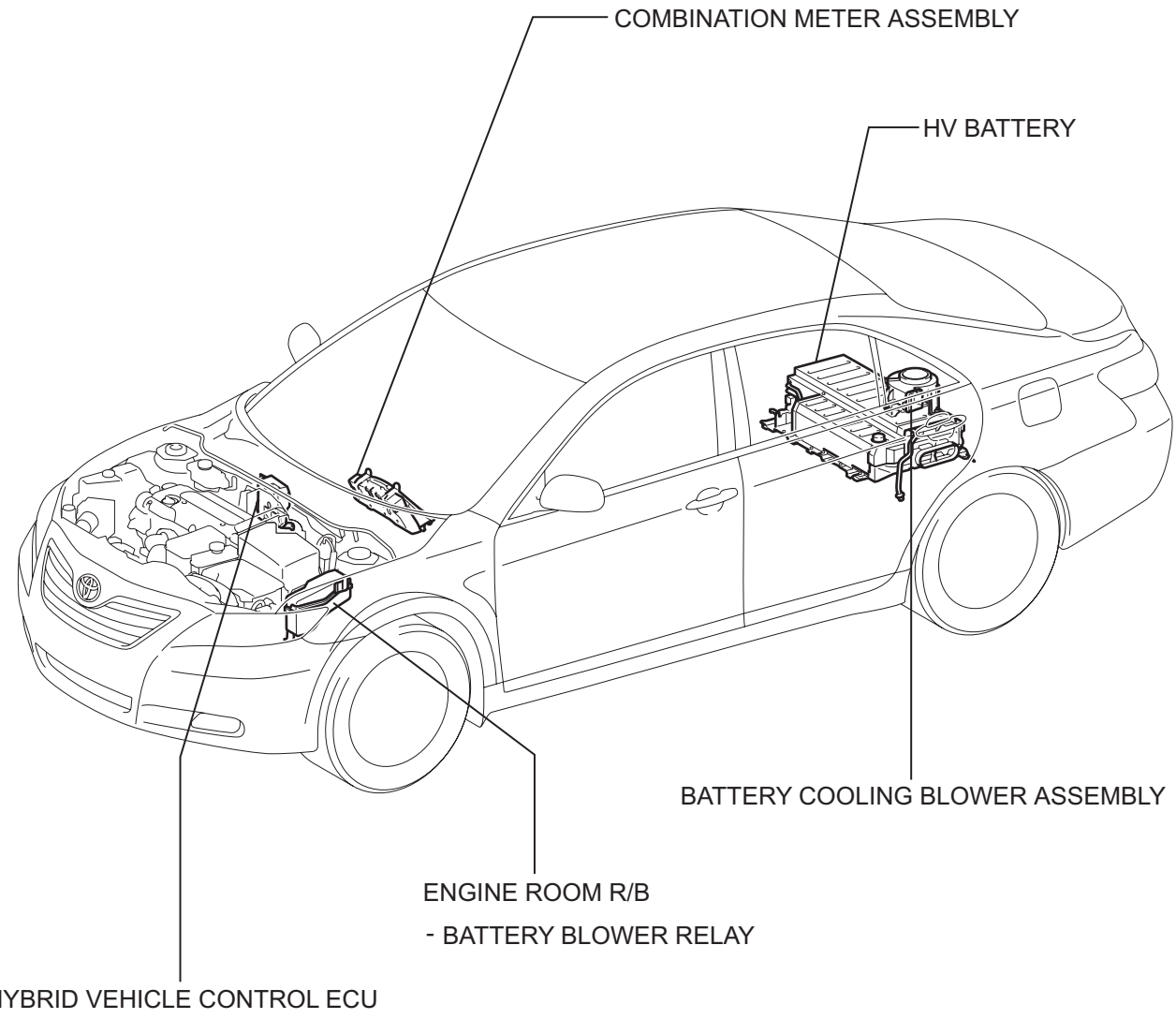
DEFINITION OF TERMS

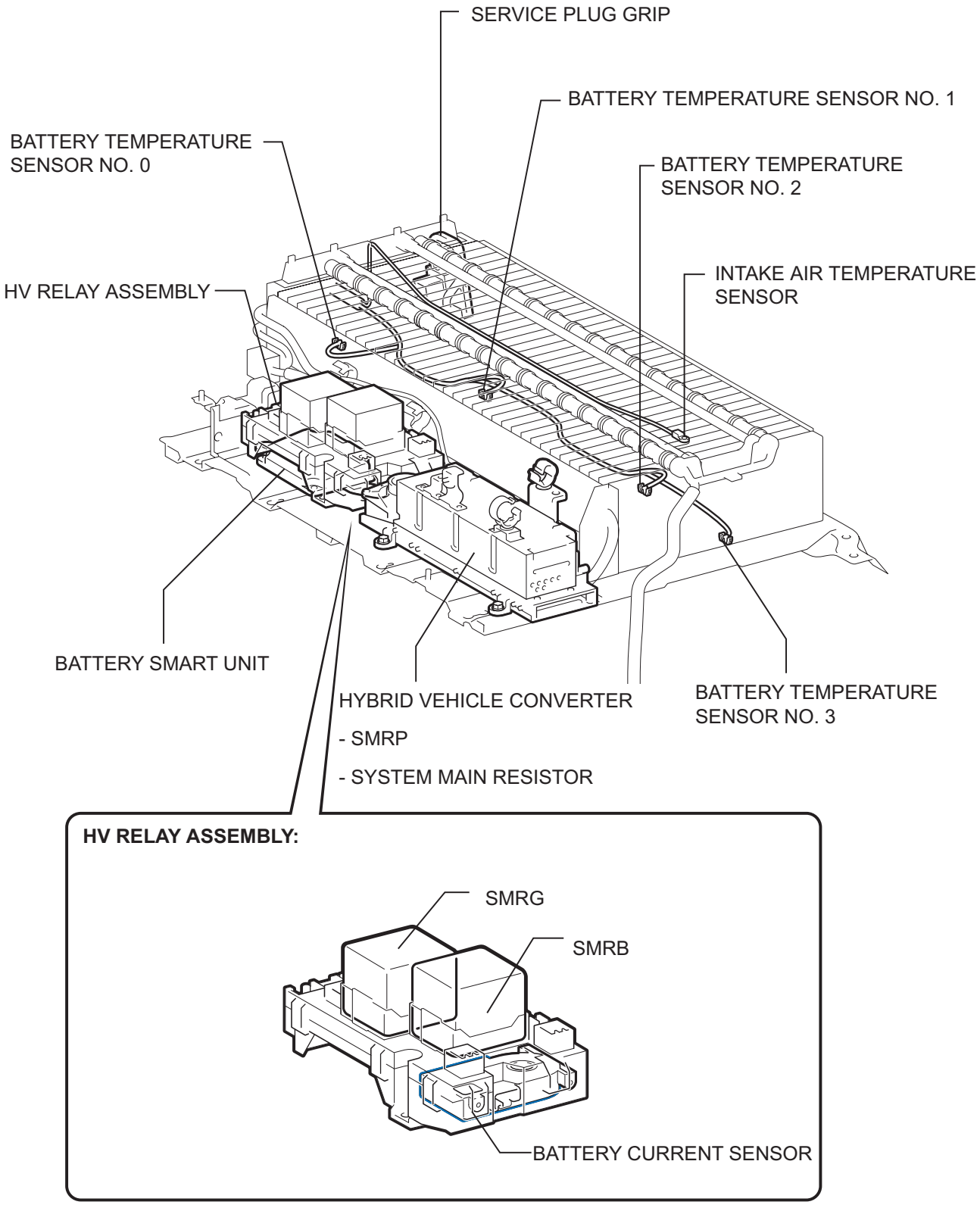
Terms	Definitions
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic.
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets DTCs when the monitored value(s) exceeds malfunction threshold(s).
Sequence of operation	Order of monitor priority, applied if multiple sensors and components are involved in a single malfunction detection process. Each sensor and component are monitored in turn and subsequent items are not monitored until the previous detection operation completes.
Required sensors/components	Sensors and components used by the ECM to detect each malfunction.
Frequency of operation	Number of times the ECM checks for each malfunction during each driving cycle. "Once per driving cycle" means the ECM only performs checks for that malfunction once during single driving cycle. "Continuous" means that the ECM performs checks for that malfunction whenever enabling conditions are met.
Duration	Minimum time for which the ECM must detect continuous deviation in monitored value(s) in order to set a DTC. Timing begins when Typical Enabling Conditions are met.
Malfunction thresholds	Value beyond which the ECM determines malfunctions exist and sets DTCs.
MIL operation	Timing of MIL illumination after a malfunction is detected. "Immediate" means that the ECM illuminates the MIL as soon as the malfunction is detected. "2 driving cycle" means that the ECM illuminates the MIL if the same malfunction is detected again during the next driving cycle.

PARTS LOCATION



T

A143335E01

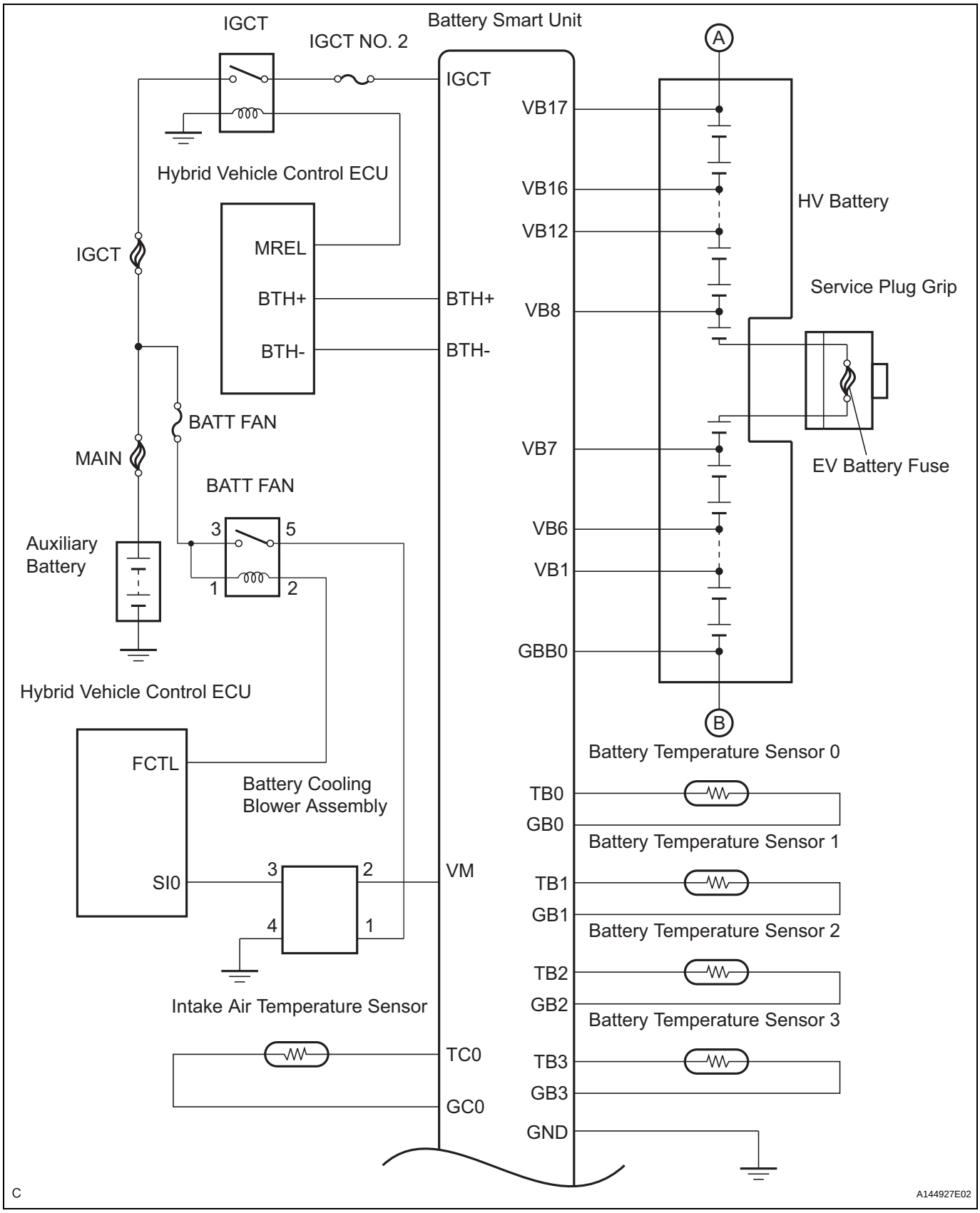


HB

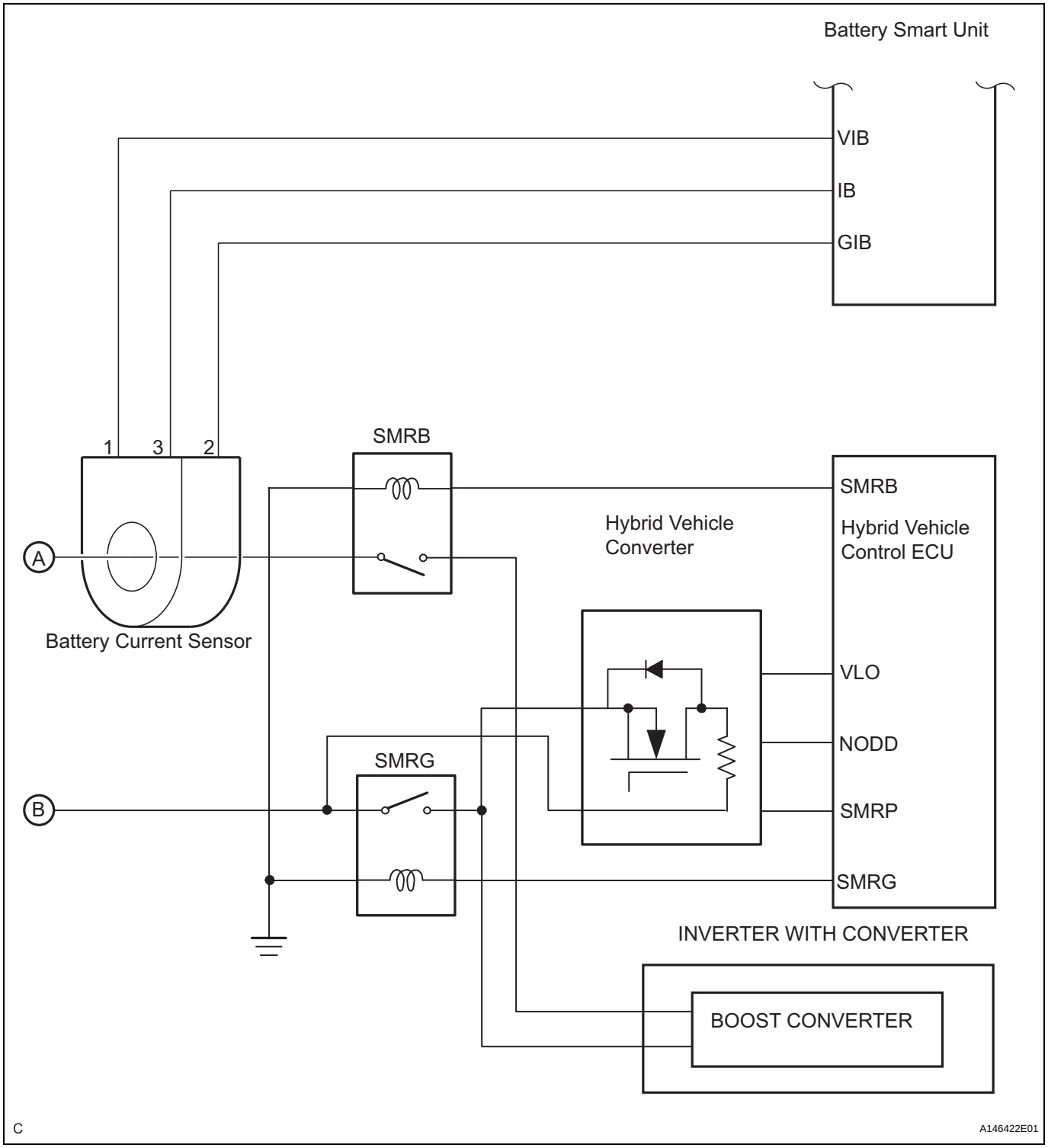
P

A143943E02

SYSTEM DIAGRAM



HB

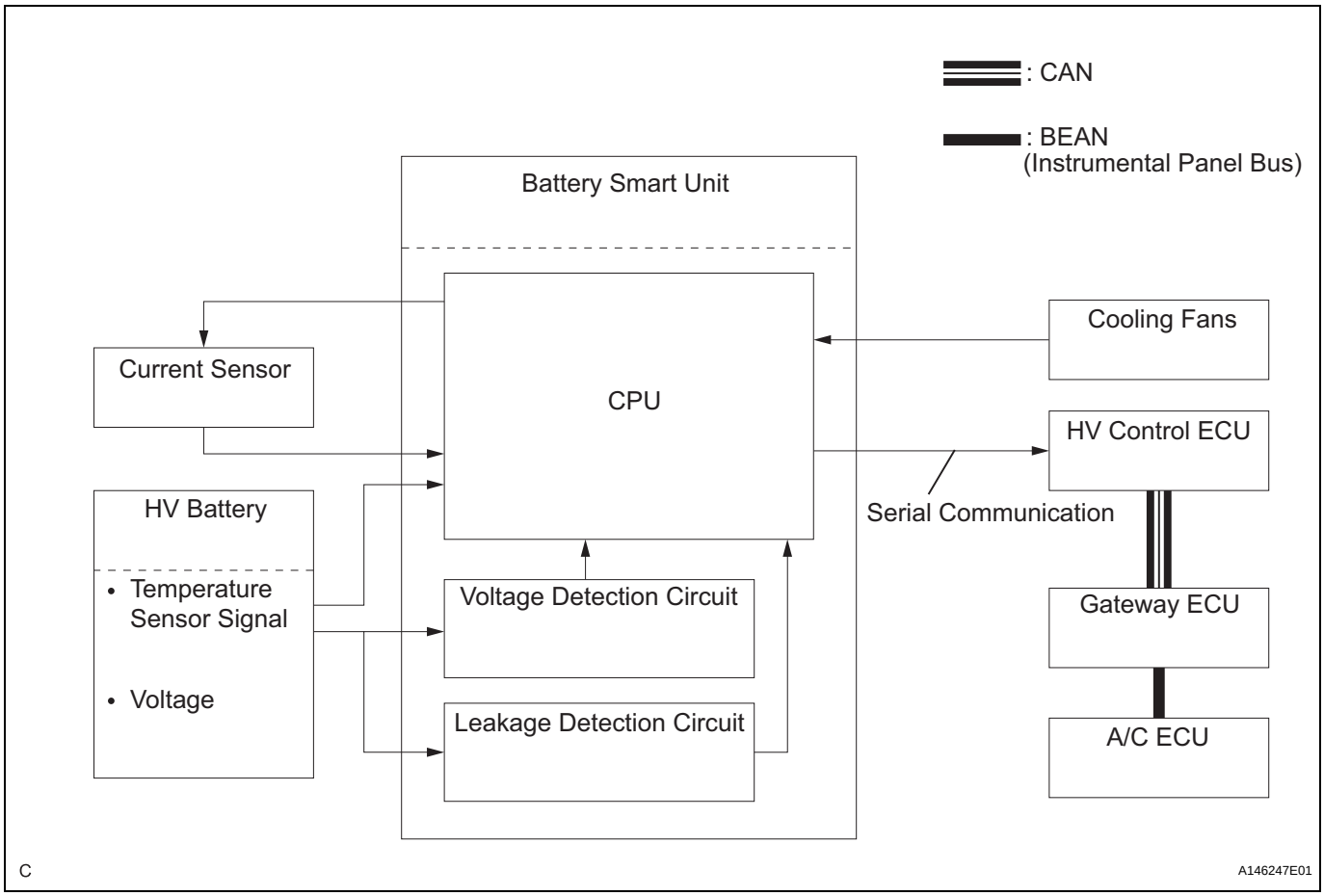

Battery Smart Unit
VIB
IB
GIB
1
3
2
SMRB
SMRB
Hybrid Vehicle Converter
Hybrid Vehicle Control ECU
A
Battery Current Sensor
VLO
NODD
SMRG
SMRP
B
SMRG
INVERTER WITH CONVERTER
BOOST CONVERTER
C
A146422E01

HB

SYSTEM DESCRIPTION

1. BATTERY SMART UNIT CONTROL

- The battery smart unit monitors the HV battery condition signals (voltage, current, and temperature), which are needed to determine the charging or discharging values that are calculated by the THS ECU and transmits them to the THS ECU via serial communication.
- A leakage detection circuit is provided in the battery smart unit in order to detect any leakage from the HV battery.
- The battery smart unit monitors the voltage of the cooling fan, which is needed by the THS ECU to effect cooling fan control, and transmits it to the THS ECU via serial communication.



HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
*: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CONNECT INTELLIGENT TESTER TO THE DLC3*

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

NEXT

4	CHECK DTC AND SAVE FREEZE FRAME DATA* (See page HB-15), (See page HB-17)

HINT:
Make sure to save freeze frame data because the data is necessary for a simulation test.

NEXT

5	CLEAR DTC* (See page HB-15)

NEXT

6	CONDUCT VISUAL INSPECTION

NEXT

7	CONFIRM PROBLEM SYMPTOMS

HINT:
If the engine does not start, perform steps 9 and 11 first.
Result

Result	Proceed to
Malfunction does not occur	A
Malfunction occurs	B

B → GO TO STEP 10

A

8	DUPLICATE CONDITIONS THAT PRODUCE SYMPTOMS

NEXT

9	CHECK FOR DTCS* (See page HB-15)

Result

Result	Proceed to
Trouble code	A
No code	B

B → GO TO STEP 11

A

10	REFER TO DTC CHART (See page HB-18)

NEXT

GO TO STEP 13

HB

11	CONDUCT BASIC INSPECTION

Result

Result	Proceed to
Malfunctioning parts not confirmed	A
Malfunctioning parts confirmed	B

B → GO TO STEP 15

A

12	CHECK ECU POWER SOURCE CIRCUIT

NEXT

13	CONDUCT CIRCUIT INSPECTION

Result

Result	Proceed to
Malfunction not confirmed	A

Result	Proceed to
Malfunction confirmed	B

B → GO TO STEP 16

A

14	CHECK FOR INTERMITTENT PROBLEMS (See page HB-10)

NEXT

GO TO STEP 16

15	CONDUCT PARTS INSPECTION

NEXT

16	IDENTIFY PROBLEM

NEXT

17	ADJUST AND/OR REPAIR

NEXT

18	CONDUCT CONFIRMATION TEST

NEXT

END

DTC	P0A82-123	Hybrid Battery Pack Cooling Fan 1

DESCRIPTION

Refer to the circuit description for DTC P0A84-123 (See page HB-35).

DTC No.	DTC Detection Condition	Trouble Area
P0A82-123	The speed of the battery cooling blower assembly is not within the specified range (1 trip detection)	• Battery cooling blower assembly • Battery smart unit • HV battery intake duct • Wire harness or connector

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A84-123 (See page HB-36).

INSPECTION PROCEDURE

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

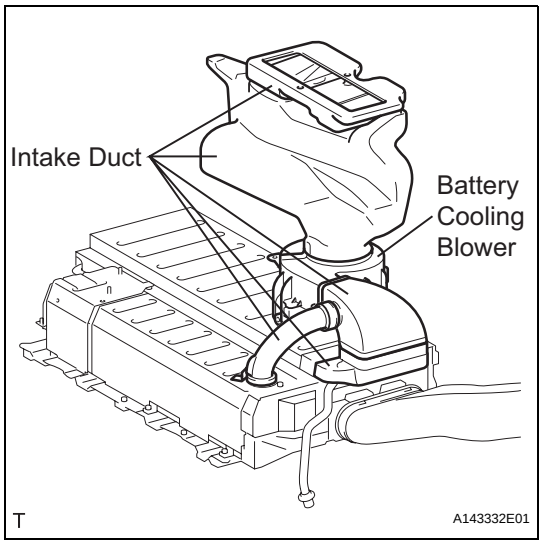
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK DUCT AND BLOWER

(a) Remove the luggage compartment front trim cover (See page HB-86).
(b) Remove the luggage compartment rear trim cover (See page HB-86).



(c) Check that the intake ducts and battery cooling blower are not disconnected, damaged, or clogged with foreign objects, and that the acoustical materials have not peeled.

OK:

The ducts and blower are not disconnected, damaged, or clogged with foreign objects and the acoustical materials have not peeled.

NG → **CORRECT THE PROBLEM**

OK

3	CHECK HARNESS AND CONNECTOR (BATTERY SMART UNIT - HYBRID VEHICLE CONTROL ECU)

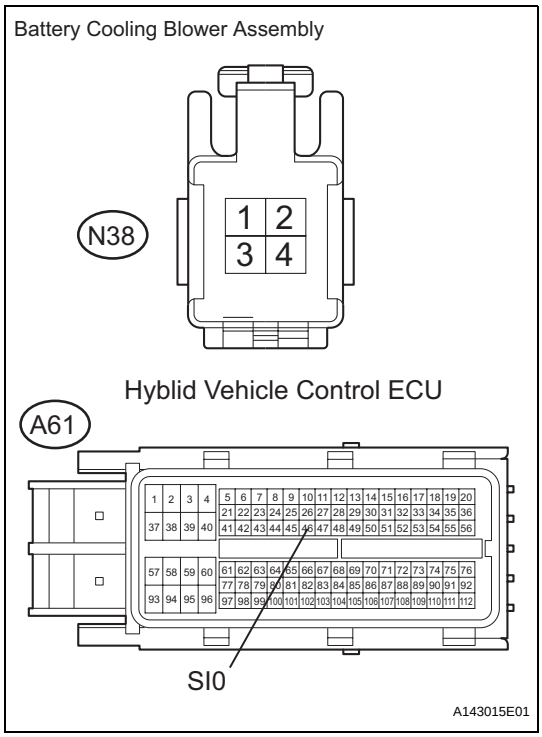
(a) Disconnect the battery cooling blower assembly connector.

(b) Disconnect connector A61 from the hybrid vehicle control ECU.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
N38-3 or SI0 (A61-46) - Body ground	10 kΩ or higher

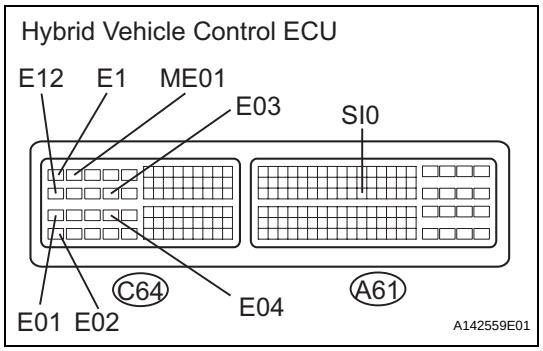


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HYBRID VEHICLE CONTROL ECU (GROUND SHORT CHECK)

(a) Remove the hybrid vehicle control ECU (See page HV-570).



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
SI0 (A61-46) - E02 (C64-65)	10 kΩ or higher
SI0 (A61-46) - ME01 (C64-13)	10 kΩ or higher
SI0 (A61-46) - E03 (C64-25)	10 kΩ or higher
SI0 (A61-46) - E04 (C64-48)	10 kΩ or higher
SI0 (A61-46) - E01 (C64-51)	10 kΩ or higher
SI0 (A61-46) - E1 (C64-14)	10 kΩ or higher
SI0 (A61-46) - E12 (C64-28)	10 kΩ or higher

NG → **REPLACE HYBRID VEHICLE CONTROL ECU**

OK

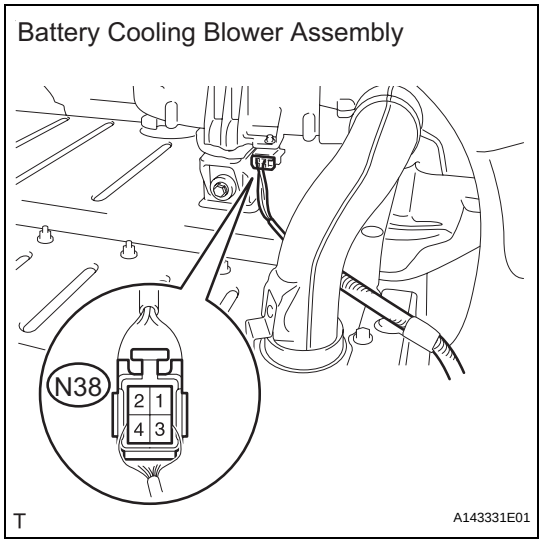
5 READ VALUE ON INTELLIGENT TESTER

(a) Connect the battery cooling blower assembly connector.
(b) Connect connector A61 to the hybrid vehicle control ECU.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the power switch on (IG).
(e) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.
HINT:
Check COOLING FAN MODE1 in the DATA LIST using the intelligent tester. If the COOLING FAN MODE1 is 1 to 6, it is not necessary to perform the ACTIVE TEST.
(f) Select the following menu items: USER DATA / VMF FAN VOLT 1.
(g) Select each air volume mode (1 to 6) in the COOLING FAN SPD active test to operate the battery cooling blower assembly.
(h) While the cooling fan is operating, compare the value in the user data (VMF FAN VOLT 1) with the voltage value that was actually measured at the battery cooling blower assembly connector.

Standard

Tester Connection	Specified Condition
N38-2 - N38-4	There is no difference between the value in the data list (cooling fan voltage) and the voltage value that was actually measured at the battery cooling blower assembly connector.

OK:
Difference of voltage is 1 V or less.



NG → **REPLACE BATTERY SMART UNIT (See page HB-99)**

HB

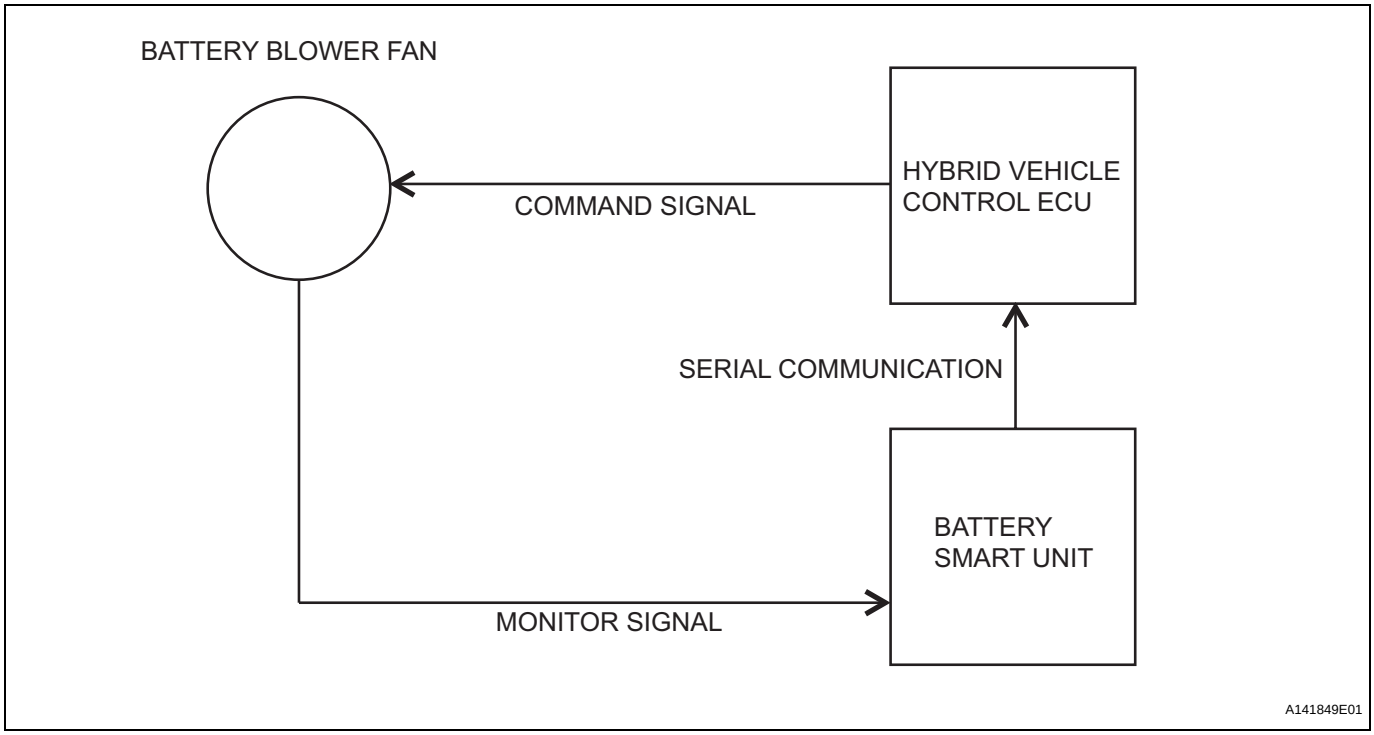
OK

REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)

DTC	P0A84-123	Hybrid Battery Pack Cooling Fan 1

DESCRIPTION

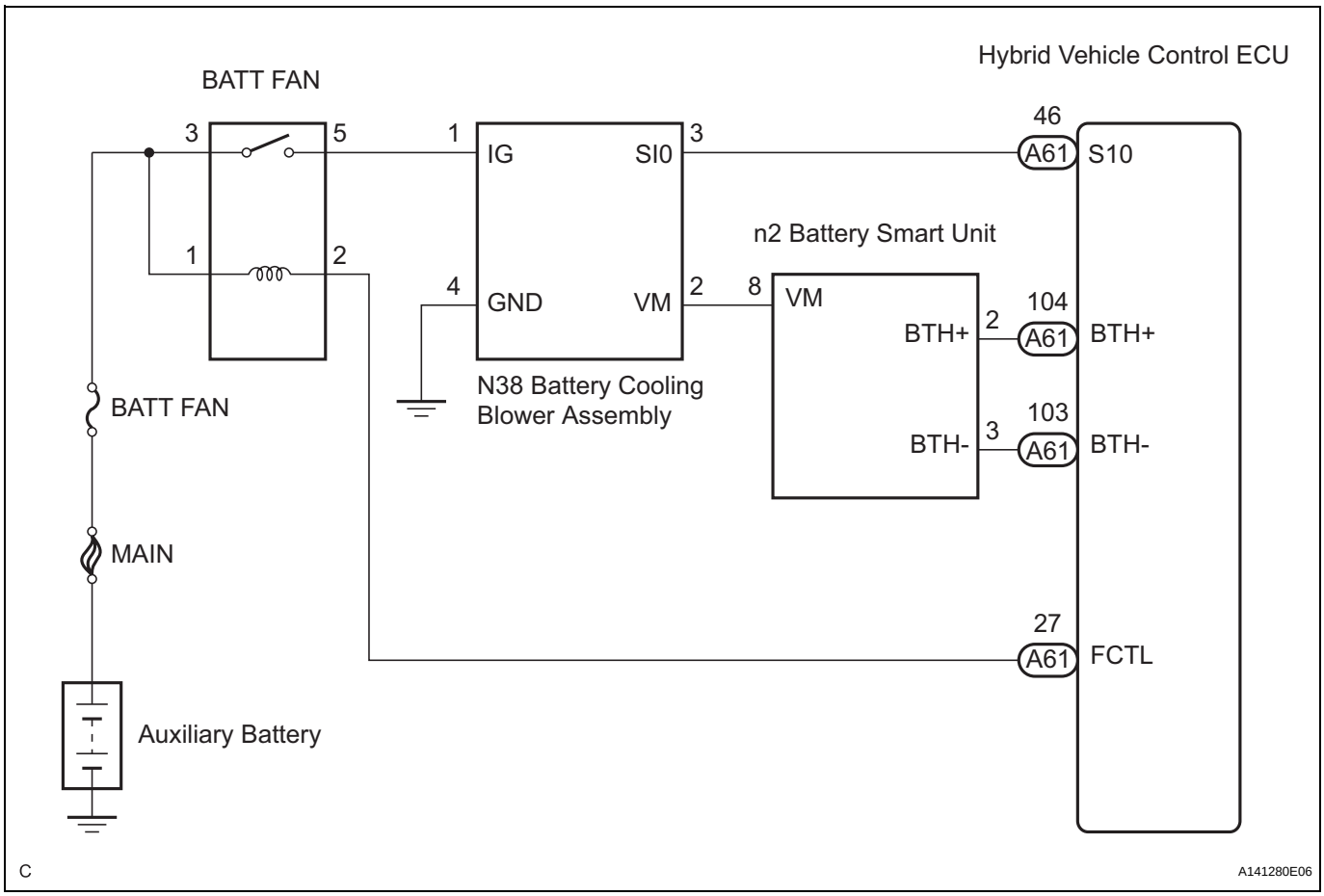
The speed of the battery cooling blower assembly is controlled by the hybrid vehicle control ECU. Battery cooling blower assembly power is supplied when the FCTL terminal of the hybrid vehicle control ECU turns on the battery blower relay. The hybrid vehicle control ECU sends command signals (SI) to the battery cooling blower assembly to get the fan speed corresponding to the HV battery temperature. Information about the voltage applied to the battery cooling blower assembly (VM) is sent to the hybrid vehicle control ECU as a monitor signal using serial communication via the battery smart unit.



DTC No.	DTC Detection Condition	Trouble Area
P0A84-123	When the output voltage of the battery cooling blower assembly (VM) is too low to the target control voltage range (1 trip detection)	• Wire harness or connector • BATT FAN fuse • Battery blower relay • Battery cooling blower assembly • Battery smart unit • Hybrid vehicle control ECU • HV battery

HB

WIRING DIAGRAM



CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

INSPECTION PROCEDURE

1	**CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
Result:
DTC P0A1F-123 is output.
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

YES	**GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

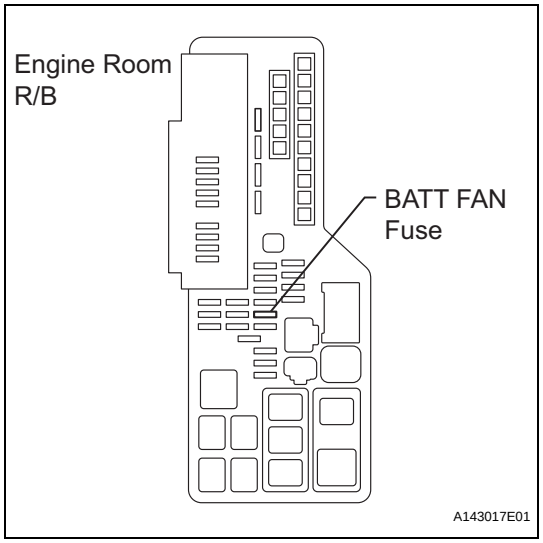
2	PERFORM ACTIVE TEST USING INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.
HINT:
Check COOLING FAN MODE1 in the DATA LIST using the intelligent tester. If the COOLING FAN MODE1 is 1 to 6, it is not necessary to perform the ACTIVE TEST.
(d) Select air volume mode 6 in the COOLING FAN SPD active test to operate the battery cooling blower assembly.
(e) Check that the fan operates and air is sucked into the inlet duct of the package tray trim panel assembly.
HINT:
The cooling fan may not stop even when turning the cooling fan off in the COOLING FAN SPD active test. This is due to HV system control and not a malfunction.
OK:
The fan operates.

