

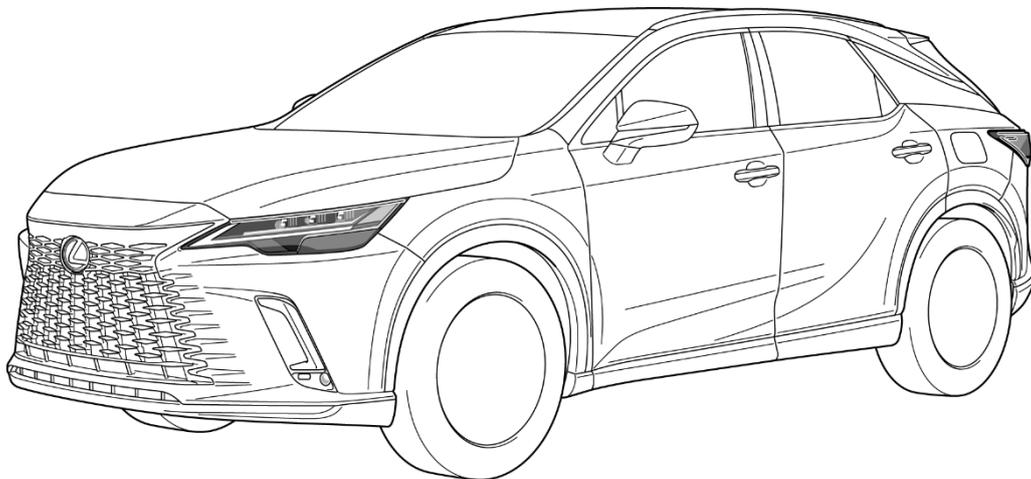


# **RX350h/ 450h+/500h**

*Gasoline-Electric*

*Lexus Hybrid Drive*

## ***HYBRID VEHICLE DISMANTLING MANUAL***



## Foreword

### for THS-HEV Model:

This guide was developed to educate and assist dismantlers in the safe handling of Lexus RX350h gasoline-electric hybrid vehicles. RX350h dismantling procedures are similar to other non-hybrid Lexus vehicles with the exception of the high voltage electrical system. It is important to recognize and understand the high voltage electrical system features and specifications of the Lexus RX350h, as they may not be familiar to dismantlers.

High voltage electricity powers the compressor with motor assembly, hybrid vehicle transaxle assembly, rear drive unit (rear traction motor with transaxle assembly)\* and inverter with converter assembly. All other conventional automotive electrical devices such as the head lights, radio, and gauges are powered from a separate 12 V auxiliary battery. Numerous safeguards have been designed into the RX350h to help ensure the high voltage, approximately 259.2 Volts, Nickel Metal Hydride (NiMH) Hybrid Vehicle (HV) battery pack is kept safe and secure in an accident.

The NiMH HV battery pack contains sealed batteries that are similar to rechargeable batteries used in some battery operated power tools and other consumer products. The electrolyte is absorbed in the cell plates and will not normally leak out even if the battery is cracked. In the unlikely event the electrolyte does leak, it can be easily neutralized with a dilute boric acid solution or vinegar.

High voltage cables, identifiable by orange insulation and connectors, are isolated from the metal chassis of the vehicle.

\*: for AWD

Additional topics contained in the guide include:

- Lexus RX350h identification.
- Major hybrid component locations and descriptions.

By following the information in this guide, dismantlers will be able to handle RX350h hybrid-electric vehicles as safely as the dismantling of a conventional gasoline engine automobile.

**for PHEV Model:**

This guide was developed to educate and assist dismantlers in the safe handling of Lexus RX450h+ gasoline-electric hybrid vehicles. RX450h+ dismantling procedures are similar to other non-hybrid Lexus vehicles with the exception of the high voltage electrical system. It is important to recognize and understand the high voltage electrical system features and specifications of the Lexus RX450h+, as they may not be familiar to dismantlers.

High voltage electricity powers the compressor with motor assembly, hybrid vehicle transaxle assembly, rear drive unit (rear traction motor with transaxle assembly), DC/DC converter assembly, electric vehicle charger assembly, junction block and hybrid motor control inverter assembly. All other conventional automotive electrical devices such as the head lights, radio, and gauges are powered from a separate 12 V auxiliary battery. Numerous safeguards have been designed into the RX450h+ to help ensure the high voltage, approximately 355.2 Volts, Lithium-ion (Li-ion) Hybrid Vehicle (HV) battery assembly is kept safe and secure in an accident.

The Lithium-ion (Li-ion) HV battery assembly contains sealed batteries that are similar to rechargeable batteries used in some battery operated power tools and other consumer products. The electrolyte is absorbed in the cell plates and will not normally leak out even if the battery is cracked. If the electrolyte is leaking, do not touch any leaked liquid because it could be the organic electrolyte that contains carbonate ester-based.

If contact is unavoidable, wipe up the liquid using a cloth while wearing rubber gloves, goggles and an organic solvent mask. Do not leave electrolyte-contaminated cloths unattended. Please contaminated cloths in an appropriate airtight container and dispose of them according to local regulations.

High voltage cables, identifiable by orange insulation and connectors, are isolated from the metal chassis of the vehicle.

Additional topics contained in the guide include:

- Lexus RX450h+ identification.
- Major hybrid component locations and descriptions.

By following the information in this guide, dismantlers will be able to handle RX450h+ hybrid-electric vehicles as safely as the dismantling of a conventional gasoline engine automobile.

### **for 1Motor-HEV Model:**

This guide was developed to educate and assist dismantlers in the safe handling of Lexus RX500h gasoline-electric hybrid vehicles. RX500h dismantling procedures are similar to other non-hybrid Lexus vehicles with the exception of the high voltage electrical system. It is important to recognize and understand the high voltage electrical system features and specifications of the Lexus RX500h, as they may not be familiar to dismantlers.

High voltage electricity powers the compressor with motor assembly, hybrid vehicle transaxle assembly (with motor and inverter), rear axle (rear transaxle assembly with motor and inverter) and DC-DC converter. All other conventional automotive electrical devices such as the head lights, radio, and gauges are powered from a separate 12 V auxiliary battery. Numerous safeguards have been designed into the RX500h to help ensure the high voltage, approximately 288 Volts, Nickel Metal Hydride (NiMH) Hybrid Vehicle (HV) battery pack is kept safe and secure in an accident.

The NiMH HV battery pack contains sealed batteries that are similar to rechargeable batteries used in some battery operated power tools and other consumer products. The electrolyte is absorbed in the cell plates and will not normally leak out even if the battery is cracked. In the unlikely event the electrolyte does leak, it can be easily neutralized with a dilute boric acid solution or vinegar.

High voltage cables, identifiable by orange insulation and connectors, are isolated from the metal chassis of the vehicle.

Additional topics contained in the guide include:

- Lexus RX500h identification.
- Major hybrid component locations and descriptions.

By following the information in this guide, dismantlers will be able to handle RX500h hybrid-electric vehicles as safely as the dismantling of a conventional gasoline engine automobile.

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## About the RX350h/500h

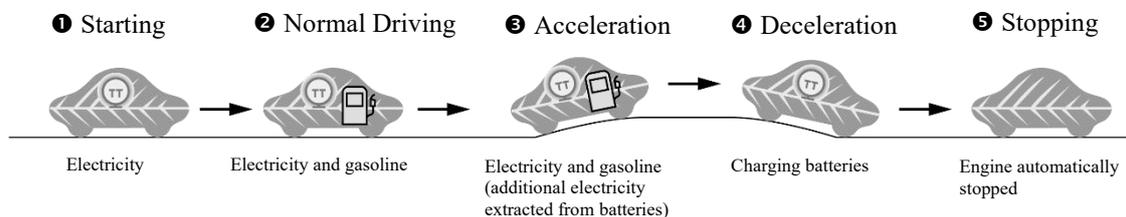
The RX350h/500h 5-door wagon joins the hybrid model for Lexus. Lexus Hybrid Drive means that the vehicle contains a gasoline engine, a front electric motor and a rear electric motor\* for power. The two hybrid power sources are stored on board the vehicle:

1. Gasoline stored in the fuel tank for the gasoline engine.
2. Electricity stored in a high voltage Hybrid Vehicle (HV) battery pack for the front electric motor and rear electric motor\*.

The result of combining these two power sources is improved fuel economy and reduced emissions. The gasoline engine also powers an electric generator to recharge the battery pack; unlike a pure all electric vehicle, the RX350h/500h never needs to be recharged from an external electric power source.

Depending on the driving conditions one or both sources are used to power the vehicle. The following illustration demonstrates how the RX350h/500h operates in various driving modes.

- ❶ During light acceleration at low speeds, the vehicle is powered by the front electric motor and rear electric motor\*. The gasoline engine is shut off.
- ❷ During normal driving, the vehicle is powered mainly by the gasoline engine. The gasoline engine also powers the generator to recharge the battery pack and to drive the motor.
- ❸ During full acceleration, such as climbing a hill, both the gasoline engine, the front electric motor and rear electric motor\* power the vehicle.
- ❹ During deceleration, such as when braking, the vehicle regenerates kinetic energy from the front wheels to produce electricity that recharges the battery pack.
- ❺ While the vehicle is stopped, the gasoline engine, front electric motor and rear electric motor\* are off, however the vehicle remains on and operational.



\*: for AWD

## About the RX450h+

The RX450h+ contains a gasoline engine, an electric motor, and a developed large capacity Li-ion battery. It is the Lexus hybrid that allows the HV battery to be plugged-in and charged by an external power source.

The two hybrid power sources are stored on board the vehicle:

1. Gasoline stored in the fuel tank for the gasoline engine.
2. Electricity stored in a large capacity externally chargeable high voltage Hybrid Vehicle (HV) battery assembly for the electric motor.

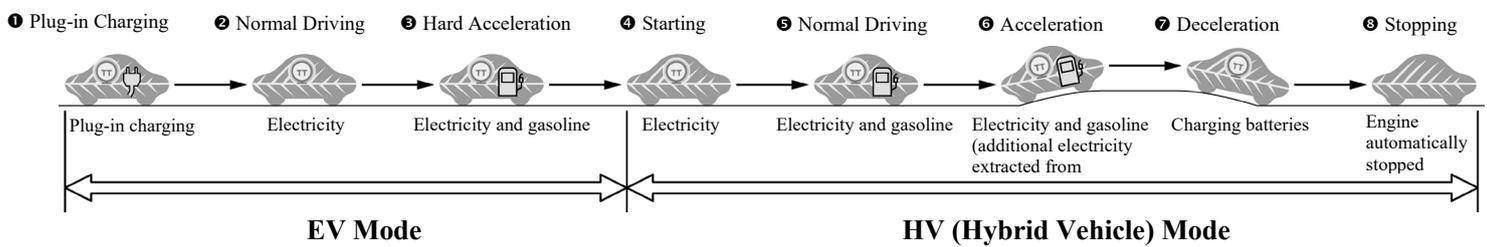
Depending on the driving conditions, one or both sources are used to power the vehicle. The following illustration demonstrates how the RX450h+ operates in various driving modes.

### **EV (Electric Vehicle) Mode:**

- ❶ A plug-in charge control system has been adopted, which allows electrical power to be supplied to the HV battery from external power source such as an electrical socket or charger.
- ❷ When the HV battery is sufficiently charged, the vehicle will basically run on the power of the motor.
- ❸ If the vehicle exceeds 135 km/h or accelerates suddenly when traveling in plug-in EV mode, the gasoline engine and motor work together to power the vehicle.

### HV (Hybrid Vehicle) Mode:

- ④ During light acceleration at low speeds, the vehicle is powered by the electric motor. The gasoline engine is shut off.
- ⑤ During normal driving, the vehicle is powered mainly by the gasoline engine. The gasoline engine also powers the generator to recharge the battery assembly and to drive the motor.
- ⑥ During full acceleration, such as climbing a hill, both the gasoline engine and the electric motor power the vehicle.
- ⑦ During deceleration, such as when braking, the vehicle regenerates the kinetic energy from the wheels to produce electricity that recharges the battery assembly.
- ⑧ While the vehicle is stopped, the gasoline engine and electric motor are off, however the vehicle remains on and operational.



## RX350h/450h+/500h Identification

In appearance, RX350h/450h+/500h is nearly identical to the conventional, non-hybrid Lexus RX350. The RX350h/450h+/500h is a 5-door wagon. Exterior, interior, and engine compartment illustrations are provided to assist in identification.

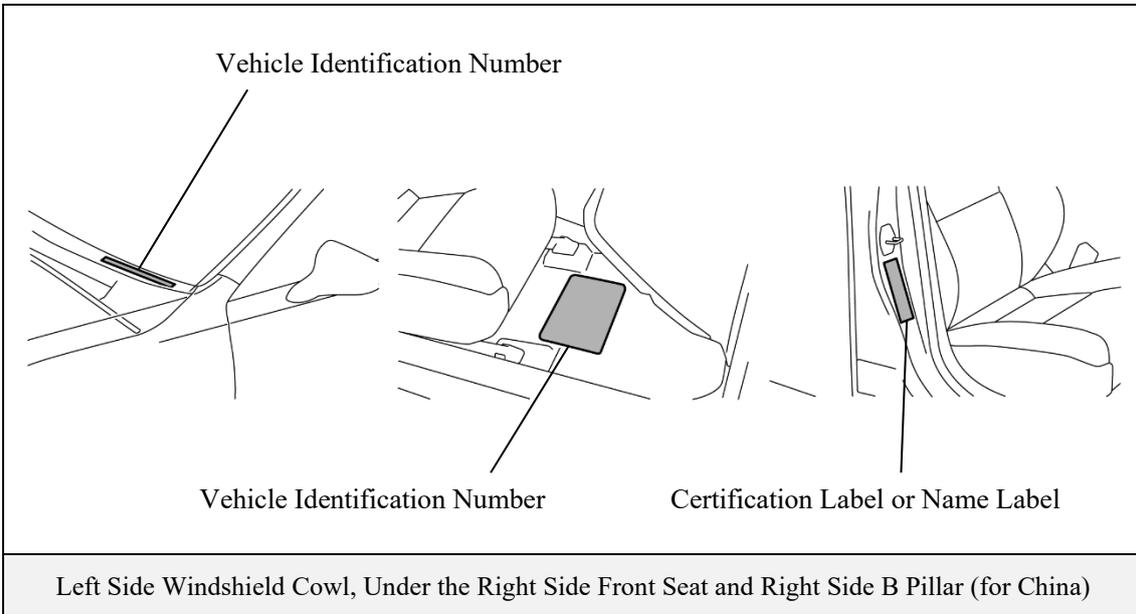
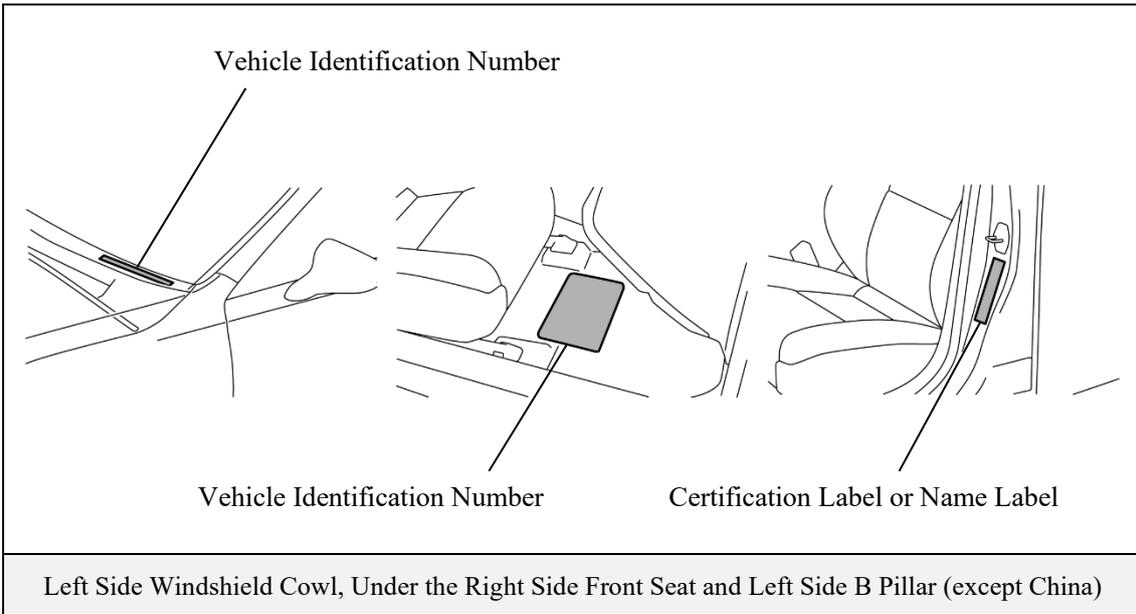
The alphanumeric 15 character Vehicle Identification Number (VIN) is provided on the left side windshield cowl, floor under the right side front seat and left side or right side B pillar.

