESS AND CONNECTOR**
   - (a) The wire harnesses and connectors with high voltage circuits are colored orange. In addition, high voltage parts such as the HV battery are affixed with a "High Voltage" caution label. Be careful not to touch these wires.

4. **PRECAUTIONS WHEN PERFORMING SERVICE OR INSPECTIONS**
   - (a) Always disconnect the power source before starting work (see item 1 above).
   - (b) Always wear insulating gloves when inspecting or servicing any high voltage wires and parts.
   - (c) Alert other technicians that you are working on the high voltage systems with a warning sign such as "High Voltage Work: Do Not Touch".

---

D020384E01
(d) Do not carry any metal objects such as a mechanical pencil or a measuring tape that could fall and cause a short circuit.

(e) After removing any high voltage wires, insulate them immediately with insulation tape.

(f) Always tighten the high voltage screw terminals to the specified torque. Insufficient or excessive torque will cause malfunctions.

(g) After finishing work on the high voltage systems and before reinstalling the service plug, reconfirm that you have not left any parts or tools lying around, that the high voltage terminals are tightened and that the connectors are connected.
COMPONENTS

- REAR NO. 3 FLOOR BOARD
- REAR NO. 2 FLOOR BOARD
- REAR DECK FLOOR BOX
- NEGATIVE BATTERY CABLE
- SERVICE PLUG GRIP

N*m (kgf*cm, ft.*lbf) : Specified torque

6.0 (61, 53 in.*lbf)
Specified torque:

- **28 (286, 21)**
- 4.0 (41, 35 in.*lbf)
**Non-reusable part**: Specified torque

- N·m (kgf·cm, ft·lbf): Specified torque
- Non-reusable part
NO. 4 WIRE HARNESS PROTECTOR COVER

NO. 2 WIRE HARNESS PROTECTOR COVER

NO. 1 WIRE HARNESS PROTECTOR COVER

JUNCTION BLOCK

BATTERY CURRENT SENSOR

SERVICE PLUG

BATTERY CLAMP PAD

Non-reusable part: Specified torque

\[ N \cdot m \text{ (kgf\cdotcm, ft\cdotlbf)} \] : Specified torque

\[ \bullet \] Non-reusable part
N*m (kgf*cm, ft.*lbf) : Specified torque
**Non-reusable part**

- **Specified torque**: N·m (kgf·cm, ft·lbf) 5.4 (55, 48 in·lbf)

- **BATTERY ROOM VENTILATION HOSE**

- **NO. 2 BATTERY SPACER**

- **NO. 2 FRAME WIRE**

- **x 26**
REMOVAL

CAUTION:
• When working on the high voltage systems, always wear insulating gloves.
• Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
• After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION
CAUTION:
The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (including installation/removal, inspection and replacement of parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)

3. REMOVE REAR DECK FLOOR BOX (See page CH-4)

4. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-4)

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

6. REMOVE SERVICE PLUG GRIP (See page HB-154)

7. REMOVE REAR DECK TRIM COVER
   (a) Detach the 4 clips shown in the illustration, then remove the deck trim cover.
8. REMOVE TONNEAU COVER  
(a) Remove the tonneau cover from the vehicle.

9. REMOVE REAR SEAT CUSHION ASSEMBLY  
(a) Undo the 2 joints shown in the illustration, then remove the rear seat cushion.

10. REMOVE REAR NO. 1 FLOOR BOARD  
(a) Remove the 2 bolts and luggage hold belt strikers.  
(b) Remove the 5 clips shown in the illustration and the rear floor board.

11. REMOVE REAR SIDE SEAT BACK FRAME LH  
(a) Remove the bolt from the rear side seat back frame LH.  
(b) Undo the 3 joints, then remove the rear side seat back frame LH.

12. REMOVE REAR SIDE SEAT BACK FRAME RH  
(a) Remove the bolt from the rear side seat back frame RH.  
(b) Undo the 4 joints, then remove the rear side seat back frame RH.
13. REMOVE REAR NO. 4 FLOOR BOARD
   (a) While lifting up the rear floor board as shown in the illustration, undo the 2 joints and remove the rear floor board.

14. REMOVE DECK FLOOR BOX LH
   (a) Remove the clip and deck floor box LH.

15. REMOVE DECK TRIM SIDE PANEL LH
   (a) Remove the bolt and luggage hold belt striker.
   (b) Remove the 2 bolts from the deck trim side panel LH.
   (c) Remove the clip from the deck trim side panel LH.
   (d) Undo the 8 clips, then pull out a part of the weather strip and remove the deck trim side panel LH.
   (e) Disconnect the lighting connector.

16. REMOVE DECK TRIM SIDE PANEL RH
   (a) Remove the bolt and luggage hold belt striker.
   (b) Remove the 2 bolts from the deck trim side panel RH.
   (c) Remove the clip from the deck trim side panel RH.
   (d) Undo the 7 clips, then pull out a part of the weather strip and remove the deck trim side panel RH.
17. REMOVE BATTERY CARRIER BRACKET
   (a) Remove the 7 bolts and battery carrier bracket.

18. REMOVE NO. 2 QUARTER VENT DUCT INNER
   (a) Disconnect the clamp and No. 1 battery blower relay.
   (b) Remove the 2 clips.
   (c) Slide the vent duct to the battery side, then remove it.

19. REMOVE BATTERY BRACKET REINFORCEMENT
   (a) Remove the 7 bolts and battery bracket reinforcement.

20. REMOVE QUARTER VENT DUCT
    (a) Disconnect the connector.
    (b) Remove the clamp, then disconnect the wire harness.
    (c) Remove the bolt, clip and quarter vent duct.

21. REMOVE NO. 6 BATTERY CARRIER PANEL
    (a) Remove the 3 bolts, 2 nuts and battery carrier panel.
22. REMOVE JUNCTION TERMINAL
CAUTION:
Wear insulating gloves.

23. REMOVE FRAME WIRE
CAUTION:
• Wear insulating gloves.
• Insulate the removed terminals with insulating tape.
(a) Remove the 2 nuts, then disconnect the frame wire from the No. 2 and No. 3 system main relay.

24. REMOVE HV BATTERY ASSEMBLY
(a) Remove the earth bolt and 4 bolts shown in the illustration.

(b) Disconnect the system main relay connector.
CAUTION:
Wear insulating gloves.
(c) Disconnect the interlock connector.
CAUTION:
Wear insulating gloves.
(d) Remove the clamp, then disconnect the battery ECU connector.
CAUTION:
Wear insulating gloves.
(e) Disconnect the battery room ventilation hose from the floor panel.
CAUTION:
Wear insulating gloves.
(f) Remove the HV battery.
CAUTION:
Wear insulating gloves.
DISASSEMBLY

1. REMOVE BATTERY COVER
   (a) Remove the protector shown in the illustration.
   (b) Remove the 6 bolts, 2 nuts, clip, battery cover and battery carrier catch bracket.

2. REMOVE NO. 1 WIRE HARNESS PROTECTOR COVER (See page HB-102)

3. REMOVE NO. 3 WIRE HARNESS PROTECTOR COVER (See page HB-102)

4. REMOVE NO. 3 BATTERY CARRIER CUSHION (See page HB-103)

5. REMOVE MAIN BATTERY CABLE (See page HB-103)

6. REMOVE NO. 2 MAIN BATTERY CABLE (See page HB-103)

7. REMOVE BATTERY CURRENT SENSOR (See page HB-142)

8. REMOVE NO. 2 WIRE HARNESS PROTECTOR COVER (See page HB-116)

9. REMOVE NO. 4 WIRE HARNESS PROTECTOR COVER (See page HB-116)

10. REMOVE BATTERY CLAMP PAD (See page HB-112)

11. REMOVE NO. 1 WIRE HARNESS PROTECTOR COVER (See page HB-113)

12. REMOVE BATTERY PLUG (See page HB-113)

13. REMOVE JUNCTION BLOCK (See page HB-117)

14. REMOVE NO. 2 SYSTEM MAIN RELAY (See page HB-123)

15. REMOVE NO. 3 SYSTEM MAIN RELAY (See page HB-124)

16. REMOVE SYSTEM MAIN RESISTOR (See page HB-136)
17. REMOVE NO. 1 SYSTEM MAIN RELAY (See page HB-124)
18. REMOVE BATTERY ECU (See page HB-149)
19. REMOVE UPPER BATTERY CARRIER
   CAUTION:
   Wear insulating gloves.
   (a) Remove the 3 nuts and upper battery carrier.
20. REMOVE NO. 2 BATTERY Spacer
   CAUTION:
   Wear insulating gloves.
21. REMOVE NO. 2 FRAME WIRE (See page HB-109)
22. REMOVE BATTERY ROOM VENTILATION HOSE
   CAUTION:
   Wear insulating gloves.