OK	Go to step 14

NG

3	CHECK FUSE (BATT FAN)



(a) Measure the resistance of the BATT FAN fuse.
Standard resistance:
Below 1 Ω

OK	Go to step 7

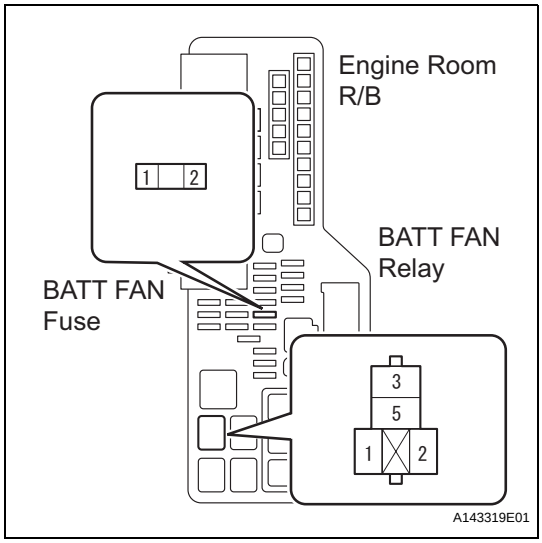
NG

HB

4	REPLACE FUSE (BATT FAN)

NEXT

5	CHECK HARNESS AND CONNECTOR (BATT FAN FUSE - BODY GROUND)



(a) Remove the BATT FAN fuse from the engine room R/B.
(b) Remove the BATT FAN relay from the engine room R/B.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
BATT FAN fuse 2 or BATT FAN relay 3 or 1 - Body ground	10 kΩ or higher

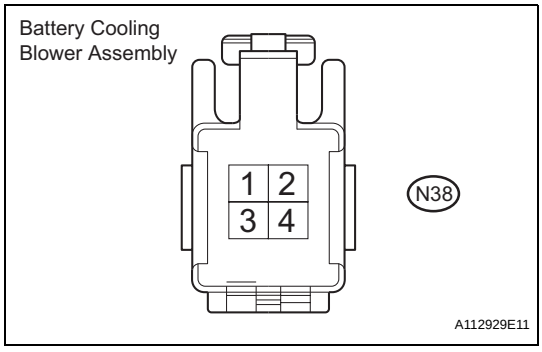
NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

HB

6	CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - BODY GROUND)



(a) Remove the front luggage compartment trim cover (See page HB-86).
(b) Disconnect the battery cooling blower assembly connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

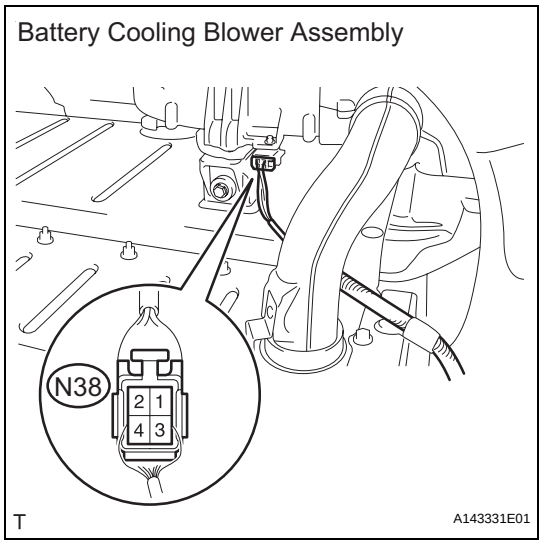
Tester Connection	Specified Condition
N38-1 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)

7 CHECK HARNESS AND CONNECTOR (VOLTAGE)



(a) Remove the front luggage compartment trim cover (See page HB-86).
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

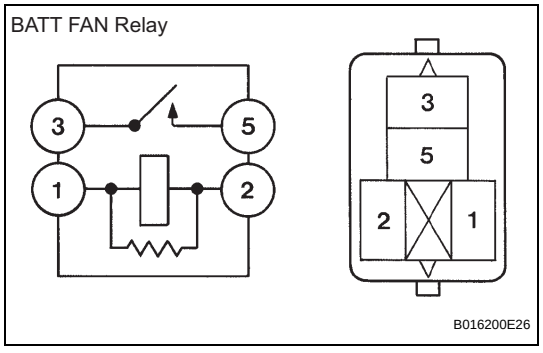
Standard voltage

Tester Connection	Specified Condition
1 (+B) - 4 (GND)	9 to 14 V

OK → **Go to step 14**

NG

8 INSPECT RELAY (BATTERY FAN)



(a) Remove the BATT FAN relay from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

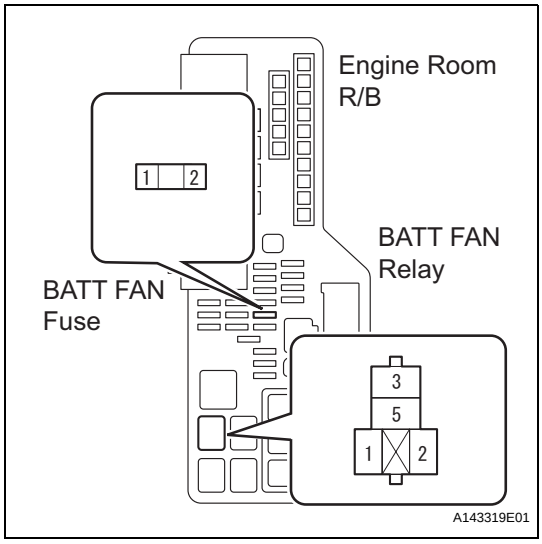
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

NG → **REPLACE RELAY (BATTERY BLOWER)**

OK

HB

9 CHECK HARNESS AND CONNECTOR (BATT FAN FUSE - BATT FAN RELAY)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

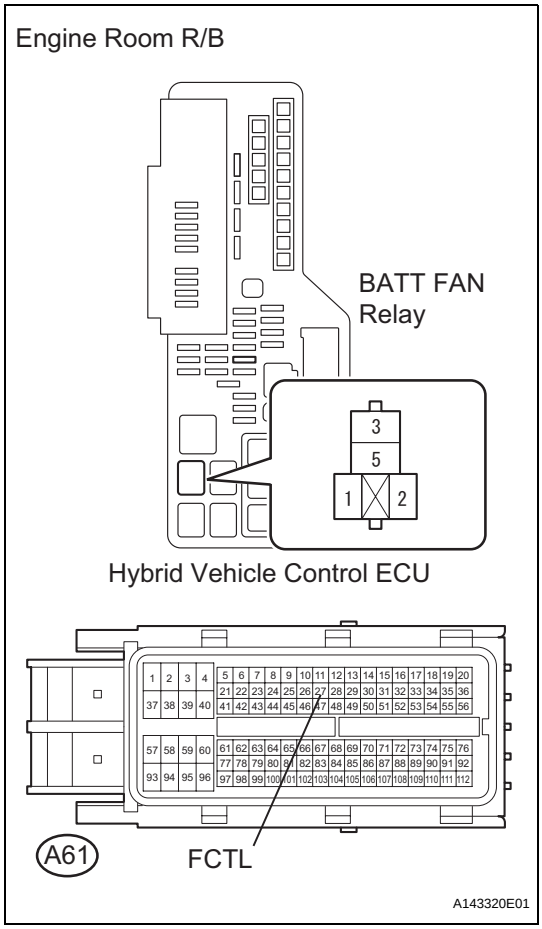
Tester Connection	Specified Condition
BATT FAN fuse 2 - BATT FAN relay 1	Below 1 Ω
BATT FAN fuse 2 - BATT FAN relay 3	Below 1 Ω

NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10 CHECK HARNESS AND CONNECTOR (BATT FAN RELAY - HYBRID VEHICLE CONTROL ECU)



(a) Disconnect connector A61 from the hybrid vehicle control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
2 - FCTL (A61-27)	Below 1 Ω

NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

(c) Turn the power switch on (IG).

(d) Measure the resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
2 or FCTL (A61-27) - Body ground	Below 1 V

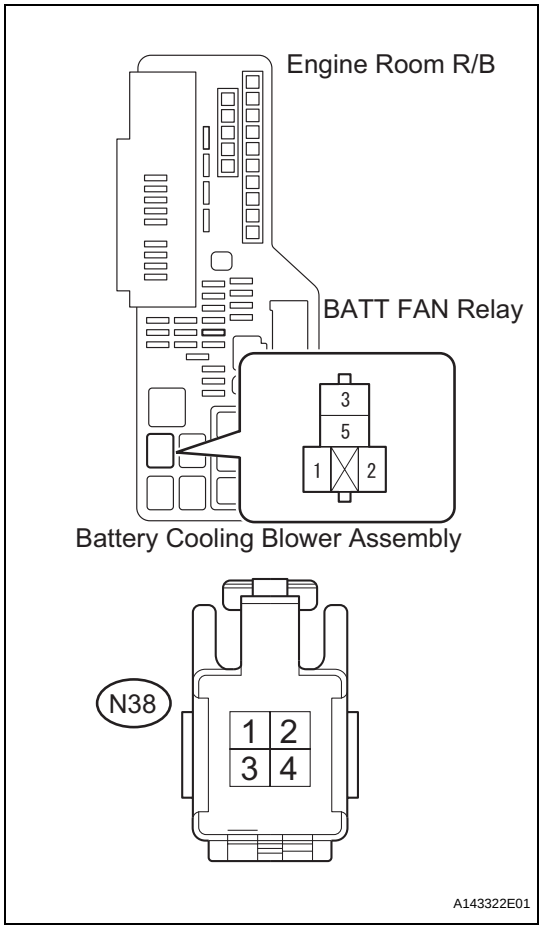
NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

HB

OK

11	CHECK HARNESS AND CONNECTOR (BATT FAN RELAY - BATTERY COOLING BLOWER)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
5 - N38-1	Below 1 Ω

NOTICE:
When taking measurements with an electrical tester, do not apply excessive force to the tester probes to avoid damaging the fuse holder or terminals.

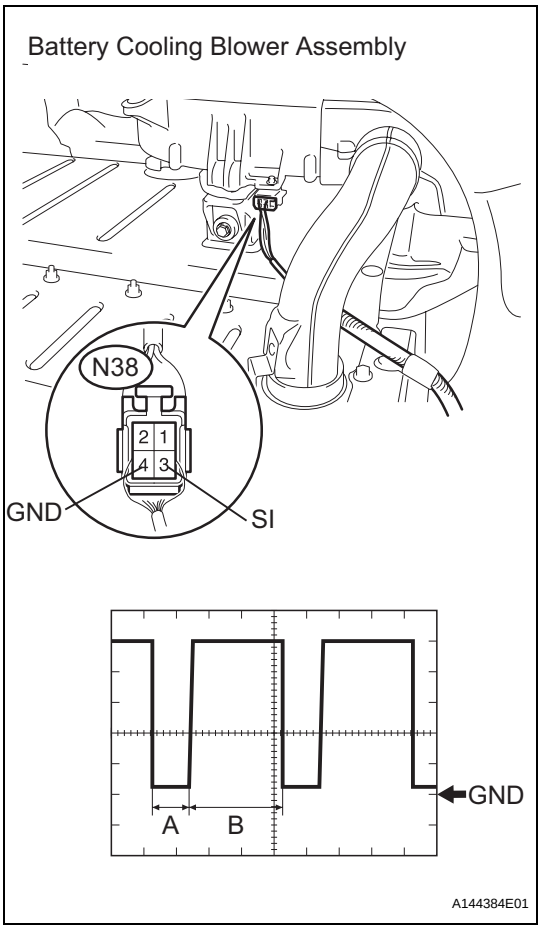
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

12	CHECK WAVEFORM

(a) Install the BATT FAN fuse to the engine room R/B No. 1.
(b) Connect the battery cooling blower assembly connector.
(c) Connect an oscilloscope between connector terminals 3 (SI) and 4 (GND) of the battery cooling blower assembly.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the power switch on (IG).
(f) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.
(g) Select air volume mode 1 to 6 in the COOLING FAN SPD active test to operate the battery cooling blower assembly.



(h) Measure the waveform.

Item	Contents
Terminal	CH1: N38-3 - N38-4
Equipment Setting	1 V/DIV., 500 μs/DIV.
Condition	Power switch on (IG) or Power switch on (READY)

HINT:

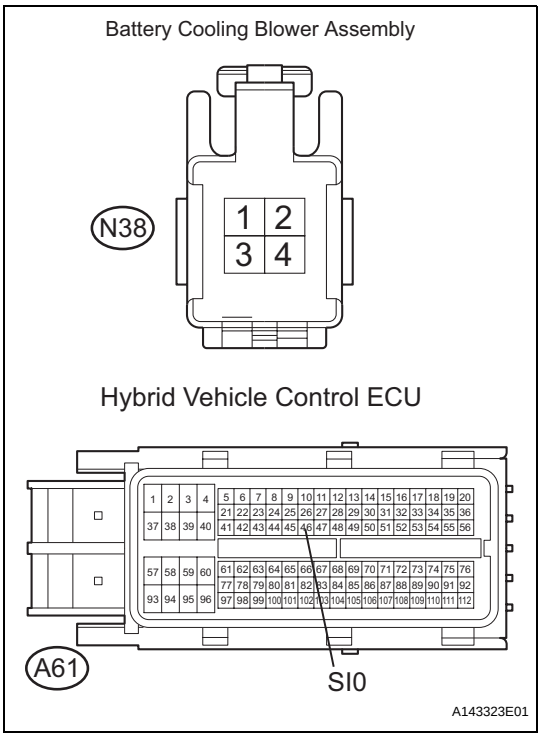
- A and B in the DUTY waveform shown in the illustration vary depending on the cooling fan mode.
- The actual duty command value is influenced by variance in fan motors and the change of power supply voltage.

OK → **REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)**

NG

HB

13 CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - HYBRID VEHICLE CONTROL ECU)



(a) Disconnect the battery cooling blower assembly connector.

(b) Disconnect connector A61 from the hybrid vehicle control ECU.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
N38-3 - SI0 (A61-46)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
N38-3 or SI0 (A61-46)- Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

14 CHECK BATTERY COOLING BLOWER ASSEMBLY (VOLTAGE)

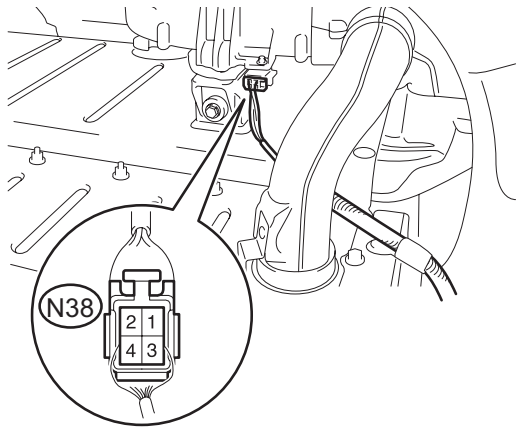
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.
HINT:
Check COOLING FAN MODE1 in the DATA LIST using the intelligent tester. If the COOLING FAN MODE1 is 1 to 6, it is not necessary to perform the ACTIVE TEST.
(d) Select the following menu items: USER DATA / VMF FAN VOLT 1.
(e) Select each air volume mode (1 to 6) in the COOLING FAN SPD active test to operate the battery cooling blower assembly.
(f) While the cooling fan is operating, compare the value in the user data (VMF FAN VOLT 1) with the voltage value that was actually measured at the battery cooling blower assembly connector.

Standard

Tester Connection	Specified Condition
N38-2 - N38-4	There is no difference between the value in the data list (cooling fan voltage) and the voltage value that was actually measured at the battery cooling blower assembly connector.

OK:
Difference of voltage is 1 V or less.

Battery Cooling Blower Assembly



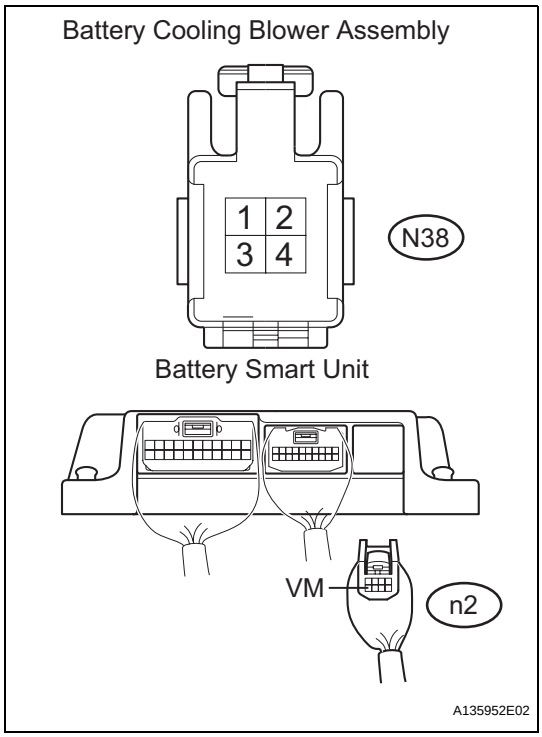
NG → **REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)**

OK

15 CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - BATTERY SMART UNIT)

CAUTION:
Be sure to wear insulated gloves.
(a) Remove the service plug grip (See page HB-86).
(b) Remove the battery smart unit (See page HB-100).
(c) Disconnect connector n2 from the battery smart unit.

HB



(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
N38-2 - VM (n2-8)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
N38-2 or VM (n2-8) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE BATTERY SMART UNIT (See page HB-99)

HYBRID BATTERY SYSTEM

PRECAUTION

NOTICE:
When the negative (-) battery terminal has been disconnected, initialize the following systems after the terminal is reconnected.

System	See Procedure
SFI System	IN-43

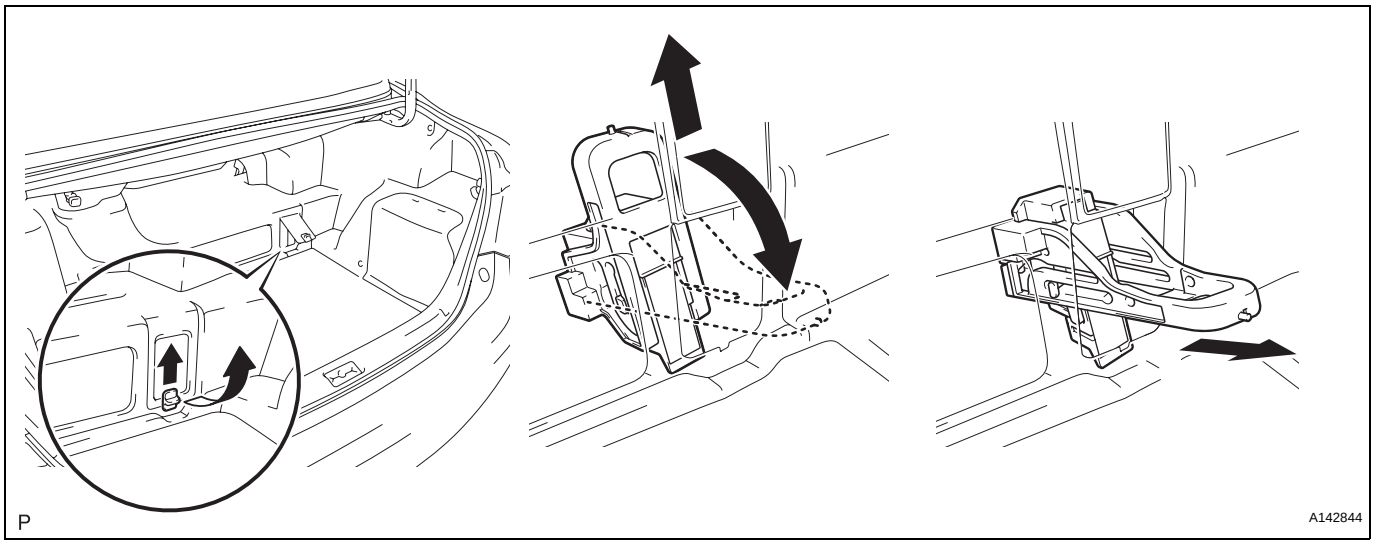
1. PRECAUTIONS FOR INSPECTING THE HYBRID CONTROL SYSTEM

(a) Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions, such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. Make sure to turn the power switch off before removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

NOTICE:
Turning the power switch on (READY) with the service plug grip removed could cause a malfunction. 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 10 minutes before touching any of the high-voltage connectors or terminals.

HB



HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

(c) Turn the power switch off, wear insulated gloves, and disconnect the negative terminal of the auxiliary battery before touching any of the orange-colored wires of the high-voltage system.
(d) Turn the power switch off before performing any resistance checks.
(e) Turn the power switch off before disconnecting or reconnecting any connectors.

2. PRECAUTIONS FOR HYBRID CONTROL SYSTEM ACTIVATION

(a) When the auxiliary battery has been disconnected and reconnected, attempting to turn the power switch on (READY) may not start the system (the system may not enter the READY-on state) on the first attempt. If so, turn the power switch off and reattempt to turn the power switch on (READY).

DTC	P0A85-123	Hybrid Battery Pack Cooling Fan 1

DESCRIPTION

Refer to the circuit description for DTC P0A84-123 (See page HB-35).

DTC No.	DTC Detection Condition	Trouble Area
P0A85-123	When the output voltage of the battery cooling blower assembly (VM) is too high to the target control voltage range (1 trip detection)	• Wire harness or connector • Battery cooling blower assembly • Battery smart unit • HV battery

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A84-123 (See page HB-36).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result:

DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK HARNESS AND CONNECTOR (VOLTAGE)

CAUTION:

Be sure to wear insulated gloves.

(a) Remove the service plug grip (See page HB-86).
(b) Remove the battery smart unit (See page HB-100).
HINT:
Do not disconnect the battery smart unit connectors.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the power switch on (IG).

(e) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / ACTIVE TEST / COOLING FAN SPD.

HINT:

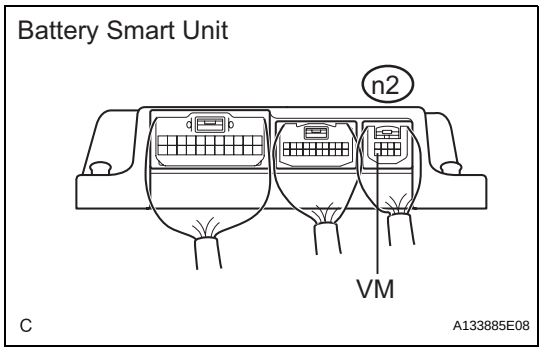
Check COOLING FAN MODE1 in the DATA LIST using the intelligent tester. If the COOLING FAN MODE1 is 1 to 6, it is not necessary to perform the ACTIVE TEST.

(f) Select each air volume mode (1 to 6) in the COOLING FAN SPD active test to operate the battery cooling blower assembly.

(g) Measure the voltage according to the value(s) in the table below while the cooling fan is operating.

Standard voltage

Tester Connection	Specified Condition
VM (n2-8) - Body ground	Below 5 V



OK → **Go to step 5**

NG

3 CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - BATTERY SMART UNIT)

CAUTION:

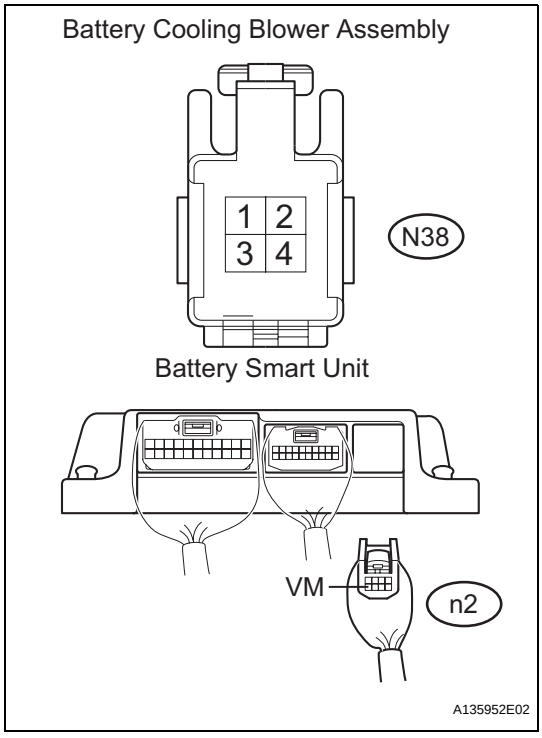
Be sure to wear insulated gloves.

(a) Disconnect connector n2 from the battery smart unit.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
N38-2 or VM (n2-8) - Other terminal	10 kΩ or higher

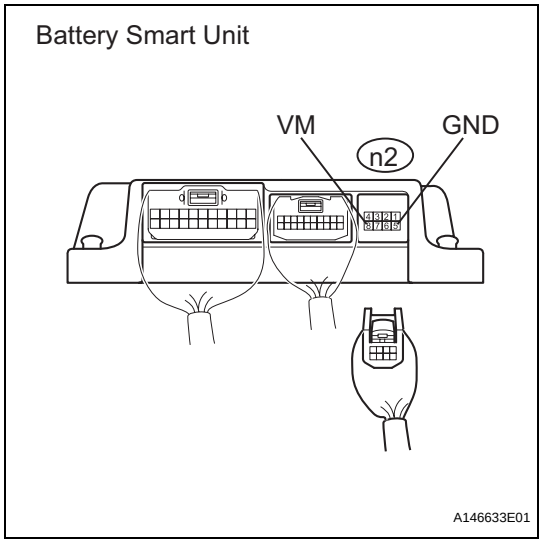


NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

HB

4	CHECK BATTERY SMART UNIT (VOLTAGE)



CAUTION:
Be sure to wear insulated gloves.

(a) Turn the power switch on (IG).
(b) Measure the resistance according to the value(s) in the table below.

Standard voltage

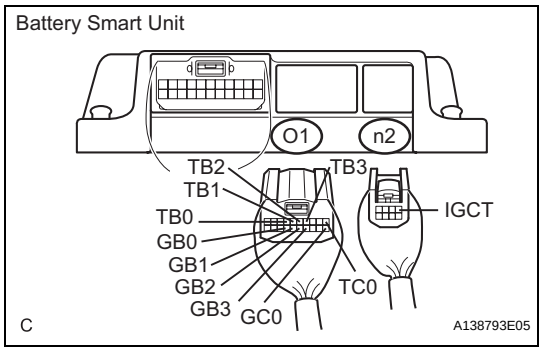
Tester Connection	Specified Condition
VM (n2-8) - GND (n2-5)	Below 5 V

NG → **REPLACE BATTERY SMART UNIT (See page HB-99)**

OK

REPLACE BATTERY COOLING BLOWER ASSEMBLY (See page HB-115)

5	CHECK HV BATTERY (BATTERY TEMPERATURE SENSOR AND INLET AIR TEMPERATURE SENSOR)



CAUTION:
Be sure to wear insulated gloves.

(a) Disconnect connector O1 from the battery smart unit.
(b) Disconnect connector n2 from the battery smart unit.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
TB0 (O1-7) - IGCT (n2-1)	10 kΩ or higher
GB0 (O1-17) - IGCT (n2-1)	10 kΩ or higher
TB1 (O1-6) - IGCT (n2-1)	10 kΩ or higher
GB1 (O1-16) - IGCT (n2-1)	10 kΩ or higher
TB2 (O1-5) - IGCT (n2-1)	10 kΩ or higher
GB2 (O1-15) - IGCT (n2-1)	10 kΩ or higher
TB3 (O1-4) - IGCT (n2-1)	10 kΩ or higher
GB3 (O1-14) - IGCT (n2-1)	10 kΩ or higher
TC0 (O1-1) - IGCT (n2-1)	10 kΩ or higher
GC0 (O1-11) - IGCT (n2-1)	10 kΩ or higher

NG → **REPLACE HV BATTERY (See page HB-81)**

HB

OK

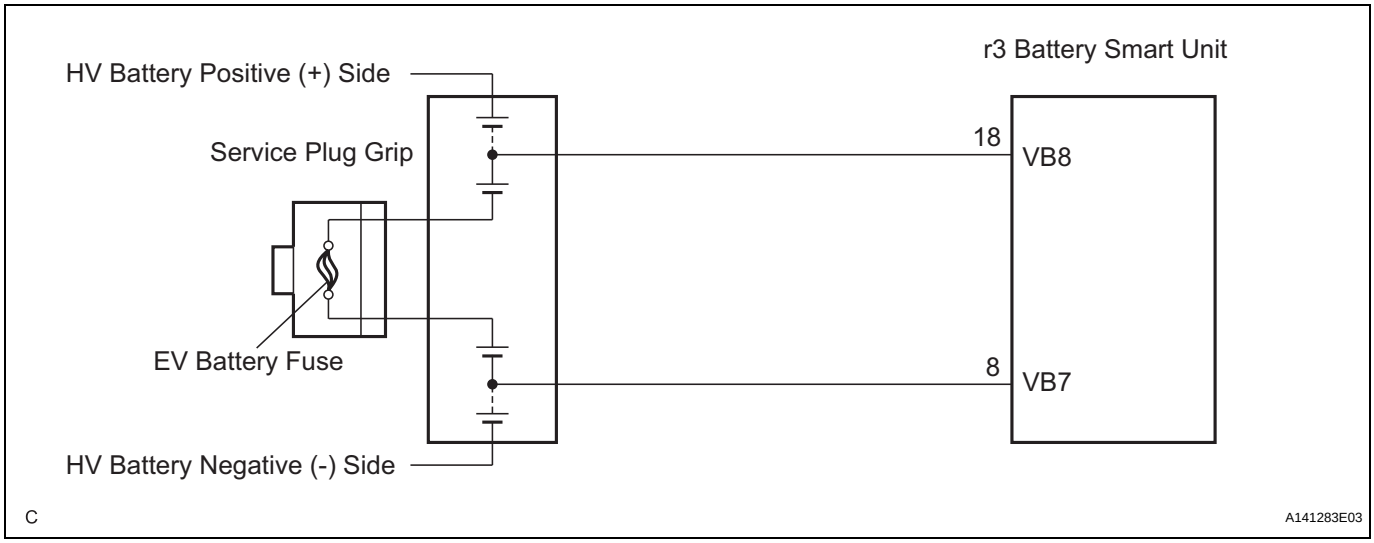
REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0A95-123	High Voltage Fuse

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
P0A95-123	Voltage between VBB7 and VBB8 terminals is below the standard despite the interlock switch being engaged (1 trip detection)	• EV battery • Service plug grip • HV battery • Battery smart unit

WIRING DIAGRAM



INSPECTION PROCEDURE

HB

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK FOR DTCS (DTCS OTHER THAN P0A95-123)

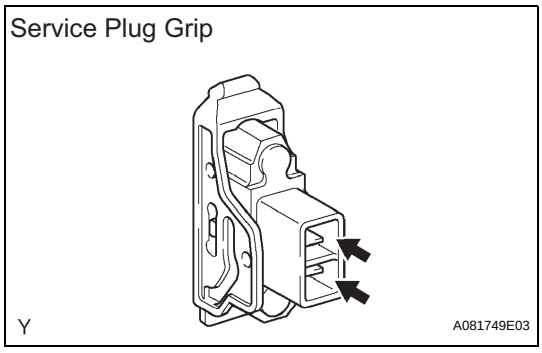
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTCs other than P0A95-123 are output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

3	INSPECT SERVICE PLUG GRIP

CAUTION:
Be sure to wear insulated gloves.
(a) Turn the power switch off and remove the service plug grip (See page HB-86).
NOTICE:
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.
(b) Measure the resistance between the terminals of the service plug grip.
Standard resistance:
Below 1 Ω



OK → **REPLACE HV BATTERY (See page HB-81)**

NG

REPLACE SERVICE PLUG GRIP (See page HB-81)

DTC	P0A9C-123	Hybrid Battery Temperature Sensor "A"

DESCRIPTION

Refer to the circuit description for DTC P0A9D-123. (See page HB-54)

DTC No.	DTC Detection Condition	Trouble Area
P0A9C-123	• When the battery temperature sensor performance is abnormal (1 trip detection/2 trip detection)	• HV battery (Battery temperature sensor) • Battery smart unit

MONITOR DESCRIPTION

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

MONITOR STRATEGY

Related DTCs	P0A9C (INF 123): Rationality
Required sensors / components	Battery temperature sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A9C (INF 123) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

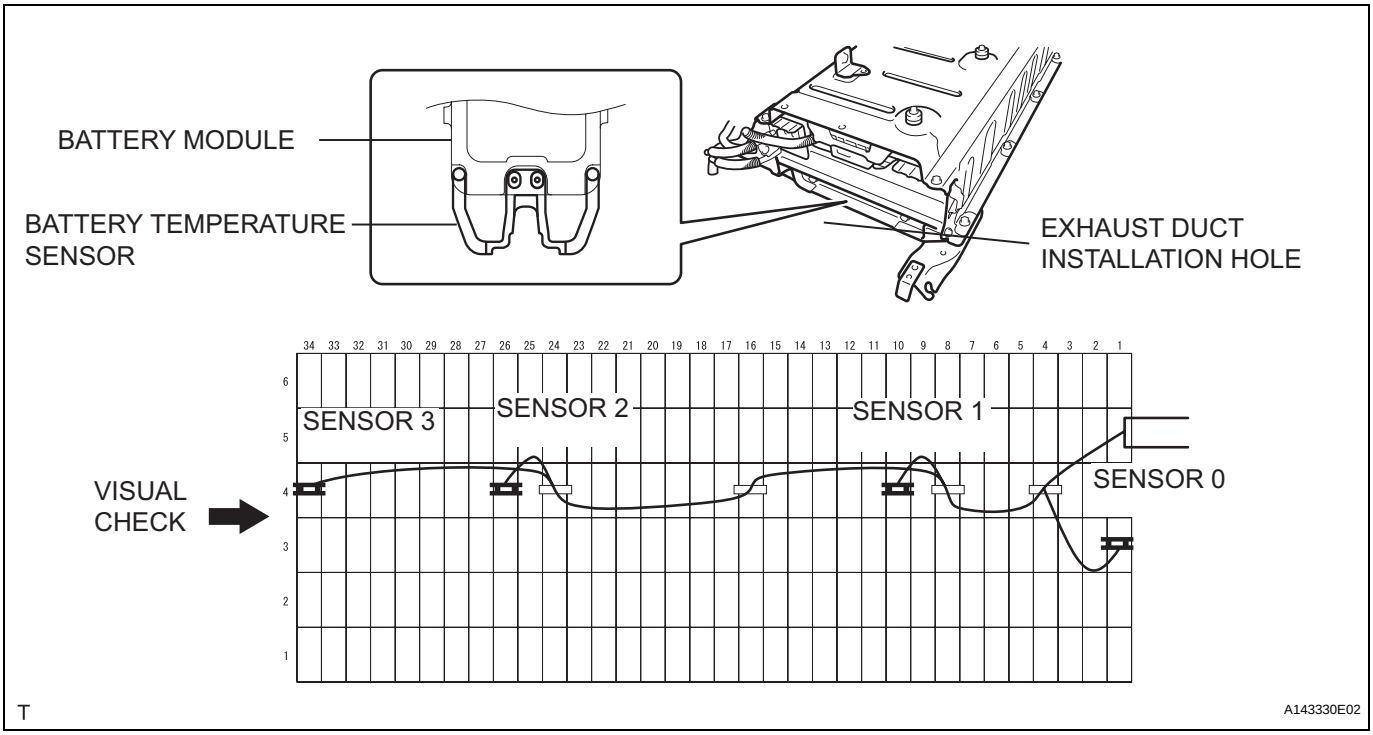
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK BATTERY TEMPERATURE SENSOR (BATTERY TEMPERATURE SENSOR 0 TO 3)

CAUTION:
Be sure to wear insulated gloves.
(a) Remove the HV battery assembly. (See page HB-86)
(b) Visually check the installation of the battery temperature sensors (0 to 3) through the exhaust duct installation hole.



OK:
The battery temperature sensors (0 to 3) are securely installed.
NOTICE:
Do not poke the battery temperature sensors with a stick or other objects when checking. Doing so may damage the sensors.

NG → REPLACE HV BATTERY (See page HB-81)

OK

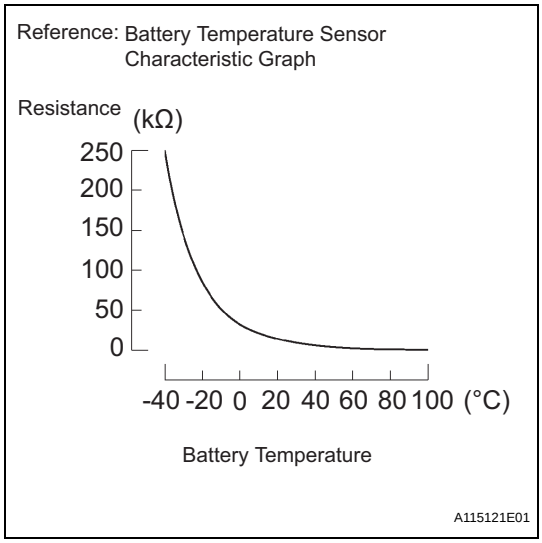
REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0A9D-123	Hybrid Battery Temperature Sensor "A" Circuit Low

DTC	P0A9E-123	Hybrid Battery Temperature Sensor "A" Circuit High

DESCRIPTION

The battery temperature sensors are provided at 4 locations on the bottom of the HV battery. The resistance of the thermistor, which is built into each battery temperature sensor, varies in accordance with changes in the HV battery temperature. The lower the battery temperature, the higher the thermistor resistance. Conversely, the higher the temperature, the lower the resistance. The battery smart unit uses the battery temperature sensors to detect the HV battery temperature, and sends the detected values to the hybrid vehicle control ECU. Based on these results, the hybrid vehicle control ECU controls the blower fan. (The blower fan starts when the HV battery temperature rises above a predetermined level.)



HB

DTC No.	DTC Detection Condition	Trouble Area
P0A9D-123 P0A9E-123	When the temperature indicated by the battery temperature sensor is lower than a predetermined limit (open circuit) or is higher than a predetermined limit (short circuit) (1 trip detection)	• HV battery (Battery temperature sensor) • Battery smart unit

HINT:
After confirming that a DTC is output, use the intelligent tester to check "BATT TEMP 1 to 4" in the HV ECU data list.

Displayed Temperature	Malfunction
-45°C or less	Open or +B short circuit
95°C or more	GND short

MONITOR DESCRIPTION

If the temperature indicated by the battery temperature sensor is lower than the standard level (open), or is higher than the standard level (short), the battery smart unit interprets this as a sensor malfunction. If the battery smart unit detects that the HV battery temperature is out of its normal range or its value is abnormal, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A9D (INF 123): Range check P0A9E (INF 123): Range check
Required sensors / components	Battery temperature sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

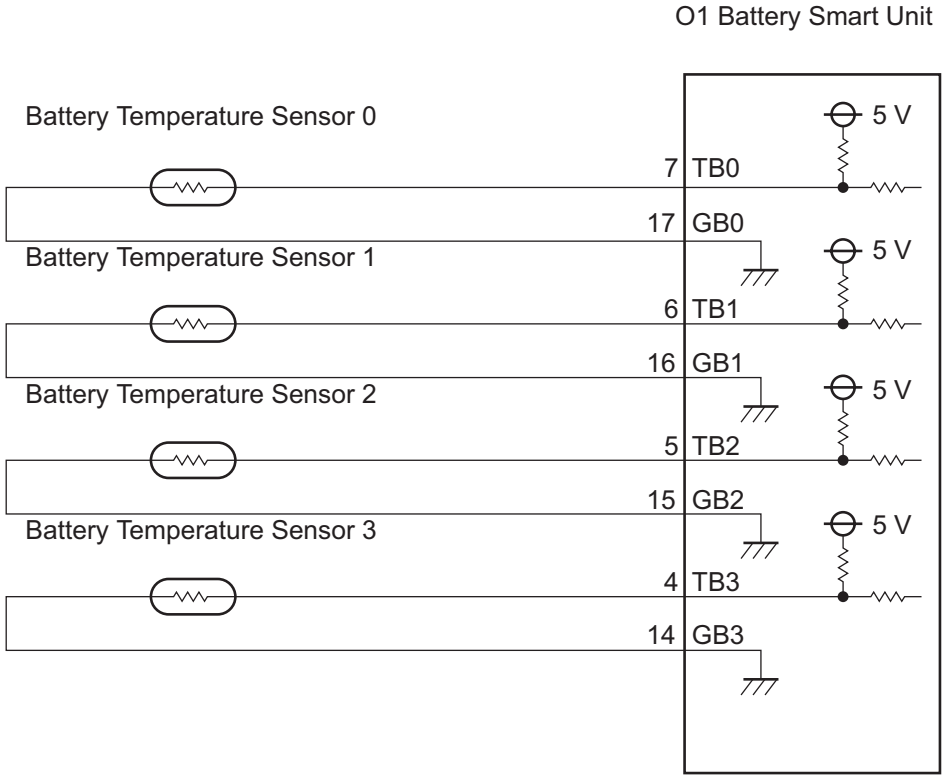
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	P0A9D (INF 123) / P0A9E (INF 123) is not detected

WIRING DIAGRAM



C

A141281E02

HB

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result:

DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (BATTERY TEMPERATURE SENSOR)

HB

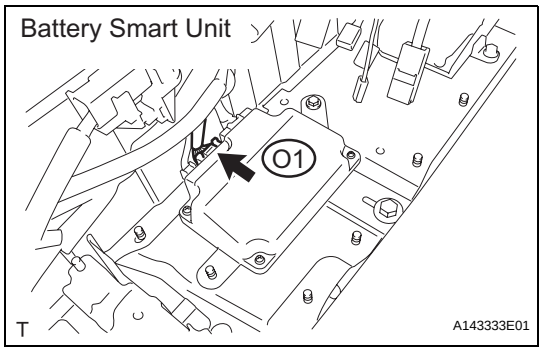
CAUTION:

Be sure to wear insulated gloves.

(a) Remove the service plug grip (See page HB-86).
(b) Remove the HV relay assembly (See page HB-105).
(c) Check the connection of connector O1 of the battery smart unit.

OK:

The connector is connected securely and there are no contact problems.



NG → **CONNECT SECURELY**

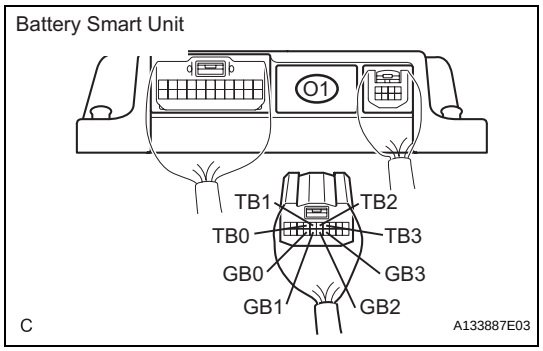
OK

3	CHECK HV BATTERY (BATTERY TEMPERATURE SENSOR)

CAUTION:

Be sure to wear insulated gloves.

(a) Remove the battery smart unit (See page HB-100).
(b) Disconnect connector O1 from the battery smart unit.



(c) For the malfunctioning battery temperature sensor(s) , measure the resistance according to the value(s) in the table below.