Example VIN:

<b>JTJCC</b> <u><b>C</b></u> <b>BAZ 0000000</b> <span style="font-size: 1.2em; font-weight: bold;">❶</span>
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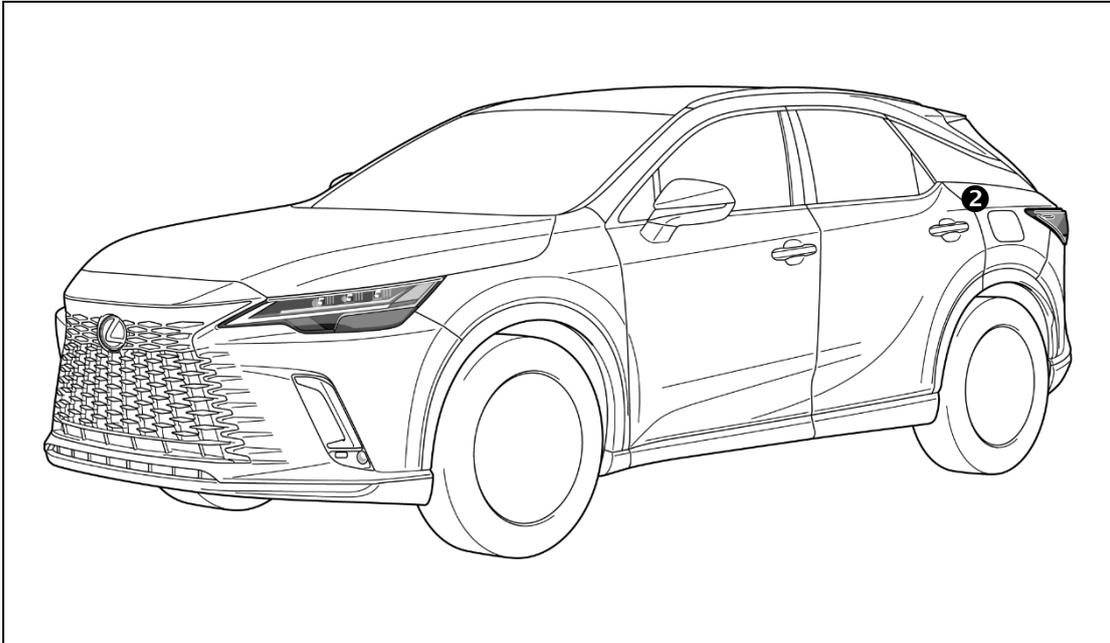
A RX350h/450h+/500h is identified by the 5th alphanumeric character of the VIN.

❶	Drive Type	Engine Series	Battery Type	Destination	Production Base
B	AWD	A25A-FXS	Nickel-Metal hydride battery	except CHINA	TMMC
C	AWD	T24A-FTS	Nickel-Metal hydride battery	except CHINA	TMMC
J	AWD	A25A-FXS	Nickel-Metal hydride battery	except CHINA	TMK
			Lithium-ion battery	except CHINA	TMK
N	AWD	A25B-FXS	Nickel-Metal hydride battery	except CHINA	TMK
F	AWD	A25B-FXS	Nickel-Metal hydride battery	for CHINA	TMK
			Lithium-ion battery	except CHINA	TMK
M	AWD	T24A-FTS	Nickel-Metal hydride battery	except CHINA	TMK
D	AWD	T24A-FTS	Nickel-Metal hydride battery	for CHINA	TMK
L	2WD	A25A-FXS	Nickel-Metal hydride battery	except CHINA	TMK
E	2WD	A25B-FXS	Nickel-Metal hydride battery	except CHINA	TMK

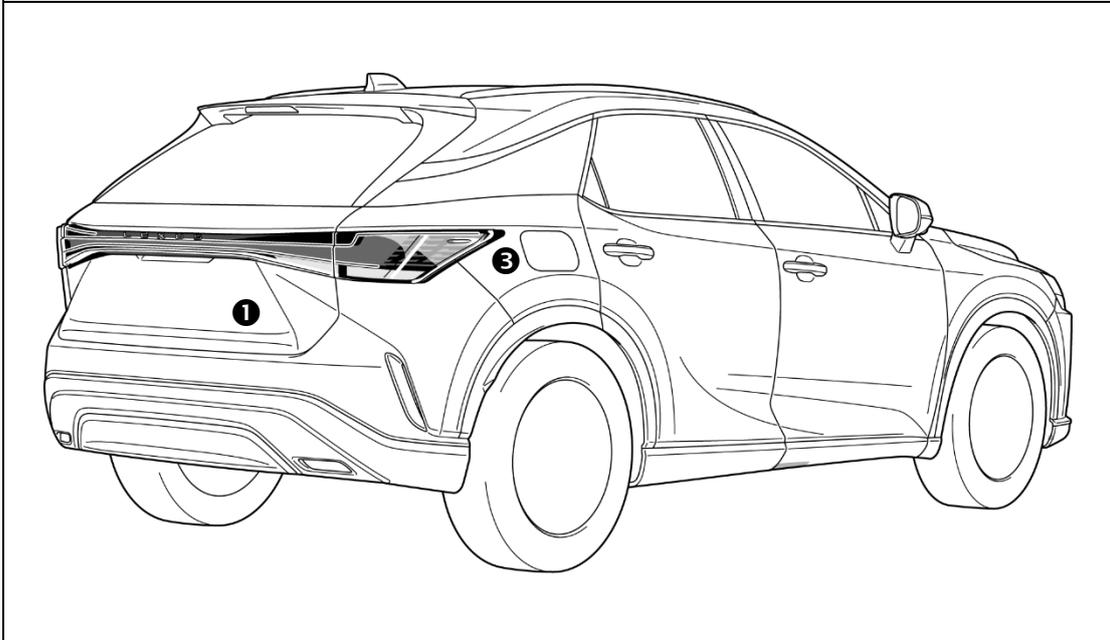


## Exterior

- ❶ RX350h/450h+/500h logos on the back door.
- ❷ Gasoline fuel filler door located on left side rear quarter panel.
- ❸ Charge inlet door located on the right side rear quarter panel. (for PHEV Model)



Exterior Front and Left Side View



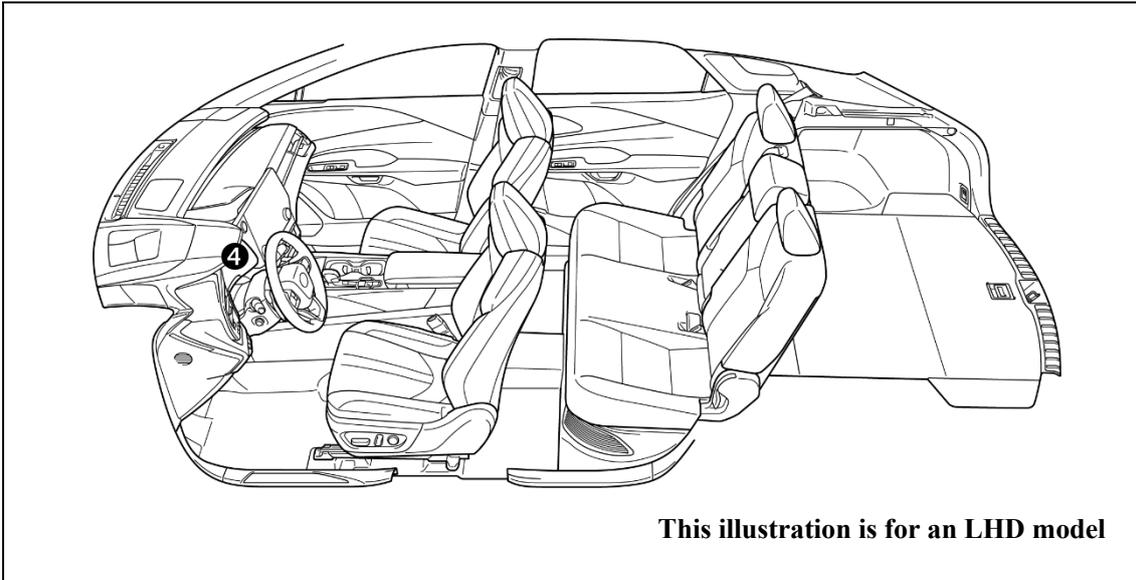
Exterior Rear and Right Side View

## Interior

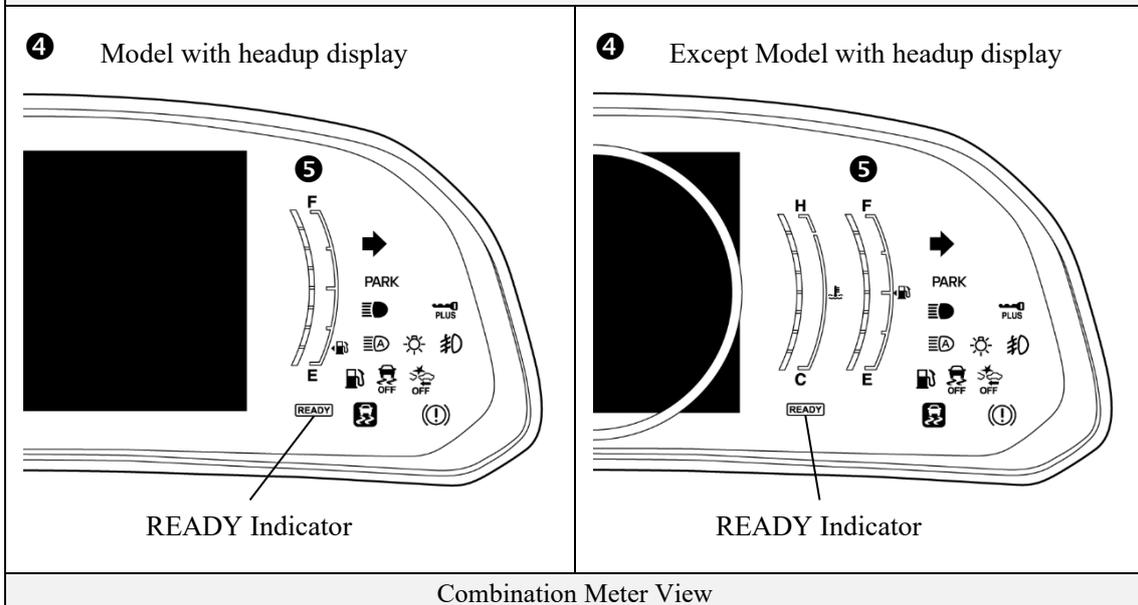
- ④ The instrument cluster (hybrid system indicator, **READY** indicator and warning lights) located in the dash behind the steering wheel, is different than the one on the conventional, non-hybrid RX350h/450h+/500h.
- ⑤ In Place of a tachometer, a hybrid system indicator is used to show power output.

### NOTICE:

If the vehicle is shut off, the instrument cluster gauges will be “blacked out”, not illuminated.