REASSEMBLY
1. INSTALL BATTERY ROOM VENTILATION HOSE
   CAUTION:
   Wear insulating gloves and protective glasses.
2. INSTALL NO. 2 FRAME WIRE (See page HB-109)
3. INSTALL NO. 2 BATTERY Spacer
   CAUTION:
   Wear insulating gloves and protective glasses.
4. INSTALL UPPER BATTERY CARRIER
   CAUTION:
   Wear insulating gloves and protective glasses.
   (a) Install the upper battery carrier with the 3 nuts.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
5. INSTALL BATTERY ECU (See page HB-149)
6. INSTALL NO. 1 SYSTEM MAIN RELAY (See page HB-127)
7. INSTALL SYSTEM MAIN RESISTOR (See page HB-136)
8. INSTALL NO. 3 SYSTEM MAIN RELAY (See page HB-127)
9. INSTALL NO. 2 SYSTEM MAIN RELAY (See page HB-127)
10. INSPECT CONTACT CONDITION (See page HB-128)
11. INSTALL JUNCTION BLOCK (See page HB-117)
12. INSTALL BATTERY PLUG (See page HB-114)
13. INSTALL NO. 1 WIRE HARNESS PROTECTOR COVER (See page HB-114)
14. INSTALL BATTERY CLAMP PAD (See page HB-114)
15. INSTALL NO. 4 WIRE HARNESS PROTECTOR COVER
   CAUTION:
   Wear insulating gloves.
16. INSTALL NO. 2 WIRE HARNESS PROTECTOR COVER
   CAUTION:
   Wear insulating gloves.
17. INSTALL BATTERY CURRENT SENSOR (See page HB-143)
18. INSTALL NO. 2 MAIN BATTERY CABLE (See page HB-104)
19. INSTALL MAIN BATTERY CABLE (See page HB-104)
20. INSTALL NO. 3 BATTERY CARRIER CUSHION (See page HB-105)
21. INSTALL NO. 3 WIRE HARNESS PROTECTOR COVER
    CAUTION:
    Wear insulating gloves.
22. INSTALL NO. 1 WIRE HARNESS PROTECTOR COVER
    CAUTION:
    Wear insulating gloves.
23. INSTALL BATTERY COVER
    CAUTION:
    Wear insulating gloves.
    (a) Temporarily fasten the battery carrier catch bracket to the battery room ventilation hose.
    (b) Install the battery cover with the 6 bolts, 2 nuts and clip.
    (c) Install the protector on the battery cover.

Torque: 8.0 N*m (82 kgf*cm, 71 in.**lbf)
INSTALLATION

1. INSTALL HV BATTERY ASSEMBLY
   (a) Install the HV battery with the earth bolt and 4 bolts.
       Torque: 19 N*m (194 kgf*cm, 14 in.*lbf)
   (b) Connect the system main relay connector.
       CAUTION:
       Wear insulating gloves.
   (c) Connect the interlock connector.
       CAUTION:
       Wear insulating gloves.
   (d) Connect the battery ECU connector.
       CAUTION:
       Wear insulating gloves.
   (e) Connect the battery room ventilation hose to the floor panel.

2. INSTALL FRAME WIRE
   CAUTION:
   Wear insulating gloves.
   (a) Install the frame wire on the No. 2 and No. 3 system main relay with 2 new nuts.
       Torque: 5.6 N*m (57 kgf*cm, 50 in.*lbf)
   (b) Connect the 2 clamps, then install the frame wire to the upper battery carrier.

3. INSTALL JUNCTION TERMINAL
   CAUTION:
   Wear insulating gloves.
4. **INSTALL NO. 6 BATTERY CARRIER PANEL**
   (a) Install the battery carrier panel with the bolt and 2 nuts.
   Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

5. **INSTALL QUARTER VENT DUCT**
   **NOTICE:**
   Ensure that the duct is installed securely.
   (a) Install the quarter vent duct with the bolt and clip.
   Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)
   (b) Connect the connector.
   (c) Install the clamp.

6. **INSTALL BATTERY BRACKET REINFORCEMENT**
   (a) Install the battery bracket reinforcement with the 7 bolts.
   Torque: 28 N*m (286 kgf*cm, 21 in.*lbf)

7. **INSTALL NO. 2 QUARTER VENT DUCT INNER**
   (a) Insert the quarter vent duct inner until it touches the backside of the HV battery.
   (b) Slide the fitting surface of the quarter vent duct inner downward, then attach it to the battery blower assembly.
   **NOTICE:**
   Ensure that the duct is installed securely.
   (c) Install the 2 clips on the vent duct.
   (d) Install the battery blower relay.

8. **INSTALL BATTERY CARRIER BRACKET**
   (a) Install the battery carrier bracket with the 7 bolts.
   Torque: 28 N*m (286 kgf*cm, 21 in.*lbf)
9. INSTALL DECK TRIM SIDE PANEL RH
   (a) Install the deck trim side panel with the 7 clips and 2 bolts, and then install the part of the weather strip.
   (b) Install the luggage hold belt striker with the bolt.

10. INSTALL DECK TRIM SIDE PANEL LH
   (a) Connect the lighting connector.
   (b) Install the deck trim side panel with the 8 clips and 2 bolts, and then install the part of the weather strip.
   (c) Install the luggage hold belt striker with the bolt.

11. INSTALL DECK FLOOR BOX LH
   (a) Install the deck floor box with the clip.

12. INSTALL REAR NO. 4 FLOOR BOARD
13. INSTALL REAR SIDE SEAT BACK FRAME RH
   (a) Install the seat back frame with the bolt.

14. INSTALL REAR SIDE SEAT BACK FRAME LH
   (a) Install the seat back frame with the bolt.

15. INSTALL REAR NO. 1 FLOOR BOARD
   (a) Install the floor board.
   (b) Install the 2 luggage strikers with the 2 bolts.

16. INSTALL REAR SEAT CUSHION ASSEMBLY

17. INSTALL TONNEAU COVER
18. INSTALL REAR DECK TRIM COVER

19. INSTALL SERVICE PLUG GRIP (See page HB-154)

20. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)

21. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)

22. INSTALL REAR DECK FLOOR BOX (See page CH-8)

23. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)

24. PERFORM INITIALIZATION
   (a) Perform initialization (see page IN-32).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
MAIN BATTERY CABLE

COMPONENTS

Non-reusable part: Specified torque N*m (kgf*cm, ft.*lbf)

- 8.0 (82, 71 in.*lbf)
- 5.6 (57, 50 in.*lbf)
- 5.4 (55, 48 in.*lbf)

HB–101

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REMOVAL

CAUTION:
- When working on the high voltage systems, always wear insulating gloves.
- Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
- After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION
CAUTION:
The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (including installation/removal, inspection and replacement of parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)

3. REMOVE REAR DECK FLOOR BOX (See page CH-4)

4. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-4)

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

6. REMOVE SERVICE PLUG GRIP (See page HB-154)

7. REMOVE HV BATTERY ASSEMBLY
   (a) Remove the HV battery from the vehicle (see page HB-88).

8. REMOVE BATTERY COVER (See page HB-93)

9. REMOVE NO. 1 WIRE HARNESS PROTECTOR COVER
   CAUTION:
   Wear insulating gloves.

10. REMOVE NO. 3 WIRE HARNESS PROTECTOR COVER
    CAUTION:
    Wear insulating gloves.
11. REMOVE NO. 3 BATTERY CARRIER CUSHION
   CAUTION:
   Wear insulating gloves.
   (a) Peel off the bonded parts, then remove the battery carrier cushion.