Tester Connection	Thermistor No.
TB0 (O1-7) - GB0 (O1 - 17)	0
TB1 (O1-6) - GB1 (O1 - 16)	1
TB2 (O1-5) - GB2 (O1 - 15)	2
TB3 (O1-4) - GB3 (O1 - 14)	3

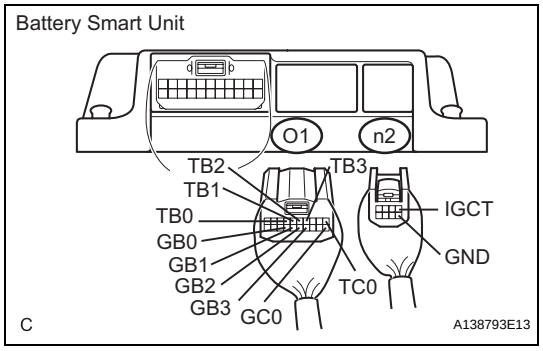
Standard resistance

Thermistor Temperature	Specified Condition
0°C (32°F)	26.7 to 27.9 kΩ
25°C (77°F)	9.9 to 10.1 kΩ
40°C (104°F)	5.7 to 6.0 kΩ

NG → **REPLACE HV BATTERY (See page HB-81)**

OK

4 CHECK HV BATTERY (BATTERY TEMPERATURE SENSOR AND INLET AIR TEMPERATURE SEMSOR)



CAUTION:
Be sure to wear insulated gloves.

(a) Disconnect connector O1 from the battery smart unit.
(b) Disconnect connector n2 from the battery smart unit.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
TB0 (O1-7) - IGCT (n2-1)	10 kΩ or higher
GB0 (O1-17) - IGCT (n2-1)	10 kΩ or higher
TB1 (O1-6) - IGCT (n2-1)	10 kΩ or higher
GB1 (O1-16) - IGCT (n2-1)	10 kΩ or higher
TB2 (O1-5) - IGCT (n2-1)	10 kΩ or higher
GB2 (O1-15) - IGCT (n2-1)	10 kΩ or higher
TB3 (O1-4) - IGCT (n2-1)	10 kΩ or higher
GB3 (O1-14) - IGCT (n2-1)	10 kΩ or higher
TC0 (O1-1) - IGCT (n2-1)	10 kΩ or higher
GC0 (O1-11) - IGCT (n2-1)	10 kΩ or higher
TB0 (O1-7) - GND(n2 - 5)	10 kΩ or higher
TB1 (O1-6) - GND(n2 - 5)	10 kΩ or higher
TB2 (O1-5) - GND(n2 - 5)	10 kΩ or higher
TB3 (O1-4) - GND(n2 - 5)	10 kΩ or higher
TC0 (O1-1) - GND(n2 - 5)	10 kΩ or higher

NG → **REPLACE HV BATTERY (See page HB-81)**

HB

OK

REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0AAC-123	Hybrid Battery Pack Air Temperature Sensor "A" Circuit

DESCRIPTION

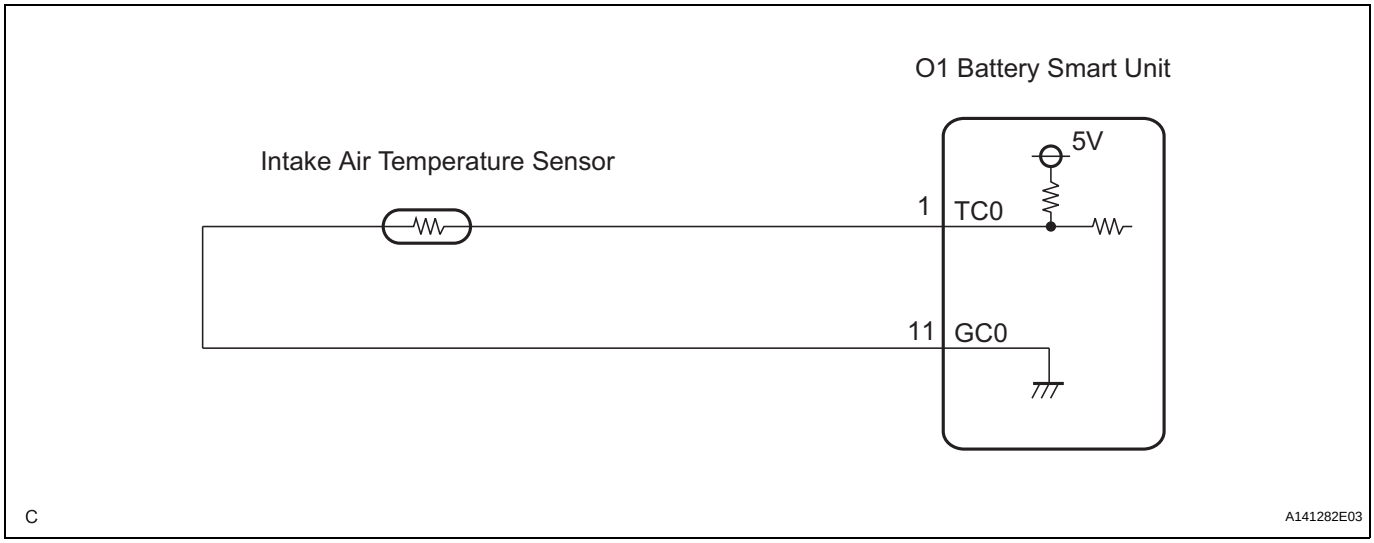
The intake air temperature sensor (battery) is mounted on the HV battery. The resistance of the sensor varies in accordance with changes in the intake air temperature. The characteristics of the intake air temperature sensor are the same as those of the battery temperature sensor. (See page HB-54) The battery smart unit uses signals from the intake air temperature sensor to control the air volume of the battery cooling blower assembly.

DTC No.	DTC Detection Condition	Trouble Area
P0AAC-123	When the temperature indicated by the intake air temperature sensor is lower than a predetermined limit (open circuit) or is higher than a predetermined limit (short circuit)	• HV battery (Intake air temperature sensor) • Battery smart unit

HINT:
After confirming that DTC P0AAC is output, use the intelligent tester to check "BATT INSIDE AIR" in the HV ECU data list.

Displayed Temperature	Malfunction
-45°C or less	Open or +B short circuit
95°C or more	GND short

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

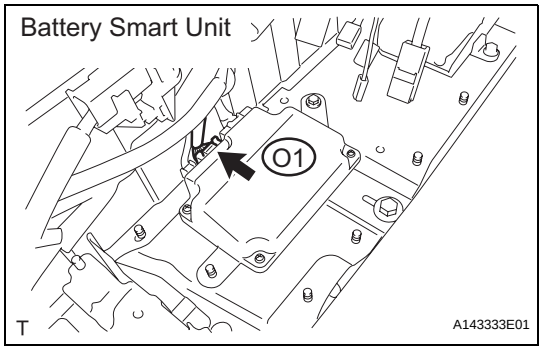
1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK CONNECTOR CONNECTION CONDITION (INTAKE AIR TEMPERATURE SENSOR)

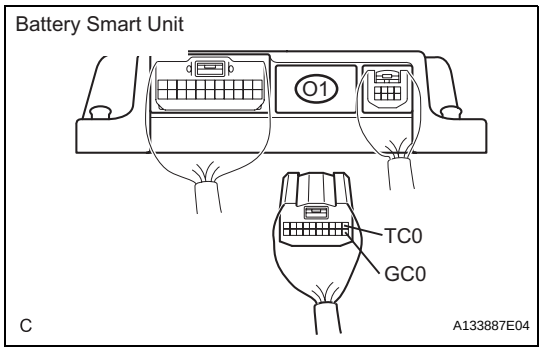


CAUTION:
Be sure to wear insulated gloves.
(a) Remove the service plug grip. (See page HB-86)
(b) Remove the HV relay assembly. (See page HB-105)
(c) Check the connection of connector O1 of the battery smart unit.
OK:
The connector is connected securely and there are no contact problems.
HINT:
The intake air temperature sensor is not available separately. If it requires replacement, replace the HV battery.

NG → **CONNECT SECURELY**

OK

3	CHECK HV BATTERY (INTAKE AIR TEMPERATURE SENSOR)



CAUTION:
Be sure to wear insulated gloves.
(a) Remove the battery smart unit (See page HB-100).
(b) Disconnect connector O1 from the battery smart unit.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

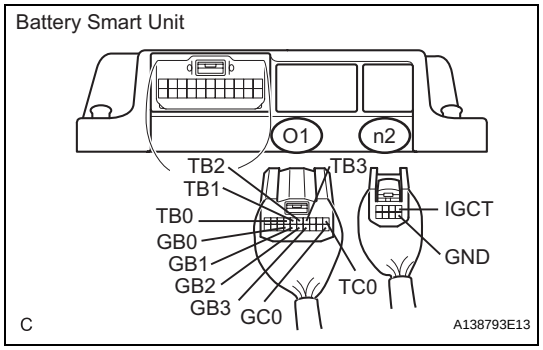
Tester Connection	Specified Condition
TCO (O1-1) - GC0 (O1-11)	26.7 to 27.9 kΩ at 0°C (32°F)
TCO (O1-1) - GC0 (O1-11)	9.9 to 10.1 kΩ at 25°C (77°F)
TCO (O1-1) - GC0 (O1-11)	5.7 to 6.0 kΩ at 40°C (104°F)

NG → **REPLACE HV BATTERY (See page HB-81)**

HB

OK

4	CHECK HV BATTERY (BATTERY TEMPERATURE SENSOR AND INLET AIR TEMPERATURE SENSOR)



CAUTION:
Be sure to wear insulated gloves.

(a) Disconnect connector O1 from the battery smart unit.
(b) Disconnect connector n2 from the battery smart unit.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
TB0 (O1-7) - IGCT (n2-1)	10 kΩ or higher
GB0 (O1-17) - IGCT (n2-1)	10 kΩ or higher
TB1 (O1-6) - IGCT (n2-1)	10 kΩ or higher
GB1 (O1-16) - IGCT (n2-1)	10 kΩ or higher
TB2 (O1-5) - IGCT (n2-1)	10 kΩ or higher
GB2 (O1-15) - IGCT (n2-1)	10 kΩ or higher
TB3 (O1-4) - IGCT (n2-1)	10 kΩ or higher
GB3 (O1-14) - IGCT (n2-1)	10 kΩ or higher
TC0 (O1-1) - IGCT (n2-1)	10 kΩ or higher
GC0 (O1-11) - IGCT (n2-1)	10 kΩ or higher
TB0 (O1-7) - GND(n2 - 5)	10 kΩ or higher
TB1 (O1-6) - GND(n2 - 5)	10 kΩ or higher
TB2 (O1-5) - GND(n2 - 5)	10 kΩ or higher
TB3 (O1-4) - GND(n2 - 5)	10 kΩ or higher
TC0 (O1-1) - GND(n2 - 5)	10 kΩ or higher

NG → REPLACE HV BATTERY (See page HB-81)

OK

REPLACE BATTERY SMART UNIT (See page HB-99)

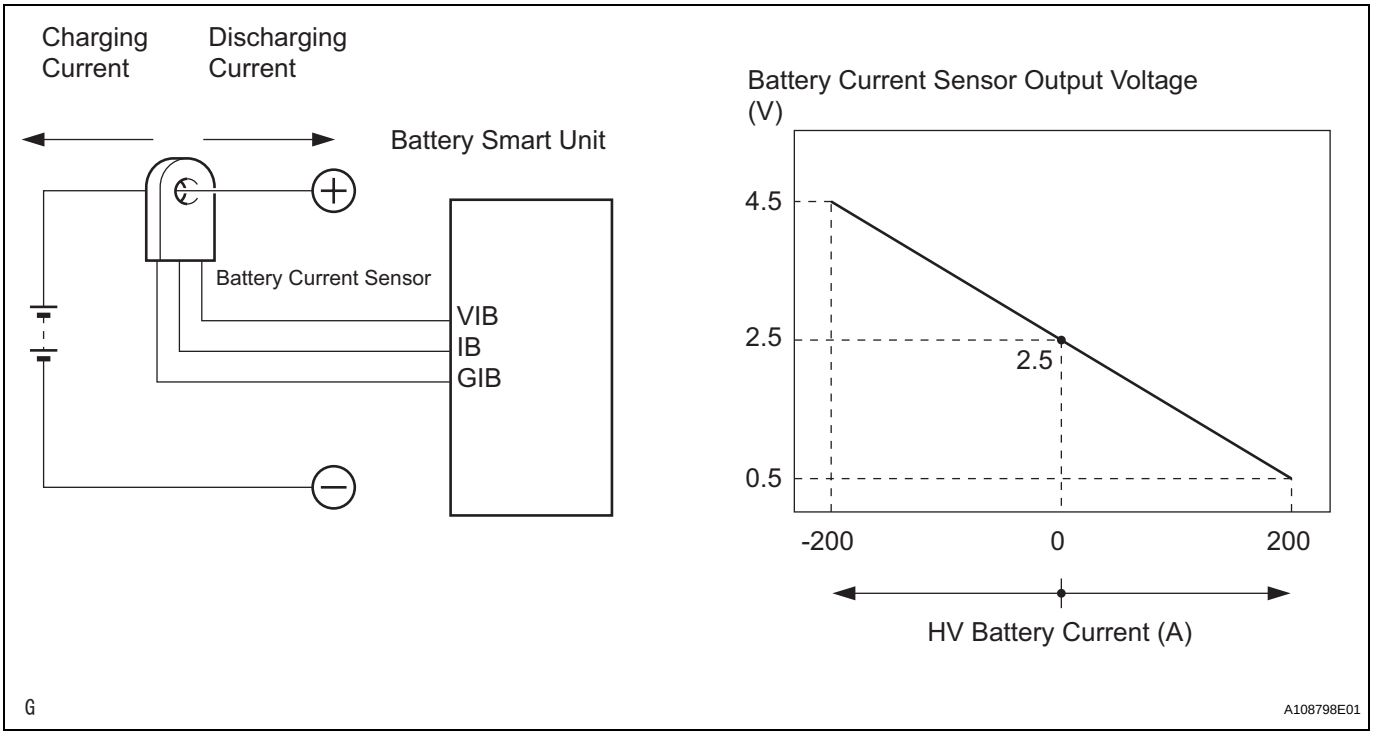
DTC	**P0ABF-123**	**Hybrid Battery Pack Current Sensor Circuit**

DTC	**P0AC1-123**	**Hybrid Battery Pack Current Sensor Circuit Low**

DTC	**P0AC2-123**	**Hybrid Battery Pack Current Sensor Circuit High**

DESCRIPTION

The battery current sensor, which is mounted on the positive cable side of the HV battery, detects the amperage that flows to and from the HV battery. The battery smart unit receives a voltage of between 0 and 5 V that is in proportion to the amperage flowing in the cable. This voltage goes into the IB terminal from the battery current sensor. A battery current sensor output voltage below 2.5 V indicates that the HV battery is being charged, and a voltage above 2.5 V indicates that the HV battery is being discharged. The hybrid vehicle control ECU determines the amount of either charge or discharge amperage that is being received by the HV battery based on the signals that are input to terminal IB of the battery smart unit from the battery smart unit. The hybrid vehicle control ECU also calculates the SOC (state of charge) of the HV battery based on the accumulated amperage.



DTC No.	DTC Detection Condition	Trouble Area
P0ABF-123	When the battery current sensor output is too low or high due to VIB/GIB failure	• HV relay assembly (battery current sensor) • Battery smart unit • Wire harness or connector
P0AC1-123 P0AC2-123	When the battery current sensor output is too low or high due to IB failure	

MONITOR DESCRIPTION

If the battery smart unit detects a malfunction in the battery current sensor, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0ABF (INF 123): Range check P0AC1 (INF 123): Range check P0AC2 (INF 123): Range check
Required sensors / components	Battery current sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

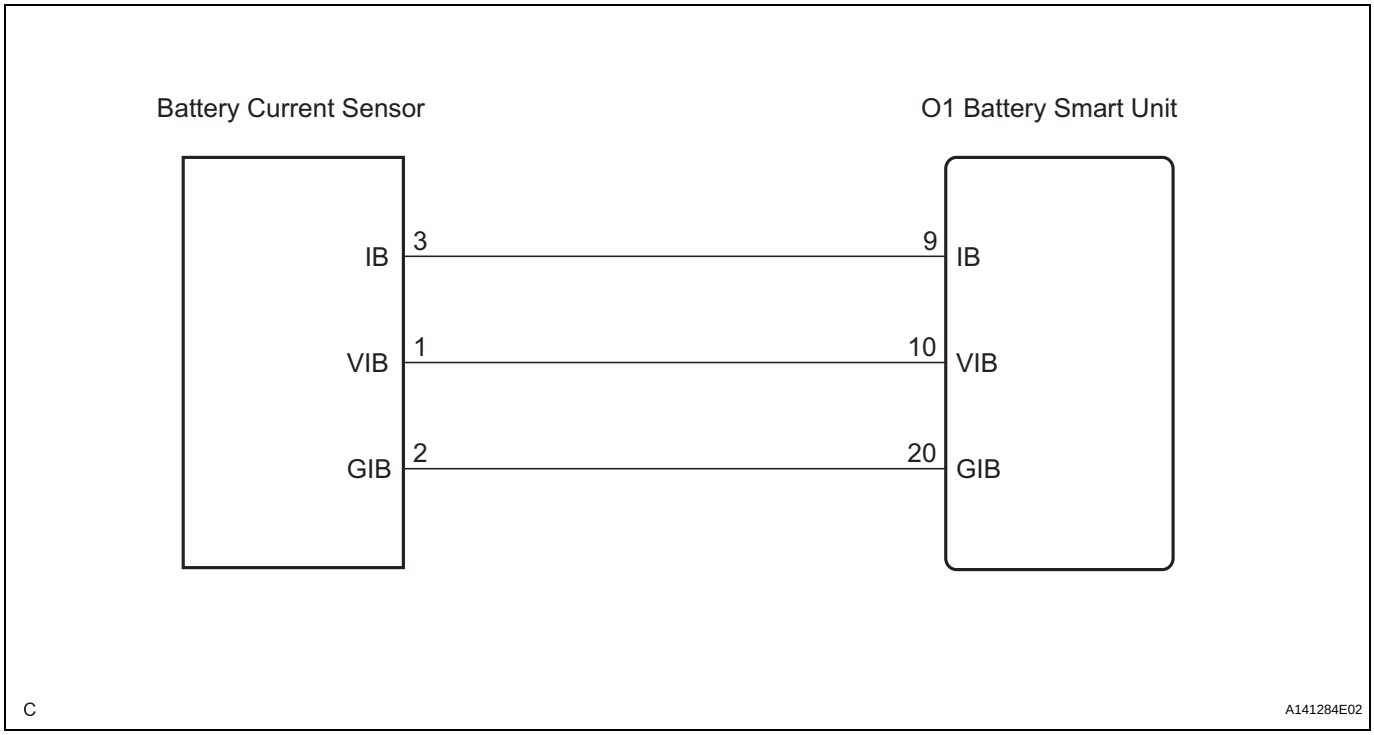
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0ABF (INF 123) / P0AC1 (INF 123) / P0AC2 (INF 123) is not detected

WIRING DIAGRAM



HB

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.

Result:

DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

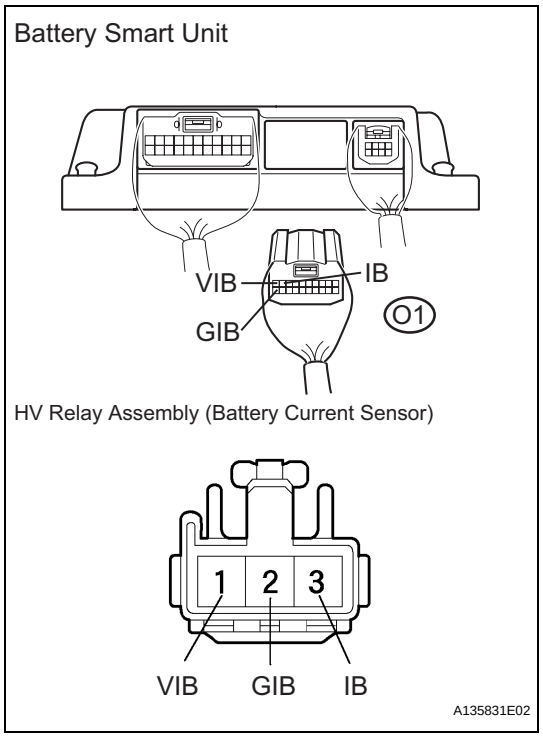
2	CHECK HARNESS AND CONNECTOR (BATTERY ECU - BATTERY CURRENT SENSOR)

HB

CAUTION:

Be sure to wear insulated gloves.

(a) Remove the service plug grip (See page HB-86).
(b) Remove the HV relay assembly (See page HB-105).
(c) Disconnect connector O1 from the battery smart unit.



(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IB (O1-9) - IB (3)	Below 1 Ω
GIB (O1-20) - GIB (2)	Below 1 Ω
VIB (O1-10) - VIB (1)	Below 1 Ω

Standard resistance (Check for short)

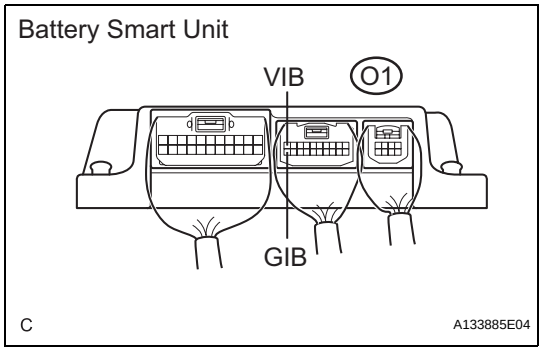
Tester Connection	Specified Condition
IB (O1-9) or IB (3) - Body ground	10 kΩ or higher
GIB (O1-20) or GIB (2) - Body ground	10 kΩ or higher
VIB (O1-10) or VIB (1) - Body ground	10 kΩ or higher

HINT:
The wire harness is not available separately. If it cannot be repaired, replace the HV battery.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK BATTERY SMART UNIT (VIB VOLTAGE)



CAUTION:
Be sure to wear insulated gloves.

(a) Connect connector O1 to the battery smart unit.
(b) Install the battery carrier. (See page HB-110)
(c) Connect the auxiliary battery positive terminal cable of the frame wire. (See page HB-92)
(d) Turn the power switch on (IG).
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
VIB (O1-10) - GIB (O1-20)	4.6 to 5.4 V

HINT:
If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be set.

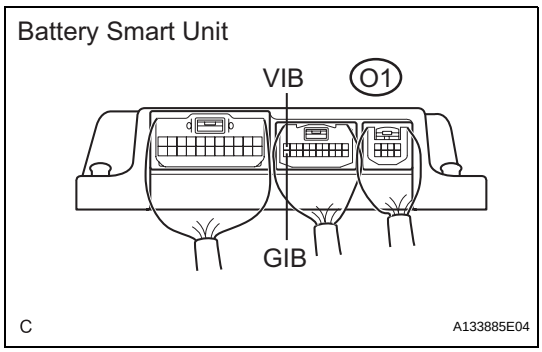
NG → **REPLACE BATTERY SMART UNIT (See page HB-99)**

OK

4 CHECK BATTERY SMART UNIT (IB VOLTAGE)

CAUTION:
Be sure to wear insulated gloves.

HB



(a) Connect the HV relay assembly (battery current sensor) connector.
(b) Turn the power switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
IB (O1-9) - GIB (O1-20)	2.46 to 2.54 V

HINT:
If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be set.

NG → **REPLACE HV RELAY ASSEMBLY (See page HB-104)**

OK

REPLACE BATTERY SMART UNIT (See page HB-99)

DTC	P0AC0-123	Hybrid Battery Pack Current Sensor Circuit Range / Performance

DESCRIPTION

Refer to the circuit description for DTC P0ABF-123 (See page HB-62).

DTC No.	DTC Detection Condition	Trouble Area
P0AC0-123	The battery current sensor is output characteristic is abnormal (offset / constant output) (1 trip detection/2 trip detection)	• HV relay assembly (battery current sensor) • Battery smart unit

MONITOR DESCRIPTION

If the battery smart unit detects malfunction in the battery current sensor, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0AC0 (INF 123): Range check
Required sensors / components	Battery current sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	P0AC0 (INF 123) is not detected

WIRING DIAGRAM

Refer to the wiring diagram for DTC P0ABF-123. (See page HB-63)

INSPECTION PROCEDURE

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	REPLACE HV RELAY ASSEMBLY

See page HB-104.

NEXT

3	CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(d) Clear DTCs.
(e) Perform a road test.
HINT:
Turn the power switch off and perform a road test again after the first road test for 2 trip detection.

NEXT

4	RECONFIRM DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0AC0-123 is output.

YES → **REPLACE BATTERY SMART UNIT (See page HB-99)**

NO

COMPLETED

DTC	P0AFA-123	Hybrid Battery System Voltage Low

DESCRIPTION

Refer to the circuit description for DTC P0A80-123 (See page HB-28).

DTC No.	DTC Detection Condition	Trouble Area
P0AFA-123	Any of the battery block voltages become less than 2.0 V (open). (1 trip detection)	• Battery smart unit • HV battery

MONITOR DESCRIPTION

The battery smart unit monitors a voltage of the battery blocks to detect an open malfunction in internal battery voltage sensor circuits of the battery smart unit and the wire harness between each battery block and battery smart unit. 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 smart unit judges that there is an open in the internal sensor circuit(s) or wire harness. The HV control ECU then illuminates the MIL and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0AFA (INF 123): Range check
Required sensors / components	The wire harness from each battery block to the battery smart unit
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0AFA (INF 123) is not detected

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

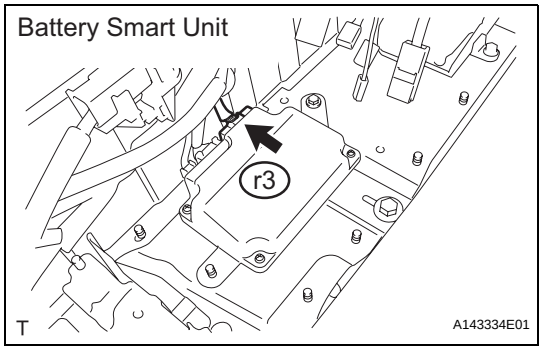
(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	CHECK CONNECTOR CONNECTION CONDITION

CAUTION:
Be sure to wear insulated gloves.
(a) Remove the service plug grip (See page HB-86).
(b) Remove the HV relay assembly (See page HB-105).
(c) Check the connection of connector r3 of the battery smart unit.
OK:
The connector is connected securely and there are no contact problems.



NG → **CONNECT SECURELY**

OK

3	REPLACE BATTERY SMART UNIT

See page HB-99.

NEXT

4	CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.
(d) Clear DTCs.

NEXT

HB

5	RECONFIRM DTC OUTPUT

(a) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(b) Check if DTCs are output.
Result:
DTC P0AFA-123 is output.

YES → **REPLACE HV BATTERY (See page HB-81)**

NO

COMPLETED

CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

(a) Perform a simulation test (See page IN-72).

(1) For the simulation test, reproduce the driving conditions that were present when the trouble occurred. These conditions should be based on the customer's comments and freeze frame data that is recorded with DTCs, such as the opening angle of the accelerator pedal, SOC, engine coolant temperature, engine rpm, and MG1/MG2 rpm and torque.

(b) Check the connector(s) and terminal(s) (See page IN-67).

(c) Wiggle the harness and connector(s) (See page IN-72).

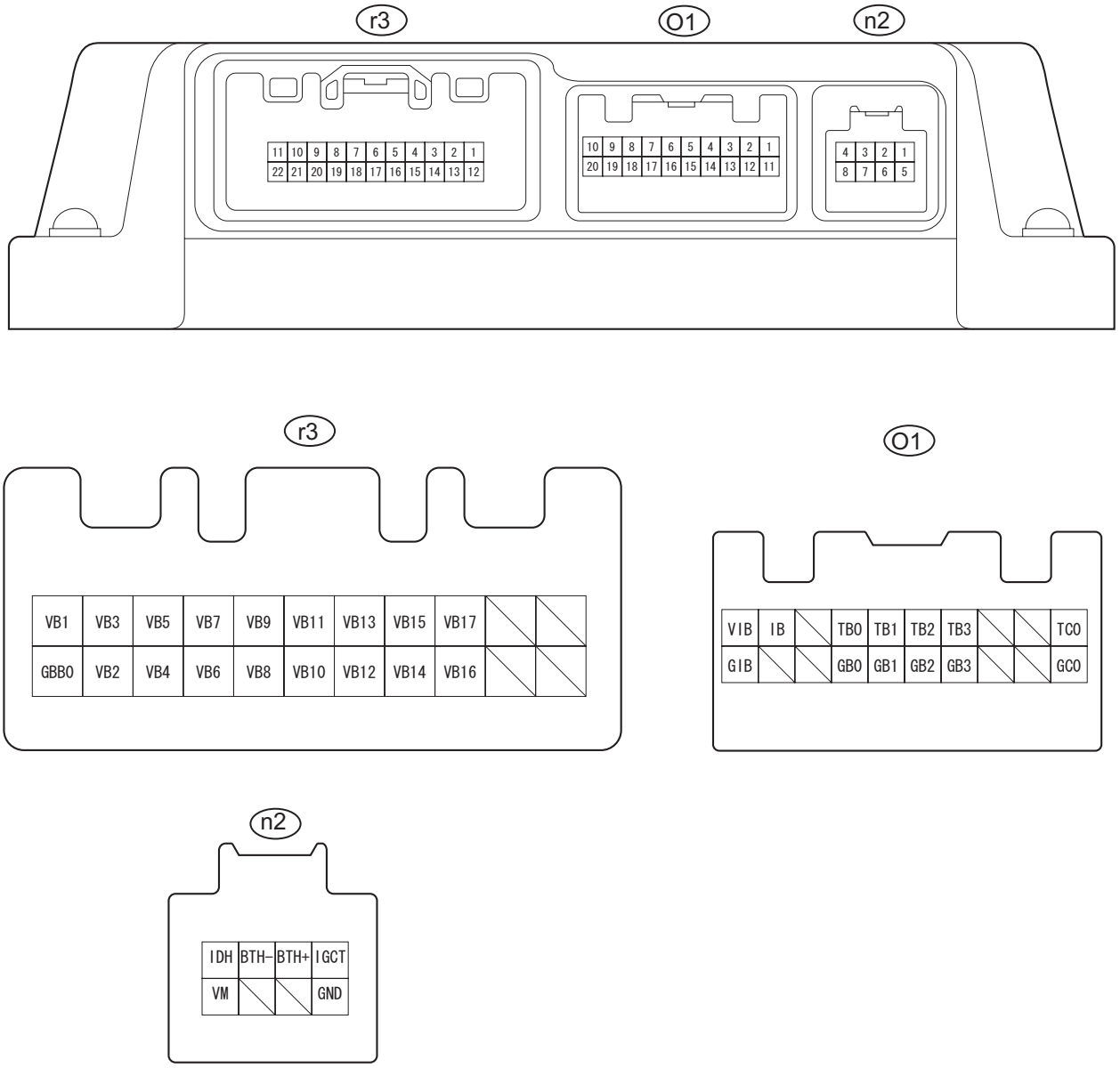
(d) Heat or cool suspected parts (See page IN-72).

NOTICE:

Do not directly heat or cool the MG ECU with the inverter cover removed.

TERMINALS OF ECU

Battery Smart Unit



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HB

ECU TERMINAL CHART:

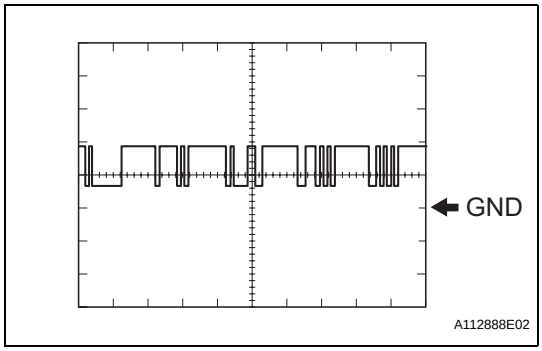
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Standard (V)
TC0 (O1-1) - GC0 (O1-11)	G - G	Intake air temperature sensor	Intake air temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0
TB3 (O1-4) - GB3 (O1-14)	L - L	HV battery temperature sensor 3	HV battery temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0
TB2 (O1-5) - GB2 (O1-15)	B - B	HV battery temperature sensor 2	HV battery temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Standard (V)
TB1 (O1-6) - GB1 (O1-16)	W - W	HV battery temperature sensor 1	HV battery temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0
TB0 (O1-7) - GB0 (O1-17)	R - R	HV battery temperature sensor 0	HV battery temperature: -40 to 90°C (-40 to 194°F)	4.8 to 1.0
IB (O1-9) - GIB (O1-20)	Y - B	Battery Current	Power switch on (READY)	0.5 to 4.5
VIB (O1-10) - GIB (O1-20)	BR - B	Power source for battery current sensor	Power switch on (IG)	4.5 to 5.5
IGCT (n2-1) - GND (n2-5)	B - W-B	Control signal	Power switch on (READY)	9 to 14
BTH+ (n2-2) - GND (n2-5)	R - W-B	Serial communication	Power switch on (IG)	Pulse generation (waveform 1)
BTH- (n2-3) - GND (n2-5)	G - W-B	Serial communication	Power switch on (IG)	Pulse generation (waveform 2)
IDH (n2-4) - GND (n2-5)	P - W-B	Hybrid Vehicle Converter Cooling Fan Signal	Power switch on (IG)	Pulse generation (waveform 3)
VM (n2-8) - GND (n2-5)	G - W-B	Cooling Fan Monitor Signal	Cooling fan activated	0 to 5
GND (n2-5) - Body ground	W-B - Body ground	Ground	Always (continuity check)	Continuity (Below 6 Ω)

1. Oscilloscope waveforms

HINT:
Oscilloscope waveform samples are provided here for informational purposes. Noise and fluttering waveforms have been omitted.

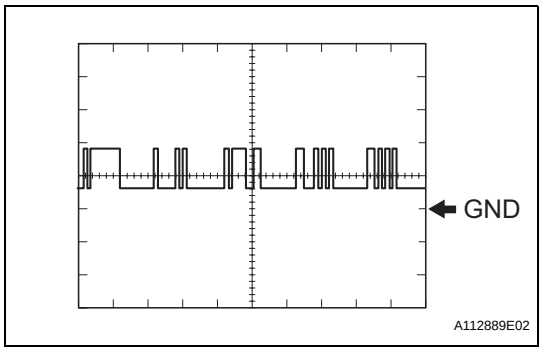
(a) Waveform 1



Item	Contents
Terminal	BTH+ (n2-2) - GND (n2-5)
Equipment Setting	2 V/DIV., 500 μs/DIV.
Condition	Power switch on (IG)

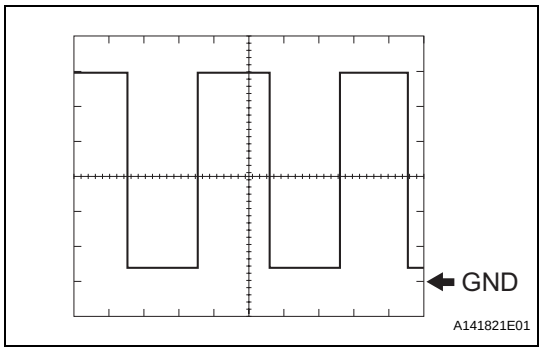
HINT:
The waveform will vary depending on the content of the digital communication (digital signal).

(b) Waveform 2



Item	Contents
Terminal	BTH- (n2-3) - GND (n2-5)
Equipment Setting	2 V/DIV., 500 μs/DIV.
Condition	Power switch on (IG)

HINT:
The waveform will vary depending on the content of the digital communication (digital signal).



(c) Waveform 3

Item	Contents
Terminal	IDH (n2-4) - GND (n2-5)
Equipment Setting	2 V/DIV., 500 2ms./DIV.
Condition	Power switch on (IG)

HINT:

- The frequency of the waveform differs according to operation conditions of the cooling fan of the hybrid vehicle converter.
- The frequency of the waveform differs (100 to 900 kHz, 8 to 14 V) depending on operation conditions of the cooling fan of the hybrid vehicle converter.

DTC	P3011-123	Battery Block 1 Becomes Weak
DTC	P3012-123	Battery Block 2 Becomes Weak
DTC	P3013-123	Battery Block 3 Becomes Weak
DTC	P3014-123	Battery Block 4 Becomes Weak
DTC	P3015-123	Battery Block 5 Becomes Weak
DTC	P3016-123	Battery Block 6 Becomes Weak
DTC	P3017-123	Battery Block 7 Becomes Weak
DTC	P3018-123	Battery Block 8 Becomes Weak
DTC	P3019-123	Battery Block 9 Becomes Weak
DTC	P3020-123	Battery Block 10 Becomes Weak
DTC	P3021-123	Battery Block 11 Becomes Weak
DTC	P3022-123	Battery Block 12 Becomes Weak
DTC	P3023-123	Battery Block 13 Becomes Weak
DTC	P3024-123	Battery Block 14 Becomes Weak
DTC	P3025-123	Battery Block 15 Becomes Weak
DTC	P3026-123	Battery Block 16 Becomes Weak
DTC	P3027-123	Battery Block 17 Becomes Weak

DESCRIPTION

Refer to the circuit description for DTC P0A80-123 (See page HB-28).

DTC No.	DTC Detection Condition	Trouble Area
P3011-123 P3012-123 P3013-123 P3014-123 P3015-123 P3016-123 P3017-123 P3018-123 P3019-123 P3020-123 P3021-123 P3022-123 P3023-123 P3024-123 P3025-123 P3026-123 P3027-123	Presence of a malfunctioning block is determined based on each battery block voltage (1 trip detection).	• HV battery • Battery smart unit

HINT:

- DTCs from P3011-123 to P3027-123 cannot be set unless the vehicle is driven for approximately 10 minutes after clearing the DTCs.

MONITOR DESCRIPTION

If there is an abnormal internal resistance or electromotive voltage in the battery blocks, the battery smart unit determines that a malfunction has occurred. When the malfunction detection condition is satisfied, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P3011 to P3027 (INF 123): Rationality
Required sensors / components	HV battery
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P3011 (INF 123) to P3027 (INF 123) is not detected

INSPECTION PROCEDURE

1	**CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).

(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2 READ VALUE ON INTELLIGENT TESTER

(a) Ensure the safety of the areas in front and at the back of the vehicle.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (READY).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / V1 to V17 BATT BLOCK.
(e) Fully warm up the engine and turn the air conditioning off.
(f) Firmly depress the brake pedal with your left foot.
(g) Move the shift lever to the D position.
(h) Record each battery block voltage from the data list (V1 to V17 BATT BLOCK) while fully depressing the accelerator pedal.
(i) Compare the battery block voltages (V1 to V17 BATT BLOCK) between the even and odd number groups in each combination shown in the table below.

HB

Even number group	Odd number group	Battery block voltages to be compared
V1 BATT BLOCK	V2 BATT BLOCK	VB0←→VB1
V3 BATT BLOCK	V4 BATT BLOCK	VB2←→VB3
V5 BATT BLOCK	V6 BATT BLOCK	VB4←→VB5
V7 BATT BLOCK	V8 BATT BLOCK	VB6←→VB7
V9 BATT BLOCK	V10 BATT BLOCK	VB8←→VB9
V11 BATT BLOCK	V12 BATT BLOCK	VB10←→VB11
V13 BATT BLOCK	V14 BATT BLOCK	VB12←→VB13
V15 BATT BLOCK	V16 BATT BLOCK	VB14←→VB15
V17 BATT BLOCK	V16 BATT BLOCK	VB16←→VB15

(j) Check the voltage difference in the all 9 combinations.
OK:
The difference in voltage of all combinations is 0.3 V or more.

YES → **REPLACE BATTERY SMART UNIT (See page HB-99)**

NO

REPLACE HV BATTERY (See page HB-81)

DTC	P3105-123	Battery Observation Communication Circuit Malfunction

DESCRIPTION

The battery smart unit detects the HV battery conditions (voltage, current, and temperature) and the battery cooling fan voltages, and sends the detected information to the hybrid vehicle control ECU via serial communication.