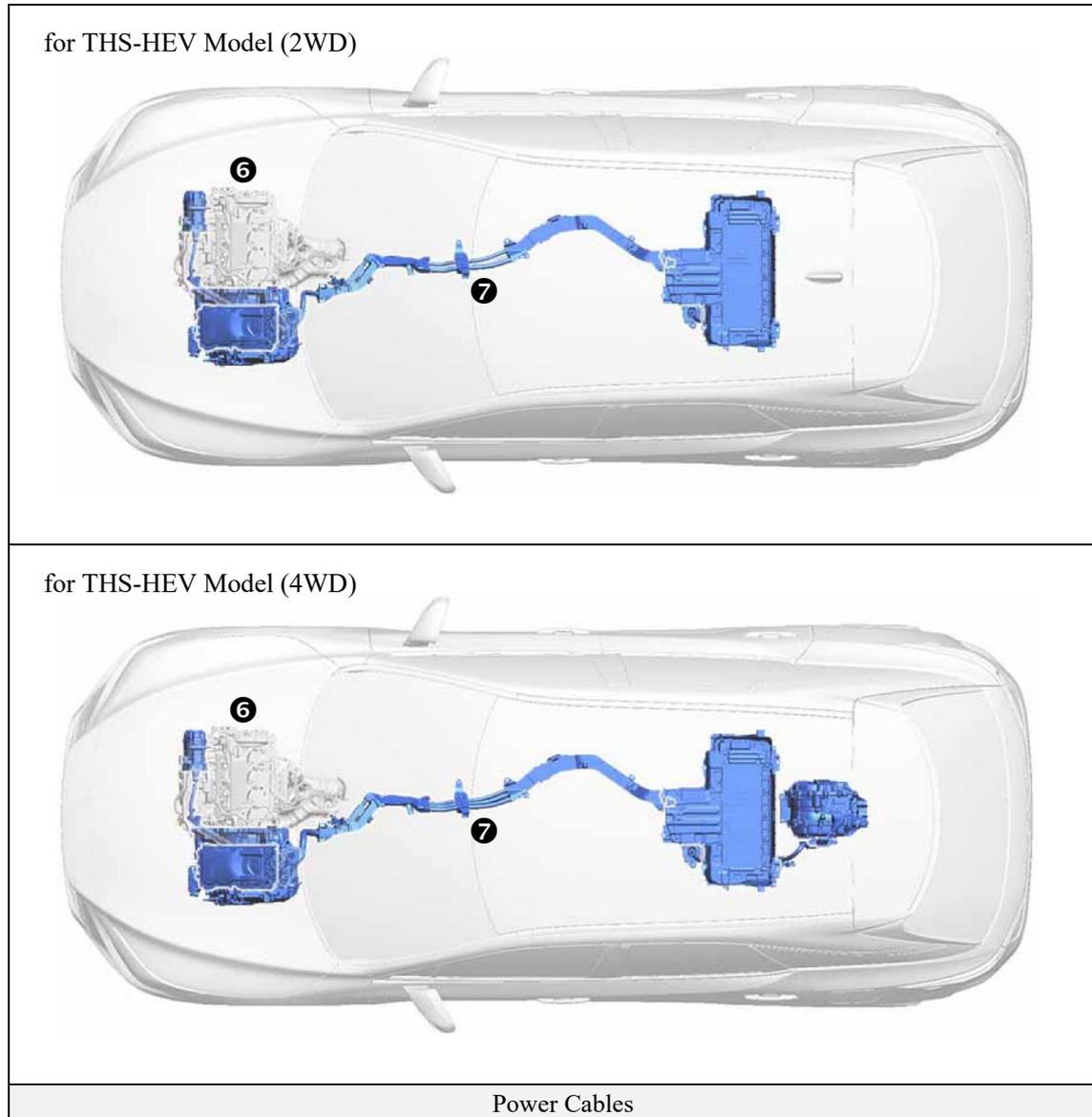


Interior View

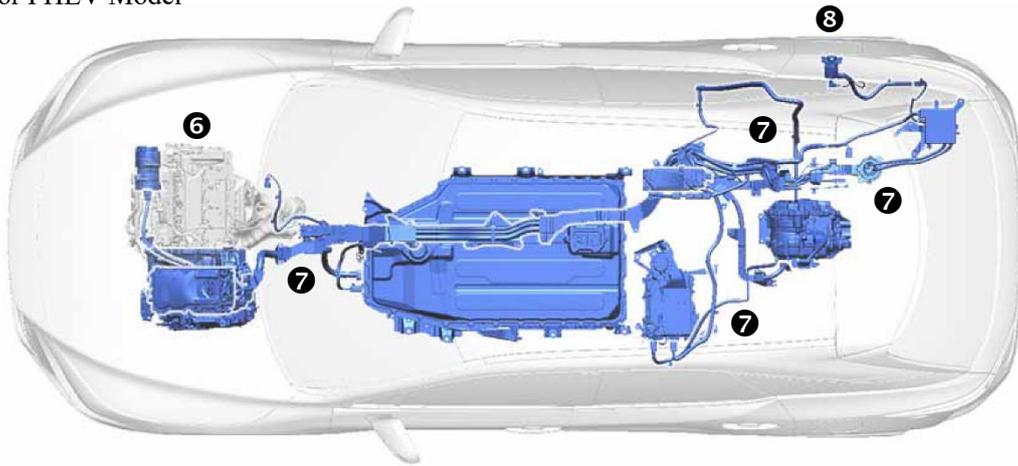


## Engine Compartment

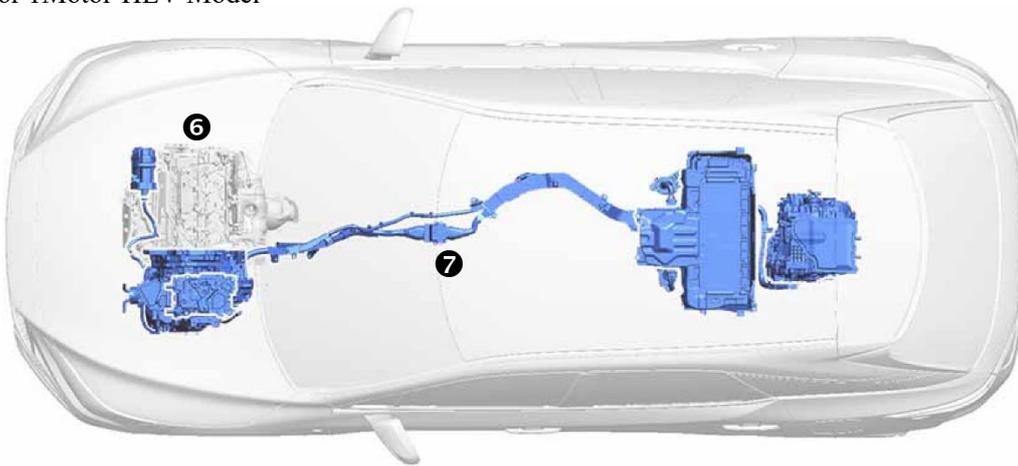
- ⑥ 2.5-liter or 2.4-liter aluminum alloy gasoline engine.
- ⑦ Orange colored high voltage power cables.
- ③ Charge inlet door located on the right side rear quarter panel. (for PHEV Model)



for PHEV Model



for 1Motor-HEV Model



Power Cables

## Hybrid Component Locations & Descriptions

for THS-HEV Model

Component	Location	Description
12 Volts Auxiliary Battery ❶	Luggage Compartment Area	Supplies electricity to the electrical components.
Hybrid Vehicle (HV) Battery Pack ❷	Cabin Area, Mounted Under Rear Seat	<ul style="list-style-type: none"> <li>· Supplies electrical power to MG1, MG2 and MGR* in accordance with the driving conditions of the vehicle.</li> <li>· Recharged by MG1, MG2 and MGR* in accordance with the SOC and the driving conditions of the vehicle.</li> </ul>
Power Cables ❸	Undercarriage and Engine Compartment	Connects the HV battery, inverter with converter assembly, hybrid vehicle transaxle assembly, rear drive unit (rear traction motor with transaxle assembly)* and compressor with motor assembly.
Inverter/Converter ❹	Engine Compartment	<ul style="list-style-type: none"> <li>· Converts the direct current from the boost converter into alternating current for MG1, MG2 and MGR*, and vice versa (from AC to DC).</li> <li>· Boosts the HV battery nominal voltage of DC 259.2 V up to a maximum voltage of DC 650 V and vice versa (steps down DC 650 V to DC 259.2 V).</li> </ul>
Gasoline Engine ❺	Engine Compartment	<p>Provides two functions:</p> <ol style="list-style-type: none"> <li>1) Powers vehicle.</li> <li>2) Powers generator to recharge the HV battery pack.</li> </ol> <p>The engine is started and stopped under control of the vehicle computer.</p>

Component	Location	Description
Front Electric Motor ⑥	Engine Compartment	<ul style="list-style-type: none"> <li>· MG2, which is driven by electrical power from MG1 and the HV battery, generates motive force for the drive wheels.</li> <li>· During braking, or when the accelerator pedal is not depressed, it generates high-voltage electricity to recharge the HV battery.</li> </ul>
Electric Generator ⑦	Engine Compartment	MG1, which is driven by the engine, generates high-voltage electricity in order to operate MG2, MGR* and charge the HV battery. Also, it functions as a starter to start the engine.
A/C Compressor (with inverter) ⑧	Engine Compartment	Is driven by the hybrid vehicle control ECU assembly using power from the HV battery to intake, compress and discharge refrigerant at a speed calculated by the air conditioning amplifier assembly, in order to provide constant air conditioning operation regardless of the engine operation state.
DC-DC Converter for 12 Volts Auxiliary Battery ⑨	Engine Compartment	Steps down the HV battery nominal voltage of DC 259.2 V to approximately DC 14 V in order to supply electricity to the electrical components, as well as to recharge the auxiliary battery.
Fuel Tank and Fuel Line ⑩	Undercarriage and Center	The fuel tank provides gasoline via a fuel line to the engine. The fuel line is routed under the center of vehicle.
Rear Electric Motor ⑪*	Under the Luggage Compartment	MGR, which is driven by electrical power from MG1 and the HV battery, generates motive force for the drive wheels.

\*Numbers in the component column apply to the illustrations on the following page.

\*: for AWD

for PHEV Model

Component	Location	Description
12 Volts Auxiliary Battery ❶	Luggage Compartment Area	Supplies electricity to the electrical components.
Hybrid Vehicle (HV) Battery Assembly ❷	Undercarriage	<ul style="list-style-type: none"> <li>· Supplies electrical power to MG1, MG2 and MGR in accordance with the driving conditions of the vehicle.</li> <li>· Recharged by MG1, MG2 and MGR in accordance with the SOC and the driving conditions of the vehicle</li> </ul>
Power Cables ❸	Undercarriage and Engine Compartment	Connects the HV battery, hybrid motor control inverter assembly, hybrid vehicle transaxle assembly, rear drive unit (rear traction motor with transaxle assembly), junction block, DC/DC converter assembly, electric vehicle charger assembly, charge inlet (AC charger inlet cable) and compressor with motor assembly.
Inverter/Converter ❹	Engine Compartment	<ul style="list-style-type: none"> <li>· Converts the direct current from the boost converter into alternating current for MG1, MG2 and MGR, and vice versa (from AC to DC).</li> <li>· Boosts the HV battery nominal voltage of DC 355.2 V up to a maximum voltage of DC 650 V and vice versa (steps down DC 650 V to DC 355.2 V).</li> </ul>
Gasoline Engine ❺	Engine Compartment	<p>Provides two functions:</p> <ol style="list-style-type: none"> <li>1) Powers vehicle.</li> <li>2) Powers generator to recharge the HV battery assembly.</li> </ol> <p>The engine is started and stopped under control of the vehicle computer.</p>

Component	Location	Description
Front Electric Motor ⑥	Engine Compartment	<ul style="list-style-type: none"> <li>· MG2, which is driven by electrical power from MG1 and the HV battery, generates motive force for the drive wheels.</li> <li>· During braking, or when the accelerator pedal is not depressed, it generates high-voltage electricity to recharge the HV battery.</li> </ul>
Electric Generator ⑦	Engine Compartment	MG1, which is driven by the engine, generates high-voltage electricity in order to operate MG2 and charge the HV battery. Also, it functions as a starter to start the engine.
A/C Compressor (with inverter) ⑧	Engine Compartment	<ul style="list-style-type: none"> <li>· If driven by the hybrid vehicle control ECU, uses power from the HV battery to intake, compress and discharge refrigerant at a speed calculated by the air conditioning amplifier assembly, in order to provide constant air conditioning operation regardless of the engine operation state.</li> <li>· If HV battery cooling is necessary, supplies refrigerant to the HV battery coolant routes.</li> </ul>
DC-DC Converter for 12 Volts Auxiliary Battery ⑨	Cabin Area, Under Rear Seat	Steps down the HV battery nominal voltage of DC 355.2 V to approximately DC 14 V in order to supply electricity to the electrical components, as well as to recharge the auxiliary battery.
Fuel Tank and Fuel Line ⑩	Undercarriage and Center	The fuel tank provides gasoline via a fuel line to the engine. The fuel line is routed under the center of vehicle.
Rear Electric Motor ⑪	Rear Sub-Frame	<ul style="list-style-type: none"> <li>· MGR, which is driven by electrical power from MG1 and the HV battery, generates motive force for the drive wheels.</li> <li>· When the accelerator pedal is not depressed, it generates high-voltage electricity to recharge the HV battery.</li> </ul>

for 1Motor-HEV Model

Component		Location	Description
12 Volts Auxiliary Battery ❶		Luggage Compartment Area	Supplies electricity to the electrical components.
Hybrid Vehicle (HV) Battery Pack ❷		Cabin Area, Mounted Under Rear Seat	<ul style="list-style-type: none"> <li>· Supplies electrical power to MG and Rear MG in accordance with the driving conditions of the vehicle.</li> <li>· Recharged by MG in accordance with the SOC and the driving conditions of the vehicle.</li> </ul>
Power Cables ❸		Undercarriage and Engine Compartment	Connects the HV battery, hybrid vehicle transaxle assembly (with motor and inverter), rear eAxle assembly (rear transaxle assembly (with motor and inverter)), DC-DC converter and compressor with motor assembly.
Gasoline Engine ❹		Engine Compartment	<p>Provides two functions:</p> <ol style="list-style-type: none"> <li>1) Powers vehicle.</li> <li>2) Powers generator to recharge the HV battery pack.</li> </ol> <p>The engine is started and stopped under control of the vehicle computer.</p>
Hybrid Vehicle Transaxle Assembly (with Motor and Inverter) ❺	Motor Generator (Front MG)	Engine Compartment	<ul style="list-style-type: none"> <li>· Front MG, which is driven by the engine, generates high-voltage electricity in order to charge the HV battery. Also, it functions as a starter to start the engine.</li> <li>· Front MG, which is driven by electrical power from the HV battery, generates motive force for the drive wheels.</li> <li>· During braking, or when the accelerator pedal is not depressed, it generates high-voltage electricity to recharge the HV battery.</li> </ul>
	Hybrid Motor Control Inverter Assembly ❻	Engine Compartment	Converts the direct current from the HV battery into alternating current for Front MG, and vice versa (from AC to DC).

Component		Location	Description
Rear eAxle (Rear Transaxle Assembly with Motor and Inverter)	Motor Generator Rear (Rear MG) ⑦	Under the Luggage Compartment	<ul style="list-style-type: none"> <li>· Drives by electrical power from the EV supply battery assembly, generates motive force for the drive wheels.</li> <li>· Generates high-voltage electricity to recharge the EV supply battery, during braking, or when the accelerator pedal is released.</li> </ul>
	EV Motor Control Inverter Assembly ⑧	Under the Luggage Compartment	Converts the direct current from the EV supply battery assembly into alternating current for electric motor, and vice versa (from AC to DC).
Compressor with Motor Assembly ⑨		Engine Compartment	Is driven by the hybrid vehicle control ECU using power from the HV battery to intake, compress and discharge refrigerant at a speed calculated by the air conditioning amplifier assembly, in order to provide constant air conditioning operation regardless of the engine operation state.
DC-DC Converter for 12 Volts Auxiliary Battery ⑩		Engine Compartment	<ul style="list-style-type: none"> <li>· Steps down the HV battery nominal voltage of DC 288 V to approximately DC 14 V in order to supply electricity to the electrical components, as well as to recharge the auxiliary battery.</li> <li>· Splits the power from the HV supply battery assembly and supplies it to the compressor with motor assembly and hybrid motor control inverter assembly.</li> </ul>
Fuel Tank and Fuel Line ⑪		Undercarriage and Center	The fuel tank provides gasoline via a fuel line to the engine. The fuel line is routed under the center of vehicle.