12. REMOVE MAIN BATTERY CABLE
   CAUTION:
   Wear insulating gloves.
   (a) Remove the terminal cover shown in the illustration.

   (b) Remove the nut, then disconnect the aluminum shield wire.
   (c) Remove the nut, then disconnect the main battery cable from the No. 3 system main relay.
   (d) Remove the nut, then disconnect the main battery cable from the No. 2 frame wire.
   (e) Remove the main battery cable from the HV battery.

13. REMOVE NO. 2 MAIN BATTERY CABLE
   CAUTION:
   Wear insulating gloves.
   (a) Remove the terminal cover shown in the illustration.
(b) Remove the nut, then disconnect the system main relay terminal and No. 2 main battery cable from the No. 2 system main relay.
(c) Remove the nut, then disconnect the No. 2 main battery cable from the frame wire.
(d) Remove the No. 2 main battery cable from the HV battery.

INSTALLATION

1. INSTALL NO. 2 MAIN BATTERY CABLE

    CAUTION:
    Wear insulating gloves.

    (a) Temporarily install the No. 2 main battery cable to the HV battery.
    (b) Install the No. 2 main battery cable to the No. 2 frame wire with a new nut.
        Torque: 5.4 N·m (55 kgf·cm, 48 in·lb)
    (c) Temporarily install the main battery cable and system main relay terminal, in that order, to the No. 2 system main relay, then tighten the new nut.
        Torque: 5.6 N·m (57 kgf·cm, 50 in·lb)
    (d) Install the terminal cover shown in the illustration.

2. INSTALL MAIN BATTERY CABLE

    CAUTION:
    Wear insulating gloves.

    (a) Temporarily install the main battery cable to the HV battery.
    (b) Install the main battery cable to the No. 2 frame wire with a new nut.
        Torque: 5.4 N·m (55 kgf·cm, 48 in·lb)
    (c) Install the main battery cable to the No. 3 system main relay with a new nut.
        Torque: 5.6 N·m (57 kgf·cm, 50 in·lb)
    (d) Install the aluminum shield wire with a new nut.
        Torque: 3.3 N·m (34 kgf·cm, 29 in·lb)
(e) Install the terminal cover shown in the illustration.

3. INSTALL NO. 3 BATTERY CARRIER CUSHION
   CAUTION:
   Wear insulating gloves.
   (a) Degrease and clean the installation surface of the battery carrier cushion.
   (b) Install a new battery carrier cushion.

4. INSTALL NO. 1 WIRE HARNESS PROTECTOR COVER
   CAUTION:
   Wear insulating gloves.

5. INSTALL NO. 3 WIRE HARNESS PROTECTOR COVER
   CAUTION:
   Wear insulating gloves.

6. INSTALL BATTERY COVER (See page HB-95)

7. INSTALL HV BATTERY ASSEMBLY
   (a) Install the HV battery to the vehicle (see page HB-96).

8. INSTALL SERVICE PLUG GRIP (See page HB-114)

9. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)

10. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)

11. INSTALL REAR DECK FLOOR BOX (See page CH-8)

12. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)

13. PERFORM INITIALIZATION
   (a) Perform initialization (see page IN-32).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (−) battery terminal.
Non-reusable part:

- Specified torque:
  - $5.4 \ (55, 48 \text{ in.} \cdot \text{lb}) 

- $N \cdot m$ (kgf cm, ft lb): Specified torque
REMOVAL

CAUTION:
- When working on the high voltage systems, always wear insulating gloves.
- Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
- After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION
   CAUTION:
   The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (including installation/removal, inspection and replacement of parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)

3. REMOVE REAR DECK FLOOR BOX (See page CH-4)

4. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-4)

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

6. REMOVE SERVICE PLUG GRIP (See page HB-154)

7. REMOVE HV BATTERY ASSEMBLY
   (a) Remove the HV battery from the vehicle (see page HB-88).

8. REMOVE BATTERY COVER (See page HB-93)

9. REMOVE NO. 1 WIRE HARNESS PROTECTOR COVER (See page HB-102)

10. REMOVE NO. 3 WIRE HARNESS PROTECTOR COVER (See page HB-102)

11. REMOVE NO. 3 BATTERY CARRIER CUSHION (See page HB-103)

12. REMOVE MAIN BATTERY CABLE (See page HB-103)

13. REMOVE NO. 2 MAIN BATTERY CABLE (See page HB-103)
14. REMOVE NO. 2 FRAME WIRE
CAUTION:
Wear insulating gloves.
(a) Disconnect the temperature sensor connector from the battery ECU.
(b) Remove the clamp, then disconnect the No. 2 frame wire connector from the battery ECU.
(c) Remove the 26 nuts and No. 2 frame wire.

INSTALLATION
1. INSTALL NO. 2 FRAME WIRE
CAUTION:
Wear insulating gloves.
(a) Install the No. 2 frame wire with new 26 nuts.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
   (b) Connect the No. 2 frame wire connector to the battery ECU, then connect the clamp.
   (c) Connect the temperature sensor connector to the battery ECU.
2. INSTALL NO. 2 MAIN BATTERY CABLE (See page HB-104)
3. INSTALL MAIN BATTERY CABLE (See page HB-104)
4. INSTALL NO. 3 BATTERY CARRIER CUSHION (See page HB-105)
5. INSTALL NO. 1 WIRE HARNESS PROTECTOR COVER (See page HB-105)
6. INSTALL NO. 3 WIRE HARNESS PROTECTOR COVER (See page HB-105)
7. INSTALL BATTERY COVER (See page HB-95)
8. INSTALL HV BATTERY ASSEMBLY
   (a) Install the HV battery to the vehicle (see page HB-96).
9. INSTALL SERVICE PLUG GRIP (See page HB-154)
10. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)

11. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)

12. INSTALL REAR DECK FLOOR BOX (See page CH-8)

13. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)

14. PERFORM INITIALIZATION
   (a) Perform initialization (see page IN-32).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
BATTERY PLUG

COMPONENTS

- NO. 1 BATTERY CARRIER CATCH BRACKET
- BATTERY COVER
- PROTECTOR
- NO. 4 WIRE HARNESS PROTECTOR COVER
- BATTERY CLAMP PAD
- SERVICE PLUG GRIP

Specified torque: N\textordmasculine} m (kgf\textordmasculine} cm, ft.\textordmasculine} lbf)

Non-reusable part
REMOVAL

CAUTION:
• When working on the high voltage systems, always wear insulating gloves.
• Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
• After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION
   CAUTION:
The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (including installation/removal, inspection and replacement of parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)

3. REMOVE REAR DECK FLOOR BOX (See page CH-4)

4. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-4)

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

6. REMOVE SERVICE PLUG GRIP (See page HB-154)

7. REMOVE HV BATTERY ASSEMBLY
   (a) Remove the HV battery from the vehicle (see page HB-88).

8. REMOVE BATTERY COVER (See page HB-93)

9. REMOVE BATTERY CLAMP PAD
   CAUTION:
   Wear insulating gloves.
   (a) Peel off the bonded parts, then remove the battery clamp pad (the battery carrier cushion).
10. REMOVE NO. 1 WIRE HARNESS PROTECTOR COVER
(a) Open the wire harness protector cover.
(b) Remove the 2 nuts, then disconnect the service plug.
(c) Remove the wire harness protector cover.