DTC No.	DTC Detection Condition	Trouble Area
P3105-123	Problem with serial communication between the battery smart unit and hybrid vehicle control ECU (1 trip)	• Wire harness or connector • Hybrid vehicle control ECU • Battery smart unit

MONITOR DESCRIPTION

If the battery smart unit detects malfunction in serial communication with hybrid vehicle control ECU, it illuminates the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P3105 (INF 123): Lost Communication With BSU/HCM
Required sensors / components	Battery smart unit
Frequency of operation	Continuity
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

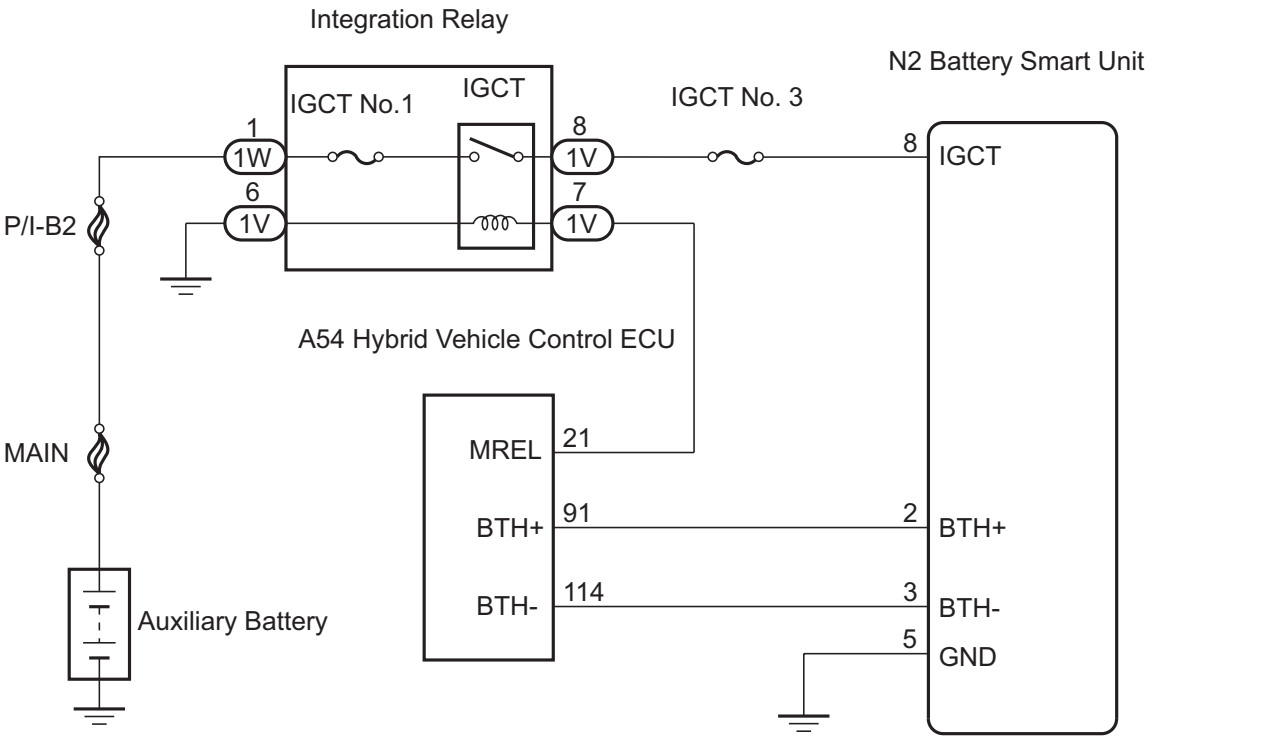
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P3105 (INF 123) is not detected

WIRING DIAGRAM



INSPECTION PROCEDURE

HB

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

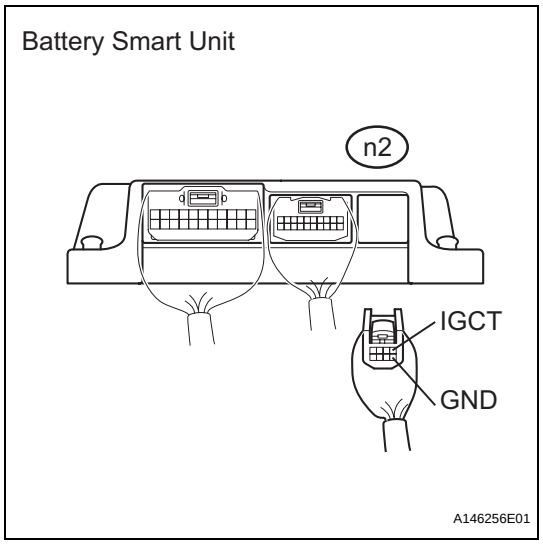
Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

1	CHECK HARNESS AND CONNECTOR (VOLTAGE)

CAUTION:

Be sure to wear insulated gloves.

(a) Remove the service plug grip (See page HB-86).
(b) Remove the battery smart unit (See page HB-100).
(c) Disconnect connector n2 from the battery smart unit.
(d) Turn the power switch on (IG).



(e) Measure the voltage according to the value(s) in the table below.

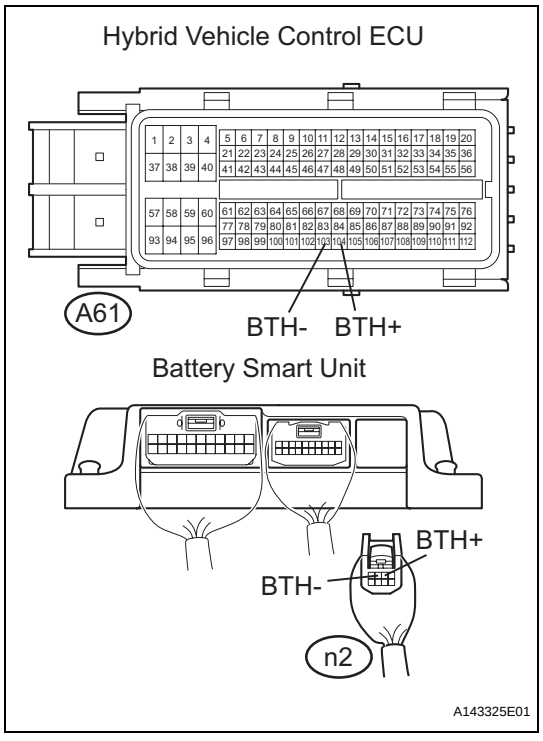
Standard voltage

Tester Connection	Specified Condition
IGCT (n2-1) - GND (n2-5)	11 to 14 V

NG → **Go to step 4**

OK

2 CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - BATTERY SMART UNIT)



CAUTION:
Be sure to wear insulated gloves.

(a) Disconnect connector A61 from the hybrid vehicle control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
BTH+ (A61-104) - BTH+ (n2-2)	Below 1 Ω
BTH- (A61-103) - BTH- (n2-3)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
BTH+ (A61-104) or BTH+ (n2-2) - Body ground	10 kΩ or higher
BTH- (A61-103) or BTH- (n2-3) - Body ground	10 kΩ or higher

(c) Turn the power switch on (IG).

(d) Measure the resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
BTH+ (A61-104) - Body ground	Below 1 V
BTH- (A61-103) - Body ground	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

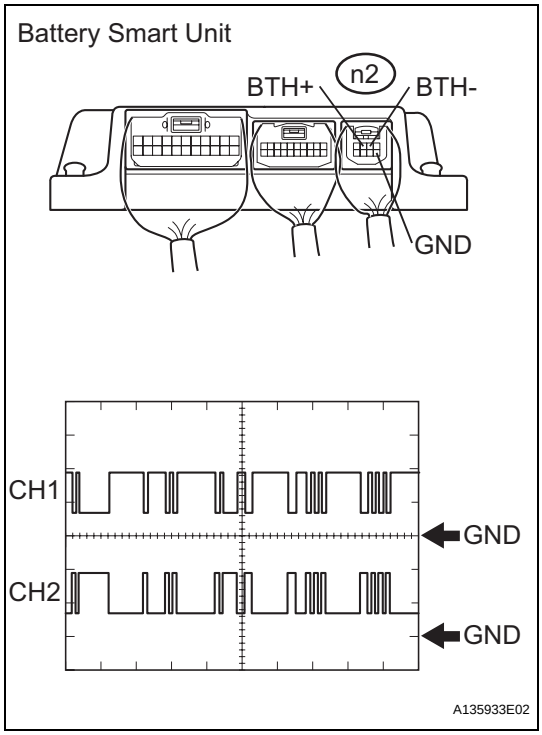
HB

3	CHECK WAVEFORM

CAUTION:
Be sure to wear insulated gloves.

(a) Connect connector A61 from the hybrid vehicle control ECU.
(b) Connect connector n2 to the battery smart unit.
(c) Connect an oscilloscope between the battery smart unit terminals specified in the table below, and measure the waveform.

Item	Contents
Terminal	CH1: BTH+ (n2-2) - GND (n2-5) CH2: BTH- (n2-3) - GND (n2-5)
Equipment Setting	2 V/DIV., 500μs/DIV.
Condition	Power switch on (IG)



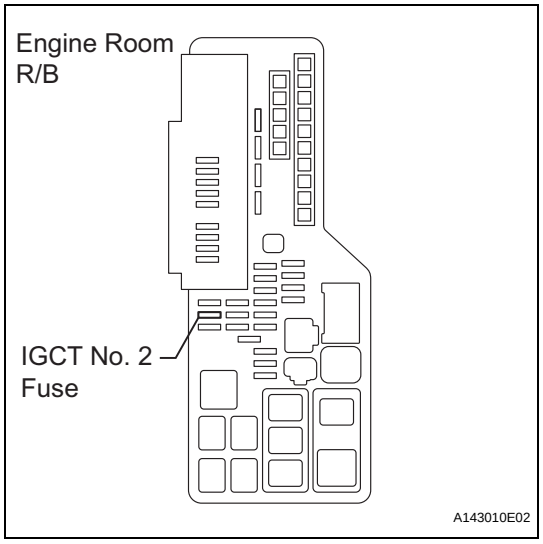
NG → **REPLACE BATTERY SMART UNIT (See page HB-99)**

OK →

REPLACE HYBRID VEHICLE CONTROL ECU (See page HV-569)

HB

4	CHECK FUSE



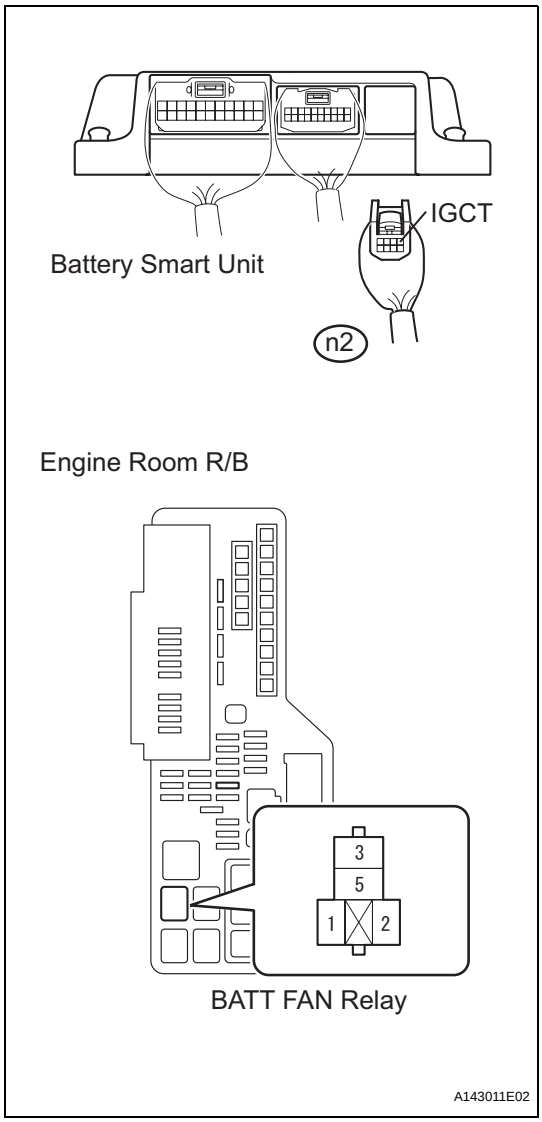
(a) Remove the IGCT No. 2 fuse from the engine room R/B.
(b) Measure the resistance of the IGCT No. 2 fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

5	CHECK HARNESS AND CONNECTOR

CAUTION:
Be sure to wear insulated gloves.
(a) Install the IGCT No. 2 fuse to the engine room R/B No. 1.
(b) Remove the integration relay from the engine room R/B.
(c) Disconnect connector n2 from the battery smart unit.



(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IGCT (n2-1) - 3	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

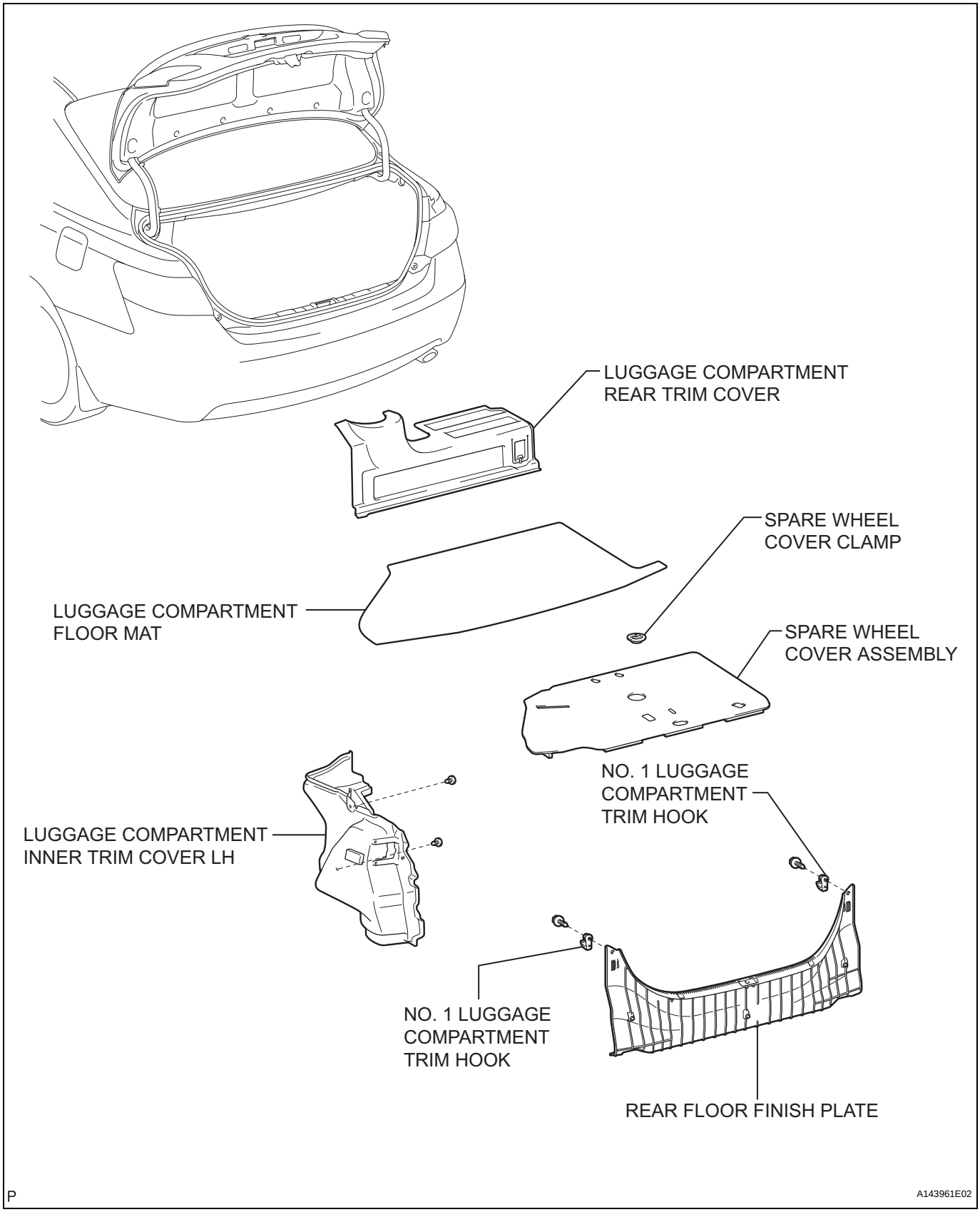
OK

CHECK AND REPAIR POWER SOURCE CIRCUIT

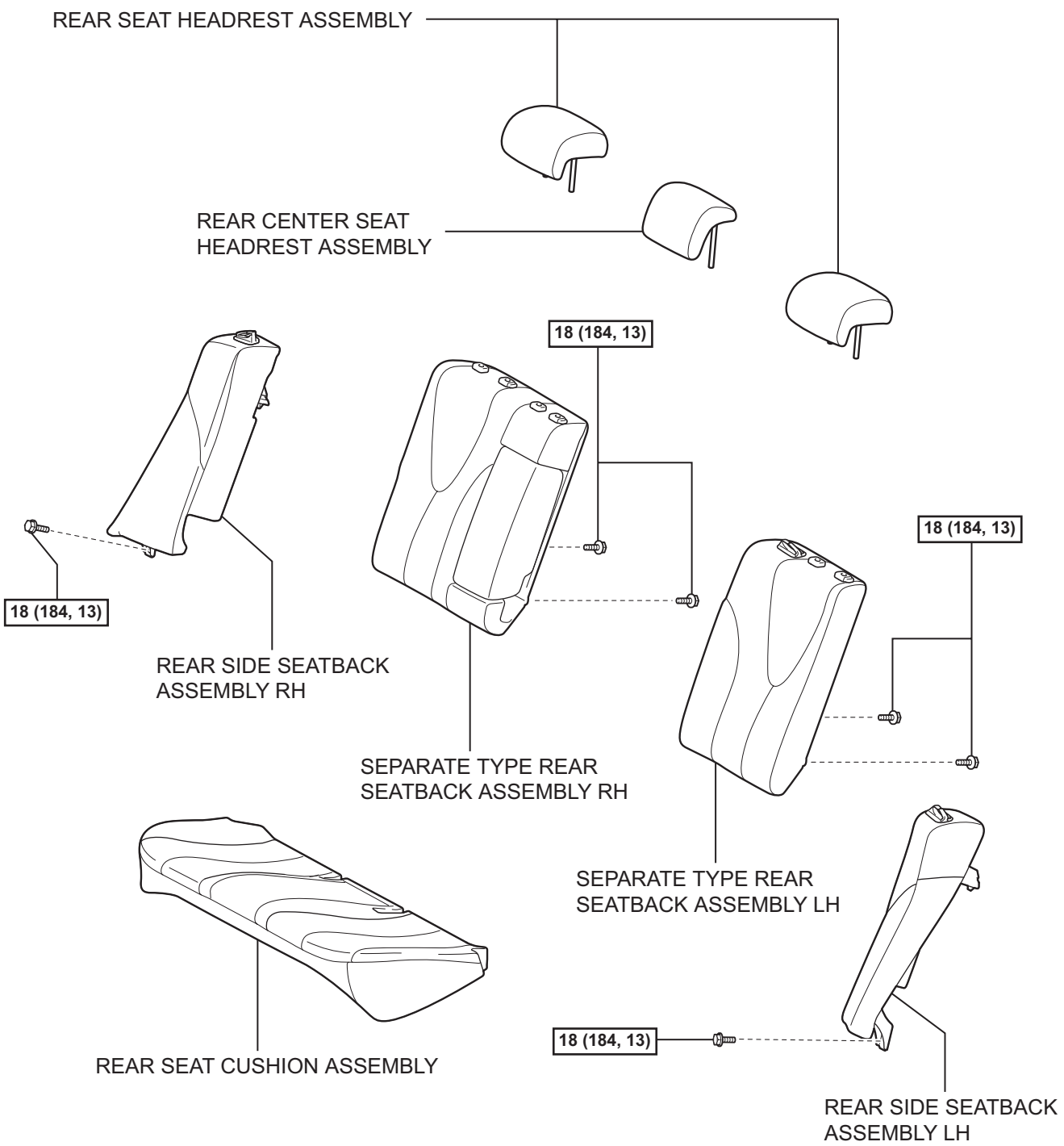
HB

HV BATTERY

COMPONENTS



HB

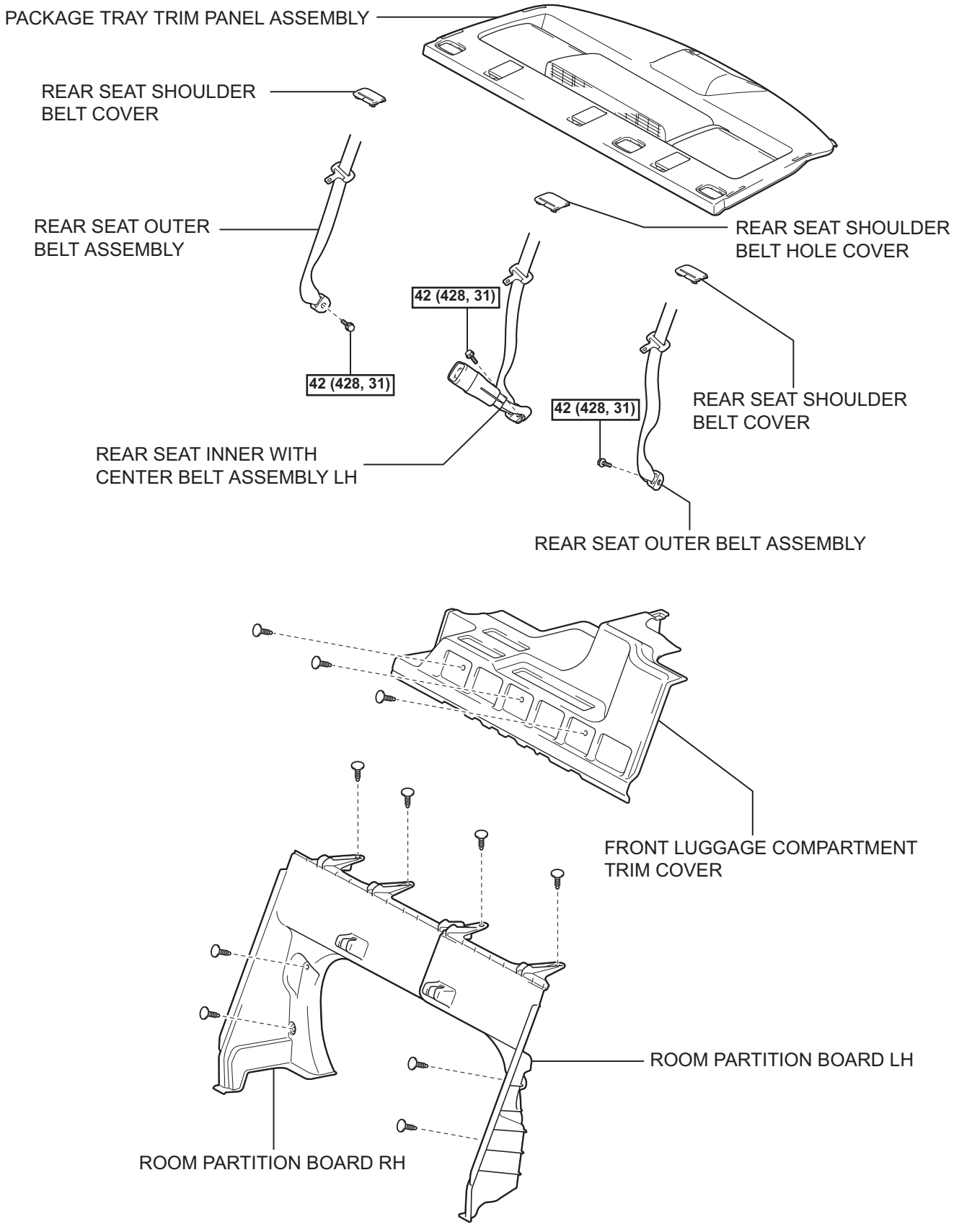


N*m (kgf*cm, ft.*lbf) : Specified torque

P

B136564E15

HB

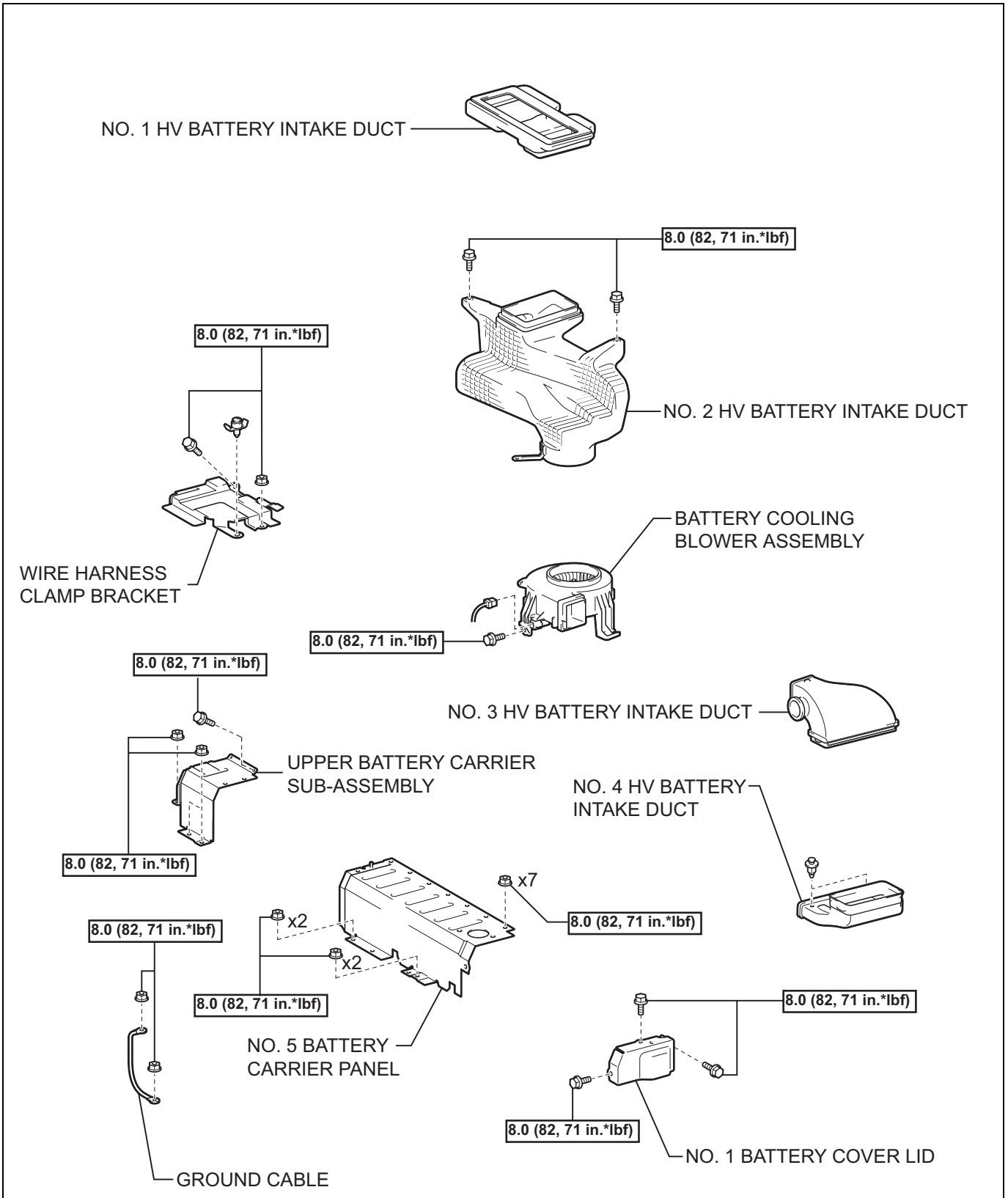


HB

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

P

A143959E02

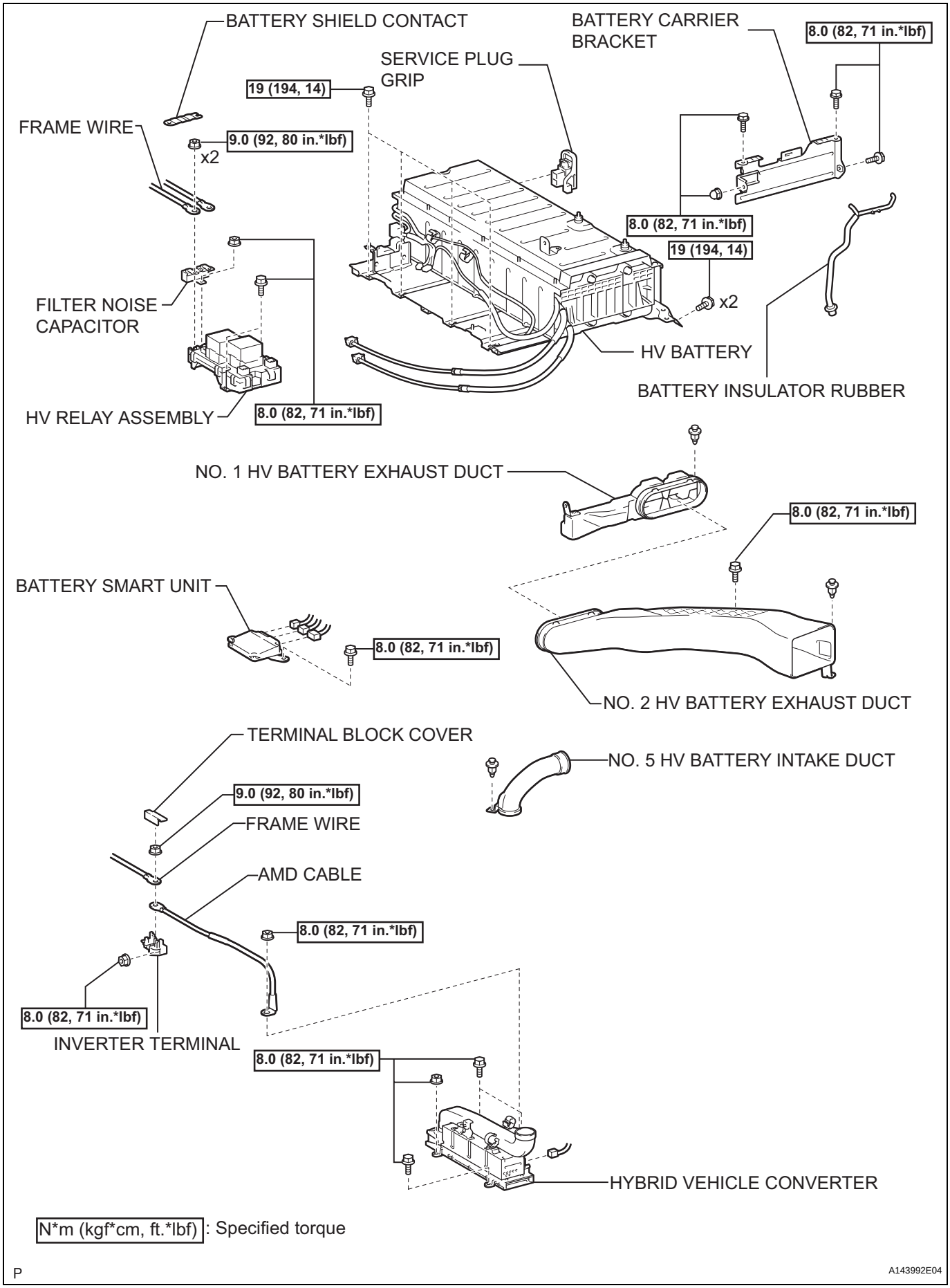


HB

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

P

A143991E03

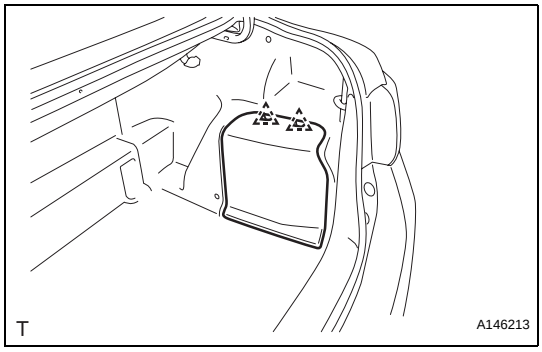

BATTERY SHIELD CONTACT
BATTERY CARRIER BRACKET
8.0 (82, 71 in.*lbf)
SERVICE PLUG GRIP
19 (194, 14)
FRAME WIRE
9.0 (92, 80 in.*lbf)
x2
8.0 (82, 71 in.*lbf)
19 (194, 14)
x2
FILTER NOISE CAPACITOR
HV BATTERY
BATTERY INSULATOR RUBBER
HV RELAY ASSEMBLY
8.0 (82, 71 in.*lbf)
NO. 1 HV BATTERY EXHAUST DUCT
8.0 (82, 71 in.*lbf)
BATTERY SMART UNIT
8.0 (82, 71 in.*lbf)
NO. 2 HV BATTERY EXHAUST DUCT
TERMINAL BLOCK COVER
NO. 5 HV BATTERY INTAKE DUCT
9.0 (92, 80 in.*lbf)
FRAME WIRE
AMD CABLE
8.0 (82, 71 in.*lbf)
8.0 (82, 71 in.*lbf)
INVERTER TERMINAL
8.0 (82, 71 in.*lbf)
HYBRID VEHICLE CONVERTER
N*m (kgf*cm, ft.*lbf) : Specified torque
P
A143992E04

HB

REMOVAL

1. **PRECAUTION**
   See page IN-5

2. **CHECK FOR DTCS**
   (a) Check for DTCs (See page HV-36).
   NOTICE:
   Confirm that P0AA6 (High voltage insulation is unusual) is not output before doing removal or installation work inside the battery. If the DTC is output, perform troubleshooting procedures first.

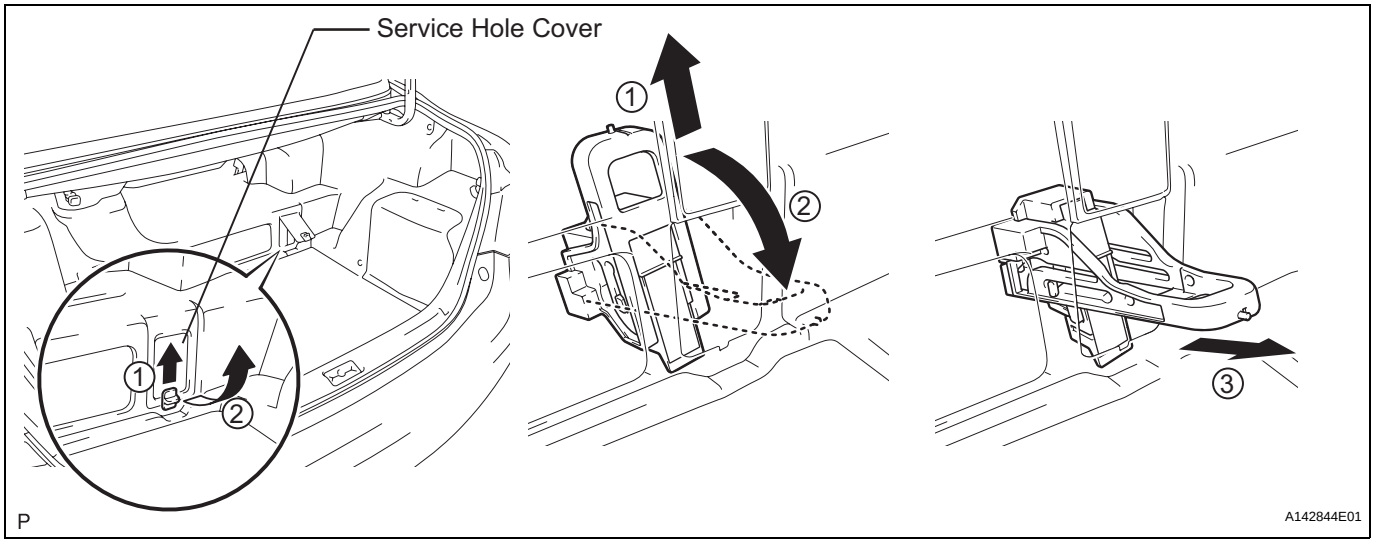


3. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER**
   (a) Release the 2 claws and remove the luggage trim service hole cover.

4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**

5. **REMOVE SERVICE PLUG GRIP**
   CAUTION:
   - **Remove the service plug grip to interrupt a high voltage circuit at the time of the check.**
   - **Keep the removed service plug grip in your pocket to prevent other technicians from accidentally reconnecting it while you are servicing the vehicle.**
   - **All the high voltage wiring connectors are orange colored.**
   - **Be sure to turn the power switch off before removing the service plug grip.**

   (a) Slide the latch upward and open the service hole cover.



(b) Wear insulated gloves. Remove the service plug grip after sliding the lever of the service plug grip.

CAUTION:

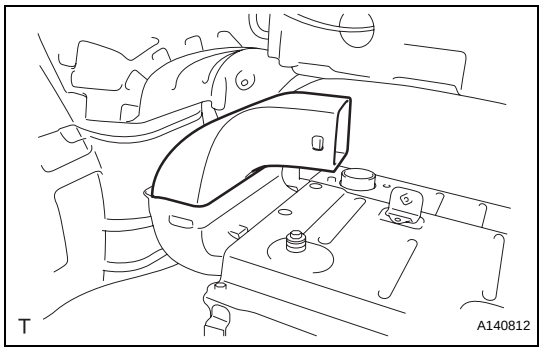
- **Keep the removed service plug grip in your pocket to prevent other technicians from accidentally reconnecting it while you are servicing the vehicle.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

NOTICE:

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

6. **REMOVE NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-560)**
7. **REMOVE CONNECTOR COVER ASSEMBLY (See page HV-560)**
8. **CHECK TERMINAL VOLTAGE (See page HV-561)**
9. **INSTALL CONNECTOR COVER ASSEMBLY (See page HV-566)**
10. **INSTALL NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-568)**
11. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
12. **REMOVE SPARE WHEEL COVER CLAMP**
13. **REMOVE SPARE WHEEL COVER ASSEMBLY**
14. **REMOVE NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-97)**
15. **REMOVE REAR FLOOR FINISH PLATE (See page ED-97)**
16. **REMOVE LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-97)**
17. **REMOVE LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-97)**
18. **REMOVE REAR SEAT HEADREST ASSEMBLY**
19. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
20. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
21. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
22. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
23. **REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)**

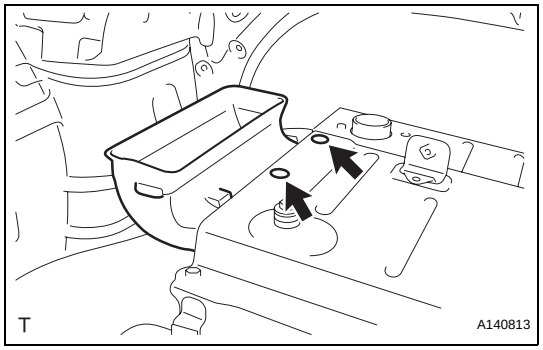
24. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)
25. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)
26. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH
27. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)
28. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH
29. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-33)
30. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-15)
31. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-15)
32. REMOVE REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-40)
33. REMOVE REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-41)
34. REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-33)
35. REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-33)
36. REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-33)
37. REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-106)
38. REMOVE ROOM PARTITION BOARD LH (See page HB-119)
39. REMOVE ROOM PARTITION BOARD RH (See page HB-119)
40. REMOVE NO. 1 HV BATTERY INTAKE DUCT (See page HB-119)
41. REMOVE NO. 2 HV BATTERY INTAKE DUCT (See page HB-119)
42. REMOVE BATTERY COOLING BLOWER ASSEMBLY (See page HB-120)
43. REMOVE NO. 5 HV BATTERY INTAKE DUCT (See page HB-106)



44. REMOVE NO. 3 HV BATTERY INTAKE DUCT

(a) Remove the No. 3 HV battery intake duct.

CAUTION:
Wear insulated gloves.



45. REMOVE NO. 4 HV BATTERY INTAKE DUCT

(a) Remove the 2 clips and No. 4 HV battery intake duct.

CAUTION:
Wear insulated gloves.

46. REMOVE NO. 2 HV BATTERY EXHAUST DUCT (See page HB-127)

47. REMOVE WIRE HARNESS CLAMP BRACKET (See page HB-107)

48. REMOVE UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-107)

49. DISCONNECT FRAME WIRE (See page HB-107)

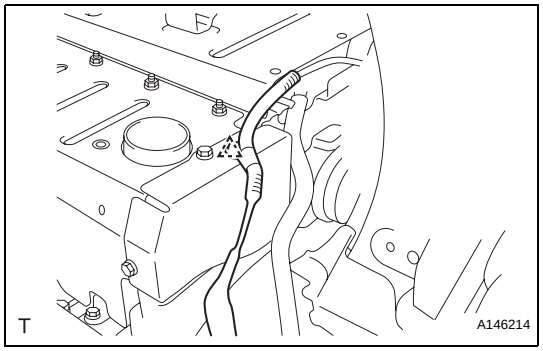
50. INSTALL SPARE WHEEL COVER ASSEMBLY

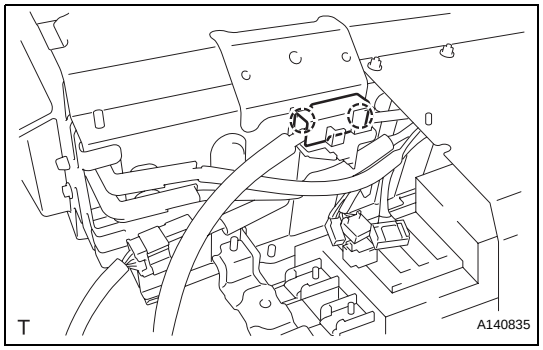
51. INSTALL SPARE WHEEL COVER CLAMP

52. INSTALL LUGGAGE COMPARTMENT FLOOR MAT

53. REMOVE HV BATTERY

(a) Disconnect the wire harness clamp from the No. 1 battery cover.