## Specifications

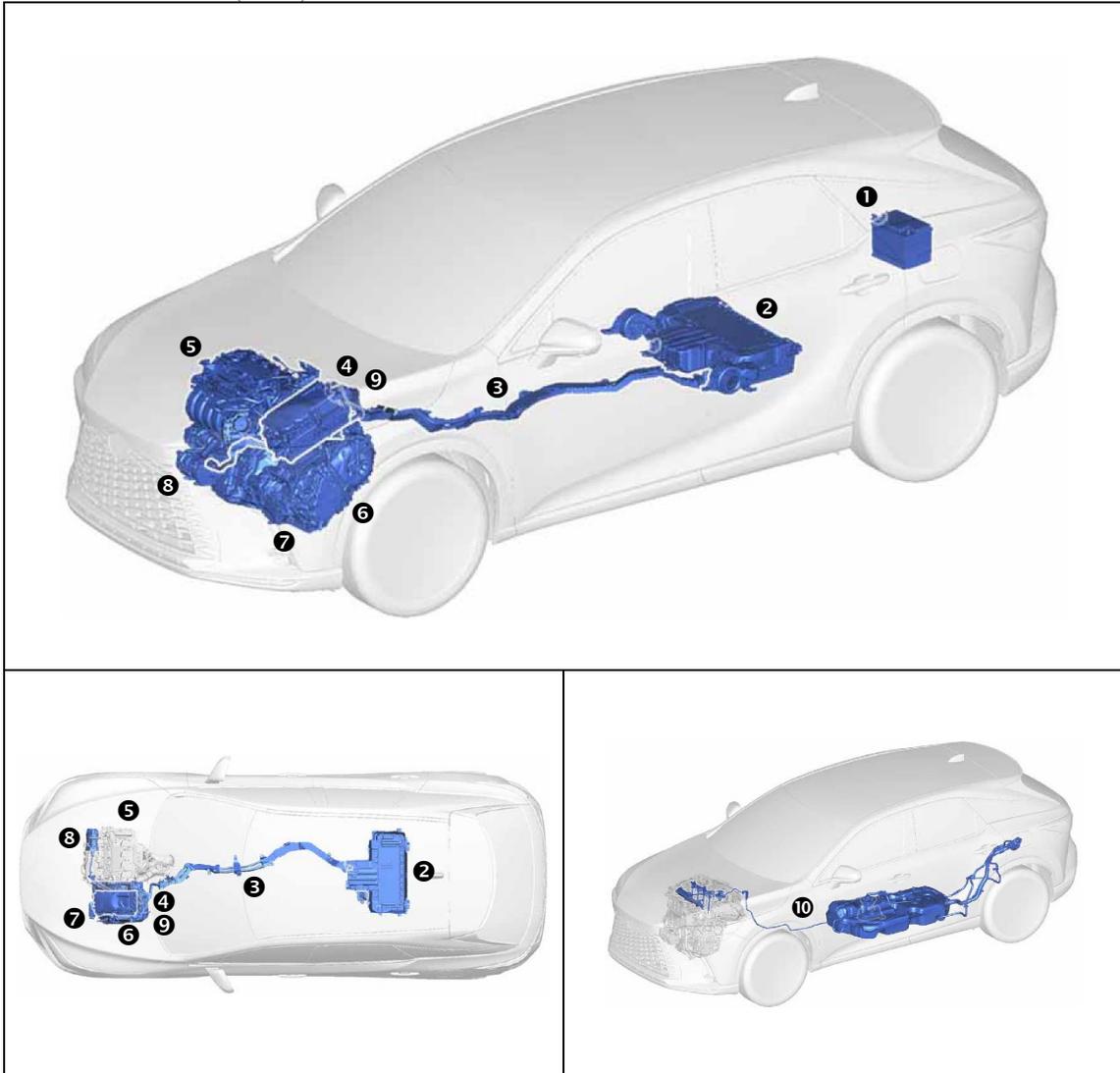
Gasoline Engine:	137 / 138 / 139 / 140kW, 2.5-liter Aluminum Alloy Engine*1*2 205 kW, 2.4-liter Aluminum Alloy Engine*3
Electric Motors	
Front:	134 kW, Permanent Magnet Motor*1*2 64 kW, Permanent Magnet Motor*3
Rear:	40 kW, Permanent Magnet Motor (for AWD)*1*2 75.9 kW, Permanent Magnet Motor (for AWD)*3
Transmission:	Automatic Only
HV Battery:	259.2 V Sealed NiMH Battery*1 288 V Sealed NiMH Battery*3 355.2 V Sealed Li-ion Battery*2
Curb Weight:	4,189-4,398 lbs / 1,900-1,995 kg*1 4,321-4,586 lbs / 1,960-2,080 kg (for AWD)*1 4,641-4,938 lbs / 2,105-2,240 kg*2 4,619-4,828 lbs / 2,095-2,190 kg*3
Fuel Tank:	14.3 Imp gals / 17.2 U.S. gals / 65 liters*1*3 12.1 Imp gals / 14.5 U.S. gals / 55 liters*2
Frame Material:	Steel Unibody
Body Material:	Steel Panels
Seating Capacity:	5 passenger

\*1: for THS-HEV Model

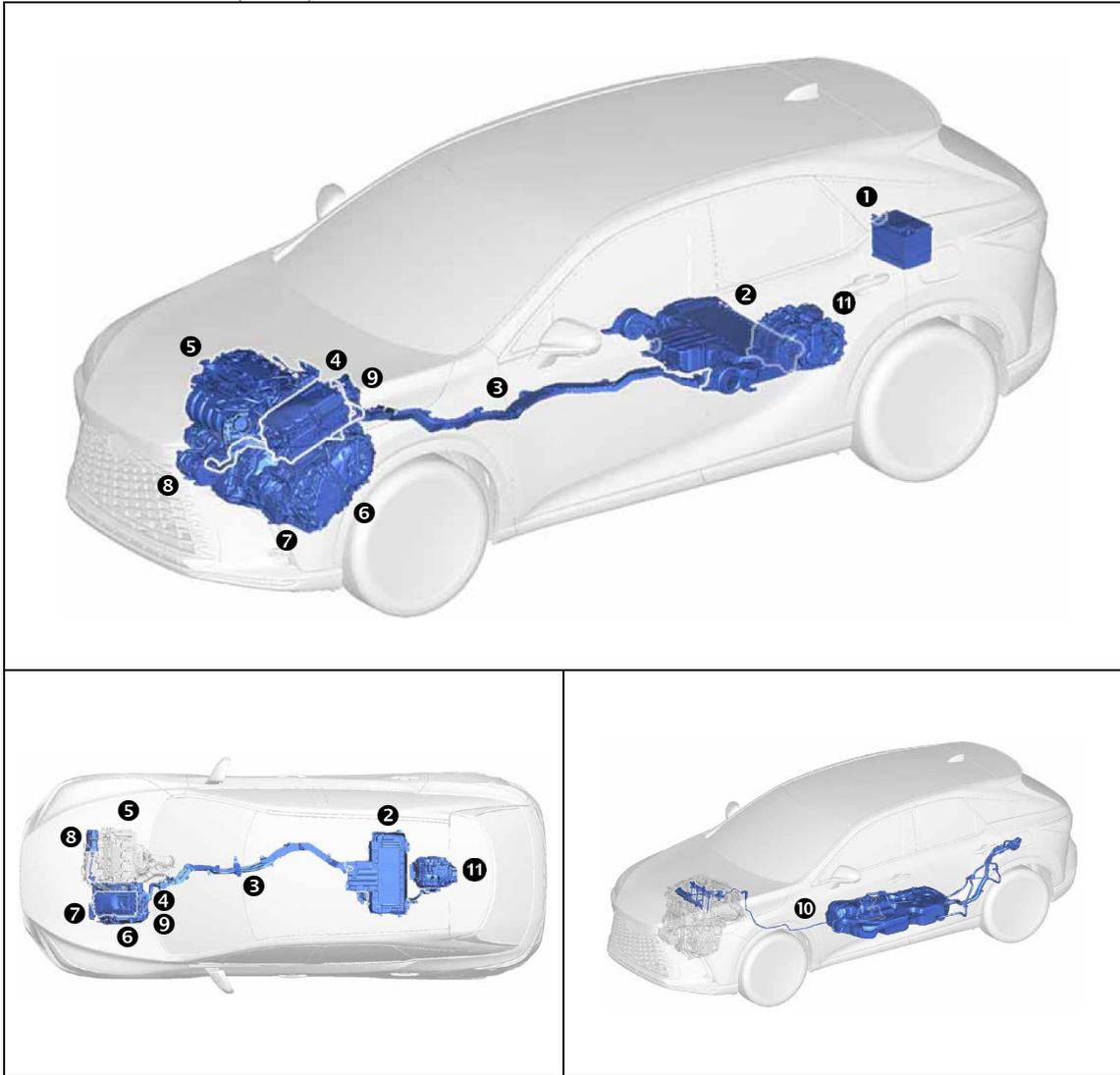
\*2: for PHEV Model

\*3: for 1Motor-HEV Model

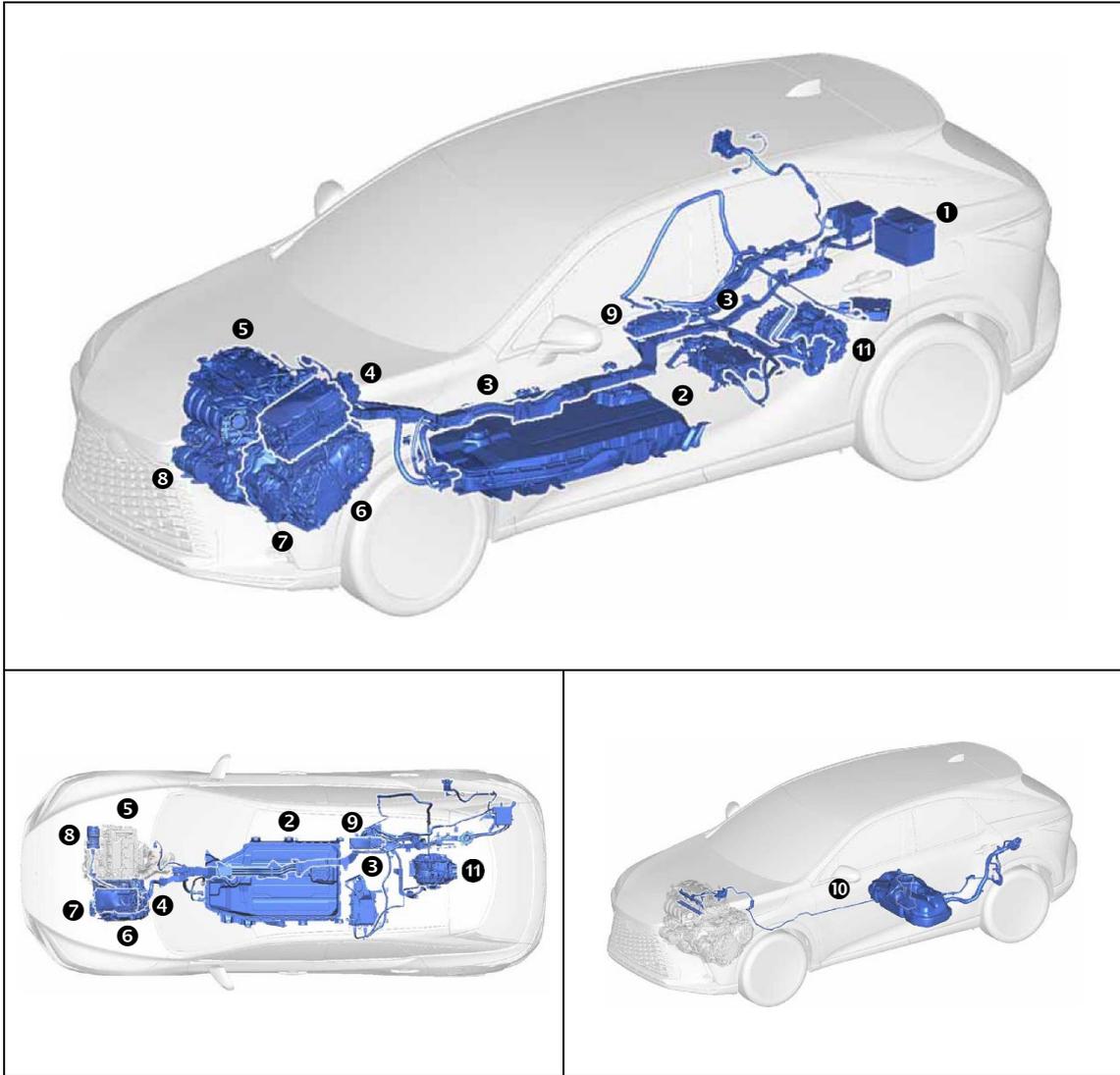
for THS-HEV Model (2WD)



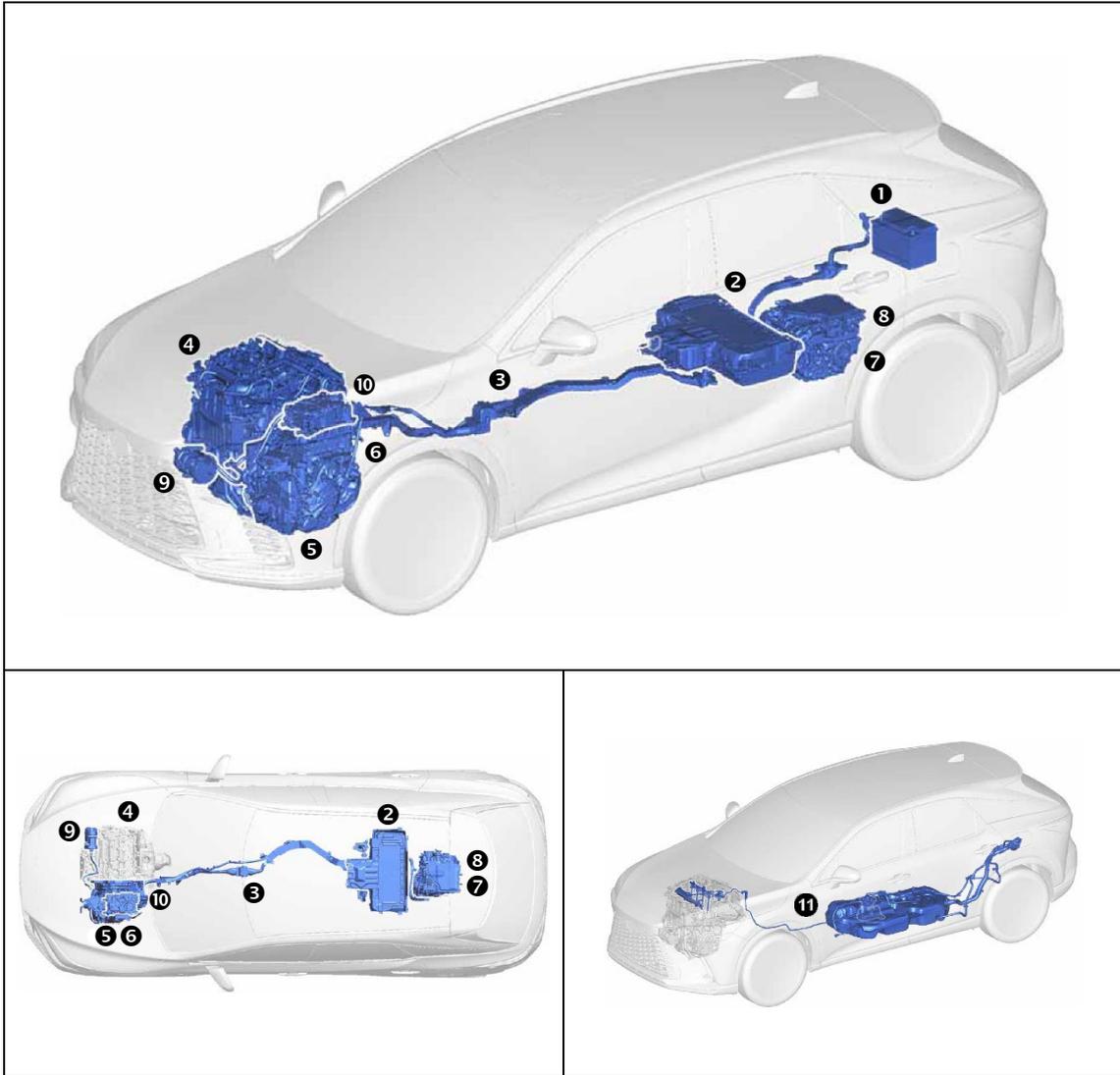
for THS-HEV Model (AWD)



for PHEV Model



for 1Motor-HEV Model



## Lexus Hybrid Drive Operation

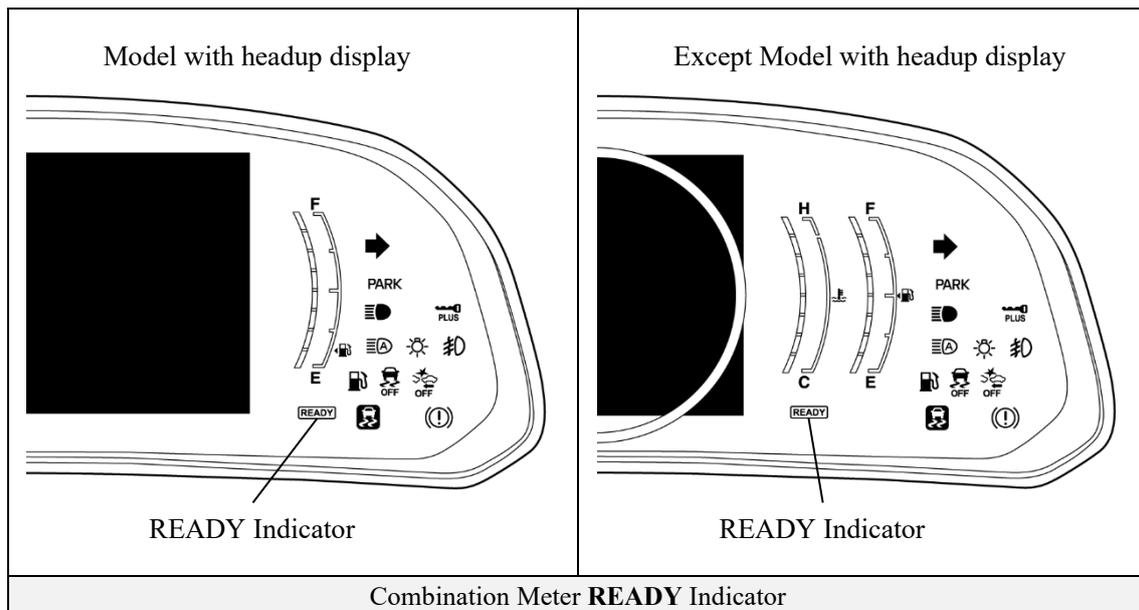
Once the **READY** indicator is illuminated in the instrument cluster, the vehicle may be driven. However, the gasoline engine does not idle like a typical automobile and will start and stop automatically. It is important to recognize and understand the **READY** indicator provided in the instrument cluster. When illuminated, it informs the driver that the vehicle is on and operational even though the gasoline engine may be off and the engine compartment is silent.