11. REMOVE BATTERY PLUG
(a) Disconnect the connector clamp.
(b) Remove the 2 bolts, then disconnect the service plug from the upper battery carrier.
(c) Open the wire harness protector cover as shown in the illustration. Then remove the service plug from the junction block.

INSPECTION
1. INSPECT BATTERY PLUG
(a) Check the resistance.
   (1) Measure the resistance between the terminals.
   **Standard resistance:**
   \[ 10 \, \text{k}\Omega \text{ or higher} \]
   If the result is not as specified, replace the battery plug.
(2) Install the service plug grip to the socket.
(3) Measure the resistance between the terminals.
   Standard resistance:
   Below 1 Ω
   If the result is not as specified, replace the battery plug.

**INSTALLATION**

1. **INSTALL BATTERY PLUG**
   (a) Temporarily fasten the service plug.
   (b) Install the service plug to the upper battery carrier with the 2 bolts.
      Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
   (c) Assemble the connector clamp.

2. **INSTALL NO. 1 WIRE HARNESS PROTECTOR COVER**
   (a) Temporarily fasten the wire harness protector cover to the service plug.
   (b) Install the wiring harness protector cover through the service plug with 2 new nuts.
      Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

3. **INSTALL BATTERY CLAMP PAD**
   **CAUTION:**
   Wear insulating gloves.
   (a) Install a new clamp pad (the battery carrier cushion).

4. **INSTALL BATTERY COVER** (See page HB-95)

5. **INSTALL HV BATTERY ASSEMBLY**
   (a) Install the HV battery to the vehicle (see page HB-96).

6. **INSTALL SERVICE PLUG GRIP** (See page HB-154)

7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL** (See page CH-7)

8. **INSTALL REAR NO. 3 FLOOR BOARD** (See page CH-8)

9. **INSTALL REAR DECK FLOOR BOX** (See page CH-8)

10. **INSTALL REAR NO. 2 FLOOR BOARD** (See page CH-8)

11. **PERFORM INITIALIZATION**
    (a) Perform initialization (see page IN-32).

**NOTICE:**
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
JUNCTION BLOCK

COMPONENTS

- NO. 1 BATTERY CARRIER
- CATCH BRACKET

- PROTECTOR

- NO. 2 WIRE HARNESS
- PROTECTOR COVER

- NO. 4 WIRE HARNESS
- PROTECTOR COVER

- JUNCTION BLOCK

- BATTERY COVER

Non-reusable part: Specified torque

- N\text{m} (kgf\text{*}cm, \text{ft.}*\text{lbf})

- 8.0 (82, 71 in.\text{*}lbf)

- 5.4 (55, 48 in.\text{*}lbf)

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REMOVAL

CAUTION:
• When working on the high voltage systems, always wear insulating gloves.
• Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
• After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION
   CAUTION:
   The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (including installation/removal, inspection and replacement of parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)

3. REMOVE REAR DECK FLOOR BOX (See page CH-4)

4. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-4)

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

6. REMOVE SERVICE PLUG GRIP (See page HB-154)

7. REMOVE HV BATTERY ASSEMBLY
   (a) Remove the HV battery from the vehicle (see page HB-88).

8. REMOVE BATTERY COVER (See page HB-93)

9. REMOVE NO. 2 WIRE HARNESS PROTECTOR COVER
   CAUTION:
   Wear insulating gloves.

10. REMOVE NO. 4 WIRE HARNESS PROTECTOR COVER
    CAUTION:
    Wear insulating gloves.
11. REMOVE JUNCTION BLOCK
   CAUTION:
   Wear insulating gloves.
   (a) Remove the 26 nuts and junction block.

INSTALLATION

1. INSTALL JUNCTION BLOCK
   CAUTION:
   Wear insulating gloves.
   (a) Install the junction block assembly with 26 new nuts.
       Torque: 5.4 N·m (55 kgf·cm, 48 in.*lbf)

2. INSTALL NO. 2 WIRE HARNESS PROTECTOR
   COVER
   CAUTION:
   Wear insulating gloves.

3. INSTALL NO. 4 WIRE HARNESS PROTECTOR
   COVER
   CAUTION:
   Wear insulating gloves.

4. INSTALL BATTERY COVER (See page HB-95)

5. INSTALL HV BATTERY ASSEMBLY
   (a) Install the HV battery to the vehicle (see page HB-96).

6. INSTALL SERVICE PLUG GRIP (See page HB-154)

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)

8. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)

9. INSTALL REAR DECK FLOOR BOX (See page CH-8)

10. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)

11. PERFORM INITIALIZATION
    (a) Perform initialization (see page IN-32).
    NOTICE:
    Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
SYSTEM MAIN RELAY

COMPONENTS

- REAR NO. 3 FLOOR BOARD
- REAR NO. 2 FLOOR BOARD
- REAR DECK FLOOR BOX
- NEGATIVE BATTERY CABLE
- SERVICE PLUG GRIP

**Specified torque**

- **N*m (kgf*cm, ft.*lbf)**: 6.0 (61, 53 in.*lbf)**
HB–120

P112 HYBRID BATTERY CONTROL – SYSTEM MAIN RELAY

REAR NO. 4 FLOOR BOARD

BATTERY CARRIER BRACKET

DECK FLOOR BOX LH

DECK TRIM SIDE PANEL LH

REAR SIDE SEAT BACK FRAME LH

LUGGAGE HOLD BELT STRIKER

N*m (kgf•cm, ft.*lbf) : Specified torque
Non-reusable part:

- Specified torque (N*m, kgf*cm, ft.*lbf):
  - NO. 1 SYSTEM MAIN RELAY: 3.4 (35, 30 in.*lbf)
  - NO. 2 SYSTEM MAIN RELAY: 3.4 (35, 30 in.*lbf)
  - NO. 3 SYSTEM MAIN RELAY: 3.4 (35, 30 in.*lbf)
  - NO. 6 BATTERY CARRIER PANEL: 7.5 (76, 66 in.*lbf)
  - SYSTEM MAIN RESISTOR: 3.4 (35, 30 in.*lbf)
  - FRAME WIRE: 5.6 (57, 50 in.*lbf)
  - WIRE HARNESS: 5.6 (57, 50 in.*lbf)
REMOVAL

CAUTION:
- When working on the high voltage systems, always wear insulating gloves.
- Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
- After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION
   CAUTION:
   The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (including installation/removal, inspection and replacement of parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)

3. REMOVE REAR DECK FLOOR BOX (See page CH-4)

4. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-8)

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

6. REMOVE SERVICE PLUG GRIP (See page HB-154)

7. REMOVE REAR DECK TRIM COVER (See page HB-88)

8. REMOVE TONNEAU COVER (See page HB-89)

9. REMOVE REAR SEAT CUSHION ASSEMBLY (See page HB-89)

10. REMOVE REAR NO. 1 FLOOR BOARD (See page HB-89)

11. REMOVE REAR SIDE SEAT BACK FRAME LH (See page HB-89)

12. REMOVE REAR NO. 4 FLOOR BOARD (See page HB-90)

13. REMOVE DECK FLOOR BOX LH (See page HB-90)

14. REMOVE DECK TRIM SIDE PANEL LH (See page HB-90)
15. REMOVE BATTERY CARRIER BRACKET (See page HB-91)

16. REMOVE NO. 6 BATTERY CARRIER PANEL (See page HB-91)

17. REMOVE JUNCTION TERMINAL (See page HB-92)

18. SEPARATE FRAME WIRE (See page HB-92)

19. REMOVE NO. 2 SYSTEM MAIN RELAY

   CAUTION:
   Wear insulating gloves.
   (a) Remove the 2 terminal covers.

   (b) Remove the nut, then disconnect the system main battery relay terminal and main battery cable.