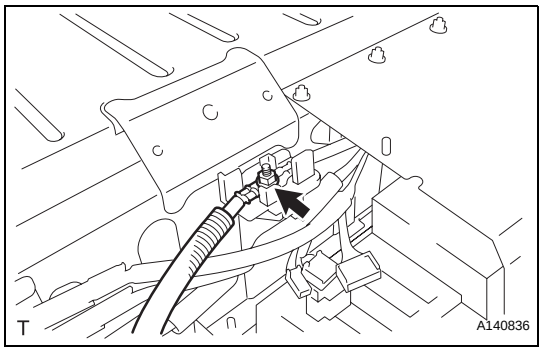




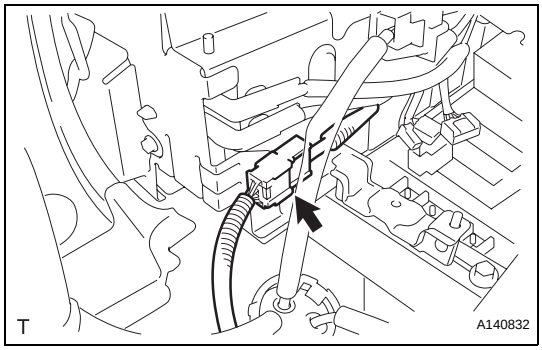
(b) Release the 2 claws and remove the terminal block cover.

CAUTION:
Wear insulated gloves.

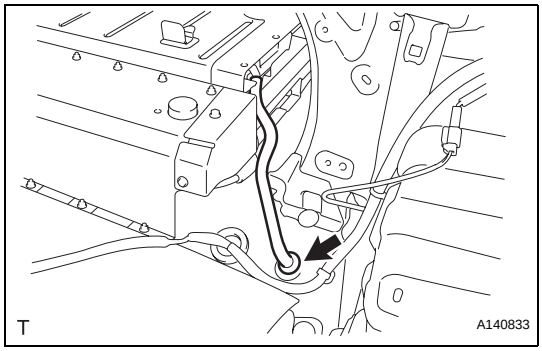
HB



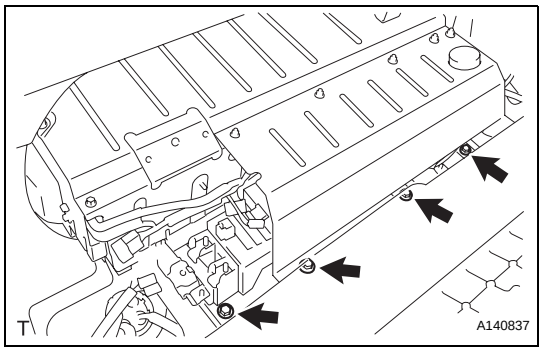
(c) Remove the nut and disconnect the frame wire (AMD cable).
CAUTION:
Wear insulated gloves.



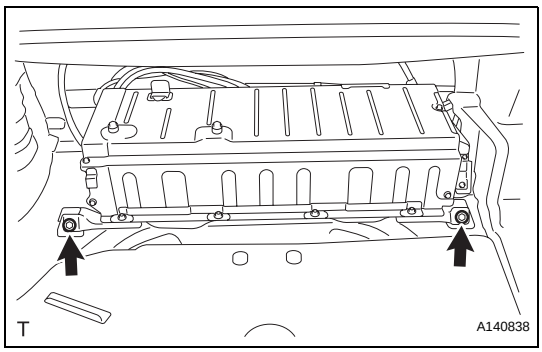
(d) Disconnect the battery pack wire connector.
CAUTION:
Wear insulated gloves.



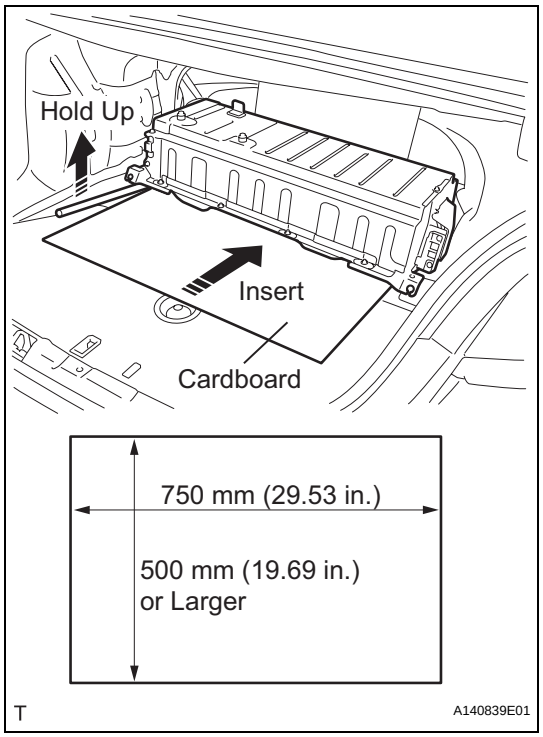
(e) Remove the grommet and battery room ventilation hose.
CAUTION:
Wear insulated gloves.



(f) Remove the 4 bolts from the HV battery.
CAUTION:
Wear insulated gloves.

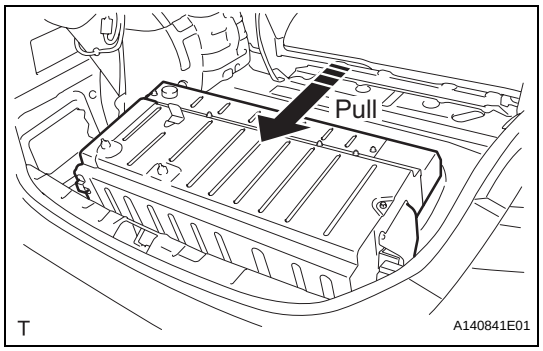


(g) Remove the 2 bolts from the HV battery.

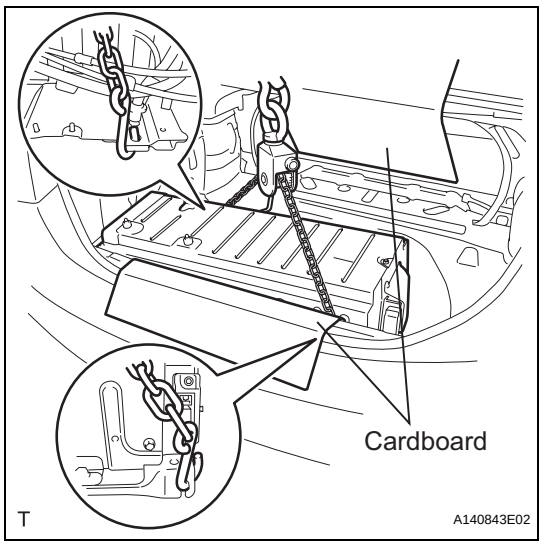


(h) Prepare a piece of cardboard of 750 mm (29.53 in.) X 500 mm (19.69 in.) or larger.

(i) Using an tire lever to hold up the HV battery, insert the cardboard until it cannot be inserted any farther.
CAUTION:
Wear insulated gloves.
NOTICE:
Bind the frame wire with electrical tape to prevent it from getting caught when moving the battery or other parts.



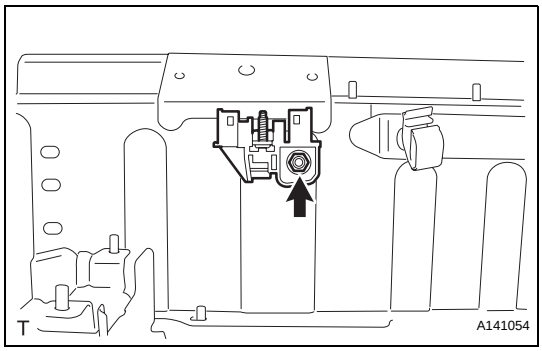
(j) Pull the HV battery together with the cardboard toward the rear of the vehicle.
CAUTION:
Wear insulated gloves.



(k) Using an engine sling device, remove the HV battery while tilting the HV battery 45° at the rear end.
CAUTION:
Wear insulated gloves.
NOTICE:
Use cardboard or other similar material to protect the HV battery and vehicle body from damage.

54. **REMOVE NO. 1 BATTERY COVER LID (See page HB-108)**
55. **REMOVE NO. 5 BATTERY CARRIER PANEL (See page HB-108)**
56. **REMOVE NO. 1 HV BATTERY EXHAUST DUCT (See page HB-127)**
57. **REMOVE FILTER NOISE CAPACITOR (See page HB-108)**
58. **REMOVE HV RELAY ASSEMBLY (See page HB-108)**
59. **REMOVE BATTERY SMART UNIT (See page HB-102)**

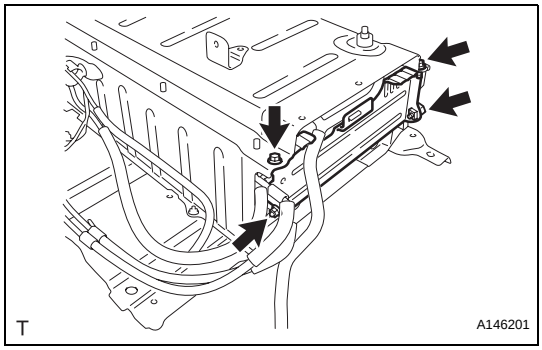
60. REMOVE HYBRID VEHICLE CONVERTER (See page HB-127)



61. REMOVE INVERTER TERMINAL

(a) Remove the nut and inverter terminal from the HV battery.

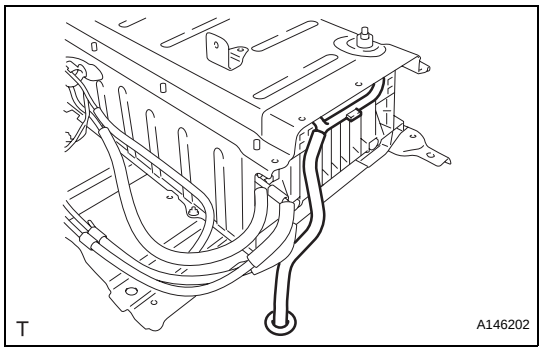
CAUTION:
Wear insulated gloves.



62. REMOVE BATTERY INSULATOR RUBBER

(a) Remove the 3 bolts, nut and battery carrier bracket.

CAUTION:
Wear insulated gloves.



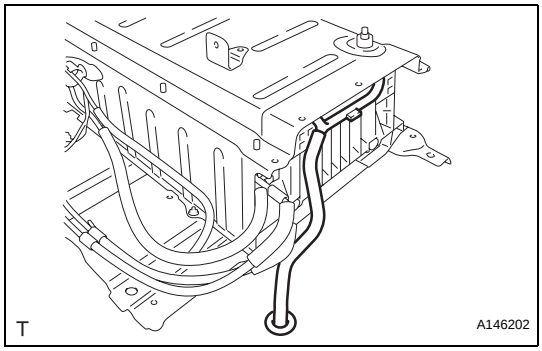
(b) Remove the battery insulator rubber.

CAUTION:
Wear insulated gloves.

HB

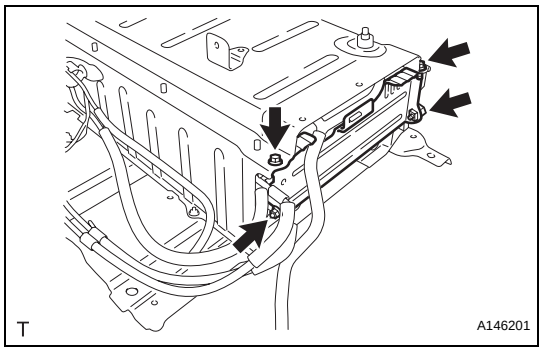
INSTALLATION

1. INSTALL BATTERY INSULATOR RUBBER

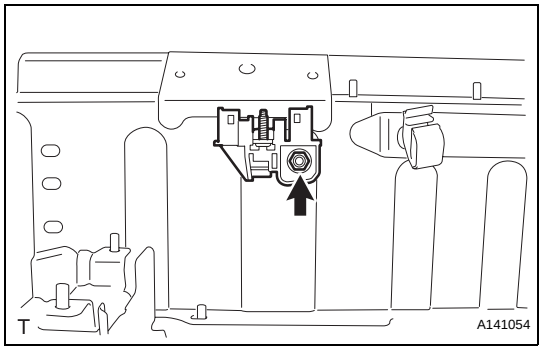


(a) Install the battery insulator rubber.

CAUTION:
Wear insulated gloves.



(b) Install the battery carrier bracket with the 3 bolts and nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



2. INSTALL INVERTER TERMINAL

(a) Install the inverter terminal to the HV battery with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

3. INSTALL HYBRID VEHICLE CONVERTER (See page HB-128)

4. INSTALL BATTERY SMART UNIT (See page HB-102)

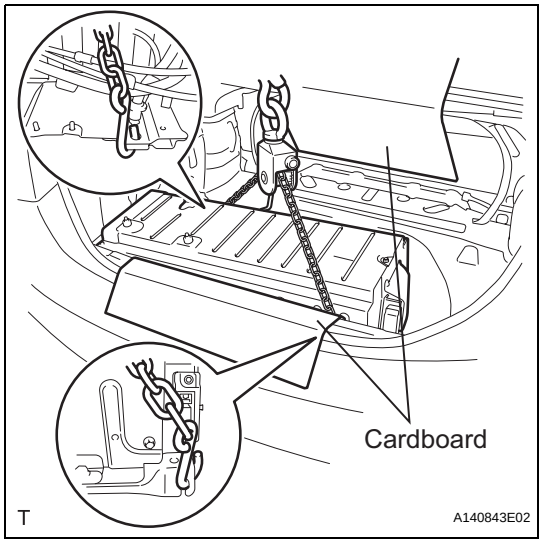
5. INSTALL HV RELAY ASSEMBLY (See page HB-110)

6. INSTALL FILTER NOISE CAPACITOR (See page HB-111)

7. INSTALL NO. 1 HV BATTERY EXHAUST DUCT (See page HB-129)

8. INSTALL NO. 5 BATTERY CARRIER PANEL (See page HB-111)

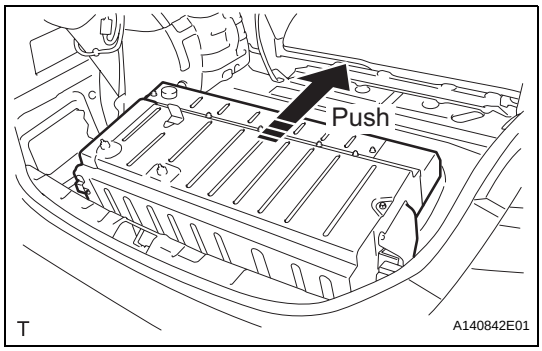
9. INSTALL NO. 1 BATTERY COVER LID (See page HB-111)



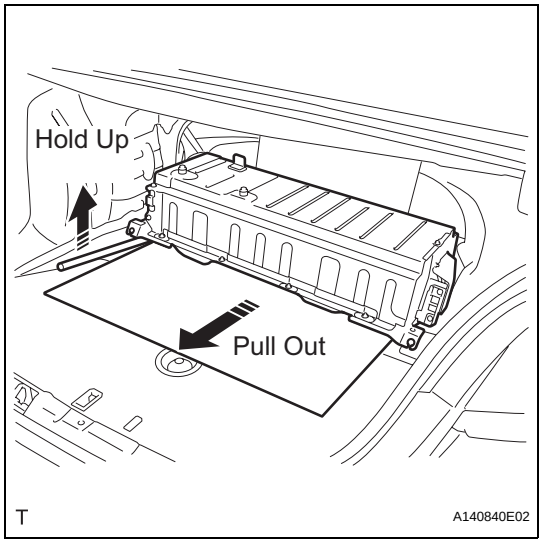
10. INSTALL HV BATTERY

(a) Place a piece of cardboard in the luggage compartment.
CAUTION:
Wear insulated gloves.

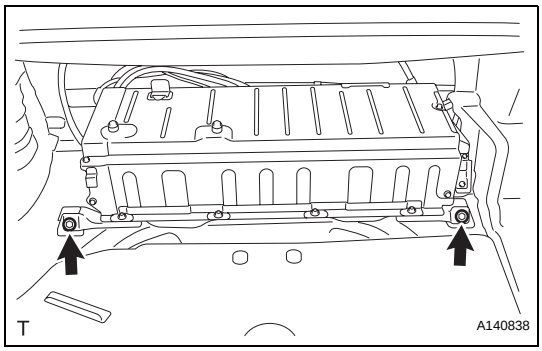
(b) Using an engine sling device, install the HV battery while tilting the HV battery 45° at the rear end.
CAUTION:
Wear insulated gloves.
NOTICE:
Use cardboard or other similar material to protect the HV battery and vehicle body from damage.



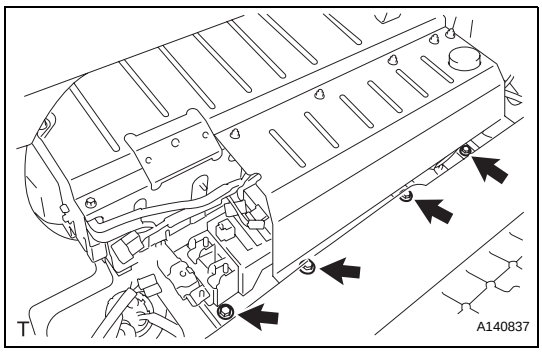
(c) Push the HV battery together with the cardboard toward the front of the vehicle.
CAUTION:
Wear insulated gloves.
NOTICE:
Align the position of the holes for HV battery holding bolts.



(d) Use a tire lever to hold up the HV battery and pull out the cardboard.
CAUTION:
Wear insulated gloves.

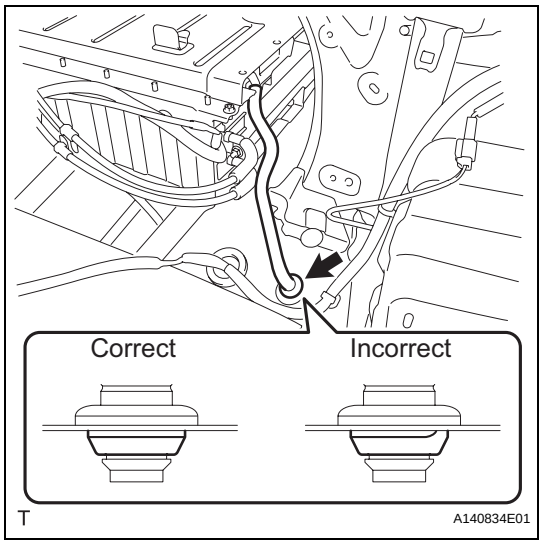


(e) Install the 2 bolts to the HV battery.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
CAUTION:
Wear insulated gloves.

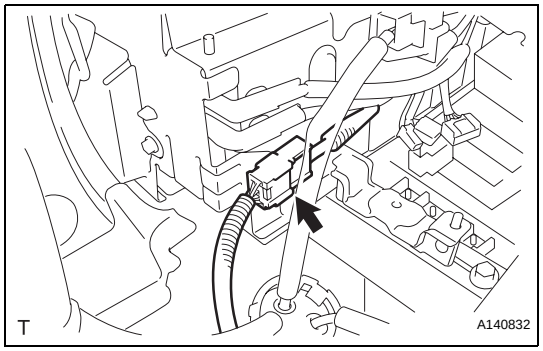


(f) Install the 4 bolts to the HV battery.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
CAUTION:
Wear insulated gloves.

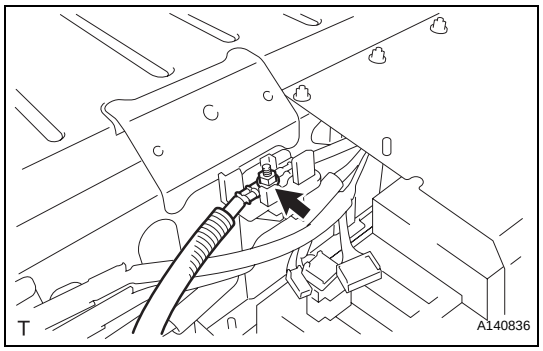
HB



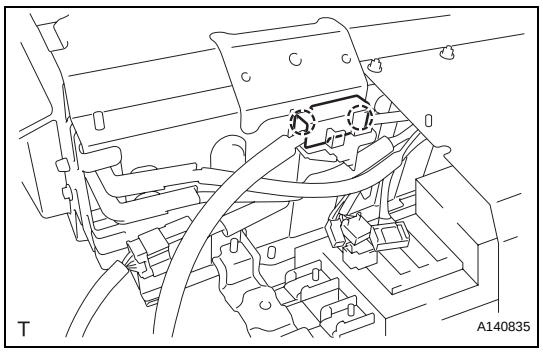
(g) Connect the battery room ventilation hose with the clamp and grommet.
CAUTION:
Wear insulated gloves.
NOTICE:
After installing the grommet, make sure that there is no clearance between the grommet and body.



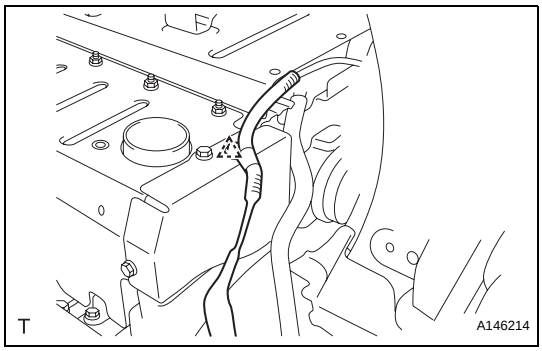
(h) Connect the battery pack wire connector.
CAUTION:
Wear insulated gloves.



(i) Connect the frame wire (AMD cable) with the nut.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
CAUTION:
Wear insulated gloves.

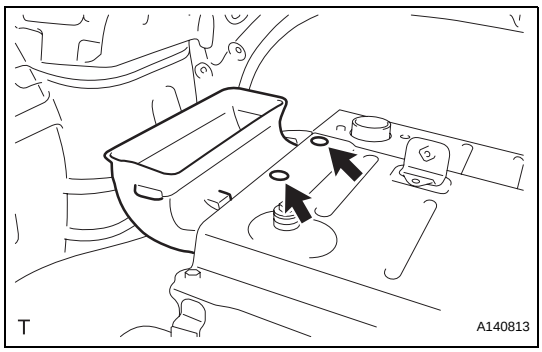


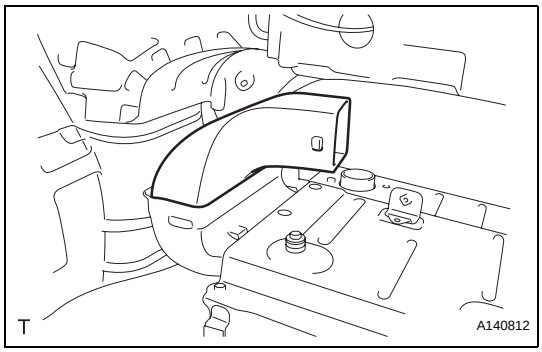
(j) Install the terminal block cover with the 2 claws.
CAUTION:
Wear insulated gloves.



(k) Connect the wire harness clamp to the No. 1 battery cover.

11. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
12. **REMOVE SPARE WHEEL COVER CLAMP**
13. **REMOVE SPARE WHEEL COVER ASSEMBLY**
14. **CONNECT FRAME WIRE (See page HB-111)**
15. **INSTALL UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-112)**
16. **INSTALL WIRE HARNESS CLAMP BRACKET (See page HB-112)**
17. **INSTALL NO. 2 HV BATTERY EXHAUST DUCT (See page HB-129)**
18. **INSTALL NO. 4 HV BATTERY INTAKE DUCT**
    (a) Install the No. 4 HV battery intake duct with the 2 clips.



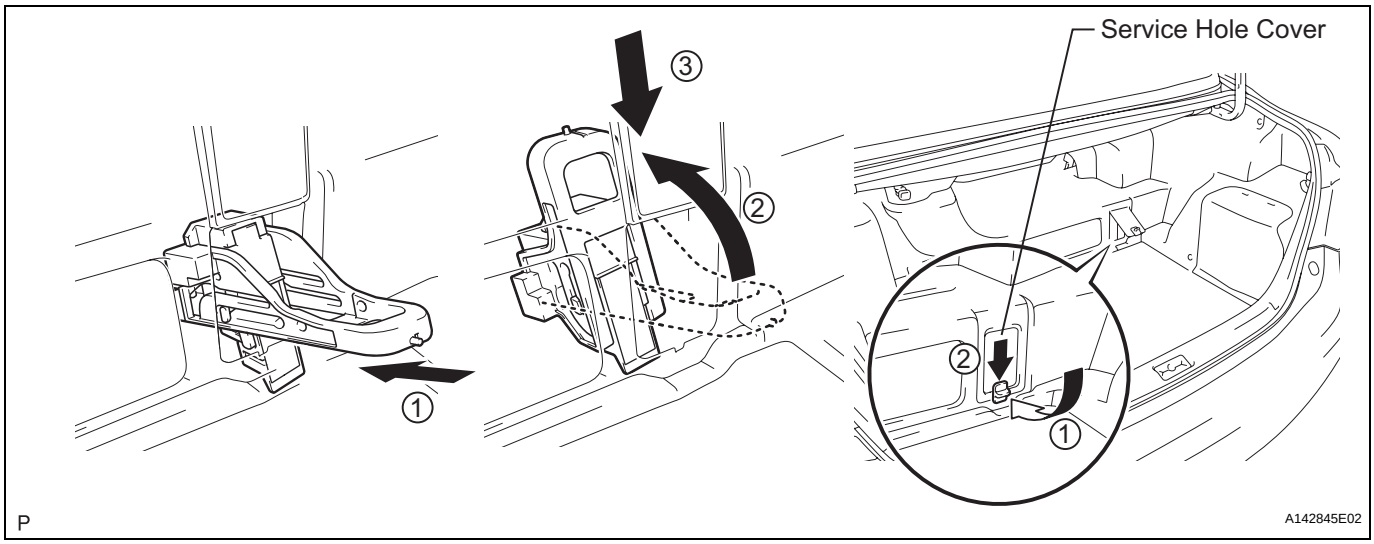


19. **INSTALL NO. 3 HV BATTERY INTAKE DUCT**
    (a) Install the No. 3 HV battery intake duct.
20. **INSTALL NO. 5 HV BATTERY INTAKE DUCT (See page HB-113)**
21. **INSTALL BATTERY COOLING BLOWER ASSEMBLY (See page HB-120)**
22. **INSTALL NO. 2 HV BATTERY INTAKE DUCT (See page HB-121)**
23. **INSTALL NO. 1 HV BATTERY INTAKE DUCT (See page HB-121)**
24. **INSTALL ROOM PARTITION BOARD RH (See page HB-121)**
25. **INSTALL ROOM PARTITION BOARD LH (See page HB-121)**
26. **INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-113)**
27. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-34)**
28. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-35)**
29. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-35)**

30. INSTALL REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-42)
31. INSTALL REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-42)
32. INSTALL ROOF SIDE INNER GARNISH LH (See page IR-39)
33. INSTALL ROOF SIDE INNER GARNISH RH (See page IR-39)
34. CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-35)
35. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH
36. INSTALL REAR DOOR SCUFF PLATE LH (See page IR-43)
37. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH
38. INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)
39. INSTALL REAR SIDE SEATBACK ASSEMBLY LH (See page SE-54)
40. INSTALL REAR SIDE SEATBACK ASSEMBLY RH
41. INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)
42. INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)
43. INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)
44. INSTALL REAR CENTER SEAT HEADREST ASSEMBLY
45. INSTALL REAR SEAT HEADREST ASSEMBLY
46. INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-102)
47. INSTALL LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-102)
48. INSTALL REAR FLOOR FINISH PLATE (See page ED-103)
49. INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-103)
50. INSTALL SPARE WHEEL COVER ASSEMBLY
51. INSTALL SPARE WHEEL COVER CLAMP
52. INSTALL LUGGAGE COMPARTMENT FLOOR MAT
53. INSTALL SERVICE PLUG GRIP
    CAUTION:
    Wear insulated gloves.

NOTICE:
Before connecting the service plug grip, make sure that no parts or tools remain in the luggage compartment and the high-voltage terminals and connectors are securely connected.

(a) Wear insulated gloves and insert the service plug grip in the order as shown in the illustration.

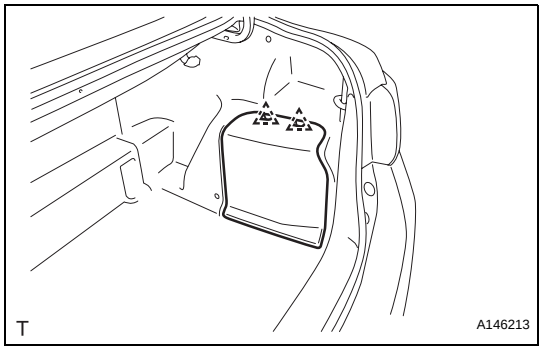


(b) Tilt the service plug grip 90° and slide it down until a click sound is heard.

(c) Install the battery service hole cover.
NOTICE:
Make sure that the battery service hole cover is installed securely.

HB

54. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL



55. INSTALL LUGGAGE TRIM SERVICE HOLE COVER

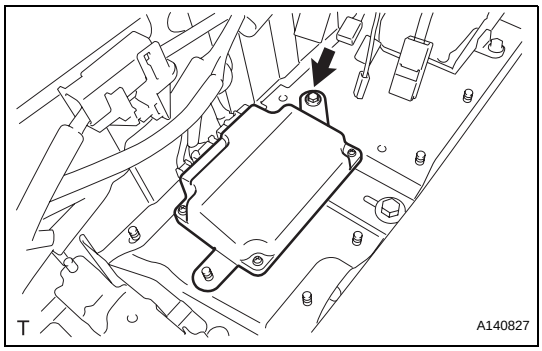
(a) Install the luggage trim service hole cover with the 2 craws.

56. PERFORM INITIALIZATION

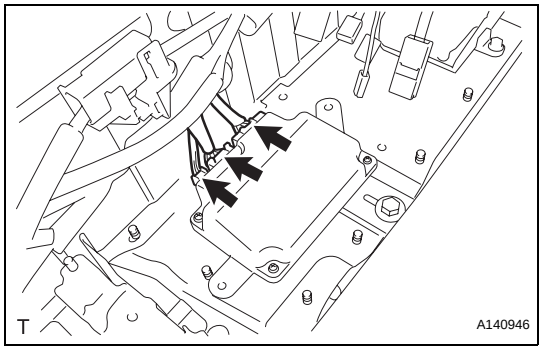
(a) Perform initialization procedure (See page IN-43).
HINT:
Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

REMOVAL

1. **PRECAUTION**
   See page IN-5
2. **CHECK FOR DTCS (See page HB-86)**
3. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER (See page HB-86)**
4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**
5. **REMOVE SERVICE PLUG GRIP (See page HB-86)**
6. **REMOVE NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-560)**
7. **REMOVE CONNECTOR COVER ASSEMBLY (See page HV-560)**
8. **CHECK TERMINAL VOLTAGE (See page HV-561)**
9. **INSTALL CONNECTOR COVER ASSEMBLY (See page HV-566)**
10. **INSTALL NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-568)**
11. **REMOVE REAR SEAT HEADREST ASSEMBLY**
12. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
13. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
14. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
15. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
16. **REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-106)**
17. **REMOVE NO. 5 HV BATTERY INTAKE DUCT (See page HB-106)**
18. **REMOVE WIRE HARNESS CLAMP BRACKET (See page HB-107)**
19. **REMOVE UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-107)**
20. **DISCONNECT FRAME WIRE (See page HB-107)**
21. **REMOVE NO. 1 BATTERY COVER LID (See page HB-108)**
22. **REMOVE NO. 5 BATTERY CARRIER PANEL (See page HB-108)**
23. **REMOVE FILTER NOISE CAPACITOR (See page HB-108)**
24. **REMOVE HV RELAY ASSEMBLY (See page HB-108)**

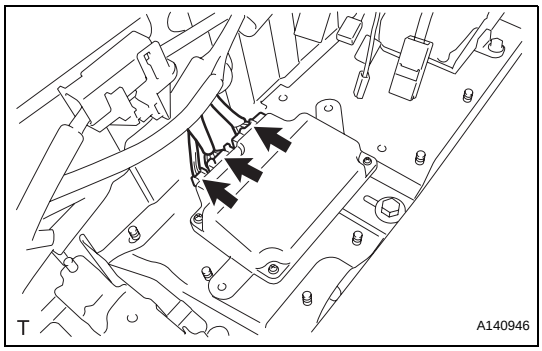


25. **REMOVE BATTERY SMART UNIT**
    (a) Remove the bolt and battery smart unit.
    CAUTION:
    Wear insulated gloves.

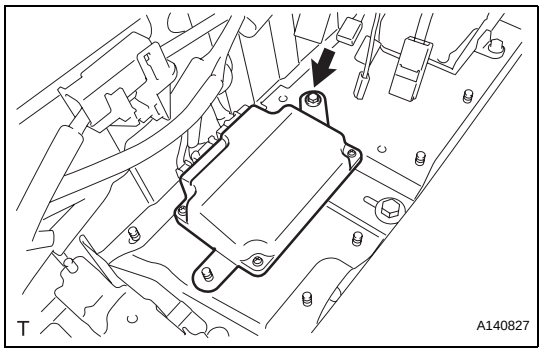


    (b) Disconnect the 3 connectors from the battery smart unit.
    CAUTION:
    Wear insulated gloves.

INSTALLATION



1. **INSTALL BATTERY SMART UNIT**
    (a) Connect the 3 connectors to the battery smart unit.
    CAUTION:
    Wear insulated gloves.



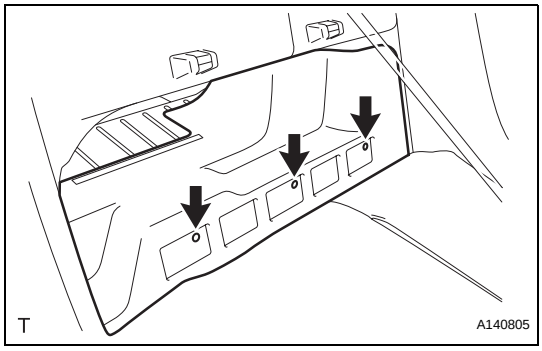
    (b) Install the battery smart unit with the bolt.
    Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
    CAUTION:
    Wear insulated gloves.

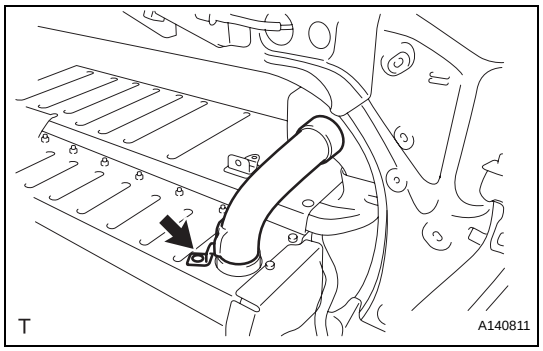
2. **INSTALL HV RELAY ASSEMBLY (See page HB-110)**
3. **INSTALL FILTER NOISE CAPACITOR (See page HB-111)**
4. **INSTALL NO. 5 BATTERY CARRIER PANEL (See page HB-111)**
5. **INSTALL NO. 1 BATTERY COVER LID (See page HB-111)**
6. **CONNECT FRAME WIRE (See page HB-111)**
7. **INSTALL UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-112)**
8. **INSTALL WIRE HARNESS CLAMP BRACKET (See page HB-112)**
9. **INSTALL NO. 5 HV BATTERY INTAKE DUCT (See page HB-113)**

10. **INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-113)**
11. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**
12. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
13. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
14. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
15. **INSTALL REAR SEAT HEADREST ASSEMBLY**
16. **INSTALL SERVICE PLUG GRIP (See page HB-97)**
17. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
18. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER (See page HB-98)**
19. **PERFORM INITIALIZATION**
    (a) Perform the initialization procedure (See page IN-43).
    HINT:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

REMOVAL

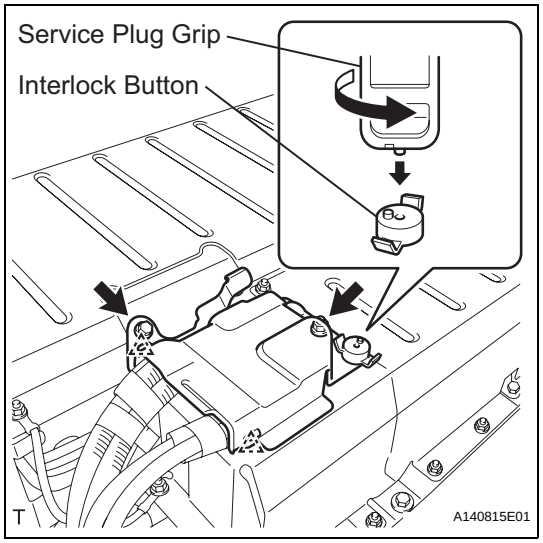
1. **PRECAUTION**
   See page IN-5
2. **CHECK FOR DTCS (See page HB-86)**
3. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER (See page HB-86)**
4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**
5. **REMOVE SERVICE PLUG GRIP (See page HB-86)**
6. **REMOVE NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-560)**
7. **REMOVE CONNECTOR COVER ASSEMBLY (See page HV-560)**
8. **CHECK TERMINAL VOLTAGE (See page HV-561)**
9. **INSTALL CONNECTOR COVER ASSEMBLY (See page HV-566)**
10. **INSTALL NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-568)**
11. **REMOVE REAR SEAT HEADREST ASSEMBLY**
12. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
13. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
14. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
15. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
16. **REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER**
    (a) Remove the 3 clips and front luggage compartment trim cover.





17. REMOVE NO. 5 HV BATTERY INTAKE DUCT

(a) Remove the clip and No. 5 HV battery intake duct.
CAUTION:
Wear insulated gloves.

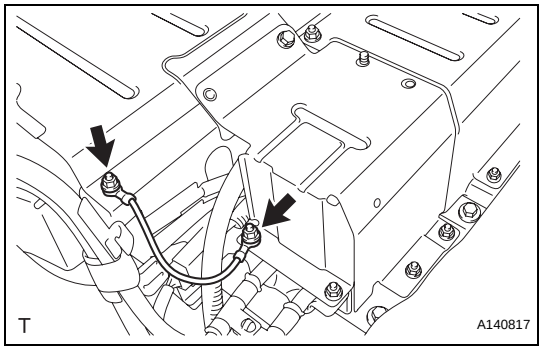


18. REMOVE WIRE HARNESS CLAMP BRACKET

(a) Using the service plug grip, release the interlock button.
CAUTION:
Wear insulated gloves.

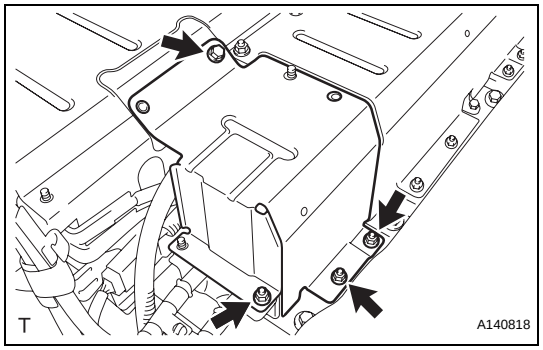
(b) Remove the bolt, nut, and wire harness clamp bracket.
CAUTION:
Wear insulated gloves.

(c) Disconnect the 2 wire harness clamps.
CAUTION:
Wear insulated gloves.

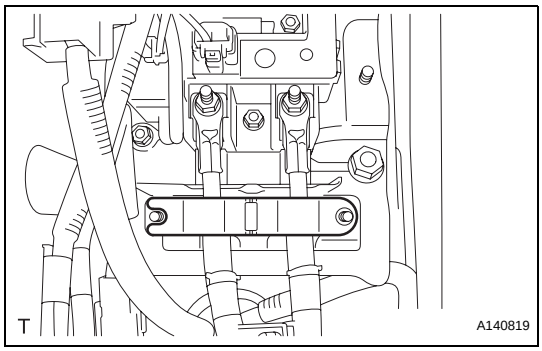


19. REMOVE UPPER BATTERY CARRIER SUB-ASSEMBLY

(a) Remove the 2 nuts and ground cable.
CAUTION:
Wear insulated gloves.

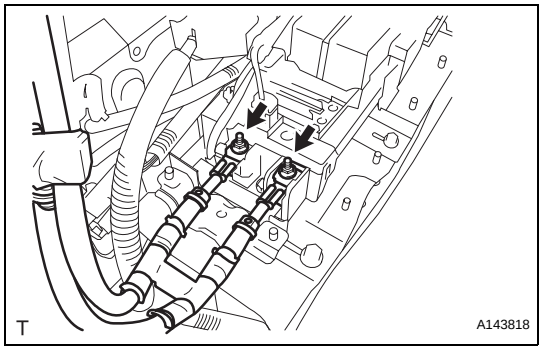


(b) Remove the 3 nuts, bolt, and upper battery carrier sub-assembly.
CAUTION:
Wear insulated gloves.

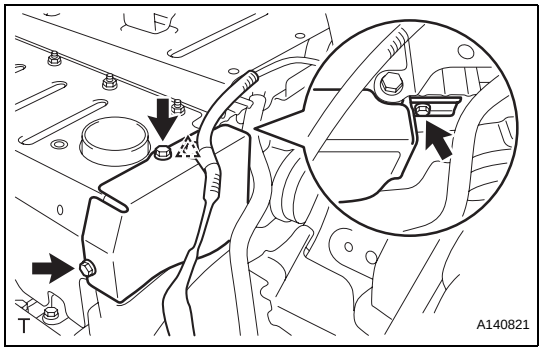


20. DISCONNECT FRAME WIRE

(a) Remove the battery shield contact.
CAUTION:
Wear insulated gloves.