### Vehicle Operation

- With the RX350h/450h+/500h, the gasoline engine may stop and start at any time while the **READY** indicator is on.
- Never assume that the vehicle is shut off just because the engine is off. Always look for the **READY** indicator status. The vehicle is shut off when the **READY** indicator is off.

The vehicle may be powered by:

1. The electric motors only.
2. A combination of both the electric motors and the gasoline engine.



## Hybrid Vehicle (HV) Battery and Auxiliary Battery

The RX350h/450h+/500h features a high voltage Hybrid Vehicle (HV) battery that contains sealed Nickel Metal Hydride (NiMH) battery modules\*1 or Lithium-ion (Li-ion) battery cells\*2.

\*1: for HEV Model

\*2: for PHEV Model

### HV Battery

#### **for Nickel-Metal hydride battery:**

- The HV battery pack is enclosed in a metal case and is rigidly mounted to the cabin area under the rear seat. The metal case is isolated from high voltage and concealed by carpet in the cabin area.
- The HV battery pack consists of 9\*1 or 10\*2 low voltage (28.8 Volts) NiMH battery modules connected in series to produce approximately 259.2\*1 or 288\*2 Volts. Each NiMH battery module is non-spillable and sealed in a metal case.
- The electrolyte used in the NiMH battery module is an alkaline mixture of potassium and sodium hydroxide. The electrolyte is absorbed into the battery cell plates and will not normally leak, even in a collision.

HV Battery Pack	
Battery pack voltage	259.2 V*1 / 288 V*2
Number of NiMH battery modules in the pack	9*1 / 10*2
NiMH battery module voltage	28.8 V

\*1: for THS-HEV Model

\*2: for 1Motor-HEV Model

**for Lithium-ion battery:**

- The HV battery assembly is enclosed in a metal case and is rigidly mounted to the cabin area under the rear seat. The metal case is isolated from high voltage and concealed by carpet covers in the cabin area.
- The HV battery assembly consists of 96 low voltage (3.7 Volts) Li-ion battery cells connected in series to produce approximately 355.2 Volts. Each Li-ion battery cell is non-spillable and in a sealed case.
- The electrolyte used in the Li-ion battery cells is a flammable organic electrolyte. The electrolyte is absorbed into the battery cell separator and will not normally leak, even in a collision.

HV Battery Assembly	
Battery assembly voltage	355.2 V
Number of Li-ion battery cells in the pack	96
Li-ion battery cell voltage	3.7 V

Components Powered by the HV Battery

for THS-HEV Model:

- Front Electric Motor
- Power Cables
- Inverter/Converter
  - DC-DC Converter for 12 Volts Auxiliary Battery
- Rear Electric Motor (for AWD)
- Electric Generator
- A/C Compressor

for PHEV Model:

- Front Electric Motor
- Power Cables
- Inverter/Converter
- DC-DC Converter for 12 Volts Auxiliary Battery
- Rear Electric Motor
- Electric Generator
- A/C Compressor

for 1Motor-HEV Model:

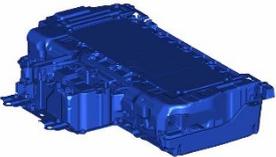
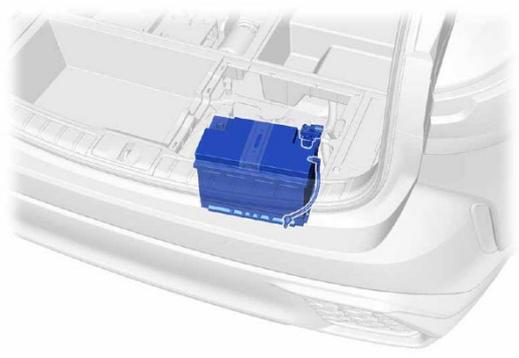
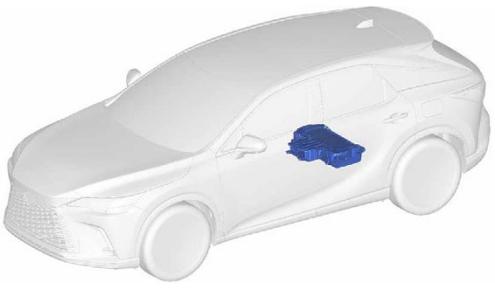
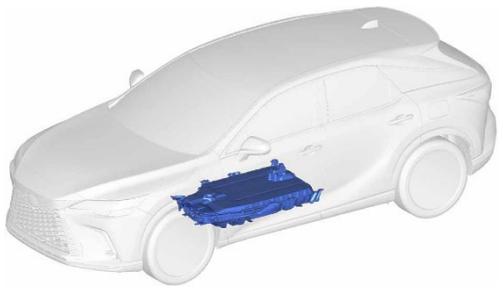
- Hybrid Vehicle Transaxle Assembly (with Motor and Inverter)
  - Motor Generator (Front MG)
  - Hybrid Motor Control Inverter Assembly
- Rear eAxle (Rear Transaxle Assembly with Motor and Inverter)
  - Motor Generator Rear (Rear MG)
  - EV Motor Control Inverter Assembly
- Power Cables
- Compressor with Motor Assembly
- DC-DC Converter for 12 Volts Auxiliary Battery

**HV Battery Recycling**

- The HV battery is recyclable. Contact either your Lexus Distributor or the nearest Lexus dealer.

**Auxiliary Battery**

- The RX350h/450h+/500h also contains a sealed lead-acid 12 Volts battery. This 12 Volts auxiliary battery powers the vehicle electrical system similar to a conventional vehicle. As with other conventional vehicles, the auxiliary battery is grounded to the metal chassis of the vehicle.
- The auxiliary battery is located under the luggage compartment area. It is concealed by a plastic resin cover on the left side in the battery compartment.

<p><b>for Nickel-Metal hydride battery:</b></p>  <p><b>for Lithium-ion battery:</b></p> 	
<p>259.2*1 / 288*3 / 355.2*2 Volts HV Battery</p>	<p>12 Volts Auxiliary Battery Mounted in Luggage Compartment Area (Right Side)</p>
<p><b>for Nickel-Metal hydride battery:</b></p> 	<p><b>for Lithium-ion battery:</b></p> 
<p>HV Battery Mounted in Cabin Area or Undercarriage</p>	

- \*1: for THS-HEV Model
- \*2: for PHEV Model
- \*3: for 1Motor-HEV Model

## High Voltage Safety

### for THS-HEV Model or PHEV Model:

The HV battery powers the high voltage electrical system with DC electricity. Positive and negative orange colored high voltage power cables are routed from the HV battery, under the vehicle floor pan, to the inverter/converter\*1\*2, A/C compressor\*2, DC/DC converter\*2. The inverter/converter contains a circuit that boosts the HV battery voltage from 259.2\*1 or 355.2\*2 to 650 Volts DC. The inverter/converter creates 3-phase AC to power the motor. Power cables are routed from the inverter/converter to each high voltage motors (front and rear electric motors, and electric generator).

\*1: THS-HEV Model

\*2: PHEV Model

### for 1Motor-HEV Model:

The HV battery pack powers the high voltage electrical system with DC electricity. Positive and negative orange colored high voltage power cables are routed from the battery pack, under the vehicle floor pan, to the hybrid vehicle transaxle assembly (with motor and inverter), rear eAxle (rear transaxle assembly with motor and inverter), compressor with motor assembly, DC/DC converter. The inverter contains a circuit that boosts the HV battery voltage from 288 to 650 Volts DC. The inverter creates 3-phase AC to power the motor.

The following systems are intended to help keep occupants in the vehicle and emergency responders safe from high voltage electricity:

### High Voltage Safety System

- A high voltage fuse ❶\* provides short circuit protection in the HV battery.
- Positive and negative high voltage power cables ❷\* connected to the HV battery are controlled by 12 Volts normally open relays ❸\*. When the vehicle is shut off, the relays stop electricity flow from leaving the HV battery.



### **WARNING:**

- ***The high voltage system may remain powered for up to 10 minutes after the vehicle is shut off or disabled. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or opening any orange high voltage power cable or high voltage component.***

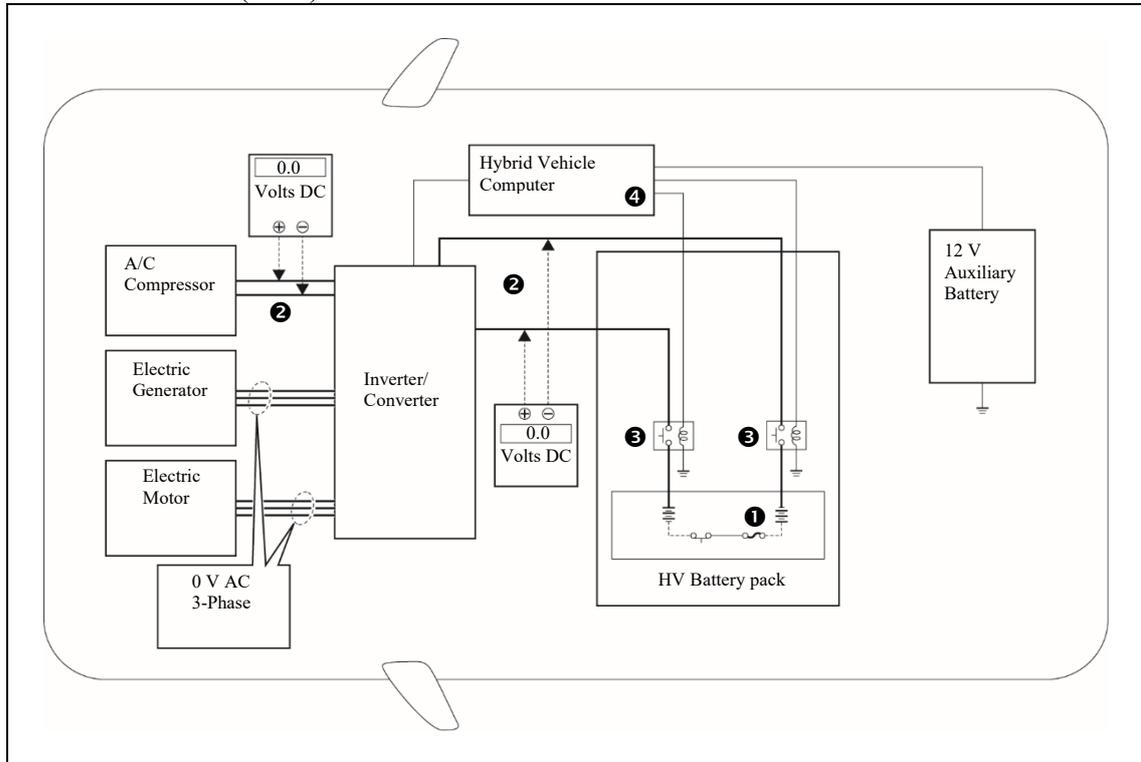
- Both positive and negative power cables ②\* are insulated from the metal body. High voltage electricity flows through these cables and not through the metal vehicle body. The metal vehicle body is safe to touch because it is insulated from the high voltage components.
- A ground fault monitor ④\* continuously monitors for high voltage leakage to the metal chassis while the vehicle is running. If a malfunction is detected, the hybrid vehicle computer ④\* will a message indicating that the hybrid system is malfunctioning will be displayed on the multi-information display.
- The HV battery relays will automatically open to stop electricity flow in a collision sufficient to activate the SRS.

\*Numbers apply to the illustration on the following page.