   (c) Disconnect the connector.
   (d) Remove the 2 nuts and No. 2 system main relay.
20. **REMOVE NO. 3 SYSTEM MAIN RELAY**

**NOTICE:**
Wear insulating gloves.
(a) Remove the nut, then disconnect the main battery cable.
(b) Remove the 2 nuts, then disconnect the No. 3 system main relay.
(c) Disconnect the connector and remove the No. 3 system main relay.

21. **REMOVE NO. 1 SYSTEM MAIN RELAY**

**CAUTION:**
Wear insulating gloves.
(a) Disconnect the connector.
(b) Remove the nut, then disconnect the ground terminal.
(c) Disconnect the 2 clamps.
(d) Remove the system main relay connector.
(e) Remove the 2 bolts and No. 1 system main relay.
INSPECTION

1. INSPECT NO. 1 SYSTEM MAIN RELAY

NOTICE:
Connectors B and C have the same shape. Identify each connector by the wire harness length (L) and the wire harness color on the terminal 2 side.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Wire Harness Length (L)</th>
<th>Wire Harness Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Short</td>
<td>Yellow</td>
</tr>
<tr>
<td>C</td>
<td>Long</td>
<td>Black</td>
</tr>
</tbody>
</table>

(a) Check the resistance.
   (1) Measure the resistance between the connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive terminal - Negative terminal</td>
<td>10 kΩ or higher</td>
</tr>
<tr>
<td>A-2 (CONT2) - B-2 (CONT2)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>A-3 (CONT3) - C-2 (CONT3)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B-1 (GND) - GND</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>C-1 (GND) - GND</td>
<td>Below 1 Ω</td>
</tr>
</tbody>
</table>

If the results are not as specified, replace the No. 1 system main relay.
2. INSPECT NO. 2 SYSTEM MAIN RELAY
(a) Install the 2 installed nuts to the negative and positive terminals.
**Torque: 5.6 N*m (57 kgf*cm, 50 in.*lbf)**
(b) Check the resistance.
   (1) Measure the resistance between the positive and negative terminals.
   **Standard resistance:**
   - 10 kΩ or higher
   If the result is not as specified, replace the No. 2 system main relay.
   (2) Apply battery voltage between the connector terminals, then measure the resistance between the positive and negative terminals.
   **Standard resistance:**
   - Below 1 Ω
   If the result is not as specified, replace the No. 2 system main relay.
(c) Inspect the resistance.
   (1) Measure the resistance between the connector terminals.
   **Standard resistance:**
   - 20 to 50 kΩ
   If the result is not as specified, replace the No. 2 system main relay.

3. INSPECT NO. 3 SYSTEM MAIN RELAY
(a) Install the 2 installed nuts to the negative and positive terminals.
**Torque: 5.6 N*m (57 kgf*cm, 50 in.*lbf)**
(b) Check the resistance.
   (1) Measure the resistance between the positive and negative terminals.
   **Standard resistance:**
   - 10 kΩ or higher
   If the result is not as specified, replace the No. 3 system main relay.
(2) Apply battery voltage between the connector terminals, then measure the resistance between the positive and negative terminals.

**Standard resistance:**
- **Below 1 Ω**
  If the result is not as specified, replace the No. 3 system main relay.

(c) Inspect the resistance.

(1) Measure the resistance between the connector terminals.

**Standard resistance:**
- **20 to 50 kΩ**
  If the result is not as specified, replace the No. 3 system main relay.
INSTALLATION

1. INSTALL NO. 1 SYSTEM MAIN RELAY
   CAUTION:
   Wear insulating gloves.
   (a) Install the No. 1 system main relay with the 2 bolts.
       Torque: 3.4 N*m (35 kgf*cm, 30 in.*lbf)
   (b) Connect the system main relay connector.
   (c) Connect the 2 clamps, then install the system main relay sub wiring harness to the upper battery carrier.
   (d) Install the ground terminal with the nut.
       Torque: 5.6 N*m (57 kgf*cm, 50 in.*lbf)
   (e) Install the connector.

2. INSTALL NO. 3 SYSTEM MAIN RELAY
   CAUTION:
   Wear insulating gloves.
   (a) Connect the connector, then temporarily install the No. 3 system main relay.
   (b) Install the No. 3 system main relay with 2 new nuts.
       Torque: 3.4 N*m (35 kgf*cm, 30 in.*lbf)
   (c) Install the main battery cable with the nut.
       Torque: 5.6 N*m (57 kgf*cm, 50 in.*lbf)

3. INSTALL NO. 2 SYSTEM MAIN RELAY
   CAUTION:
   Wear insulating gloves.
   (a) Install the No. 2 system main relay with the 2 nuts.
       Torque: 3.4 N*m (35 kgf*cm, 30 in.*lbf)
   (b) Connect the connector.
(c) Temporarily install the system main relay terminal and No. 2 main battery cable terminal, in that order, and tighten a new nut. **Torque: 5.6 N*m (57 kgf*cm, 50 in.*lbf)**
(d) Install the 2 terminal covers.

4. **INSPECT CONTACT CONDITION**

**CAUTION:**
Wear insulating gloves.

(a) Check that all the wire harnesses are correctly and securely connected on the upper battery carrier.

5. **INSTALL FRAME WIRE** (See page HB-96)
6. **INSTALL JUNCTION TERMINAL** (See page HB-96)
7. **INSTALL NO. 6 BATTERY CARRIER PANEL** (See page HB-97)
8. **INSTALL BATTERY CARRIER BRACKET** (See page HB-97)
9. **INSTALL DECK TRIM SIDE PANEL LH** (See page HB-98)
10. **INSTALL DECK FLOOR BOX LH** (See page HB-98)
11. **INSTALL REAR NO. 4 FLOOR BOARD** (See page HB-98)
12. **INSTALL REAR SIDE SEAT BACK FRAME LH** (See page HB-99)
13. INSTALL REAR NO. 1 FLOOR BOARD (See page HB-99)
14. INSTALL REAR SEAT CUSHION ASSEMBLY (See page HB-99)
15. INSTALL TONNEAU COVER (See page HB-99)
16. INSTALL REAR DECK TRIM COVER (See page HB-99)
17. INSTALL SERVICE PLUG GRIP (See page HB-154)
18. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)
19. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)
20. INSTALL REAR DECK FLOOR BOX (See page CH-8)
21. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)
22. PERFORM INITIALIZATION
   (a) Perform initialization (see page IN-32).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
BATTERY BLOWER RELAY

ON-VEHICLE INSPECTION

1. INSPECT BATTERY BLOWER RELAY
   (a) Measure the battery blower relay resistance.

   **Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 5</td>
<td>10 kΩ or higher</td>
</tr>
<tr>
<td>3 - 5</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td></td>
<td>(when battery voltage is applied to terminals 1 and 2)</td>
</tr>
</tbody>
</table>

If the result is not as specified, replace the relay.
SYSTEM MAIN RESISTOR

COMPONENTS

NEGATIVE BATTERY CABLE
SERVICE PLUG GRIP

REAR NO. 3 FLOOR BOARD
REAR NO. 2 FLOOR BOARD
REAR DECK FLOOR BOX

N*m (kgf*cm, ft.*lbf) : Specified torque

6.0 (61, 53 in.*lbf)
The image contains a diagram of automotive components with specified torques in Nm (kgf·cm, ft·lbf). The components labeled include:

- Rear No. 4 Floor Board
- Battery Carrier Bracket
- Deck Floor Box LH
- Deck Trim Side Panel LH
- Rear Side Seat Back Frame LH
- Luggage Hold Belt Striker

Specified torque: $N\cdot m$ (kgf·cm, ft·lbf)
HB–134

P112 HYBRID BATTERY CONTROL – SYSTEM MAIN RESISTOR

Non-reusable part

Specified torque $N \cdot m$ (kgf·cm, ft·lbf)

- 7.5 (76, 66 in·lbf)
- 3.4 (35, 30 in·lbf)
- 5.6 (57, 50 in·lbf)

- Frame wire
- No. 6 battery carrier panel
- Junction terminal
- System main resistor