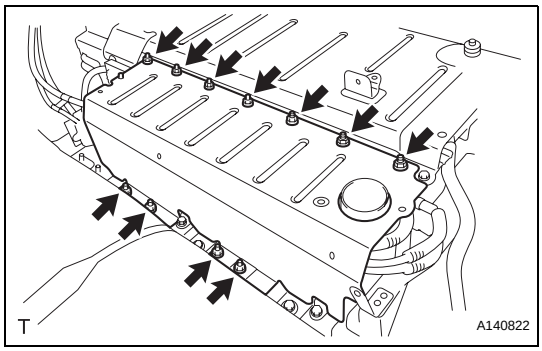


(b) Remove the 2 nuts and disconnect the frame wire (high voltage cable).
CAUTION:
Wear insulated gloves.



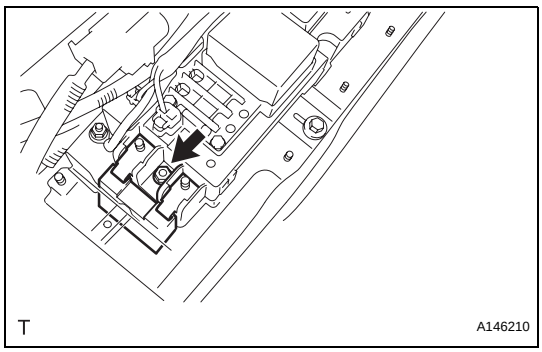
21. REMOVE NO. 1 BATTERY COVER LID

(a) Remove the 3 bolts, clamp, and No. 1 battery cover lid.
CAUTION:
Wear insulated gloves.



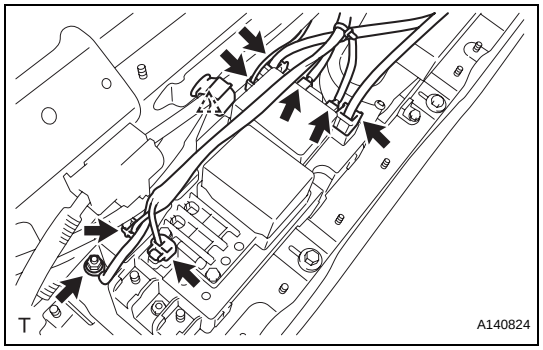
22. REMOVE NO. 5 BATTERY CARRIER PANEL

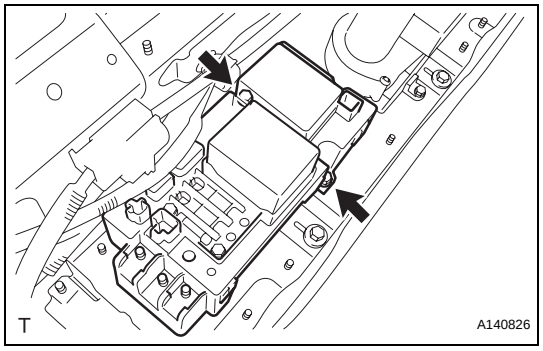
(a) Remove the 11 bolts and No.5 battery carrier panel.
CAUTION:
Wear insulated gloves.



23. REMOVE FILTER NOISE CAPACITOR

(a) Remove the nut and filter noise capacitor.
CAUTION:
Wear insulated gloves.





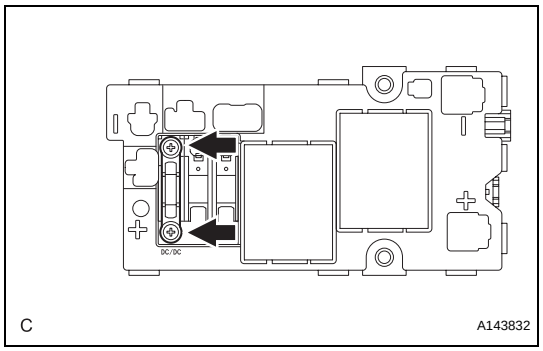
24. REMOVE HV RELAY ASSEMBLY

(a) Remove the nut and disconnect the ground cable.
CAUTION:
Wear insulated gloves.

(b) Disconnect the 7 connectors from the HV relay assembly.
CAUTION:
Wear insulated gloves.

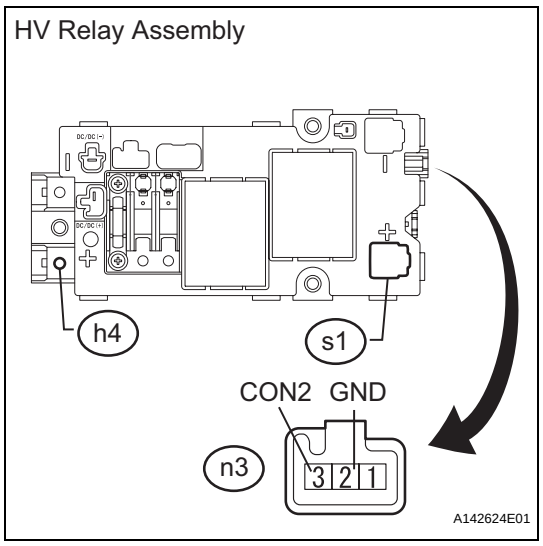
(c) Remove the wire harness clamp.
CAUTION:
Wear insulated gloves.

(d) Remove the 2 bolts and HV relay assembly.
CAUTION:
Wear insulated gloves.



25. REMOVE HIGH VOLTAGE FUSE

(a) Remove the 2 bolts and high voltage fuse.



INSPECTION

1. HV RELAY ASSEMBLY

(a) SMRB inspection

(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h4-1 - s1-1	10 kΩ or more

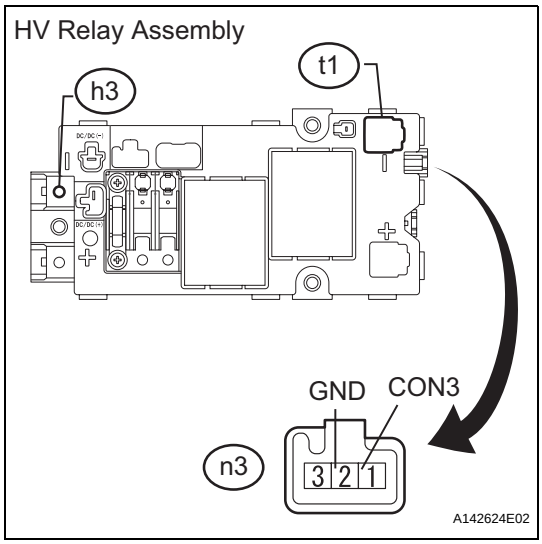
(2) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h4-1 - s1-1	Below 1 Ω (When battery voltage applied to terminals n3-2 and n3-3)

HB

(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
CON2 (n3-3) - GND (n3-2)	18.8 to 32.1 Ω at -35 to 80°C (-31 to 176°F)



(b) SMRG inspection
(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

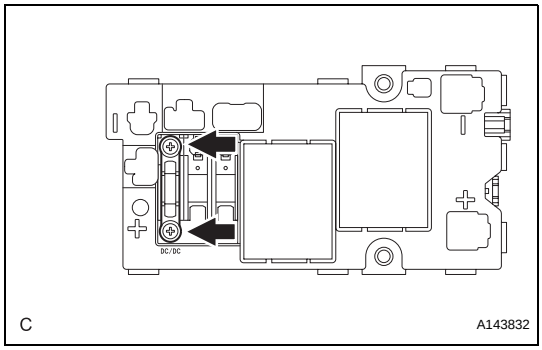
Tester Connection	Specified Condition
h3-1 - t1-1	10 kΩ or more

(2) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
h3-1 - t1-1	Below 1 Ω (When battery voltage applied to terminals n3-1 and n3-2)

(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

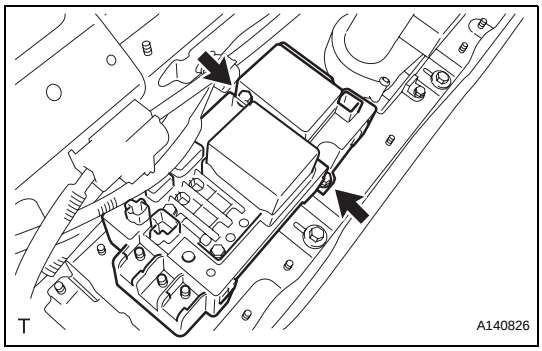
Tester Connection	Specified Condition
CON3 (n3-1) - GND (n3-2)	18.8 to 32.1 Ω at -35 to 80°C (-31 to 176°F)



INSTALLATION

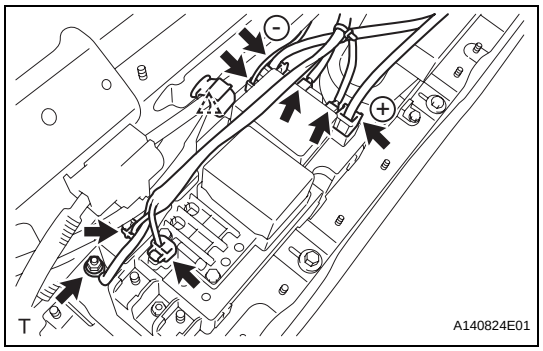
1. INSTALL HIGH VOLTAGE FUSE

(a) Install the high voltage fuse with the 2 bolts.
Torque: 4.5 N*m (46 kgf*cm, 40 in.*lbf)
CAUTION:
Wear insulated gloves.
NOTICE:
Be sure to use a torque wrench to tighten the bolts.



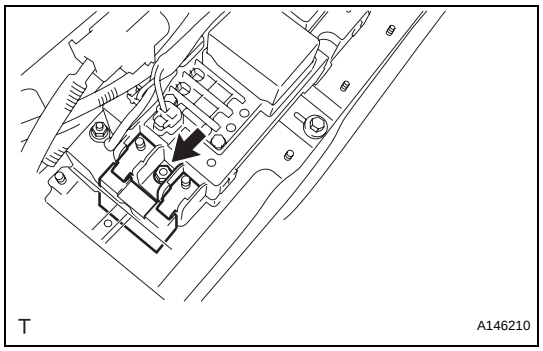
2. INSTALL HV RELAY ASSEMBLY

(a) Install the HV relay assembly with the 2 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



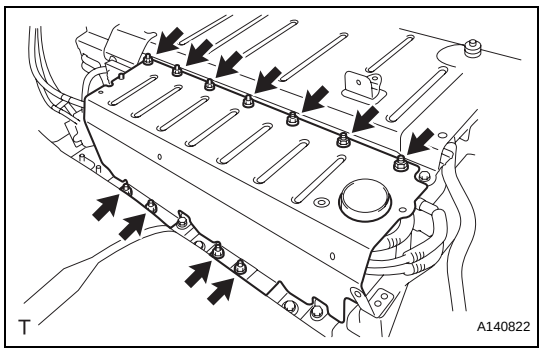
(b) Connect the 7 connectors and clamp to the HV relay assembly.
CAUTION:
Wear insulated gloves.
NOTICE:
- **Connect the wire wrapped with red tape to the terminal indicated by the "+" mark of the HV relay and the wire not wrapped with red tape to the terminal indicated by the "-" mark of the HV battery.**
- **Make sure that the connectors are engaged securely.**

(c) Connect the ground cable with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



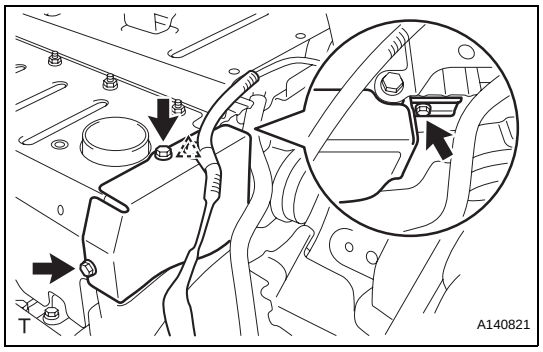
3. INSTALL FILTER NOISE CAPACITOR

(a) Install the filter noise capacitor with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



4. INSTALL NO. 5 BATTERY CARRIER PANEL

(a) Install the No. 5 battery carrier panel with the 11 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

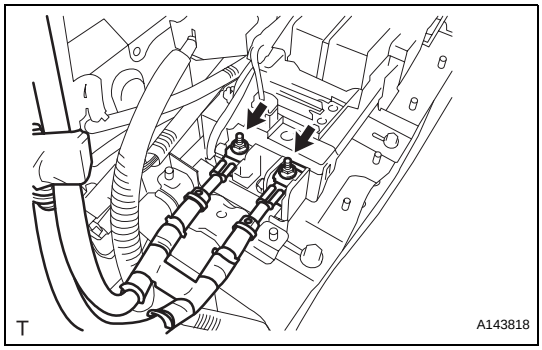


5. INSTALL NO. 1 BATTERY COVER LID

(a) Install the No. 1 battery cover lid with the 3 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

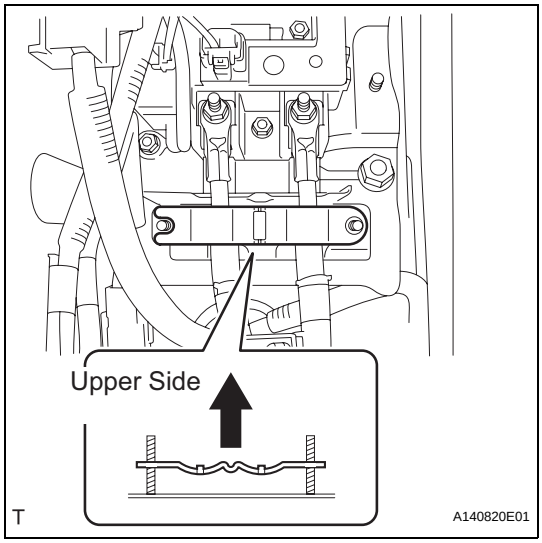
(b) Connect the wire harness clamp to the No. 1 battery cover lid.
CAUTION:
Wear insulated gloves.

HB

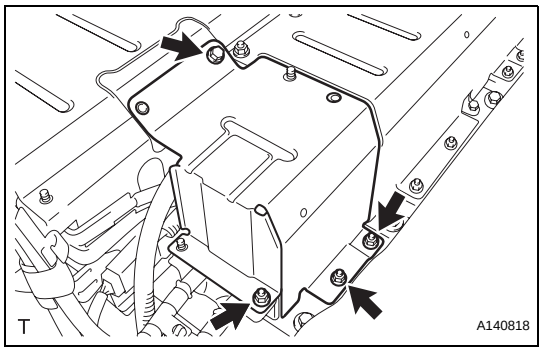


6. CONNECT FRAME WIRE

(a) Connect the frame wire (high voltage cable) with the 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
CAUTION:
Wear insulated gloves.

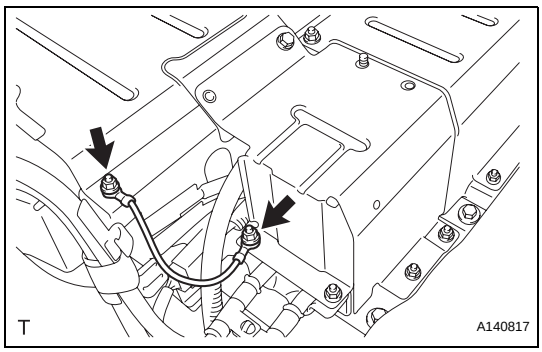


(b) Install the battery shield contact.
CAUTION:
Wear insulated gloves.
NOTICE:
Be sure to install the battery shield contact in the correct direction.



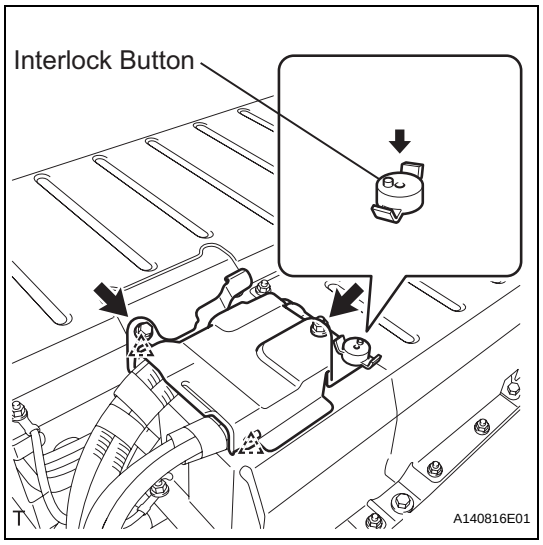
7. INSTALL UPPER BATTERY CARRIER SUB-ASSEMBLY

(a) Install the upper battery carrier sub-assembly with the 3 nuts and bolt.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



(b) Install the ground cable with the 2 nuts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

HB



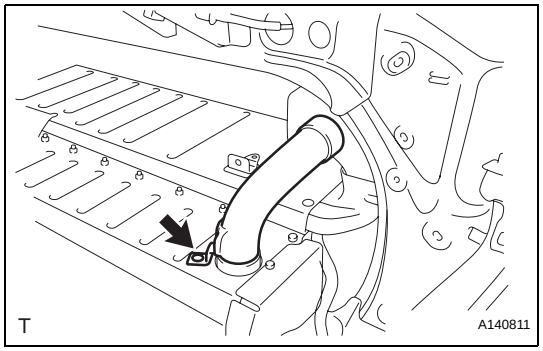
8. INSTALL WIRE HARNESS CLAMP BRACKET

(a) Connect the 2 wire harness clamps.
CAUTION:
Wear insulated gloves.

(b) Install the wire harness clamp bracket with the interlock button.
CAUTION:
Wear insulated gloves.

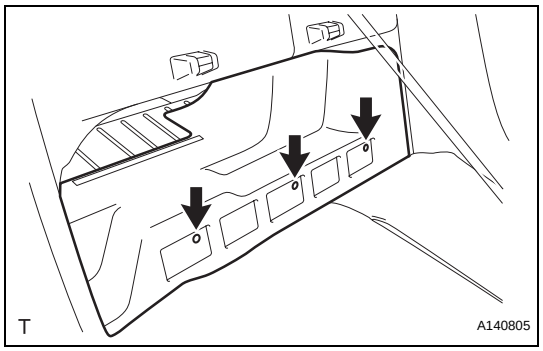
(c) Press the interlock button.
CAUTION:
Wear insulated gloves.

(d) Secure the wire harness clamp bracket with the bolt and nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



9. INSTALL NO. 5 HV BATTERY INTAKE DUCT

(a) Install the No. 5 HV battery intake duct with the clamp.
CAUTION:
Wear insulated gloves.



10. INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER

(a) Install the front luggage compartment trim cover with the 3 clips.

11. INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)

12. INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)

13. INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)

14. INSTALL REAR CENTER SEAT HEADREST ASSEMBLY

15. INSTALL REAR SEAT HEADREST ASSEMBLY

16. INSTALL SERVICE PLUG GRIP (See page HB-97)

17. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

18. INSTALL LUGGAGE TRIM SERVICE HOLE COVER (See page HB-98)

19. PERFORM INITIALIZATION

(a) Perform the initialization procedure (See page IN-43).

HINT:

Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

REMOVAL

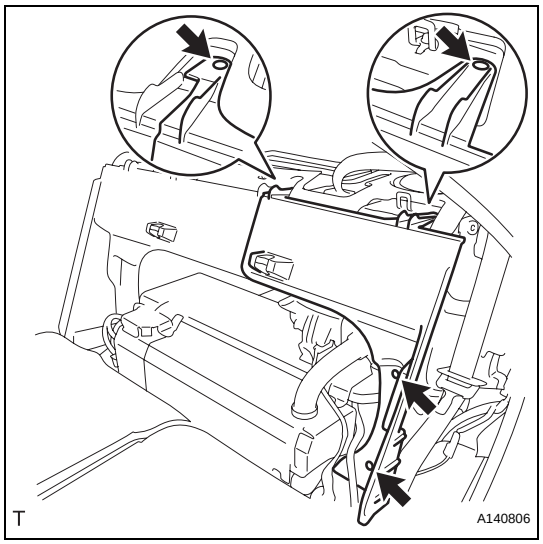
1. REMOVE LUGGAGE COMPARTMENT FLOOR MAT
2. REMOVE SPARE WHEEL COVER CLAMP
3. REMOVE SPARE WHEEL COVER ASSEMBLY
4. REMOVE NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-97)
5. REMOVE REAR FLOOR FINISH PLATE (See page ED-97)
6. REMOVE LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-97)
7. REMOVE LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-97)
8. REMOVE REAR SEAT HEADREST ASSEMBLY
9. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
10. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)
11. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)
12. REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)
13. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (See page SE-45)
14. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (See page SE-45)
15. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-13)
16. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH
17. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-13)
18. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH
19. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-33)
20. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-15)
21. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-15)
22. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-40)
23. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-41)

24. **REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-33)**

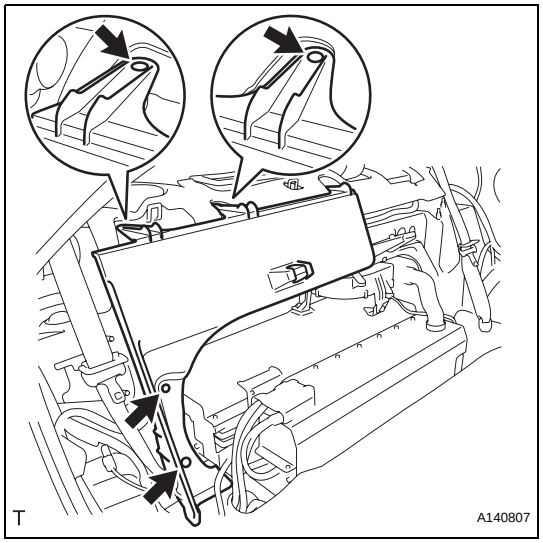
25. **REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-33)**

26. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-33)**

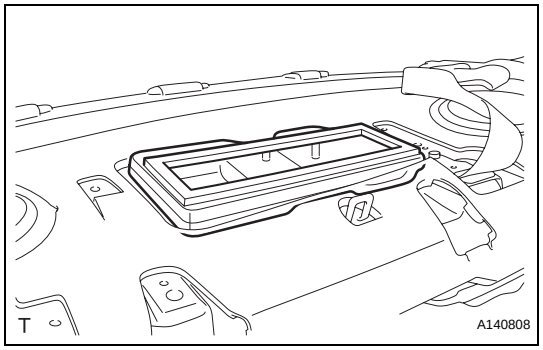
27. **REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-106)**



28. **REMOVE ROOM PARTITION BOARD LH**
    (a) Remove the 4 clips and room partition board LH.

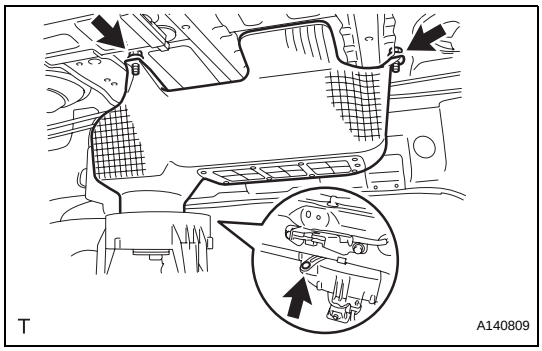


29. **REMOVE ROOM PARTITION BOARD RH**
    (a) Remove the 4 clips and room partition board RH.



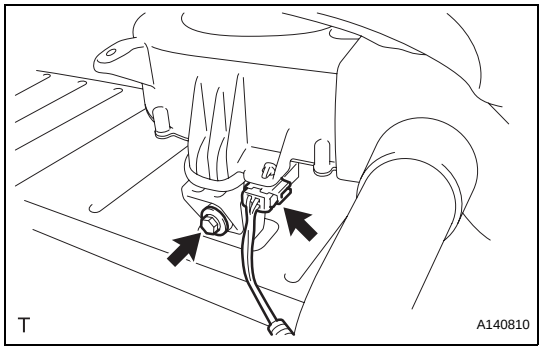
30. **REMOVE NO. 1 HV BATTERY INTAKE DUCT**
    (a) Remove the No. 1 HV battery intake duct.

HB



31. REMOVE NO. 2 HV BATTERY INTAKE DUCT

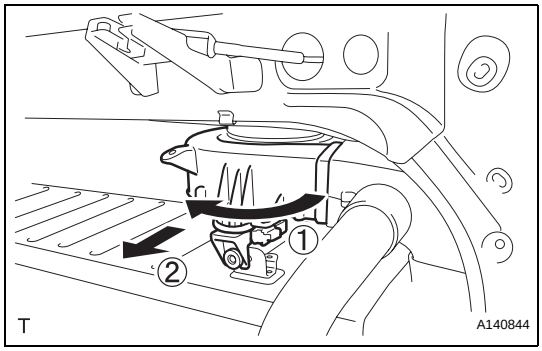
(a) Remove the 2 bolts, clip, and No. 2 HV battery intake duct.



32. REMOVE BATTERY COOLING BLOWER ASSEMBLY

(a) Remove the bolt from the battery cooling blower assembly.

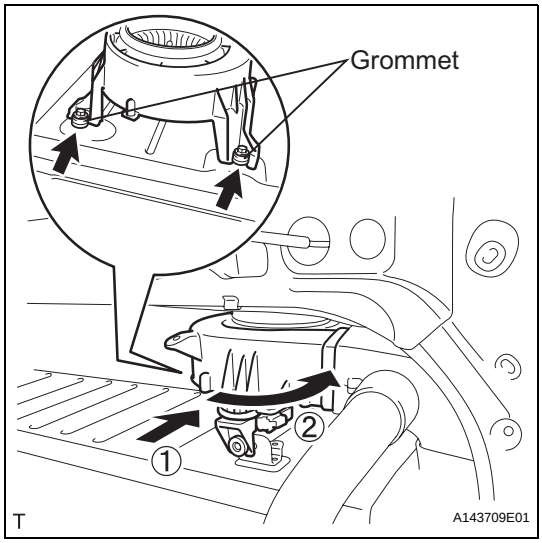
(b) Disconnect the connector from the battery cooling blower assembly.



(c) Remove the battery cooling blower assembly shown in the illustration.

NOTICE:

- **Do not touch the fan of the battery cooling blower assembly.**
- **Do not hold the wire harness when lifting the battery cooling blower assembly.**



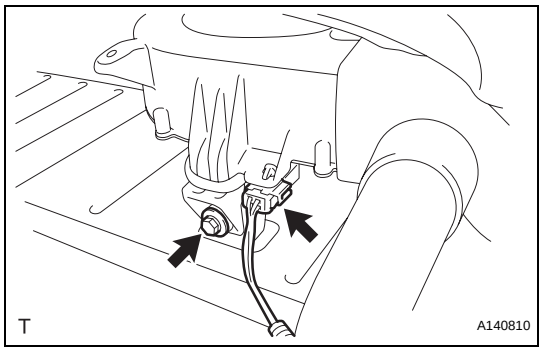
INSTALLATION

1. INSTALL BATTERY COOLING BLOWER ASSEMBLY

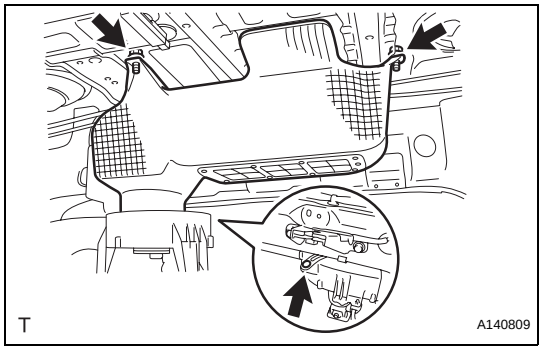
(a) Install the battery cooling blower assembly as shown in the illustration.

NOTICE:

- **Do not touch the fan of the battery cooling blower assembly.**
- **Do not hold the wire harness when lifting the battery cooling blower assembly.**
- **Be sure to engage the cutout on the battery cooling blower assembly to the bushing securely.**

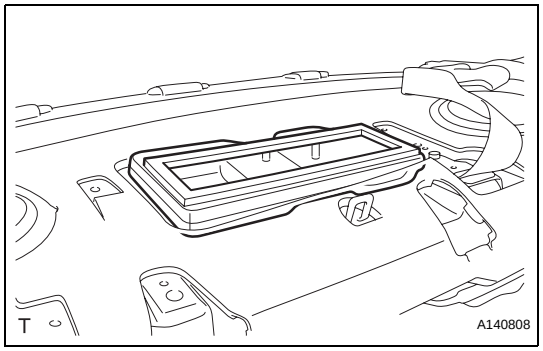


(b) Install the bolt to the battery cooling blower assembly.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



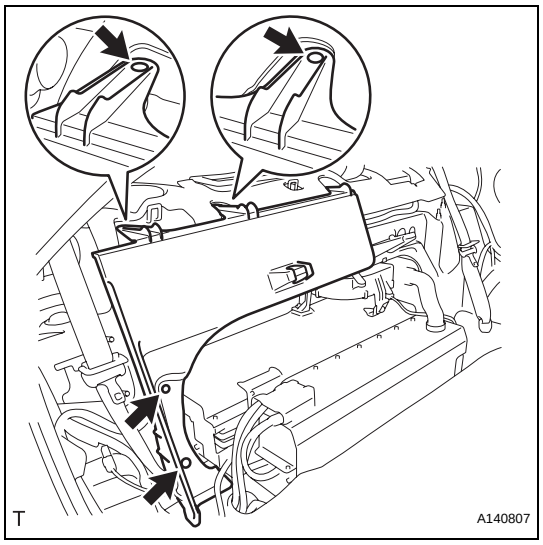
2. INSTALL NO. 2 HV BATTERY INTAKE DUCT

(a) Install the No. 2 HV battery intake duct with the 2 bolts and clip.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



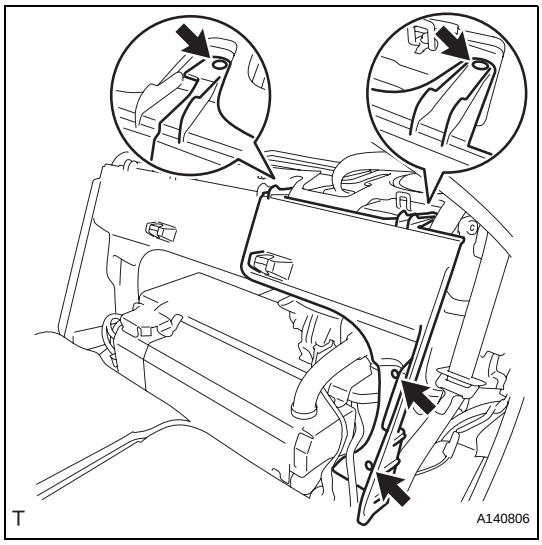
3. INSTALL NO. 1 HV BATTERY INTAKE DUCT

(a) Install the No. 1 HV battery intake duct.



4. INSTALL ROOM PARTITION BOARD RH

(a) Install the room partition board RH with the 4 clips.



5. **INSTALL ROOM PARTITION BOARD LH**
   (a) Install the room partition board LH with the 4 clips.
6. **INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-113)**
7. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-34)**
8. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-35)**
9. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-35)**
10. **INSTALL REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-42)**
11. **INSTALL REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-42)**
12. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-39)**
13. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-39)**
14. **INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (See page SB-35)**
15. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH**
16. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-43)**
17. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**
18. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-43)**
19. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (See page SE-54)**
20. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH**
21. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**
22. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
23. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
24. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
25. **INSTALL REAR SEAT HEADREST ASSEMBLY**
26. **INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-102)**
27. **INSTALL LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-102)**

28. **INSTALL REAR FLOOR FINISH PLATE (See page ED-103)**
29. **INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-103)**
30. **INSTALL SPARE WHEEL COVER ASSEMBLY**
31. **INSTALL SPARE WHEEL COVER CLAMP**
32. **INSTALL LUGGAGE COMPARTMENT FLOOR MAT**

REMOVAL

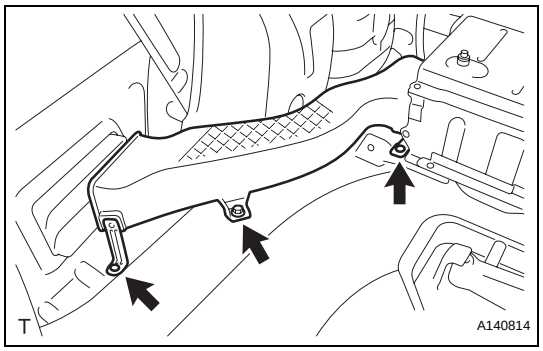
1. **PRECAUTION**
   See page IN-5
2. **CHECK FOR DTCS (See page HB-86)**
3. **REMOVE LUGGAGE TRIM SERVICE HOLE COVER (See page HB-86)**
4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page HV-560)**
5. **REMOVE SERVICE PLUG GRIP (See page HB-86)**
6. **REMOVE NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-560)**
7. **REMOVE CONNECTOR COVER ASSEMBLY (See page HV-560)**
8. **CHECK TERMINAL VOLTAGE (See page HV-561)**
9. **INSTALL CONNECTOR COVER ASSEMBLY (See page HV-566)**
10. **INSTALL NO. 2 ENGINE ROOM SIDE LH COVER (See page HV-568)**
11. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
12. **REMOVE SPARE WHEEL COVER CLAMP**
13. **REMOVE SPARE WHEEL COVER ASSEMBLY**
14. **REMOVE NO.1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-97)**
15. **REMOVE REAR FLOOR FINISH PLATE (See page ED-97)**
16. **REMOVE LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-97)**
17. **REMOVE LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-97)**
18. **REMOVE REAR SEAT HEADREST ASSEMBLY**
19. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
20. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-44)**
21. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-44)**
22. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-44)**
23. **REMOVE FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-106)**
24. **REMOVE NO. 5 HV BATTERY INTAKE DUCT (See page HB-106)**

25. **REMOVE WIRE HARNESS CLAMP BRACKET (See page HB-107)**

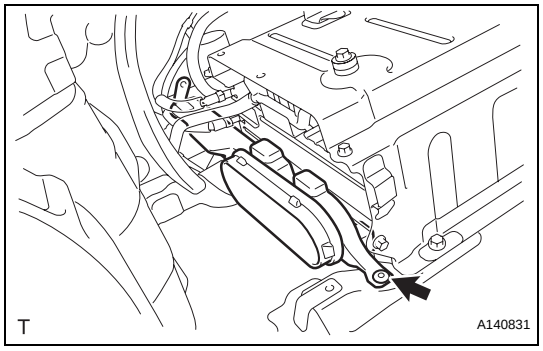
26. **REMOVE UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-107)**

27. **REMOVE NO. 1 BATTERY COVER LID (See page HB-108)**

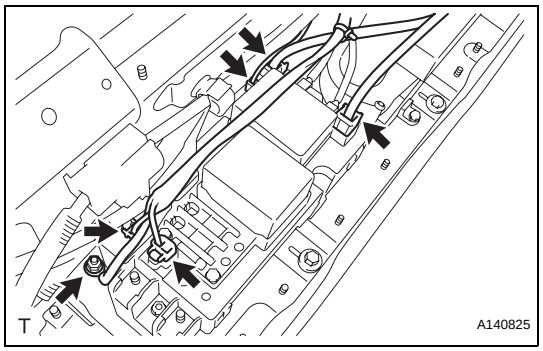
28. **REMOVE NO. 5 BATTERY CARRIER PANEL (See page HB-108)**



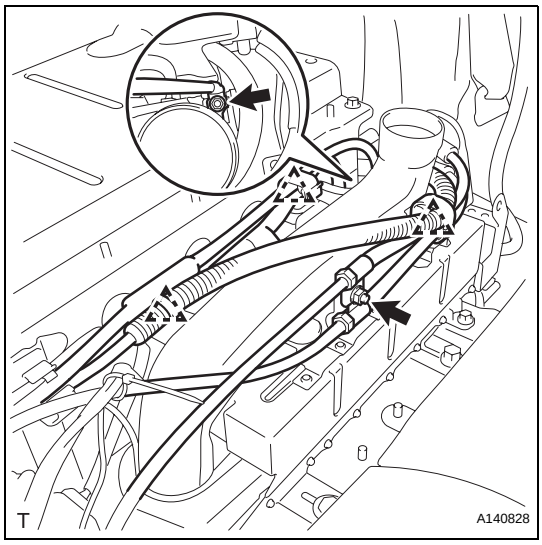
29. **REMOVE NO. 2 HV BATTERY EXHAUST DUCT**
    (a) Remove the 2 clips, nut and No. 2 HV battery exhaust duct.



30. **REMOVE NO. 1 HV BATTERY EXHAUST DUCT**
    (a) Remove the clip and No. 1 HV battery exhaust duct.
    CAUTION:
    Wear insulated gloves.

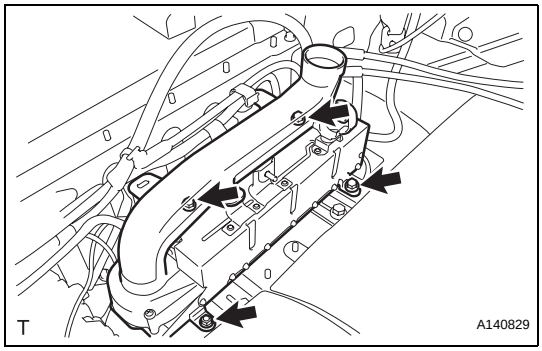


31. **DISCONNECT HV RELAY ASSEMBLY**
    (a) Remove the nut and disconnect the ground cable.
    CAUTION:
    Wear insulated gloves.
    (b) Disconnect the 5 connectors from the HV relay assembly.
    CAUTION:
    Wear insulated gloves.

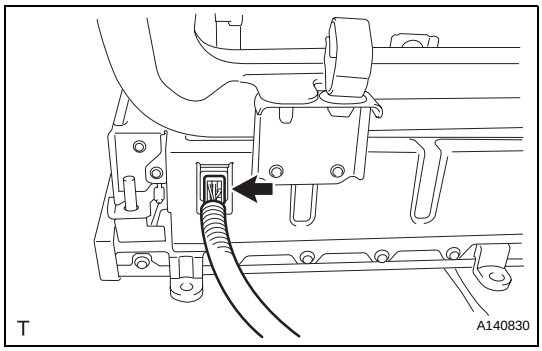


32. REMOVE HYBRID VEHICLE CONVERTER

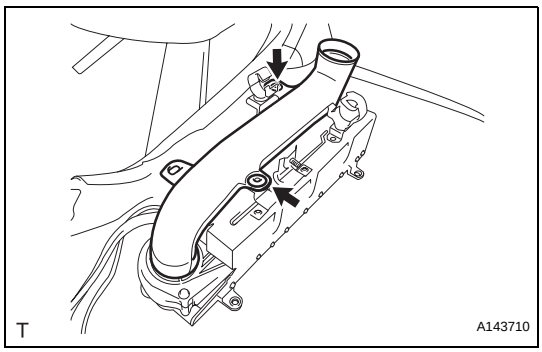
(a) Remove the 2 nuts and 3 clamps and disconnect the wire harness from the hybrid vehicle converter.
CAUTION:
Wear insulated gloves.



(b) Remove the 3 bolts, nut, and hybrid vehicle converter.
CAUTION:
Wear insulated gloves.



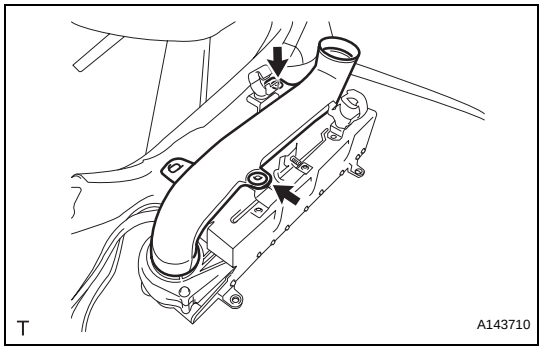
(c) Disconnect the connector from the hybrid vehicle converter.
CAUTION:
Wear insulated gloves.



33. REMOVE VENTILATOR INNER DUCT

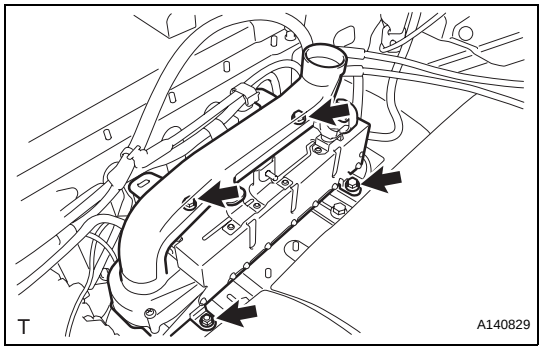
(a) Remove the 2 clips and ventilator inner duct.