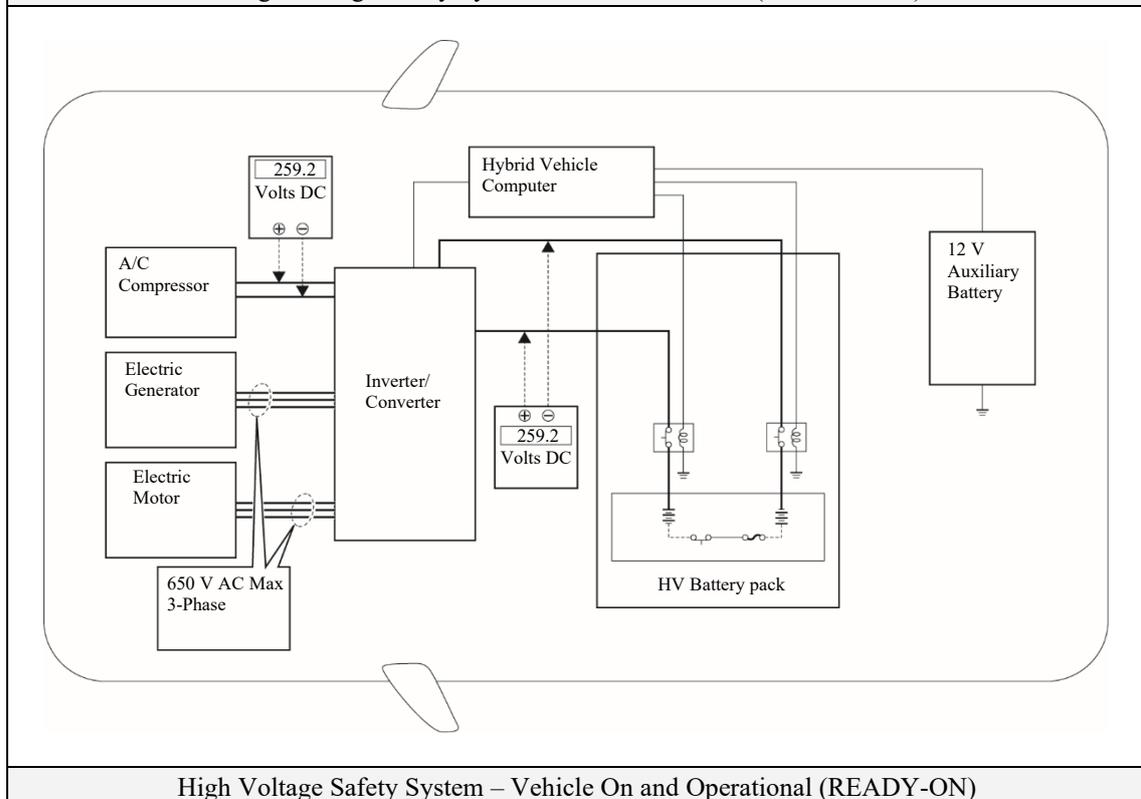
### Service Plug Grip

- The high voltage circuit is cut by removing the service plug grip (see page 35 or 41).

for THS-HEV Model (2WD)

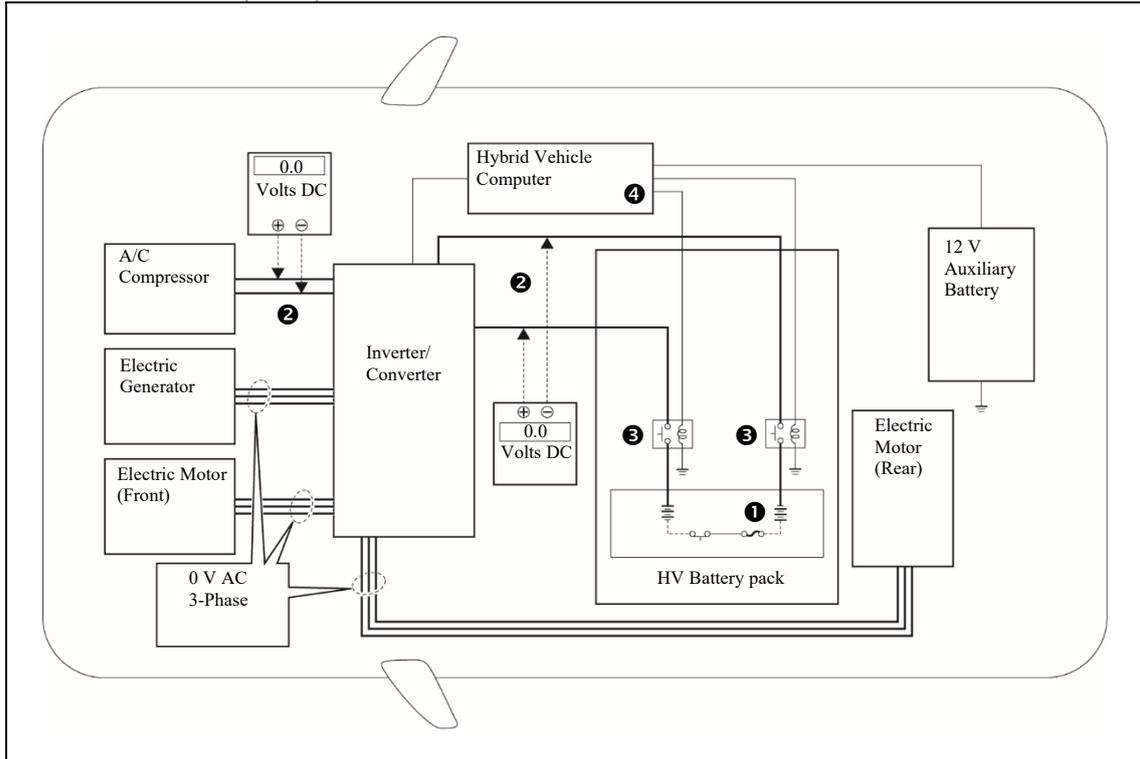


High Voltage Safety System – Vehicle Shut Off (READY-OFF)

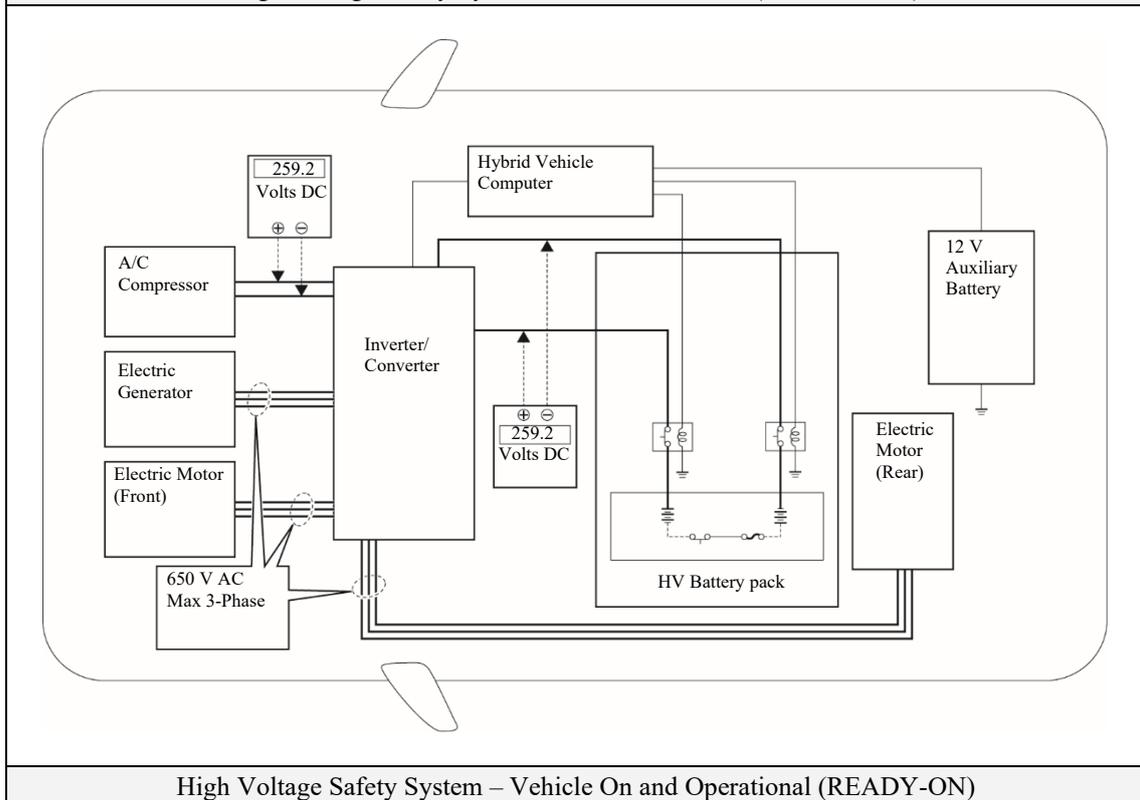


High Voltage Safety System – Vehicle On and Operational (READY-ON)

for THS-HEV Model (AWD)

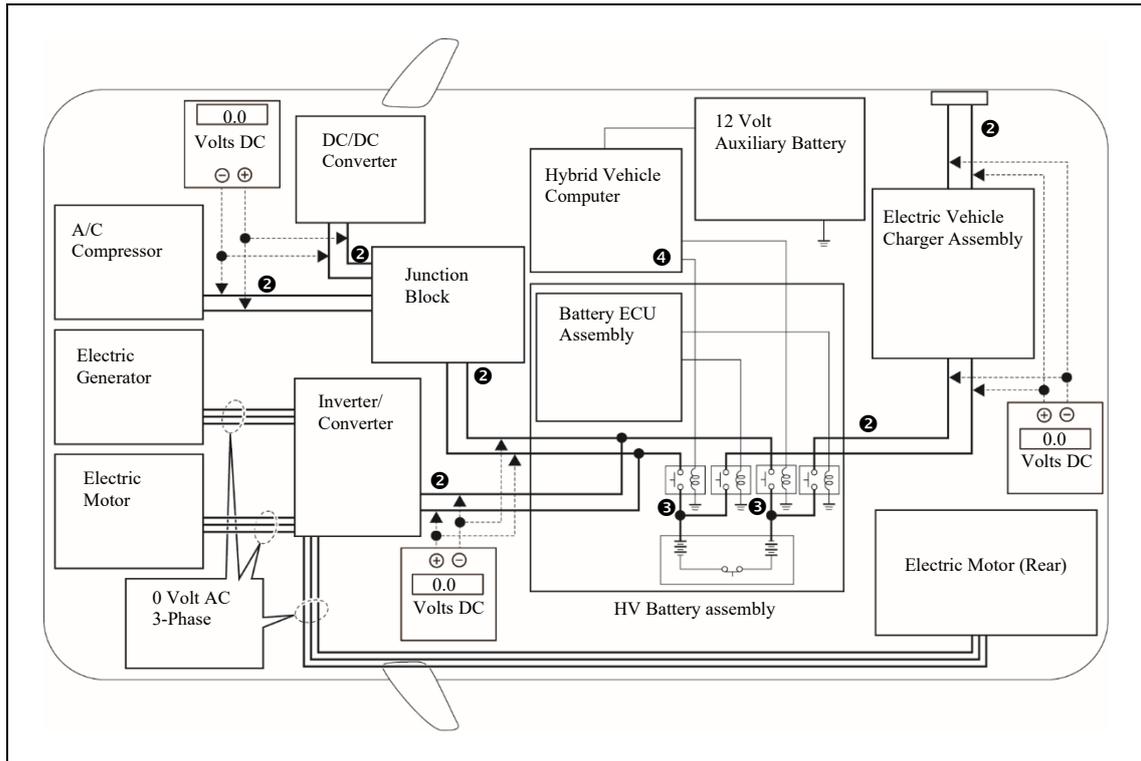


High Voltage Safety System – Vehicle Shut Off (READY-OFF)

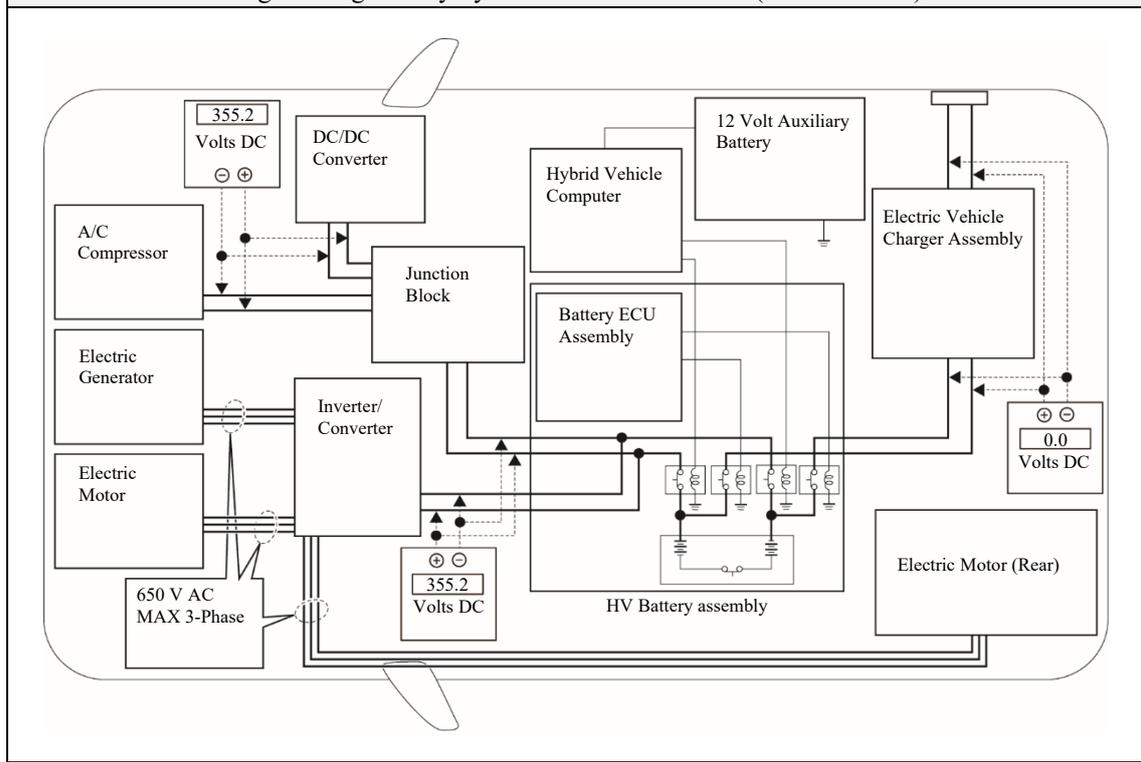


High Voltage Safety System – Vehicle On and Operational (READY-ON)

for PHEV Model

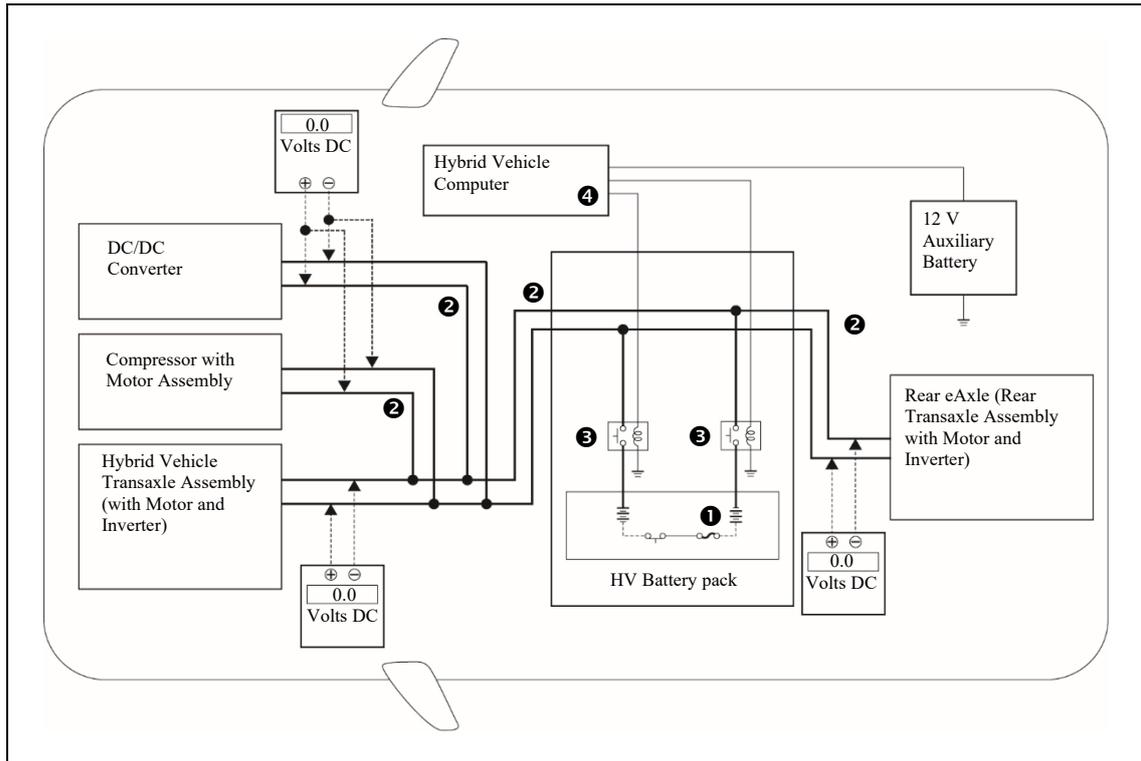


High Voltage Safety System – Vehicle Shut Off (READY-OFF)