$N \cdot m$ (kgf·cm, ft·lbf): Specified torque

Non-reusable part
REMOVAL

CAUTION:
- When working on the high voltage systems, always wear insulating gloves.
- Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
- After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION
   CAUTION:
The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (including installation/removal, inspection and replacement of parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)

3. REMOVE REAR DECK FLOOR BOX (See page CH-4)

4. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-4)

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

6. REMOVE SERVICE PLUG GRIP (See page HB-154)

7. REMOVE REAR DECK TRIM COVER (See page HB-88)

8. REMOVE TONNEAU COVER (See page HB-89)

9. REMOVE REAR SEAT CUSHION ASSEMBLY (See page HB-89)

10. REMOVE REAR NO. 1 FLOOR BOARD (See page HB-89)

11. REMOVE REAR SIDE SEAT BACK FRAME LH (See page HB-89)

12. REMOVE REAR NO. 4 FLOOR BOARD (See page HB-90)

13. REMOVE DECK FLOOR BOX LH (See page HB-90)

14. REMOVE DECK TRIM SIDE PANEL LH (See page HB-90)
15. REMOVE BATTERY CARRIER BRACKET (See page HB-91)

16. REMOVE NO. 6 BATTERY CARRIER PANEL (See page HB-91)

17. REMOVE JUNCTION TERMINAL (See page HB-92)

18. DISCONNECT FRAME WIRE

   CAUTION:
   • Wear insulating gloves.
   • Insulate the removed terminals with insulating tape.

   (a) Remove the nut, then disconnect the frame wire from the No. 2 system main relay.

19. REMOVE SYSTEM MAIN RESISTOR

   CAUTION:
   Wear insulating gloves.

   (a) Disconnect the connector from the No. 1 system main relay.
   (b) Remove the bolt and system main resistor.

INSPECTION

1. INSPECT SYSTEM MAIN RESISTOR

   (a) Measure the resistance between the terminals.
   
   Standard resistance:
   18 to 22 Ω
   
   If the result is not as specified, replace the system main resistor.

INSTALLATION

1. INSTALL SYSTEM MAIN RESISTOR

   CAUTION:
   Wear insulating gloves.

   (a) Install the system main resistor with the bolt.
   
   Torque: 3.4 N*m (35 kgf·cm, 30 in.*lb)

   (b) Install the connector to the No. 1 system main relay.

2. INSPECT CONTACT CONDITION (See page HB-128)
3. INSTALL FRAME WIRE
CAUTION:
Wear insulating gloves.
(a) Temporarily install the system main resistor terminal and frame wire, in that order, and tighten a new nut.
Torque: 5.6 N*m (57 kgf*cm, 50 in.*lb)

4. INSTALL JUNCTION TERMINAL (See page HB-96)
5. INSTALL NO. 6 BATTERY CARRIER PANEL (See page HB-97)
6. INSTALL BATTERY CARRIER BRACKET (See page HB-97)
7. INSTALL DECK TRIM SIDE PANEL LH (See page HB-98)
8. INSTALL DECK FLOOR BOX LH (See page HB-98)
9. INSTALL REAR NO. 4 FLOOR BOARD (See page HB-98)
10. INSTALL REAR SIDE SEAT BACK FRAME LH (See page HB-99)
11. INSTALL REAR NO. 1 FLOOR BOARD (See page HB-99)
12. INSTALL REAR SEAT CUSHION ASSEMBLY (See page HB-99)
13. INSTALL TONNEAU COVER (See page HB-99)
14. INSTALL REAR DECK TRIM COVER (See page HB-100)
15. INSTALL SERVICE PLUG GRIP (See page HB-154)
16. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)
17. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)
18. INSTALL REAR DECK FLOOR BOX (See page CH-8)
19. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)
20. PERFORM INITIALIZATION
(a) Perform initialization (see page IN-32).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
BATTERY CURRENT SENSOR

COMPONENTS

- REAR NO. 3 FLOOR BOARD
- REAR NO. 2 FLOOR BOARD
- REAR DECK FLOOR BOX
- NEGATIVE BATTERY CABLE
- SERVICE PLUG GRIP

\[ N \cdot m \text{ (kgf} \cdot \text{cm, ft} \cdot \text{lb}) \] : Specified torque
TONNEAU COVER

REAR DECK TRIM COVER

LUGGAGE HOLD BELT STRIKER

REAR NO. 1 FLOOR BOARD

LUGGAGE HOLD BELT STRIKER

REAR SEAT CUSHION ASSEMBLY
HB–140

P12 HYBRID BATTERY CONTROL – BATTERY CURRENT SENSOR

Non-reusable part

N*m (kgf*cm, ft.*lbf) : Specified torque
REMOVAL

CAUTION:

- When working on the high voltage systems, always wear insulating gloves.
- Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
- After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION

CAUTION:
The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (including installation/ removal, inspection and replacement of parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)

3. REMOVE REAR DECK FLOOR BOX (See page CH-4)

4. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-4)

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

6. REMOVE SERVICE PLUG GRIP (See page HB-154)

7. REMOVE REAR DECK TRIM COVER (See page HB-88)

8. REMOVE TONNEAU COVER (See page HB-89)

9. REMOVE REAR SEAT CUSHION ASSEMBLY (See page HB-89)

10. REMOVE REAR NO. 1 FLOOR BOARD (See page HB-89)

11. REMOVE REAR SIDE SEAT BACK FRAME LH (See page HB-89)

12. REMOVE REAR NO. 4 FLOOR BOARD (See page HB-90)

13. REMOVE DECK FLOOR BOX LH (See page HB-90)

14. REMOVE DECK TRIM SIDE PANEL LH (See page HB-90)
15. REMOVE BATTERY CARRIER BRACKET (See page HB-91)

16. REMOVE NO. 6 BATTERY CARRIER PANEL (See page HB-91)

17. REMOVE BATTERY CURRENT SENSOR
   CAUTION:
   Wear insulating gloves.
   (a) Remove the terminal cover.
   (b) Remove the nut, then disconnect the main battery cable.
   (c) Disconnect the connector.
   (d) Remove the 2 screws and battery current sensor.

INSPECTION

1. INSPECT BATTERY CURRENT SENSOR
   (a) Inspect the resistance.
   (1) Measure the resistance between terminals 1 (VIB) and 2 (GIB).
   **Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive probe to terminal 1 (VIB)</td>
<td>3.5 to 4.5 kΩ</td>
</tr>
<tr>
<td>Negative probe to terminal 2 (GIB)</td>
<td></td>
</tr>
<tr>
<td>Positive probe to terminal 2 (GIB)</td>
<td>5 to 7 kΩ</td>
</tr>
<tr>
<td>Negative probe to terminal 1 (VIB)</td>
<td></td>
</tr>
</tbody>
</table>

   If the results are not as specified, replace the battery current sensor.
(2) Measure the resistance between terminals 1 (VIB) and 3 (IB).

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive probe to terminal 1 (VIB) Negative probe to terminal 3 (IB)</td>
<td>3.5 to 4.5 kΩ</td>
</tr>
<tr>
<td>Positive probe to terminal 1 (VIB) Negative probe to terminal 3 (IB)</td>
<td>5 to 7 kΩ</td>
</tr>
</tbody>
</table>

If the results are not as specified, replace the battery current sensor.

(3) Measure the resistance between terminals 2 (GIB) and 3 (IB).

**Standard resistance:**

0.2 kΩ or less

**NOTICE:**

Even if the probes are changed around, the resistance will not vary.

If the result is not as specified, replace the battery current sensor.

**INSTALLATION**

1. **INSTALL BATTERY CURRENT SENSOR**

CAUTION:

Wear insulating gloves.

(a) Install the battery current sensor with the 2 screws.

Torque: 1.4 N·m (14 kgf·cm, 12 in.*lbf)

(b) Connect the connector.

(c) Install the main battery cable with a new nut.