INSTALLATION



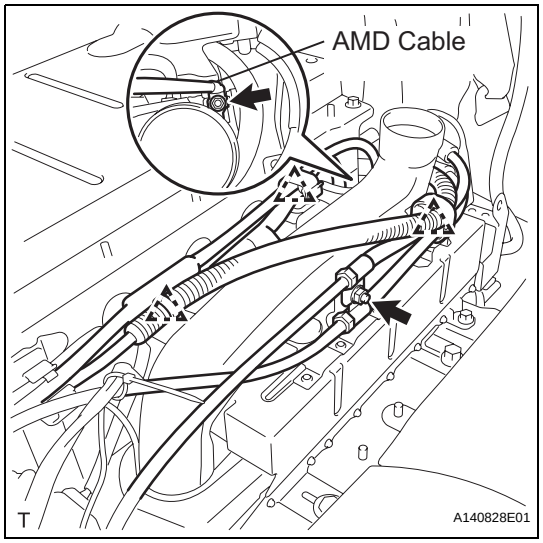
1. INSTALL VENTILATOR INNER DUCT

(a) Install the ventilator inner duct with the 2 clips.



2. INSTALL HYBRID VEHICLE CONVERTER

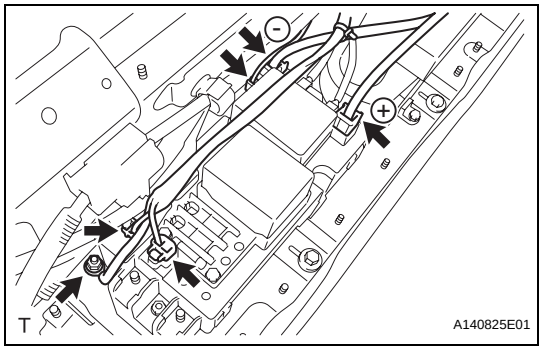
(a) Install the hybrid vehicle converter with the 3 bolts and nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.



(b) Connect the wire harness with the 3 clamps.
CAUTION:
Wear insulated gloves.

(c) Connect the AMD cable with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

(d) Connect the high voltage cable with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
CAUTION:
Wear insulated gloves.

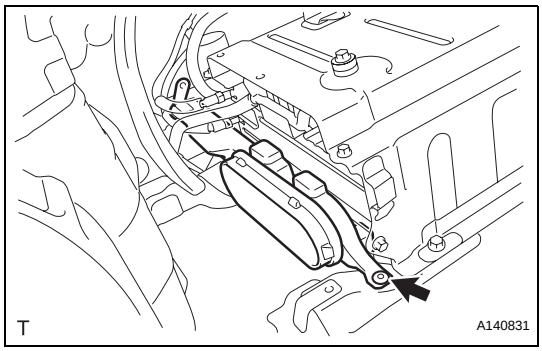


3. CONNECT HV RELAY ASSEMBLY

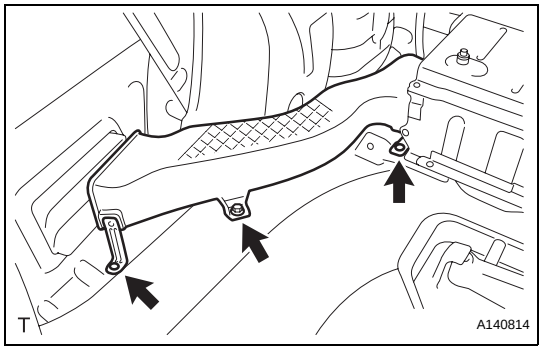
(a) Connect the 5 connectors to the HV relay assembly.
CAUTION:
Wear insulated gloves.
NOTICE:
- **Connect the wire wrapped with red tape to the terminal indicated by the "+" mark of the HV relay and the wire not wrapped with red tape to the terminal indicated by the "-" mark of the HV battery.**
- **Make sure that the connectors are engaged securely.**

(b) Connect the ground cable with the nut.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

HB



4. **INSTALL NO. 1 HV BATTERY EXHAUST DUCT**
   (a) Install the No. 1 battery exhaust duct with the clip.
   CAUTION:
   Wear insulated gloves.



5. **INSTALL NO. 2 HV BATTERY EXHAUST DUCT**
   (a) Install the No. 2 battery exhaust duct with the bolt and 2 clips.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
6. **INSTALL NO. 5 BATTERY CARRIER PANEL (See page HB-111)**
7. **INSTALL NO. 1 BATTERY COVER LID (See page HB-111)**
8. **INSTALL UPPER BATTERY CARRIER SUB-ASSEMBLY (See page HB-112)**
9. **INSTALL WIRE HARNESS CLAMP BRACKET (See page HB-112)**
10. **INSTALL NO. 5 HV BATTERY INTAKE DUCT (See page HB-113)**
11. **INSTALL FRONT LUGGAGE COMPARTMENT TRIM COVER (See page HB-113)**
12. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (See page SE-54)**
13. **INSTALL SEPARATE TYPE REAR SEATBACK ASSEMBLY RH (See page SE-54)**
14. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-55)**
15. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
16. **INSTALL REAR SEAT HEADREST ASSEMBLY**
17. **INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER LH (See page ED-102)**
18. **INSTALL LUGGAGE COMPARTMENT REAR TRIM COVER (See page ED-102)**
19. **INSTALL REAR FLOOR FINISH PLATE (See page ED-103)**
20. **INSTALL NO.1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-103)**
21. **INSTALL SPARE WHEEL COVER ASSEMBLY**
22. **INSTALL SPARE WHEEL COVER CLAMP**

23. **INSTALL LUGGAGE COMPARTMENT FLOOR MAT**

24. **INSTALL SERVICE PLUG GRIP (See page HB-97)**

25. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

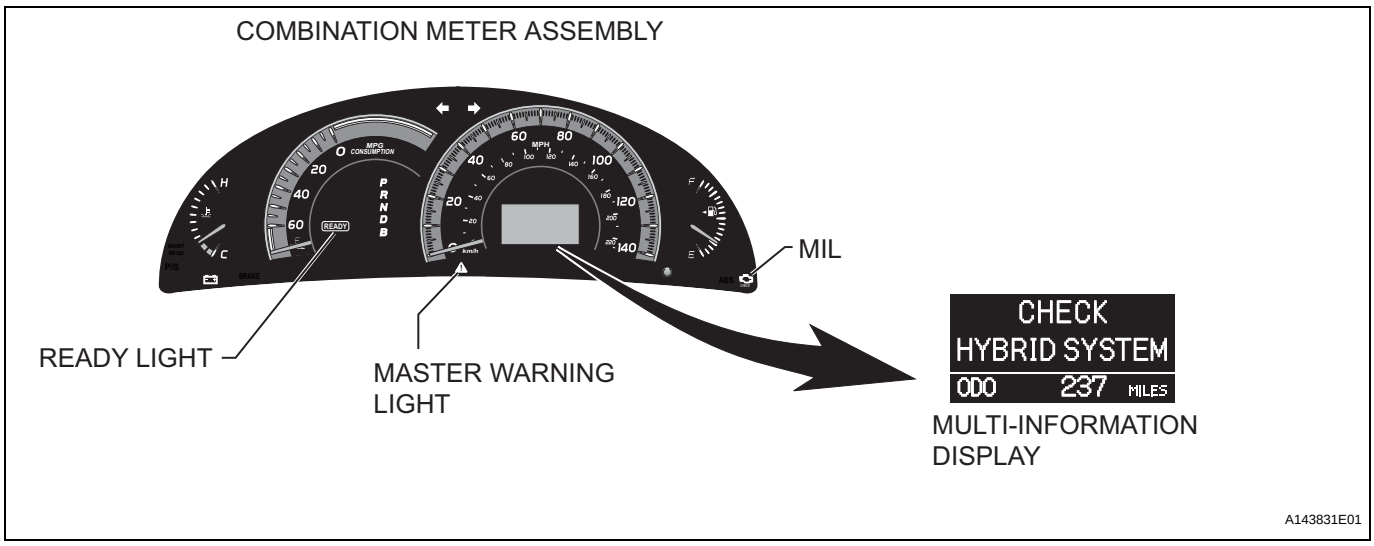
26. **INSTALL LUGGAGE TRIM SERVICE HOLE COVER (See page HB-98)**

27. **PERFORM INITIALIZATION**
    (a) Perform the initialization procedure (See page IN-43).
    HINT:
    Some vehicle systems require initialization after reconnecting the cable to the negative battery terminal.

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The HV control ECU has a self-diagnosis system. If the computer, hybrid vehicle control system, or a component is not working properly, the ECU records the conditions that relate to the fault. The ECU also illuminates the master warning light and/or MIL in the combination meter and displays warning messages on the multi-information display.



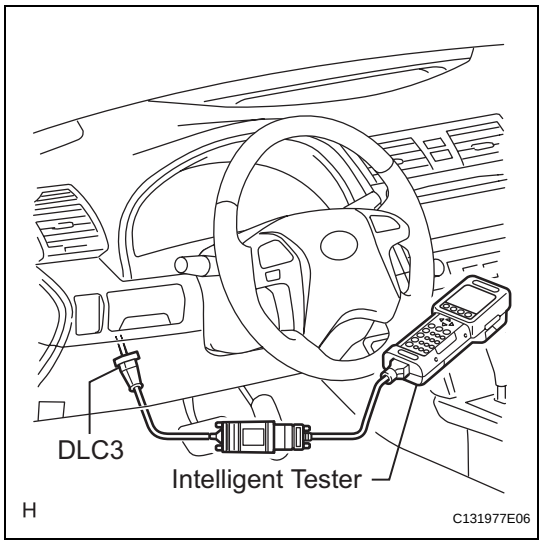
HINT:

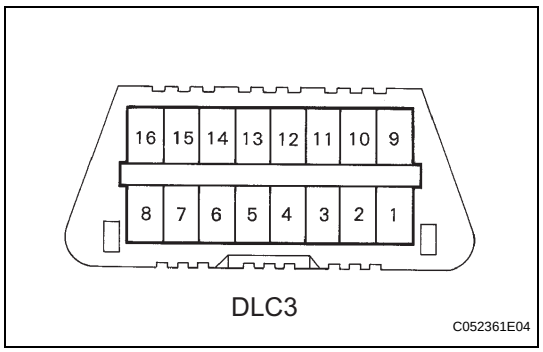
The master warning light will illuminate when the THS II fails and the light will blink when in inspection mode.

- When troubleshooting OBD II vehicles, it is necessary to connect an OBD II scan tool that complies with SAE J1978 or connect an intelligent tester to the vehicle. Using one of these testers, it will be possible to read various data output from the vehicle's ECUs.
- OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator light (MIL) in the instrument panel when the computer detects a malfunction in (1) the emission control system/ components, (2) the powertrain control components (which affect vehicle emissions), (3) the ECM and HV control ECU. In addition, applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the HV control ECU memory (See page HB-18).

If a malfunction does not recur in 3 consecutive trips, the MIL will go off automatically. However the DTCs will remain recorded in the HV control ECU memory.

HB





- To check for DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) with the CAN vehicle interface module (CAN VIM). The intelligent tester also allows erasing of DTCs, viewing of freeze frame data, and viewing of various forms of THS II data (for operating instructions, refer to the tester's instruction manual). 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 the manufacturer within prescribed limits (See page HB-18).

2. CHECK DLC3

(a) The HV control ECU uses the ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Symbol	Terminal No.	Name	Reference Terminal	Result	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	Always
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BATT	16	Battery positive	Body ground	11 to 14 V	Power switch off
CANH	6	HIGH-level CAN bus line	14 - LOW-level CAN bus line	54 to 69 Ω	Power switch off
CANH	6	HIGH-level CAN bus line	14 - Battery positive	1 MΩ or higher	Power switch off
CANH	6	HIGH-level CAN bus line	4 - Chassis ground	1 kΩ or higher	Power switch off
CANL	14	LOW-level CAN bus line	16 - Battery positive	1 MΩ or higher	Power switch off
CANL	14	LOW-level CAN bus line	4 - Chassis ground	1 kΩ or higher	Power switch off

HINT:

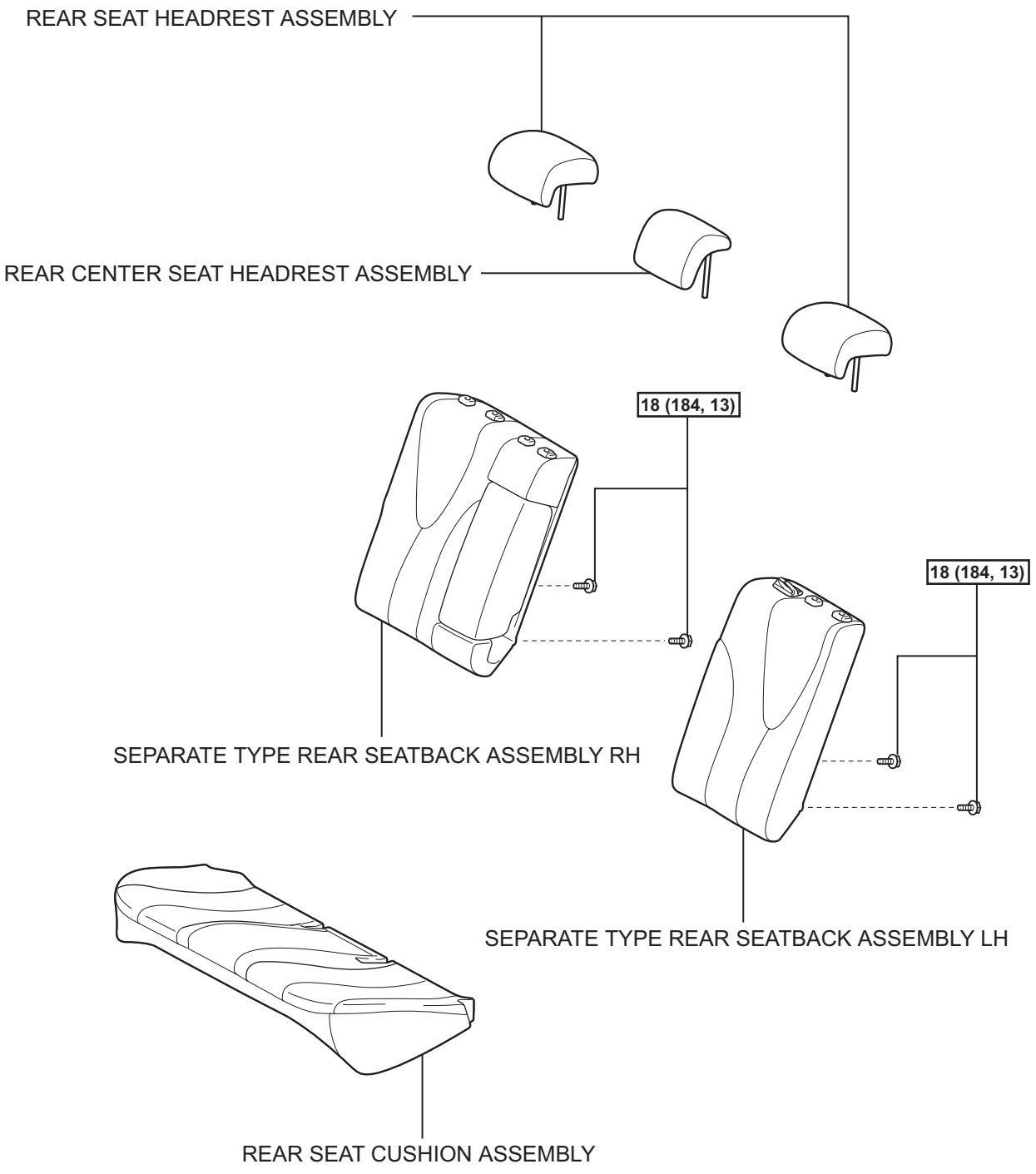
Connect the cable of the intelligent tester to the DLC3, turn the power switch on (IG), and attempt to use the tester. If the display on the tester indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If the tester is able to communicate when it is connected to another vehicle, inspect the DLC3 connector of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the tester's instruction manual for information on service or repair of the tester.

3. **INSPECT AUXILIARY BATTERY**
   (a) Measure the voltage of the auxiliary battery.
   Standard Voltage:
   10 to 14 V
   (b) Inspect the auxiliary battery, fuses, fusible links, wiring harness, connectors and ground.
4. **CHECK MIL**
   (a) The MIL will illuminate when the power switch is turned on (IG), before the "READY" light comes on. If the MIL does not illuminate, troubleshoot the MIL circuit (See page ES-373).
   (b) When the "READY" light turns on, the MIL should turn off. If the MIL remains on, the diagnosis system has detected a malfunction or abnormality in the system.

BATTERY SMART UNIT

COMPONENTS

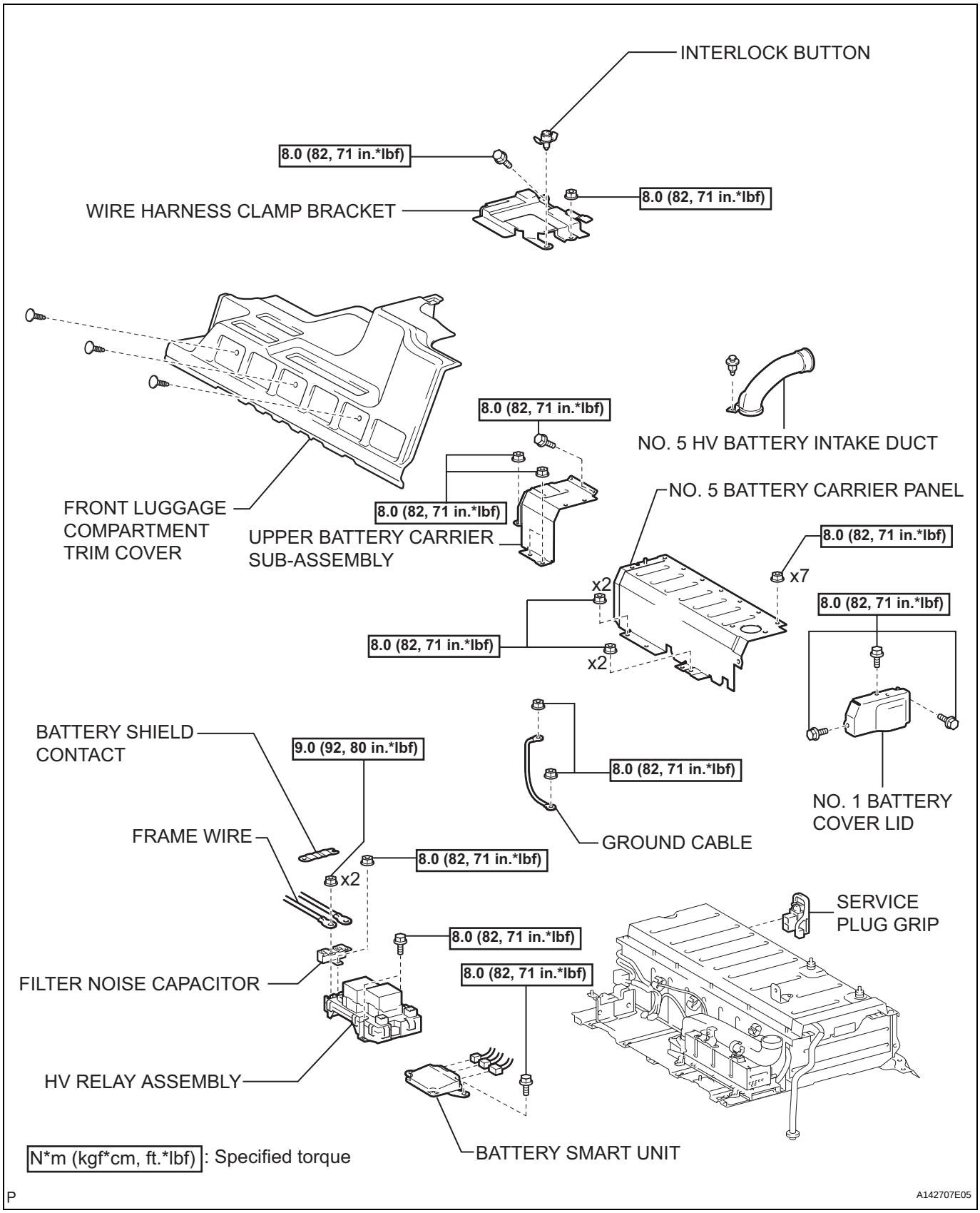


N*m (kgf*cm, ft.*lbf): Specified torque

P

A146938E01

HB


INTERLOCK BUTTON
8.0 (82, 71 in.*lbf)
8.0 (82, 71 in.*lbf)
WIRE HARNESS CLAMP BRACKET
8.0 (82, 71 in.*lbf)
NO. 5 HV BATTERY INTAKE DUCT
FRONT LUGGAGE COMPARTMENT TRIM COVER
8.0 (82, 71 in.*lbf)
UPPER BATTERY CARRIER SUB-ASSEMBLY
NO. 5 BATTERY CARRIER PANEL
8.0 (82, 71 in.*lbf)
x7
x2
8.0 (82, 71 in.*lbf)
x2
8.0 (82, 71 in.*lbf)
BATTERY SHIELD CONTACT
9.0 (92, 80 in.*lbf)
8.0 (82, 71 in.*lbf)
NO. 1 BATTERY COVER LID
GROUND CABLE
FRAME WIRE
8.0 (82, 71 in.*lbf)
x2
SERVICE PLUG GRIP
8.0 (82, 71 in.*lbf)
FILTER NOISE CAPACITOR
8.0 (82, 71 in.*lbf)
HV RELAY ASSEMBLY
BATTERY SMART UNIT
N*m (kgf*cm, ft.*lbf): Specified torque
P
A142707E05

DTC CHECK / CLEAR

DTC CHECK / CLEAR

1. CHECK FOR DTCS (HV CONTROL ECU)

(a) Connect the intelligent tester to the DLC3.

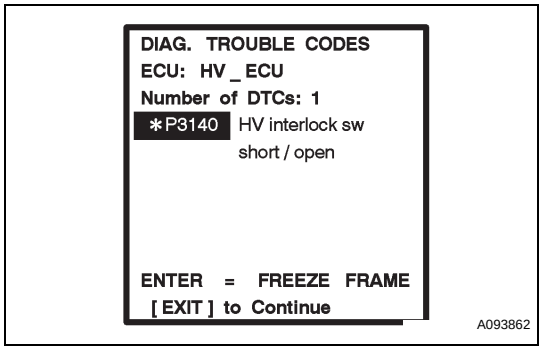
(b) Turn the power switch on (IG) and turn the intelligent tester on.

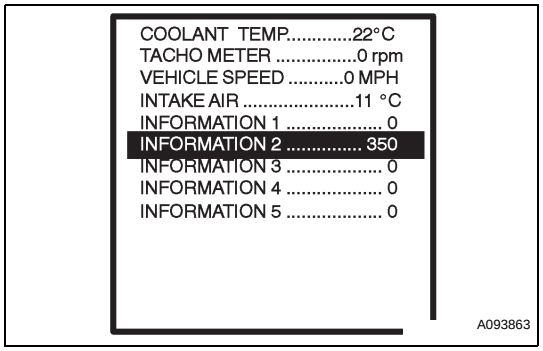
(c) Using the intelligent tester, check for DTCs and freeze frame data. If present, record or print the codes and the freeze frame data. Using the intelligent tester, enter the following menus: DIAGNOSIS / OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.

(d) Confirm the details of the DTCs. (See page HB-18)

2. CHECK FREEZE FRAME DATA AND INFORMATION

(a) If a DTC is present, select it in order to display its freeze frame data.





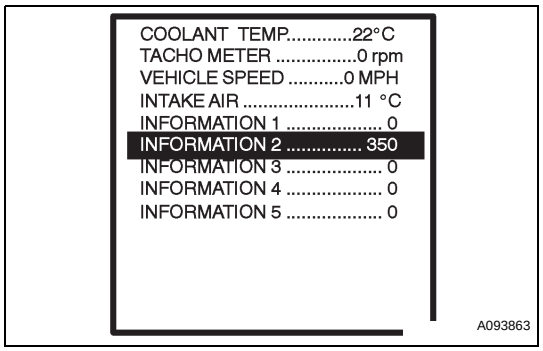
(b) Read the freeze frame data recorded when the DTC was set.

NOTICE:

An information code (INF code) will be displayed in one of the INFORMATION lines 1 to 5. Check the details by following the procedures in the following steps.

HINT:

In the case shown in the illustration, refer to troubleshooting for DTC P3140 and INF code 350.

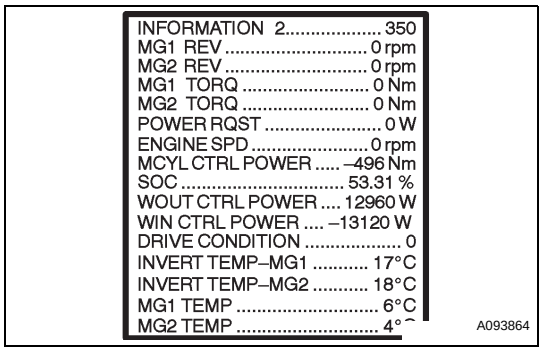


(c) Read the information.

(1) Select the item from among INFORMATION 1 to 5 that has an INF code on the freeze frame data screen.

(2) Press ENTER.

HB



(3) Additional information will be displayed as shown in the illustration.

3. CHECK FOR DTC (SYSTEMS OTHER THAN THE HV CONTROL ECU)

HINT:

The HV control ECU maintains communication with other computers, including the ECM, battery ECU, skid control ECU, and power steering ECU. Therefore, if the HV control 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 turn the intelligent tester on.

(c) On the intelligent tester, enter the following menus: DIAGNOSIS / OBD/MOBD / CODES (All).

(d) If DTCs are present, check the relevant systems.

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 system.

4. CLEAR DTCS

NOTICE:

Clearing the DTCs will also clear the freeze frame data, information (see page HV-65), and operation history data (see page HV-70).

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) Check that the P shift position has been selected.

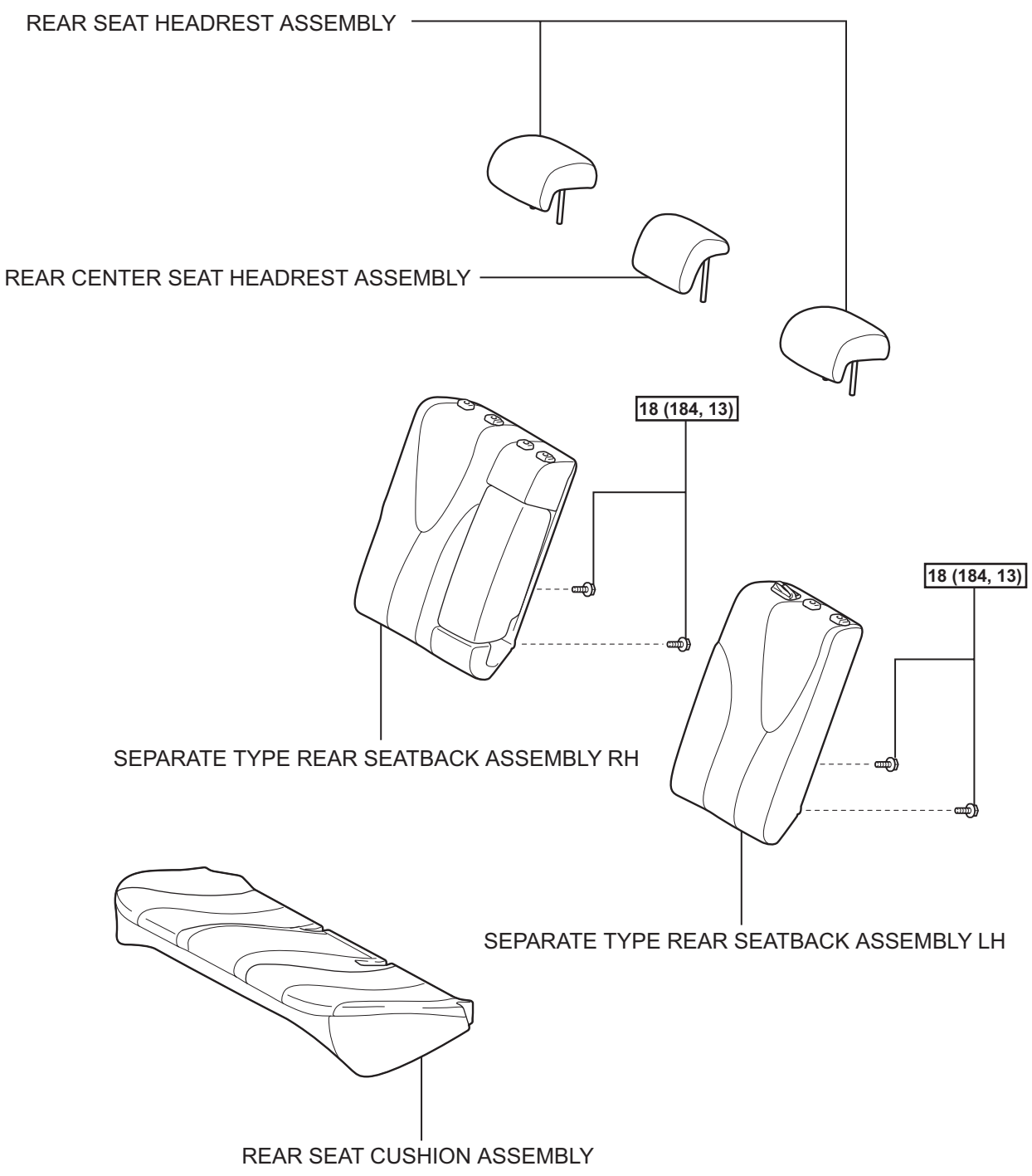
(d) Clear DTCs and freeze frame data using the intelligent tester.

(1) Enter the following menus: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CLEAR CODES.

(2) Press YES.

HV RELAY ASSEMBLY

COMPONENTS

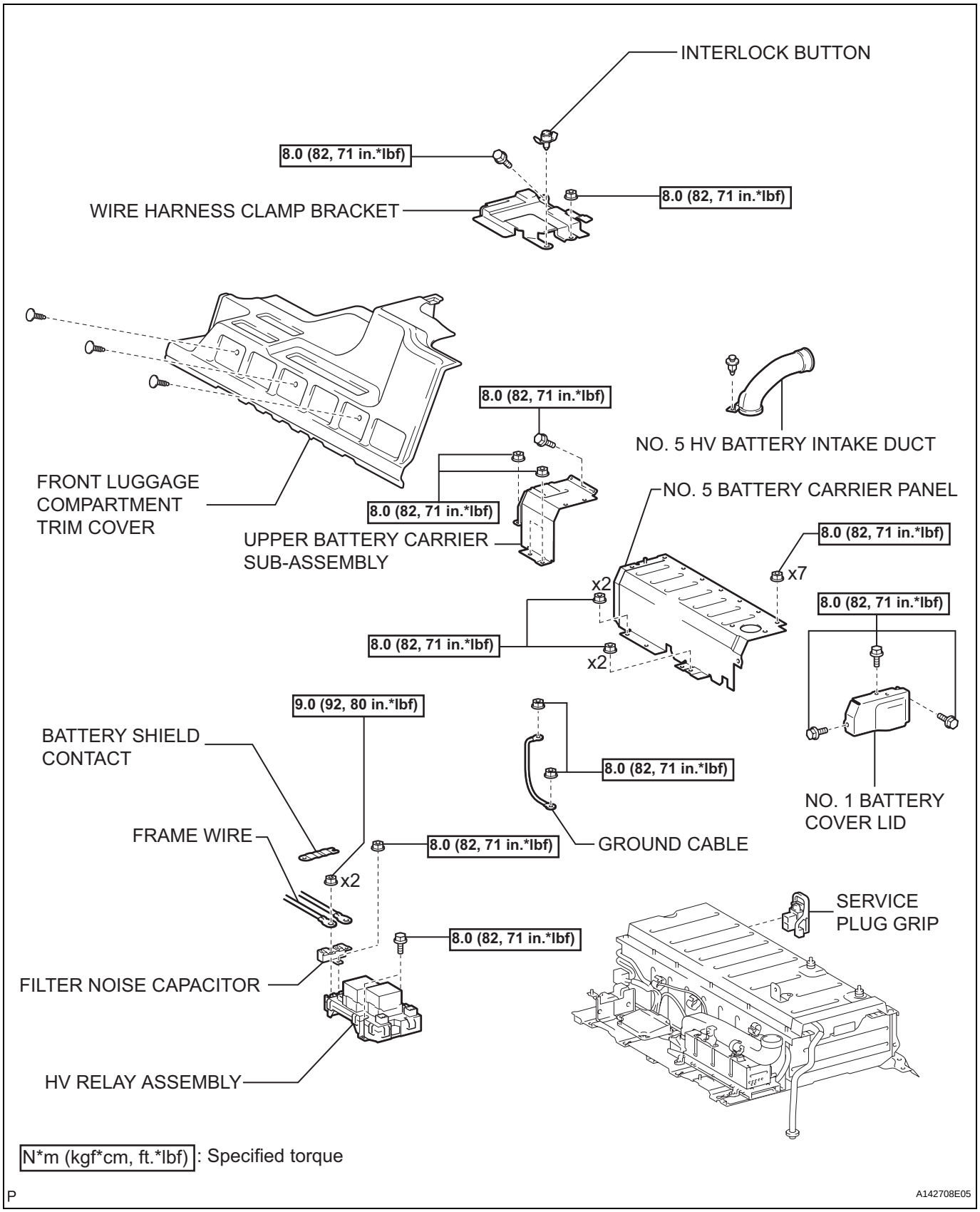


N*m (kgf*cm, ft.*lbf): Specified torque

P

A146938E01

HB


INTERLOCK BUTTON
8.0 (82, 71 in.*lbf)
8.0 (82, 71 in.*lbf)
WIRE HARNESS CLAMP BRACKET
FRONT LUGGAGE COMPARTMENT TRIM COVER
8.0 (82, 71 in.*lbf)
8.0 (82, 71 in.*lbf)
UPPER BATTERY CARRIER SUB-ASSEMBLY
NO. 5 HV BATTERY INTAKE DUCT
NO. 5 BATTERY CARRIER PANEL
8.0 (82, 71 in.*lbf)
x7
x2
8.0 (82, 71 in.*lbf)
x2
8.0 (82, 71 in.*lbf)
NO. 1 BATTERY COVER LID
9.0 (92, 80 in.*lbf)
BATTERY SHIELD CONTACT
8.0 (82, 71 in.*lbf)
GROUND CABLE
FRAME WIRE
8.0 (82, 71 in.*lbf)
x2
8.0 (82, 71 in.*lbf)
SERVICE PLUG GRIP
FILTER NOISE CAPACITOR
HV RELAY ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
P
A142708E05

HB

FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:
The hybrid vehicle control ECU records vehicle and driving condition information as freeze frame data the moment a DTC is stored. That data can be used for estimating or duplicating the vehicle conditions that were present when the malfunction occurred.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG) and turn the intelligent tester on.
(c) Select DIAGNOSIS on the menu screen.
(d) Select the following menu items: OBD/MOBD / HV ECU / DTC INFO / CURRENT CODES.
(e) Check the freeze frame data of the output DTCs.
HINT:
For the freeze frame data chart, see page HV-65.

DATA LIST / ACTIVE TEST

1. DATA LIST

NOTICE:

- **Some data list values may vary significantly if there are slight differences in the environment in which the vehicle is operating when the measurements are obtained. Variations may also occur due to aging of the vehicle. Due to these considerations, it is not always possible to provide definite values to be used for judgment of malfunctions. It is possible that there may be a malfunction even if measured values are within the reference range.**
- **In the event of a problem with 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 in the data list.**

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) Select DIAGNOSIS on the menu screen.

(d) Select the following menu items: OBD/MOBD / HV ECU / DATA LIST.

HINT:

For the data list, see page HV-38.

2. ACTIVE TEST

HINT:

Using the intelligent tester to perform active tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing active tests early in troubleshooting is one way to save diagnostic time. Data list information can be displayed while performing active tests.

NOTICE:

It is necessary to use caution, because if the intelligent tester connector becomes disconnected or if a communication error occurs during an active test, the vehicle could become inoperative (the READY light may go off).

(a) Connect the intelligent tester to the DLC3.

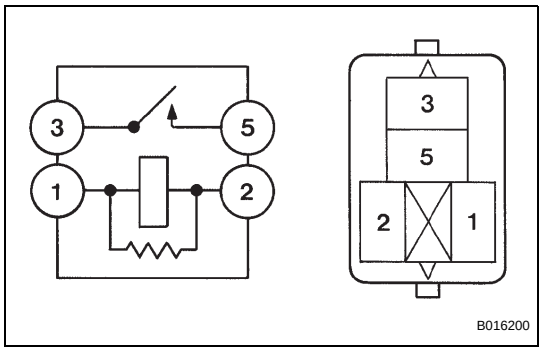
(b) Turn the power switch on (IG) and turn the intelligent tester on.

(c) Select "DIAGNOSIS" on the menu screen.

(d) Select the following menu items: OBD/MOBD / HV ECU / ACTIVE TEST.

HINT:

For the active test chart, see page HV-38.