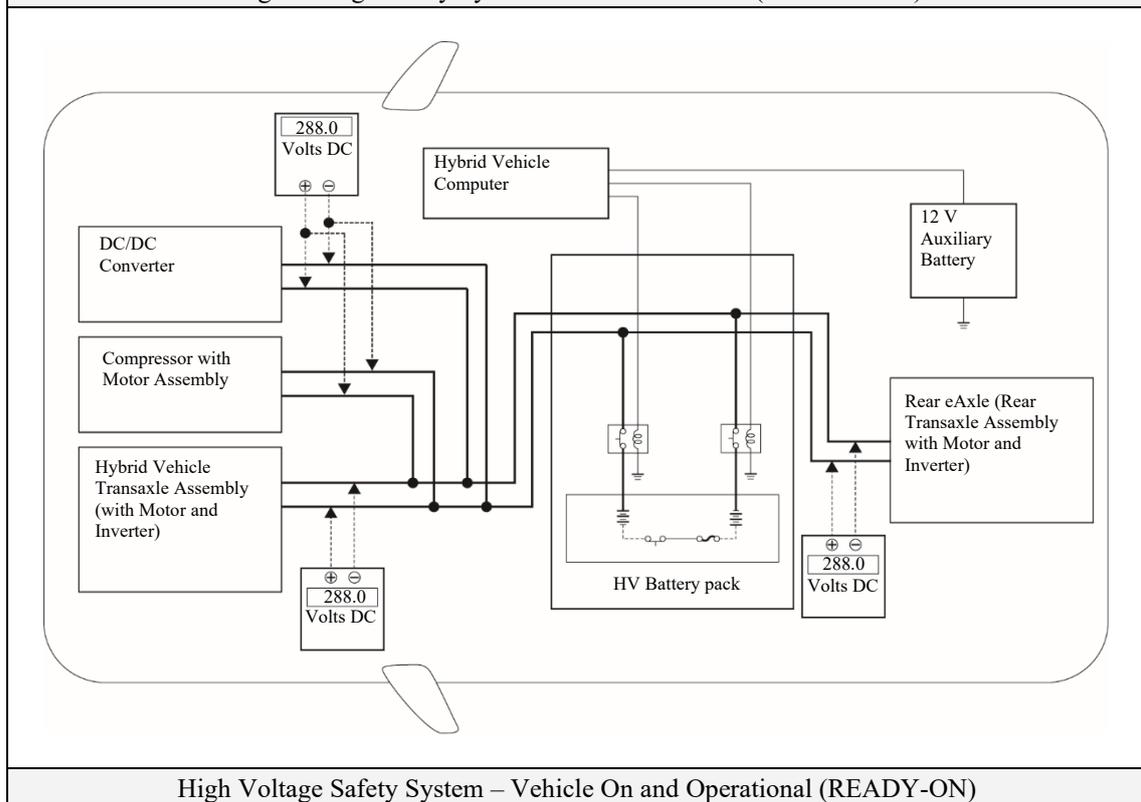


High Voltage Safety System – Vehicle On and Operational (READY-ON)

for 1Motor-HEV Model



High Voltage Safety System – Vehicle Shut Off (READY-OFF)



High Voltage Safety System – Vehicle On and Operational (READY-ON)

## **Precaution to be observed when dismantling the vehicle**

- To prevent electric shock, wear insulated gloves when working on wire harnesses and components of the high voltage system. Before using insulated gloves, be sure to check them for cracks, tears and other types of damage.
- When servicing the vehicle, do not carry metal objects like mechanical pencils or rulers that can be dropped accidentally and cause a short circuit.
- To reduce the risk of electric shock, make sure to remove the service plug grip to cut off the high voltage circuit before servicing the vehicle.
- To reduce the risk of electric shock, make sure to wait at least 10 minutes after removing the service plug grip to fully discharge the high voltage capacitor inside the inverter with converter assembly.
- Do not touch any high voltage wire harnesses, connectors or parts with bare hands.
- Do not touch the terminals of the service plug grip.
- Make sure to insulate the high-voltage connectors and terminals of the HV battery with insulating tape after removing them.
- 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.
- Before touching a bare high-voltage terminal, wear insulated gloves and use a tester to make sure that the terminal voltage is 0 V.
- If the vehicle catches on fire, use an ABC fire extinguisher to extinguish the fire. Trying to extinguish a fire using only a small amount of water can be more dangerous than effective. Use a substantial amount of water or wait for firefighters.
- Do not allow any foreign matter or water to enter the HV battery.

### **for Nickel-Metal hydride battery:**

- If the electrolyte comes in contact with your skin, use a saturated boric acid solution or a large amount of water to wash it off. If the electrolyte comes in contact with an article of clothing, take it off immediately.
- If the electrolyte comes in contact with your eyes, call out loudly for help. Do not rub your eyes. Wash them immediately with a large amount of water and seek medical care.
- If the electrolyte is swallowed, seek medical care immediately. Do not induce vomiting, unless instructed by the doctor.

**for Lithium-ion battery:**

- Electrolyte leaks may cause acute poisoning if a high concentration of the vapor from the electrolyte is inhaled. In case of inhalation, move the affected person to a place with ample fresh air and let them lie quietly. Seek medical care.
- If the electrolyte comes in contact with your skin, wash the area thoroughly with soap and plenty of water, and seek medical care. If the electrolyte comes in contact with an article of clothing, take it off immediately. Prolonged contact with the electrolyte may cause skin irritation.
- If the electrolyte comes in contact with your eyes, call out loudly for help. Do not rub your eyes. Immediately flush them with a large amount of water for at least 15 minutes and seek medical care.
- If electrolyte is swallowed, seek medical care immediately. Do not induce vomiting, unless instructed by the doctor.

Necessary Items

- Protective clothing such as insulated gloves (electrically insulated), rubber gloves, helmet, safety goggles, safety shoes and SCBA or protective mask.
- Insulating tape such as electrical tape that has a suitable electrical insulation rating and insulation tool set.
- An electrical tester that is capable of measuring DC 750 Volts or more.

## Spills

### **for Nickel-Metal hydride battery:**

The RX350h/500h contains the same common automotive fluids used in other non-hybrid Lexus vehicles, with the exception of the NiMH electrolyte used in the HV battery pack. The NiMH battery electrolyte is a caustic alkaline (pH 13.5) that is damaging to human tissues. The electrolyte, however, is absorbed in the cell plates and will not normally spill or leak out even if a battery module is cracked. A catastrophic crash that would breach both the metal battery pack case and a metal battery module would be a rare occurrence.

A caustic alkaline is at the opposite end of the pH scale from a strong acid. A safe (neutral) substance is approximately in the middle of this scale. Adding a weak acidic mixture, such as a dilute boric acid solution or vinegar, to the caustic alkaline electrolyte will cause the electrolyte to be neutralized. This is similar but opposite to the use of baking soda to neutralize a lead-acid battery electrolyte spill.

A Lexus Product Safety Data Sheets (PSDS) is attached to this document.

- Handle NiMH electrolyte spills using the following Personal Protective Equipment (PPE):
  - Splash shield or safety goggles. Fold down helmet shields are not acceptable for acid or electrolyte spills.
  - Rubber, latex or nitrile gloves.
  - Apron suitable for alkaline.
  - Rubber boots.
  
- Neutralize NiMH electrolyte.
  - Use a boric acid solution or vinegar.
  - Boric acid solution - 800 grams boric acid to 20 liters water or 5.5 ounces boric acid to 1 gallon of water.

**for Lithium-ion battery:**

The RX450h+ contains the same common automotive fluids used in other non-hybrid Lexus vehicles, with the exception of the Li-ion electrolyte used in the HV battery assembly. The electrolyte used in the Li-ion battery cells is a flammable organic electrolyte. The electrolyte is absorbed into the battery cell separators, even if the battery cells are crushed or cracked, it is unlikely that liquid electrolyte will leak. Any liquid electrolyte that leaks from a Li-ion battery cell quickly evaporates.



**WARNING:**

- *The Li-ion battery contains organic electrolyte. Only a small amount may leak from the batteries which may irritate the eyes, nose, throat, and skin.*
- *Contact with the vapor produced by the electrolyte may irritate the nose and throat.*
- *To avoid injury by coming in contact with the electrolyte or vapor, wear personal protective equipment for organic electrolyte including SCBA or protective mask for organic gases.*

- Handle Li-ion electrolyte spills using the following Personal Protective Equipment (PPE):
  - Splash shield or safety goggles. A fold down face shield is not acceptable for acid or electrolyte spills.
  - Rubber gloves or gloves suitable for organic solvents.
  - Apron suitable for organic solvents.
  - Rubber boots or boots suitable for organic solvents.
  - Protective mask for organic gases or SCBA.

## Dismantling the vehicle (for HEV Model)

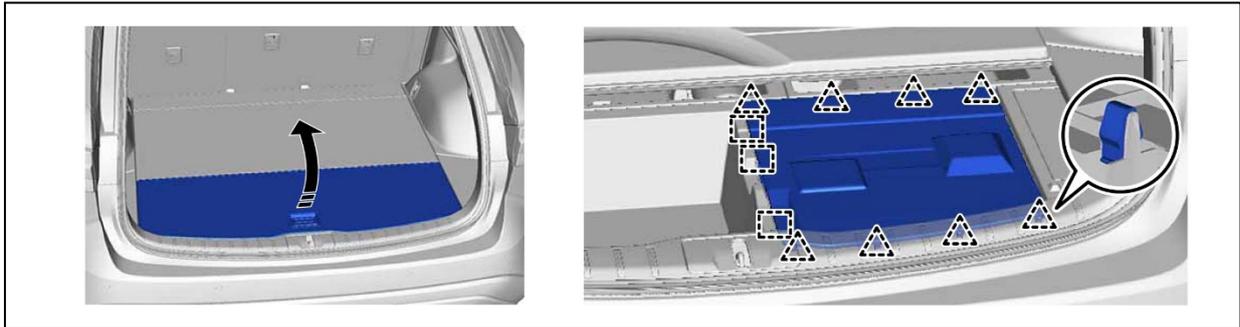
The following 6 pages contain general instructions for use when working on a RX350h/500h. Read these instructions before proceeding to the HV battery removal instructions on page 48.



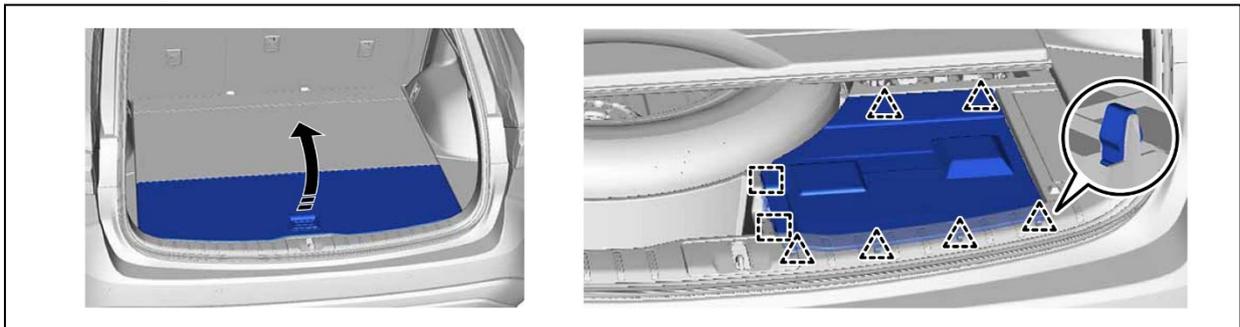
### **WARNING:**

- ***The high voltage system may remain powered for up to 10 minutes after the vehicle is shut off or disabled. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or opening any orange high voltage power cable or any high voltage component.***

1. Shut off the ignition (**READY** indicator is off).
2. Remove battery service cover plate.
  - a. w/o Spare Tire:

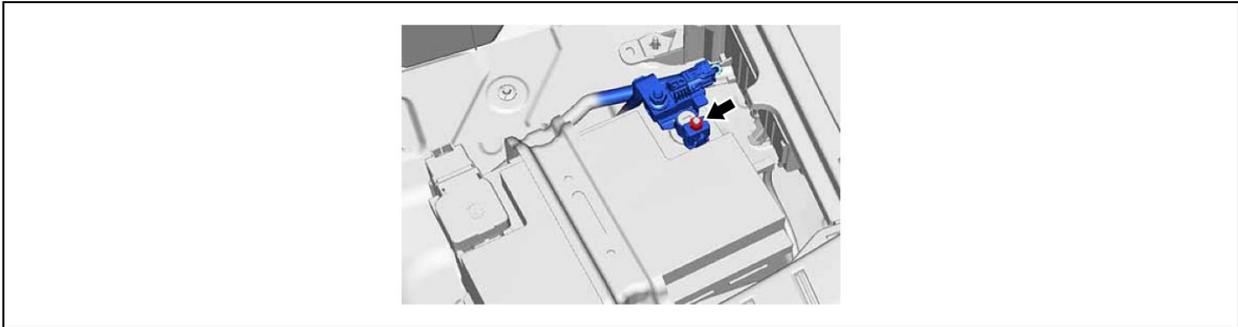


- b. w/ Spare Tire:



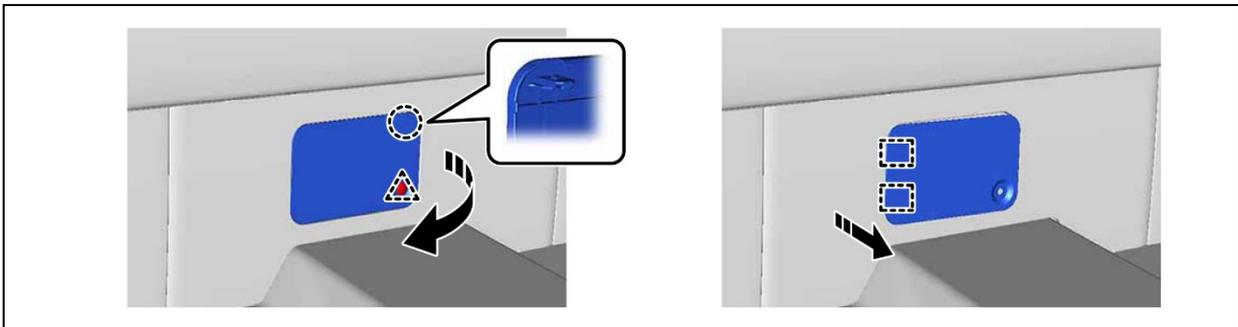
3. Disconnect cable from negative auxiliary battery terminal.

a.



4. Remove battery service hole cover.

a.



5. Remove service plug grip.

	<p><b>CAUTION:</b></p> <ul style="list-style-type: none"><li>• Be sure to wear insulated gloves.</li><li>• Do not inspect or service the high voltage system with the service plug grip installed.</li><li>• To reduce the risk of electric shock, make sure to remove the service plug grip to cut off the high voltage circuit before servicing the vehicle.</li></ul>	
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- To reduce the risk of electric shock, make sure to wait at least 10 minutes after removing the service plug grip to fully discharge the high voltage capacitor inside the inverter with converter assembly.
- Keep the removed service plug grip in your pocket to prevent other technicians from accidentally installing it while you are servicing the vehicle.