Torque: 5.6 N·m (57 kgf·cm, 50 in.*lbf)

(d) Install the terminal cover.

2. **INSTALL NO. 6 BATTERY CARRIER PANEL** (See page HB-97)

3. **INSTALL BATTERY CARRIER BRACKET** (See page HB-97)

4. **INSTALL DECK TRIM SIDE PANEL LH** (See page HB-98)

5. **INSTALL DECK FLOOR BOX LH** (See page HB-98)

6. **INSTALL REAR NO. 4 FLOOR BOARD** (See page HB-98)
7. INSTALL REAR SIDE SEAT BACK FRAME LH (See page HB-99)

8. INSTALL REAR NO. 1 FLOOR BOARD (See page HB-99)

9. INSTALL REAR SEAT CUSHION ASSEMBLY (See page HB-99)

10. INSTALL TONNEAU COVER (See page HB-99)

11. INSTALL REAR DECK TRIM COVER (See page HB-100)

12. INSTALL SERVICE PLUG GRIP (See page HB-154)

13. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)

14. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)

15. INSTALL REAR DECK FLOOR BOX (See page CH-8)

16. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)

17. PERFORM INITIALIZATION
   (a) Perform initialization (see page IN-32).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
BATTERY ECU

COMPONENTS

- REAR NO. 3 FLOOR BOARD
- REAR NO. 2 FLOOR BOARD
- REAR DECK FLOOR BOX

Specified torque: 6.0 Nm (61 kgf·cm, 53 ft·lbf)

NEGATIVE BATTERY CABLE

SERVICE PLUG GRIP

N·m (kgf·cm, ft·lbf) : Specified torque
Non-reusable part

:\[ N \cdot \text{m} (\text{kgf} \cdot \text{cm}, \text{ft} \cdot \text{lbf}) : \text{Specified torque} \]

- BATTERY CARRIER BRACKET
- REAR NO. 4 FLOOR BOARD
- NO. 6 BATTERY CARRIER PANEL
- DECK FLOOR BOX LH
- JUNCTION TERMINAL
- BATTERY ECU CONNECTOR
- REAR SIDE SEAT BACK FRAME LH
- LUGGAGE HOLD BELT STRIKER
- DECK TRIM SIDE PANEL LH

A131345E01
REMOVAL

CAUTION:
- When working on the high voltage systems, always wear insulating gloves.
- Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
- After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION
   CAUTION:
   The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (e.g. installing or removing the parts, inspection, replacing the parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)

3. REMOVE REAR DECK FLOOR BOX (See page CH-4)

4. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-4)

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

6. REMOVE SERVICE PLUG GRIP (See page HB-154)

7. REMOVE REAR DECK TRIM COVER (See page HB-88)

8. REMOVE TONNEAU COVER (See page HB-89)

9. REMOVE REAR SEAT CUSHION ASSEMBLY (See page HB-89)

10. REMOVE REAR NO. 1 FLOOR BOARD (See page HB-89)

11. REMOVE REAR SIDE SEAT BACK FRAME LH (See page HB-89)

12. REMOVE REAR NO. 4 FLOOR BOARD (See page HB-90)

13. REMOVE DECK FLOOR BOX LH (See page HB-90)

14. REMOVE DECK TRIM SIDE PANEL LH (See page HB-90)
15. REMOVE BATTERY CARRIER BRACKET (See page HB-91)

16. REMOVE NO. 6 BATTERY CARRIER PANEL (See page HB-91)

17. REMOVE JUNCTION TERMINAL (See page HB-92)

18. REMOVE BATTERY ECU

CAUTION:
Wear insulating gloves.
(a) Disconnect the system main relay connector.  
CAUTION:
Insulate the disconnected connectors with insulating tape.
(b) Disconnect the battery ECU connector.  
CAUTION:
Insulate the disconnected connectors with insulating tape.
(c) Disconnect the thermistor connector.  
CAUTION:
Insulate the disconnected connectors with insulating tape.
(d) Remove the clamp, then disconnect the No. 2 frame wire connector.  
CAUTION:
Insulate the disconnected connectors with insulating tape.
(e) Remove the nut, then disconnect the aluminum shield wire of the main battery cable.
(f) Remove the 2 screws and battery ECU.
INSTALLATION

1. INSTALL BATTERY ECU
   CAUTION:
   Wear insulating gloves.
   (a) Install the battery ECU with the 2 screws.
       Torque: 3.3 N*m (34 kgf*cm, 29 in.*lbf)
   (b) Install the aluminum shield wire of the main battery
cable together with the battery ECU with a new nut.
       Torque: 3.3 N*m (34 kgf*cm, 29 in.*lbf)
   (c) Connect the clamp and No. 2 frame wire connector.
   (d) Connect the thermistor connector.
   (e) Connect the system main relay connector.

2. INSTALL JUNCTION TERMINAL (See page HB-96)
3. INSTALL NO. 6 BATTERY CARRIER PANEL (See page HB-97)
4. INSTALL BATTERY CARRIER BRACKET (See page HB-97)
5. INSTALL DECK TRIM SIDE PANEL LH (See page HB-98)
6. INSTALL DECK FLOOR BOX LH (See page HB-98)
7. INSTALL REAR NO. 4 FLOOR BOARD (See page HB-98)
8. INSTALL REAR SIDE SEAT BACK FRAME LH (See page HB-99)
9. INSTALL REAR NO. 1 FLOOR BOARD (See page HB-99)
10. INSTALL REAR SEAT CUSHION ASSEMBLY (See page HB-99)
11. INSTALL TONNEAU COVER (See page HB-99)
12. INSTALL REAR DECK TRIM COVER (See page HB-100)
13. INSTALL SERVICE PLUG GRIP (See page HB-154)
14. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)
15. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)
16. INSTALL REAR DECK FLOOR BOX (See page CH-8)

17. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)

18. PERFORM INITIALIZATION
   (a) Perform initialization (see page IN-32).
   **NOTICE:**
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
SERVICE PLUG GRIP

COMPONENTS

REAR NO. 3 FLOOR BOARD
REAR NO. 2 FLOOR BOARD
REAR DECK FLOOR BOX
NEGATIVE BATTERY CABLE
SERVICE PLUG GRIP

N*m (kgf*cm, ft.*lbf) : Specified torque
REMOVAL

CAUTION:
- When working on the high voltage systems, always wear insulating gloves.
- Keep the removed service plug in your pocket to prevent other technicians from reconnecting it while you are servicing the vehicle.
- After removing the service plug grip, do not touch the high voltage connectors and terminals for 5 minutes.

NOTICE:
After removing the service plug grip, do not operate the power switch as it may damage the hybrid vehicle control ECU.

1. PRECAUTION
CAUTION:
The hybrid system uses high voltage circuits, so improper handling could cause an electric shock or leakage. During service (including installation/removal, inspection and replacement of parts), be sure to follow the procedures (see page HB-77).

2. REMOVE REAR NO. 2 FLOOR BOARD
   (a) As shown in the illustration, turn the knob to release the lock.
   (b) Remove the rear floor board No. 2.

3. REMOVE REAR DECK FLOOR BOX
   (a) Remove the deck floor box rear shown in the illustration.

4. REMOVE REAR NO. 3 FLOOR BOARD
   (a) Remove the rear floor board shown in the illustration.
5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
   (a) Disconnect the cable from the negative terminal of the 12 V auxiliary battery.

6. REMOVE SERVICE PLUG GRIP
   CAUTION:
   Wear insulating gloves.
   (a) Slide up the lever of the service plug grip. Remove the service plug grip while turning the lever to the left.
   (b) Insulate the service plug with insulating tape.

7. REMOVE BATTERY POSITIVE TERMINAL
   (a) Remove the 2 joints shown in the illustration, then remove the service plug grip cover.
   (b) Remove the 2 bolts and electric vehicle fuse.
INSTALLATION

1. INSTALL BATTERY POSITIVE TERMINAL
   (a) Install the electric vehicle fuse with the 2 bolts. Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
   (b) Fit the 2 joints, then install the service plug grip cover.