BATTERY BLOWER RELAY

INSPECTION

1. INSPECT BATTERY BLOWER RELAY

(a) Measure the resistance between the terminals of the relay.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

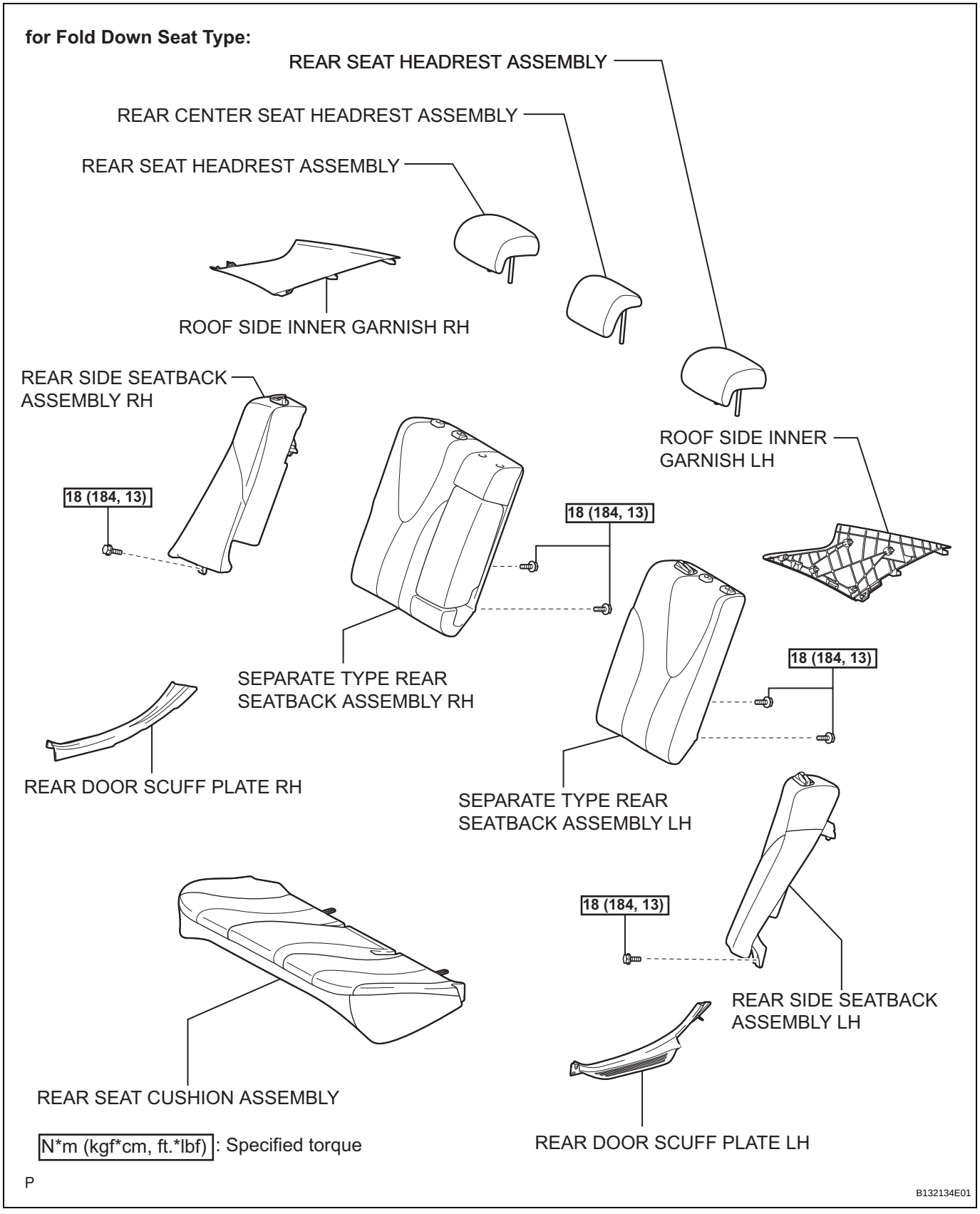
DIAGNOSTIC TROUBLE CODE CHART

DTC Code	Detection Item	Trouble Area	MIL	Master Warning	Memory	See page
P0A1F-123	Battery Energy Control Module	1. Battery smart unit 2. Auxiliary battery 3. Wire harness or connector 4. IGCT No. 2 fuse	Comes on	Comes on	DTC stored	HB-21
P0A7F-123	Hybrid Battery Pack Deterioration	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-25
P0A80-123	Replace Hybrid Battery Pack	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-28
P0A82-123	Hybrid Battery Pack Cooling Fan 1	1. Battery cooling blower assembly 2. Battery smart unit 3. HV battery intake duct 4. Wire harness or connector	-	Comes on	DTC stored	HB-31
P0A84-123	Hybrid Battery Pack Cooling Fan 1	1. Wire harness or connector 2. BATT FAN fuse 3. Battery blower relay 4. Battery cooling blower assembly 5. Battery smart unit 6. Hybrid vehicle control ECU 7. HV battery	-	Comes on	DTC stored	HB-35
P0A85-123	Hybrid Battery Pack Cooling Fan 1	1. Wire harness or connector 2. Battery cooling blower assembly 3. Battery smart unit 4. HV battery	-	Comes on	DTC stored	HB-45
P0A95-123	High Voltage Fuse	1. Electric vehicle fuse 2. Service plug grip 3. HV battery 4. Battery smart unit	-	Comes on	DTC stored	HB-49
P0A9C-123	Hybrid Battery Temperature Sensor "A"	1. HV battery (Battery temperature sensor) 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-51
P0A9D-123	Hybrid Battery Temperature Sensor "A" Circuit Low	1. HV battery (Battery temperature sensor) 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-54
P0A9E-123	Hybrid Battery Temperature Sensor "A" Circuit High	1. HV battery (Battery temperature sensor) 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-54
P0AAC-123	Hybrid Battery Pack Air Temperature Sensor "A" Circuit	1. HV battery (Intake air temperature sensor) 2. Battery smart unit	-	Comes on	DTC stored	HB-59
P0ABF-123	Hybrid Battery Pack Current Sensor Circuit	1. HV relay assembly (battery current sensor) 2. Battery smart unit 3. Wire harness or connector	Comes on	Comes on	DTC stored	HB-62
P0AC0-123	Hybrid Battery Pack Current Sensor Circuit Range / Performance	1. HV relay assembly (battery current sensor) 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-67
P0AC1-123	Hybrid Battery Pack Current Sensor Circuit Low	1. HV relay assembly (battery current sensor) 2. Battery smart unit 3. Wire harness or connector	Comes on	Comes on	DTC stored	HB-62
P0AC2-123	Hybrid Battery Pack Current Sensor Circuit High	1. HV relay assembly (battery current sensor) 2. Battery smart unit 3. Wire harness or connector	Comes on	Comes on	DTC stored	HB-62
P0AFA-123	Hybrid Battery System Voltage Low	1. Battery smart unit 2. HV battery	Comes on	Comes on	DTC stored	HB-69

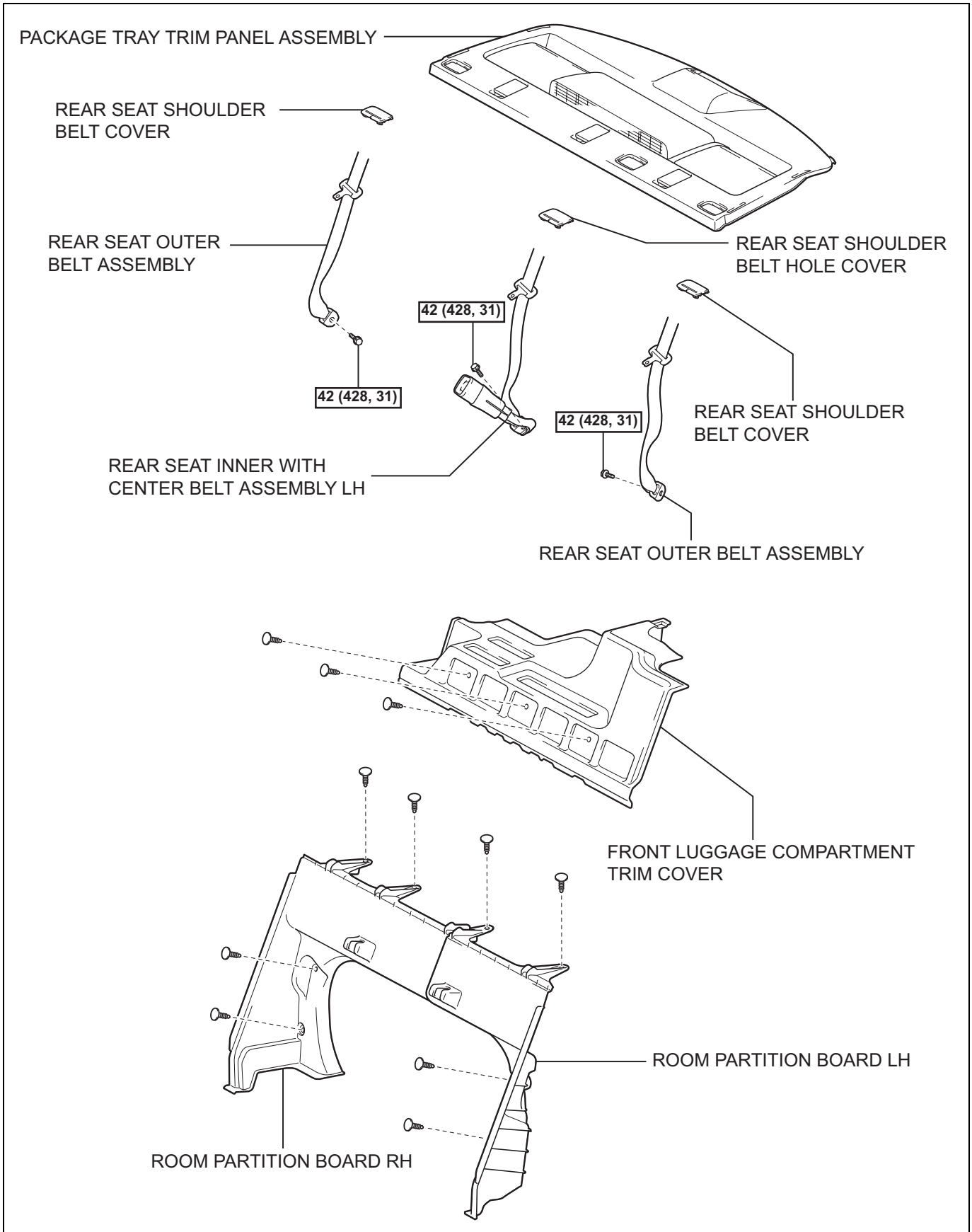
DTC Code	Detection Item	Trouble Area	MIL	Master Warning	Memory	See page
P3011-123	Battery Block 1 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3012-123	Battery Block 2 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3013-123	Battery Block 3 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3014-123	Battery Block 4 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3015-123	Battery Block 5 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3016-123	Battery Block 6 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3017-123	Battery Block 7 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3018-123	Battery Block 8 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3019-123	Battery Block 9 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3020-123	Battery Block 10 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3021-123	Battery Block 11 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3022-123	Battery Block 12 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3023-123	Battery Block 13 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3024-123	Battery Block 14 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3025-123	Battery Block 15 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3026-123	Battery Block 16 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3027-123	Battery Block 17 Becomes Weak	1. HV battery 2. Battery smart unit	Comes on	Comes on	DTC stored	HB-72
P3105-123	Battery Observation Communication Circuit Malfunction	1. Wire harness or connector 2. Hybrid vehicle control ECU 3. Battery smart unit	Comes on	Comes on	DTC stored	HB-75

BATTERY BLOWER

COMPONENTS



HB

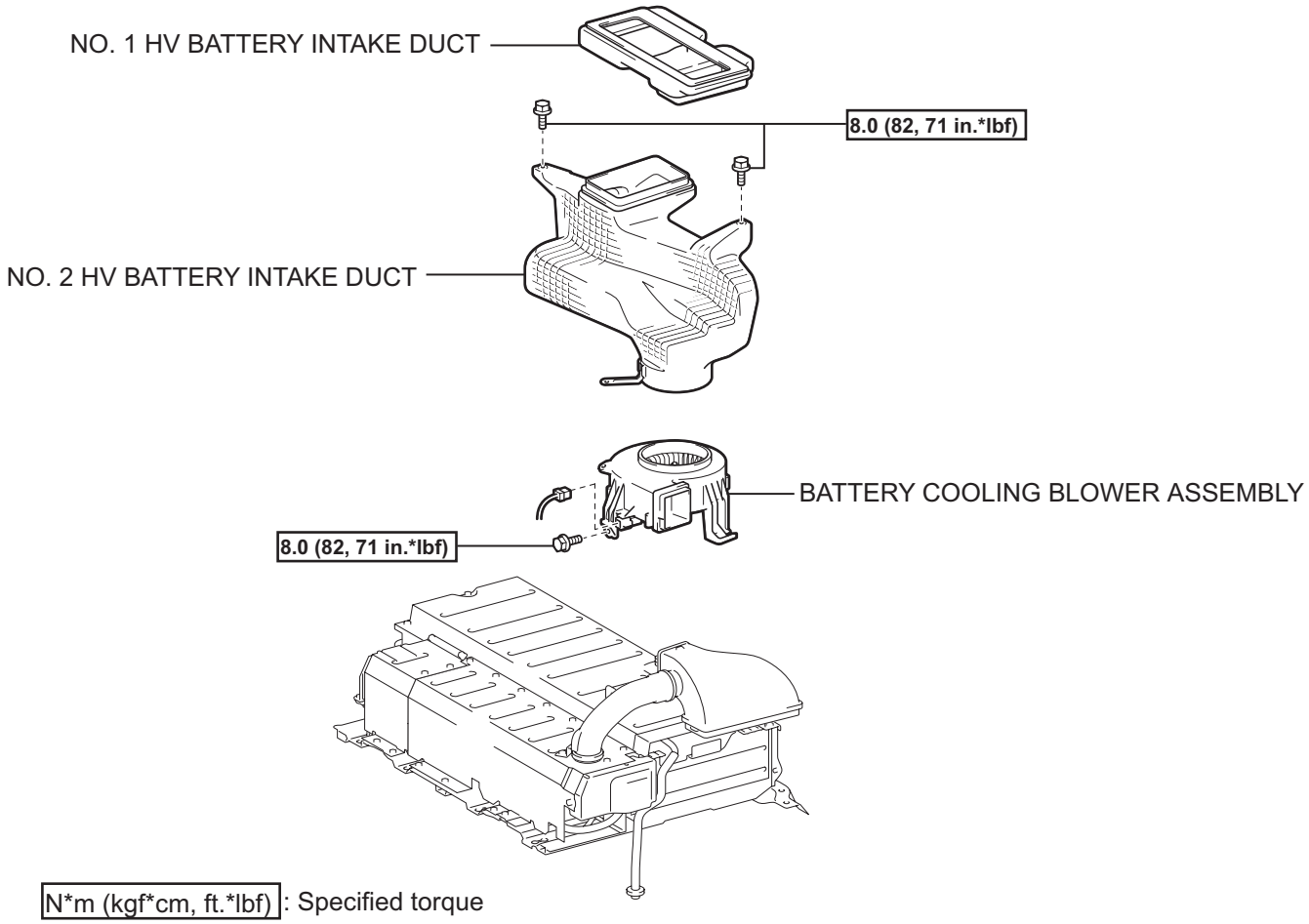


HB

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

P

A143959E02


NO. 1 HV BATTERY INTAKE DUCT
8.0 (82, 71 in.*lbf)
NO. 2 HV BATTERY INTAKE DUCT
BATTERY COOLING BLOWER ASSEMBLY
8.0 (82, 71 in.*lbf)
N*m (kgf*cm, ft.*lbf) : Specified torque
P
A142710E02

DTC	P0A1F-123	Battery Energy Control Module

DESCRIPTION

The hybrid vehicle control ECU alerts the driver and performs fail safe control based on error signals sent from the battery smart unit.

DTC No.	DTC Detection Condition	Trouble Area
P0A1F-123	Reception of an error signal from the battery smart unit	• Battery smart unit • Auxiliary battery • Wire harness or connector • IGCT No. 2 fuse

MONITOR DESCRIPTION

If the battery smart unit detects an internal malfunction in the unit itself, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A1F (INF 123): Range check / Rationality
Required sensors / components	Battery smart unit
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

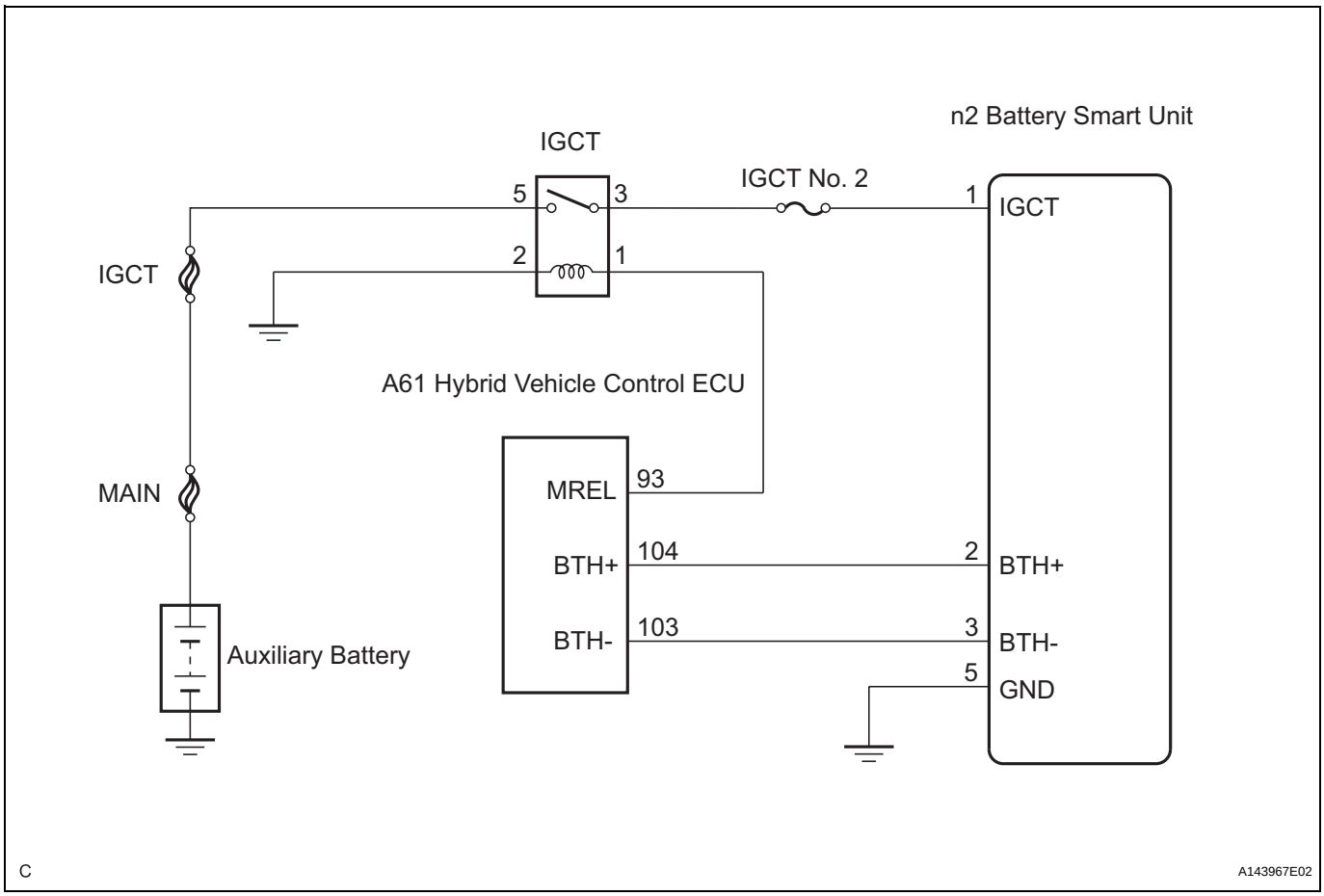
TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A1F (INF 123) is not detected

WIRING DIAGRAM



HB

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.**

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- After completing repairs, restart the system (turn the power switch on (READY)) and recheck for DTCs. (See page HB-15)

1	**CHECK AUXILIARY BATTERY**

(a) Measure the voltage between the terminals of the auxiliary battery.

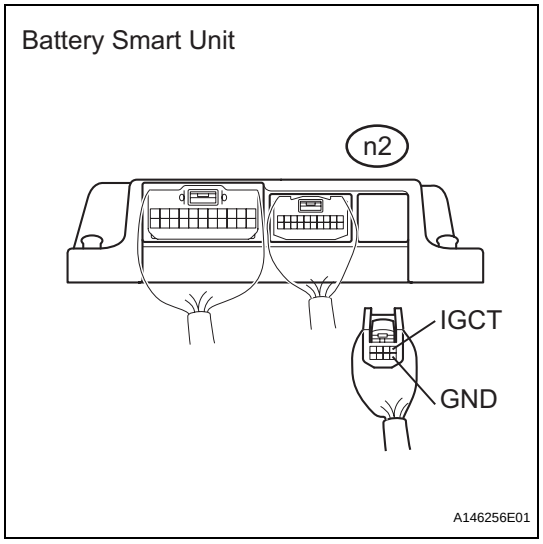
Standard voltage:

11 to 14 V

NG	**CHARGE OR REPLACE AUXILIARY BATTERY**

OK

2	CHECK HARNESS AND CONNECTOR (IGCT VOLTAGE)



CAUTION:
Be sure to wear insulated gloves.

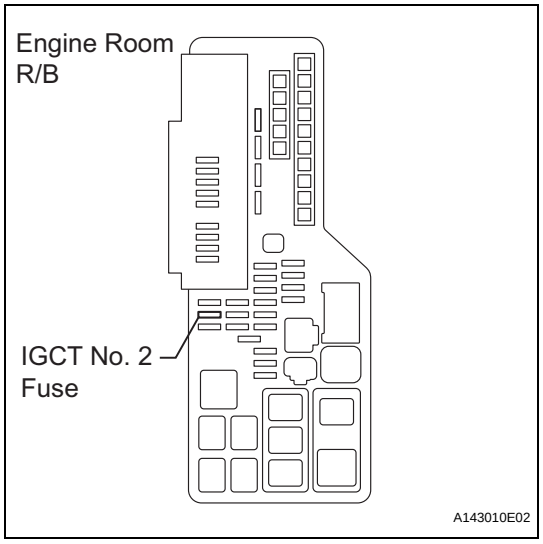
(a) Remove the service plug grip (See page HB-86).
(b) Remove the battery smart unit (See page HB-100).
HINT:
Do not disconnect the battery smart unit connectors.
(c) Disconnect connector n2 from the battery smart unit.
(d) Turn the power switch on (IG).
(e) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Specified Condition
IGCT (N2-1) - GND (N2-5)	8.6 V or higher

OK → **REPLACE BATTERY SMART UNIT (See page HB-99)**

NG

3	CHECK FUSE (IGCT NO. 2 FUSE)



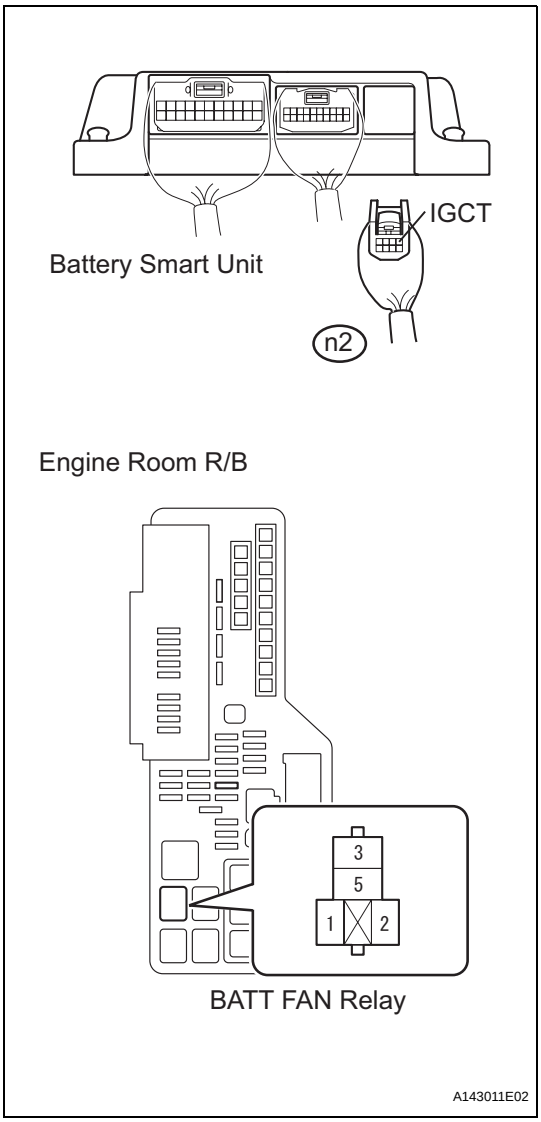
(a) Remove the IGCT No. 2 fuse from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE (IGCT NO. 2 FUSE)**

OK

HB

4	CHECK HARNESS AND CONNECTOR (BATTERY SMART UNIT - IGCT RELAY)



CAUTION:
Be sure to wear insulated gloves.

(a) Install the IGCT No. 2 fuse to the engine room R/B.
(b) Remove the IGCT relay from the engine room R/B.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IGCT (n2-1) - 3	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

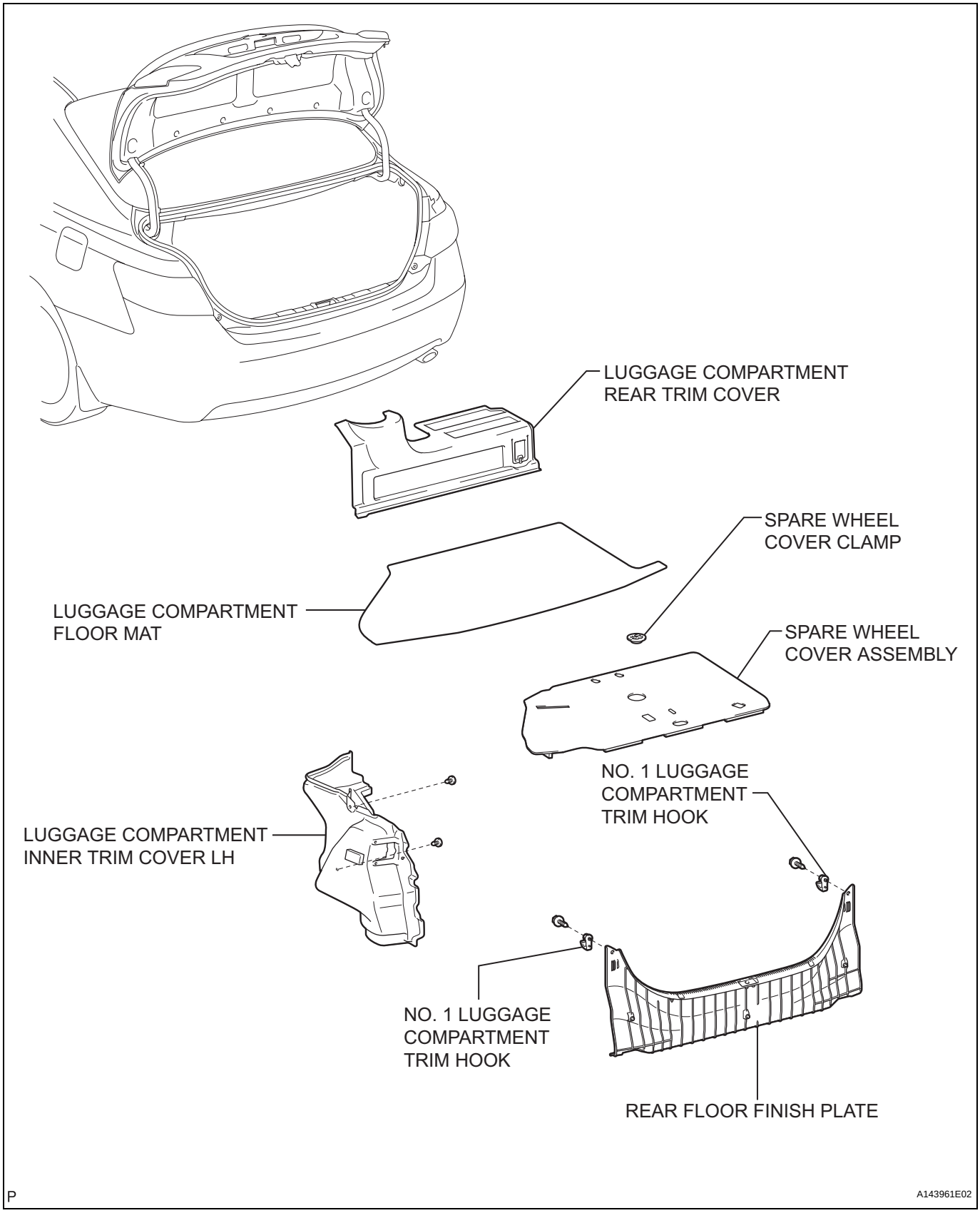
OK

CHECK AND REPAIR POWER SOURCE CIRCUIT

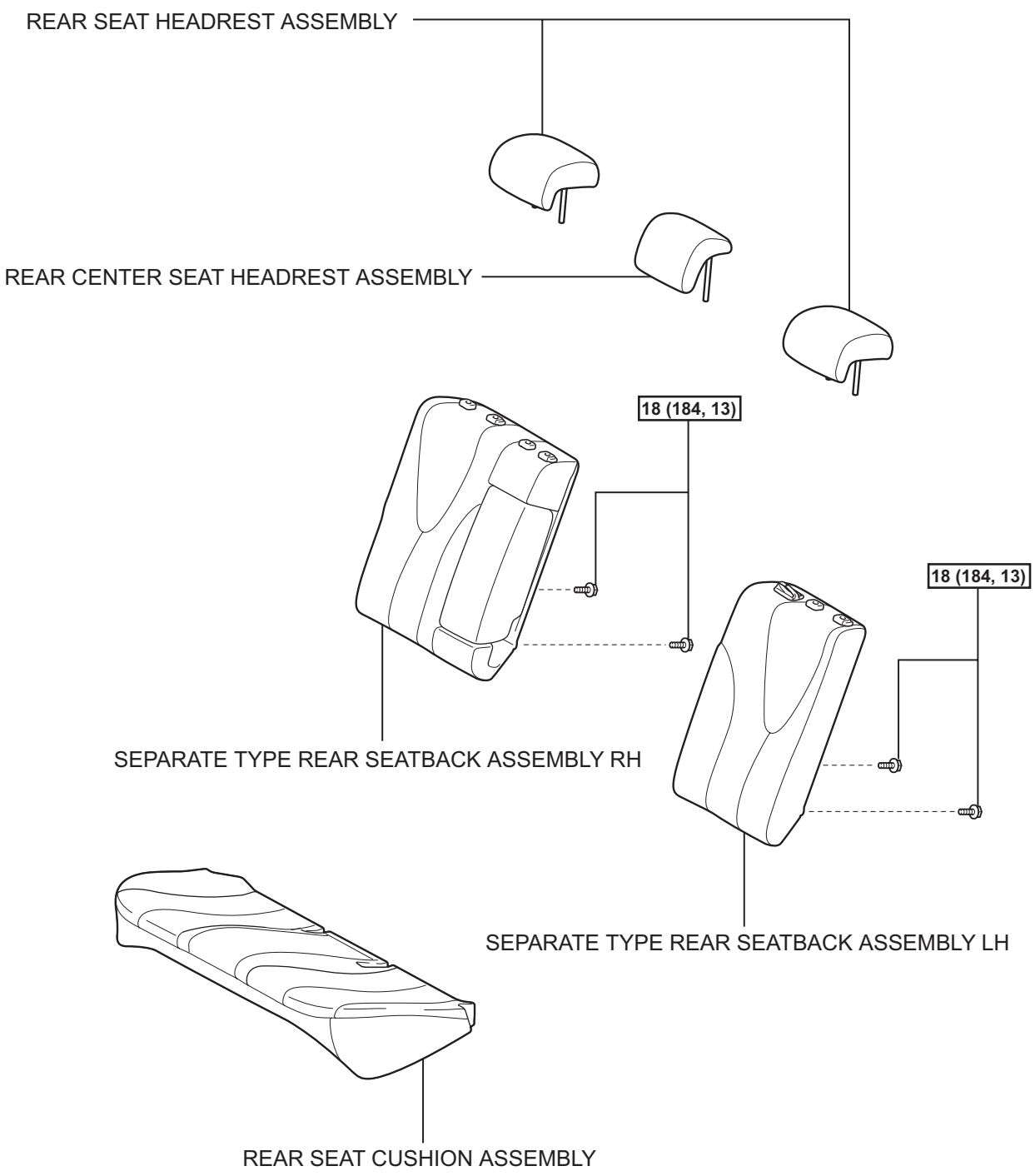
HB

HV CONVERTER

COMPONENTS



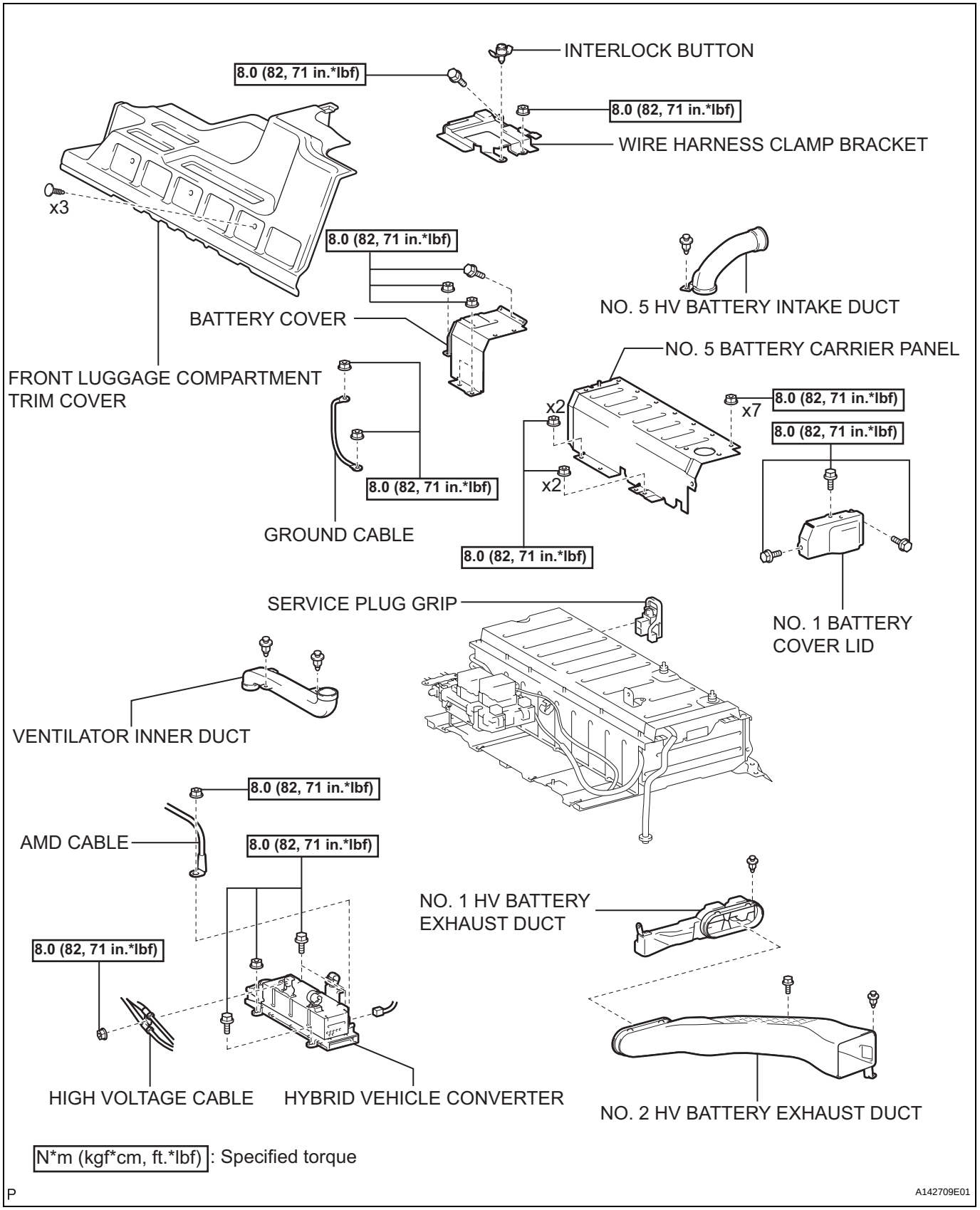
HB



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

P

A146938E01

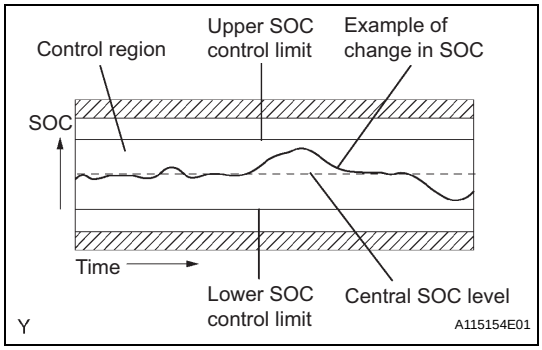

INTERLOCK BUTTON
8.0 (82, 71 in.*lbf)
8.0 (82, 71 in.*lbf)
WIRE HARNESS CLAMP BRACKET
x3
8.0 (82, 71 in.*lbf)
NO. 5 HV BATTERY INTAKE DUCT
BATTERY COVER
NO. 5 BATTERY CARRIER PANEL
FRONT LUGGAGE COMPARTMENT TRIM COVER
x2
x7
8.0 (82, 71 in.*lbf)
8.0 (82, 71 in.*lbf)
x2
8.0 (82, 71 in.*lbf)
GROUND CABLE
8.0 (82, 71 in.*lbf)
SERVICE PLUG GRIP
NO. 1 BATTERY COVER LID
VENTILATOR INNER DUCT
8.0 (82, 71 in.*lbf)
AMD CABLE
8.0 (82, 71 in.*lbf)
NO. 1 HV BATTERY EXHAUST DUCT
8.0 (82, 71 in.*lbf)
HIGH VOLTAGE CABLE
HYBRID VEHICLE CONVERTER
NO. 2 HV BATTERY EXHAUST DUCT
N*m (kgf*cm, ft.*lbf): Specified torque
P
A142709E01

HB

DTC	P0A7F-123	Hybrid Battery Pack Deterioration

DESCRIPTION

The battery smart unit and hybrid vehicle control ECU calculate the SOC (state of charge) of the HV battery based on the accumulated amperage in the HV battery. The battery smart unit sends a signal indicating the condition of the HV battery to the hybrid vehicle control ECU. The hybrid vehicle control ECU then calculates the SOC based on this information and controls HV battery charge and discharge according to the driving conditions.



DTC No.	DTC Detection Condition	Trouble Area
P0A7F-123	• Internal resistance of HV battery is higher than the standard (1 trip detection) • Difference in the capacity between battery blocks is larger than the standard (2 trip detection)	• HV battery • Battery smart unit

HINT:
P0A7F cannot be set unless the vehicle is driven for approximately 10 minutes after clearing the DTCs. (For 2 trip detection, turn the power switch off and perform a road test again after the first road test.)

HB

MONITOR DESCRIPTION

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

MONITOR STRATEGY

Related DTCs	P0A7F (INF 123): Rationality
Required sensors / components	Main: Battery voltage sensor inside battery smart unit, battery current sensor Sub: Battery temperature sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A7F (INF 123) is not detected

INSPECTION PROCEDURE

1	**CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2	**READ VALUE ON INTELLIGENT TESTER**

HB

(a) Ensure the safety of the areas in front and at the back of the vehicle.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (READY).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / V1 to V17 BATT BLOCK.
(e) Fully warm up the engine and turn the air conditioning off.
(f) Firmly depress the brake pedal with your left foot.
(g) Move the shift lever to the D position.
(h) Record each battery block voltage from the data list (V1 to V17 BATT BLOCK) while fully depressing the accelerator pedal.
(i) Compare the battery block voltages (V1 to V17 BATT BLOCK) between the even and odd number groups in each combination shown in the table below.

Even number group	Odd number group	Battery block voltages to be compared
V1 BATT BLOCK	V2 BATT BLOCK	VB0←→VB1
V3 BATT BLOCK	V4 BATT BLOCK	VB2←→VB3
V5 BATT BLOCK	V6 BATT BLOCK	VB4←→VB5
V7 BATT BLOCK	V8 BATT BLOCK	VB6←→VB7
V9 BATT BLOCK	V10 BATT BLOCK	VB8←→VB9
V11 BATT BLOCK	V12 BATT BLOCK	VB10←→VB11
V13 BATT BLOCK	V14 BATT BLOCK	VB12←→VB13

Even number group	Odd number group	Battery block voltages to be compared
V15 BATT BLOCK	V16 BATT BLOCK	VB14←→VB15
V17 BATT BLOCK	V16 BATT BLOCK	VB16←→VB15

(j) Check the voltage difference in the all 9 combinations.

OK:

The difference in voltage of all combinations is 0.3 V or more.

YES → **REPLACE BATTERY SMART UNIT (See page HB-99)**

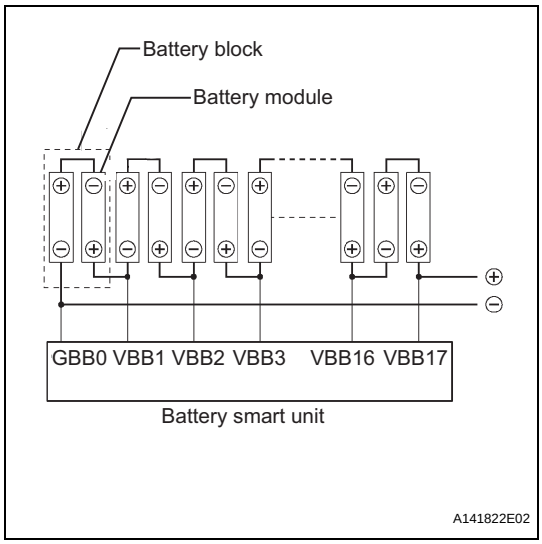
NO

REPLACE HV BATTERY (See page HB-81)

DTC	P0A80-123	Replace Hybrid Battery Pack

DESCRIPTION

The hybrid vehicle control ECU controls the SOC (state of charge) of the HV battery at a constant level while driving. The HV battery is composed of 34 modules, and each module consists of six 1.2 V cells in series. The battery smart unit monitors battery block voltage at 17 locations. Each battery block is composed of 2 modules in a set.



DTC No.	DTC Detection Condition	Trouble Area
P0A80-123	Difference in voltage between battery blocks is larger than the standard (2 trip detection)	• HV battery • Battery smart unit

HB

HINT:
P0A80-123 cannot be set unless the vehicle is driven for approximately 10 minutes after clearing the DTCs. (Turn the power switch off and perform a road test again after the first road test because this DTC is a 2 trip detection DTC.)

MONITOR DESCRIPTION

The battery smart unit, which monitors the voltage of the battery blocks, determines that a malfunction has occurred if a voltage difference between the battery blocks exceeds the standard. When the DTC detection condition is satisfied, the HV control ECU will illuminate the MIL and set a DTC.

MONITOR STRATEGY

Related DTCs	P0A80 (INF 123): Rationality
Required sensors / components	Main: Battery voltage sensor inside battery smart unit Sub: Battery current sensor, battery temperature sensor
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	TMC's intellectual property
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

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

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery smart unit	DTC P0A8F (INF 123) is not detected

INSPECTION PROCEDURE

1 CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch on (IG).
(c) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DTC INFO / CURRENT CODES.
(d) Check if DTCs are output.
Result:
DTC P0A1F-123 is output.

YES → **GO TO INSPECTION PROCEDURE RELEVANT TO OUTPUT DTC**

NO

2 READ VALUE ON INTELLIGENT TESTER

(a) Ensure the safety of the areas in front and at the back of the vehicle.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the power switch on (READY).
(d) Select the following menu items: DIAGNOSIS / OBD/ MOBD / HV ECU / DATA LIST / V1 to V17 BATT BLOCK.
(e) Fully warm up the engine and turn the air conditioning off.
(f) Firmly depress the brake pedal with your left foot.
(g) Move the shift lever to the D position.
(h) Record each battery block voltage from the data list (V1 to V17 BATT BLOCK) while fully depressing the accelerator pedal.
(i) Compare the battery block voltages (V1 to V17 BATT BLOCK) between the even and odd number groups in each combination shown in the table below.

Even number group	Odd number group	Battery block voltages to be compared
V1 BATT BLOCK	V2 BATT BLOCK	VB0←→VB1
V3 BATT BLOCK	V4 BATT BLOCK	VB2←→VB3
V5 BATT BLOCK	V6 BATT BLOCK	VB4←→VB5
V7 BATT BLOCK	V8 BATT BLOCK	VB6←→VB7
V9 BATT BLOCK	V10 BATT BLOCK	VB8←→VB9
V11 BATT BLOCK	V12 BATT BLOCK	VB10←→VB11
V13 BATT BLOCK	V14 BATT BLOCK	VB12←→VB13

Even number group	Odd number group	Battery block voltages to be compared
V15 BATT BLOCK	V16 BATT BLOCK	VB14←→VB15
V17 BATT BLOCK	V16 BATT BLOCK	VB16←→VB15

(j) Check the voltage difference in the all 9 combinations.

OK:

The difference in voltage of all combinations is 0.3 V or more.

YES → **REPLACE BATTERY SMART UNIT (See page HB-99)**

NO

REPLACE HV BATTERY (See page HB-81)