2. INSTALL SERVICE PLUG GRIP
   CAUTION:
   Wear insulating gloves.
   (a) Joint the service plug grip with the HV battery.
   (b) While pushing the service plug grip to the right, rotate the lever to the right.
   (c) Slide the lever down to lock the service plug grip in place.
   NOTICE:
   • The service plug grip must be locked. If not, it may cause DTCs to output.
   • Do not operate the power switch when the service plug grip is not properly locked. It may damage the hybrid vehicle control ECU in rare cases.

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)

4. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)

5. INSTALL REAR DECK FLOOR BOX (See page CH-8)

6. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)

7. PERFORM INITIALIZATION
   (a) Perform initialization (see page IN-32).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
BATTERY BLOWER

COMPONENTS

- REAR NO. 3 FLOOR BOARD
- REAR NO. 2 FLOOR BOARD
- REAR DECK FLOOR BOX

N*m (kgf*cm, ft.*lbf) : Specified torque

6.0 (61, 53 in.*lbf) : NEGATIVE BATTERY CABLE
HB–158

P112 HYBRID BATTERY CONTROL – BATTERY BLOWER

- VENTILATOR DUCT INNER
- BATTERY BLOWER
- NO. 2 QUARTER VENT DUCT INNER
- DECK TRIM SIDE PANEL RH
- LUGGAGE HOLD BELT STRIKER
- REAR SIDE SEAT BACK FRAME RH

N*m (kgf*cm, ft.*lbf)  Specified torque
ON-VEHICLE INSPECTION

1. INSPECT BATTERY BLOWER

(a) Check the operation.
   (1) Connect the intelligent tester to the DLC3.
   (2) Turn the power switch ON (IG).
   (3) Select the item:
       DIAGNOSIS / OBD/MOBD / HV BATTERY / ACTIVE TEST / COOLING FAN SPD / 1 to 6.
   NOTICE:
       If the check results are normal, do not perform the following check.

(b) Inspect the resistance.
   (1) Remove the service plug grip (see page HB-153).
   (2) Disconnect the connector of the battery blower motor.
   (3) Measure the resistance between terminals 1 and 2 of the connector.
       Standard resistance:
       9 Ω or less
       If the result is not as specified, replace the battery blower assembly.

(c) Inspect the voltage.
   (1) Connect the connector of the blower motor.
   (2) Measure the resistance between terminal 1 (GND) of the blower motor control connector and body ground.
       Standard resistance:
       1 Ω or less
   (3) Connect the negative terminal of the auxiliary battery.
       Torque: 6.0 N·m (61 kgf·cm, 53 in.*lbf)
   (4) Connect the intelligent tester to the DLC3.
   (5) Turn the power switch ON (IG).
   (6) Select the item:
       DIAGNOSIS / OBD/MOBD / HV BATTERY / ACTIVE TEST / COOLING FAN SPD / 1.
(7) Measure the voltage between terminals 1 (GND) of the blower motor connector and the body ground.

**Standard voltage:**
9 to 14 V

**NOTICE:**
If there is no voltage, there may be a defect in the power supply system relays or in the wire harness.

(8) Turn the power switch OFF, then disconnect the cable from the negative terminal of the auxiliary battery.

(9) Disconnect the battery blower motor, battery blower motor control, and connector of the battery ECU.

(10) Measure the resistance of the wire harness side connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B9-1 - B10-4 (VM)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B9-1 - B11-9 (VM)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B9-1 - Body ground</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

**NOTICE:**
If the result is not as specified, repair or replace the wire harness and recheck the blower motor operation by the intelligent tester.
(11) Measure the resistance of the wire harness side connectors.

**Standard resistance**

<table>
<thead>
<tr>
<th>Tester Connection</th>
<th>Specified Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>B14-2 - B11-10 (FCTL1)</td>
<td>Below 1 Ω</td>
</tr>
<tr>
<td>B14-2 - Body ground</td>
<td>10 kΩ or higher</td>
</tr>
</tbody>
</table>

**NOTICE:**
If the result is not as specified, repair or replace the wire harness and recheck the blower motor operation by the intelligent tester.

(12) Reconnect all the disconnected connectors.

**NOTICE:**
Do not connect the service plug grip.

(13) Connect the intelligent tester to the DLC3.

(14) Turn the power switch ON (IG).

(15) Select the item:
DIAGNOSIS / OBD/MOBD / HV BATTERY / ACTIVE TEST / COOLING FAN SPD / 1.

(16) Measure the voltage between terminals 1 (GND) and 2 (SI) of the battery blower motor control.

**Standard voltage:**
1 V or more

**NOTICE:**
If the result is not as specified, repair or replace the wire harness and recheck the blower motor operation by the intelligent tester.
(17) Measure the voltage between the terminals on the blower motor connector.  
**Standard voltage:**  
2 to 4 V  
**NOTICE:**  
If the result is not as specified, repair or replace the wire harness and recheck the blower motor operation by the intelligent tester.

(18) Measure the voltage between terminals 1 (GND) and 4 (VM) of the blower motor control.  
**HINT:**  
A = (Measured voltage between terminals 1 (GND) of the blower motor connector and the body ground.)  
**Standard condition:**  
A - 4 V to A - 2 V  
**NOTICE:**  
If the result is not as specified, repair or replace the wire harness and recheck the blower motor operation by the intelligent tester.

(19) Recheck the blower motor operation by the intelligent tester, and perform the inspection again.
REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (See page CH-4)
2. REMOVE REAR DECK FLOOR BOX (See page CH-4)
3. REMOVE REAR NO. 3 FLOOR BOARD (See page CH-4)
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
   CAUTION: Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
5. REMOVE REAR DECK TRIM COVER (See page HB-88)
6. REMOVE TONNEAU COVER (See page HB-89)
7. REMOVE REAR SEAT CUSHION ASSEMBLY (See page HB-89)
8. REMOVE REAR NO. 1 FLOOR BOARD (See page HB-89)
9. REMOVE REAR SIDE SEAT BACK FRAME RH (See page HB-89)
10. REMOVE DECK TRIM SIDE PANEL RH (See page HB-90)
11. REMOVE NO. 2 QUARTER VENT DUCT INNER (See page HB-91)
12. REMOVE VENTILATOR DUCT INNER
   (a) Remove the 3 clips and ventilator duct inner.

13. REMOVE BATTERY BLOWER
   (a) Remove the 3 nuts, then disconnect the battery blower assembly from the vehicle.
   (b) Remove the connector, clamp and battery blower.
INSTALLATION

1. INSTALL BATTERY BLOWER
   (a) Connect the connector to the battery blower.
   (b) Install the clamp on the battery blower.
   (c) Install the battery blower with the 3 nuts.

   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

2. INSTALL VENTILATOR DUCT INNER
   (a) Install the ventilator duct inner with the 3 clips.

3. INSTALL NO. 2 QUARTER VENT DUCT INNER (See page HB-97)

4. INSTALL DECK TRIM SIDE PANEL RH (See page HB-98)

5. INSTALL REAR SIDE SEAT BACK FRAME RH (See page HB-99)

6. INSTALL REAR NO. 1 FLOOR BOARD (See page HB-99)

7. INSTALL REAR SEAT CUSHION ASSEMBLY (See page HB-99)

8. INSTALL TONNEAU COVER (See page HB-99)

9. INSTALL REAR DECK TRIM COVER (See page HB-100)

10. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page CH-7)

11. INSTALL REAR NO. 3 FLOOR BOARD (See page CH-8)

12. INSTALL REAR DECK FLOOR BOX (See page CH-8)

13. INSTALL REAR NO. 2 FLOOR BOARD (See page CH-8)

14. PERFORM INITIALIZATION
   (a) Perform initialization (see page IN-32).

   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.