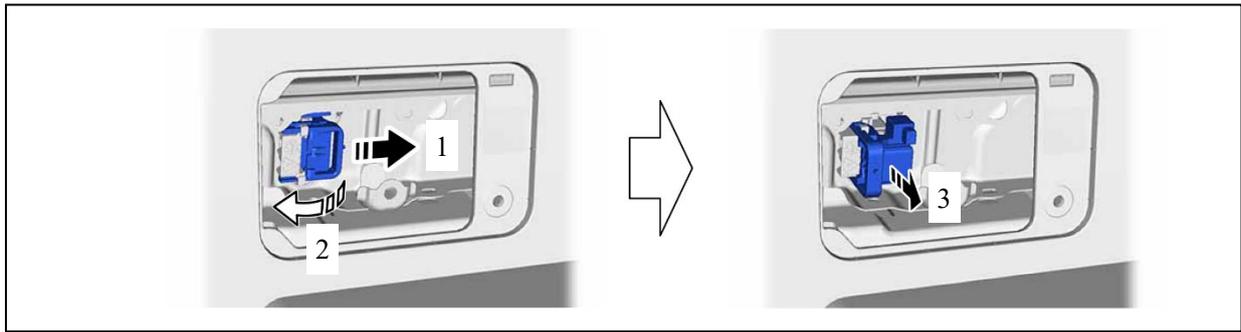
**NOTICE:**

- After removing the service plug grip, turning the ignition switch to ON (READY) may cause a malfunction. Do not turn the ignition switch to ON (READY) unless instructed by the repair manual.
- Do not touch the terminals of the service plug grip.
- If the service plug grip has been struck or dropped, replace it.

**HINT:**

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

a.



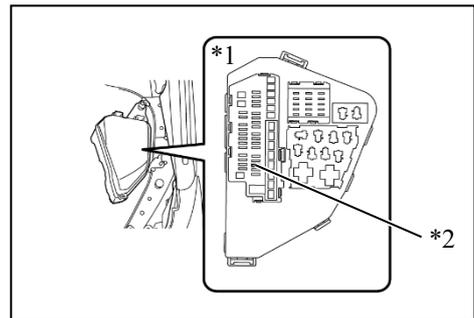
(1) While wearing insulated gloves, rotate the handle of the service plug grip and remove the service plug grip as indicated by the arrows, in the order shown in the illustration.

6. Carry the removed service plug grip in your pocket to prevent other technicians from accidentally installing it while you are servicing the vehicle.
7. Make other staff aware that a high-voltage system is being dismantled by using the following sign: CAUTION: HIGH-VOLTAGE. DO NOT TOUCH (see page 40).

8. If the service plug grip cannot be removed due to damage to the vehicle, remove the **IGP-MAIN NO. 1** fuse.

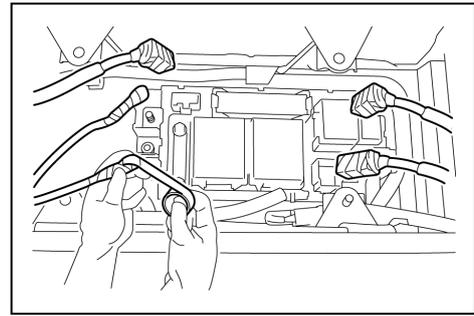
**CAUTION:**

**This operation shuts off the HV system. Be sure to wear insulated gloves because high voltage is not shut off inside the HV battery. When it is possible to remove the service plug grip, remove it and continue the procedure.**



*1	No. 1 Engine Room Relay Block and No. 1 Junction Block Assembly
*2	IGP-MAIN NO. 1 Fuse

9. After disconnecting or exposing a high-voltage connector or terminal, insulate it immediately using insulating tape. Before disconnecting or touching a bare high-voltage terminal, wear insulated gloves.



10. Check the HV battery and nearby area for leakage. If you find any liquid, it may be strong alkaline electrolyte. Wear rubber gloves and goggles and neutralize the liquid using a saturated boric acid solution or vinegar. Then wipe up the liquid using waste rags etc.
11. If the electrolyte comes in contact with your skin, use a saturated boric acid solution or a large amount of water to wash it off. If the electrolyte comes in contact with an article of clothing, take it off immediately.
12. If the electrolyte comes in contact with your eyes, call out loudly for help. Do not rub your eyes. Immediately flush them with a large amount of water for at least 15 minutes and seek medical care.
13. With the exception of the HV battery, remove parts by following procedures which are similar to conventional Lexus vehicles. For the removal of the HV battery, refer to the following pages.

Person in charge: \_\_\_\_\_

**CAUTION:**  
**HIGH-VOLTAGE.**  
**DO NOT TOUCH.**

**CAUTION:**  
**HIGH-VOLTAGE.**  
**DO NOT TOUCH.**

Person in charge: \_\_\_\_\_

When performing work on the HV system, fold this sign and put it on the roof of the vehicle.

## Dismantling the vehicle (for PHEV Model)

The following 7 pages contain general instructions for use when working on a RX450h+.

Read these instructions before proceeding to the HV battery removal instructions on page 73.



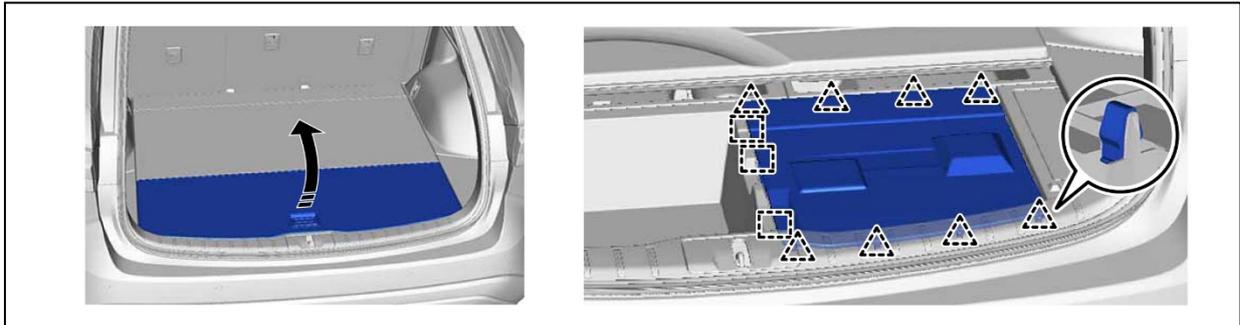
### **WARNING:**

- ***The high voltage system may remain powered for up to 10 minutes after the vehicle is shut off or disabled. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or opening any orange high voltage power cable or any high voltage component.***

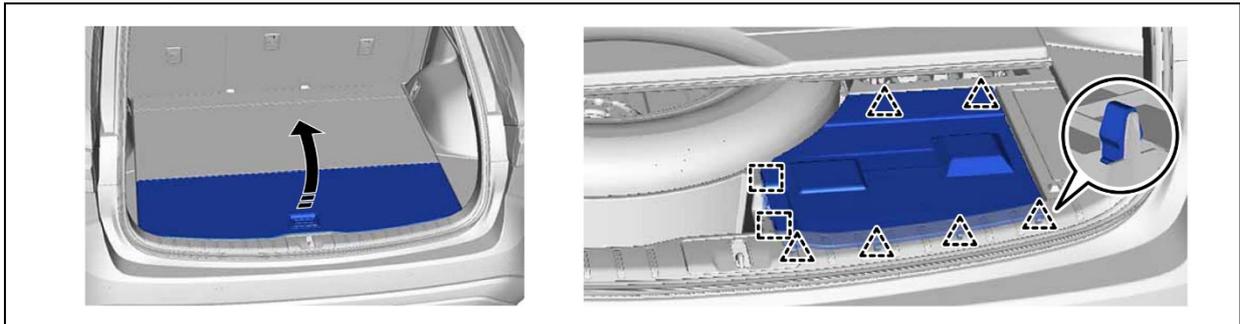
1. Shut off the ignition (**READY** indicator is off).

2. Remove battery service cover plate.

a. w/o Spare Tire:

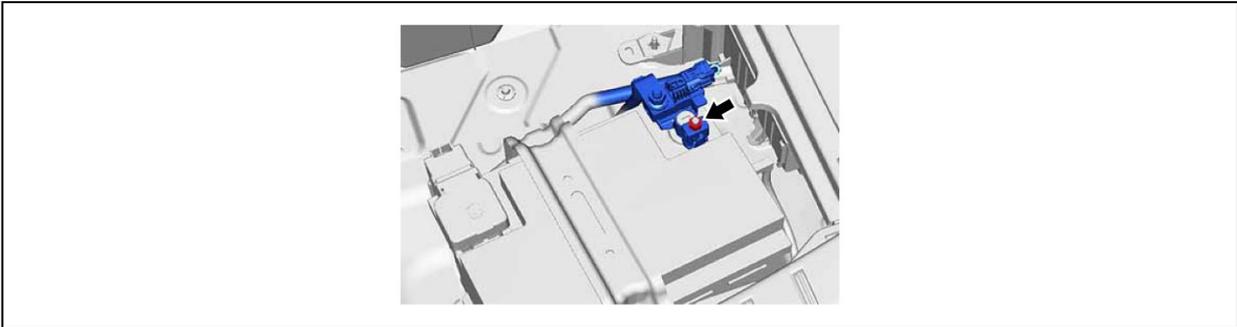


b. w/ Spare Tire:



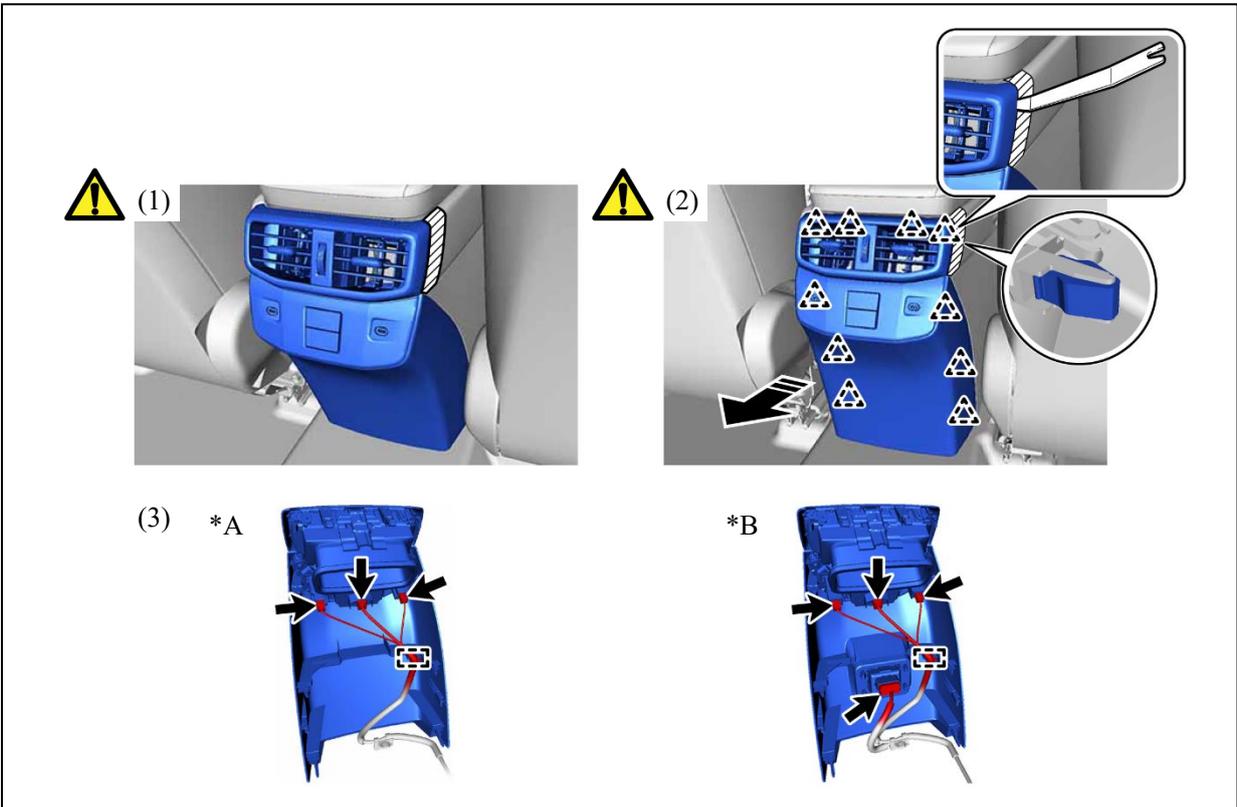
3. Disconnect cable from negative auxiliary battery terminal.

a.



4. Remove console rear end panel sub-assembly.

a.

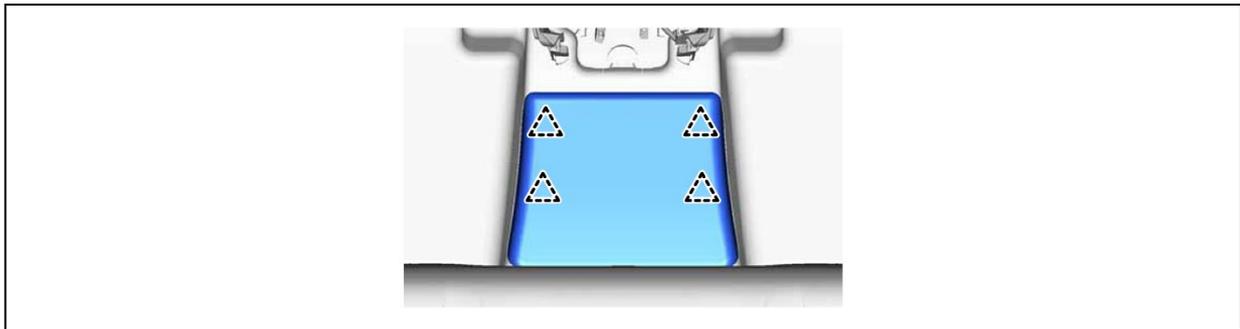


*A	w/o Power Outlet Socket	*B	w/ Power Outlet Socket
	Remove in this Direction	-	-

- (1) Apply protective tape to the area shown in the illustration.
- (2) Using a moulding remover, disengage the 10 clips as shown in the illustration to remove the console rear end panel sub-assembly.
- (3) Disengage the clamp and disconnect each connector.

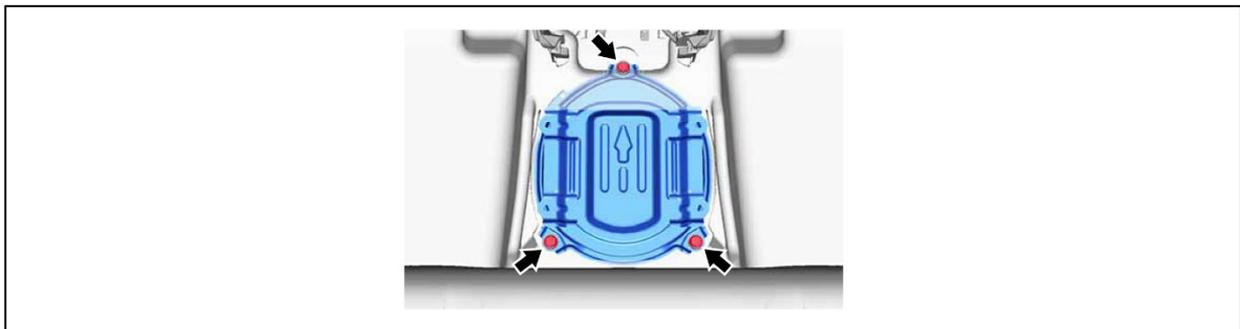
5. Remove battery service hole cover.

a.



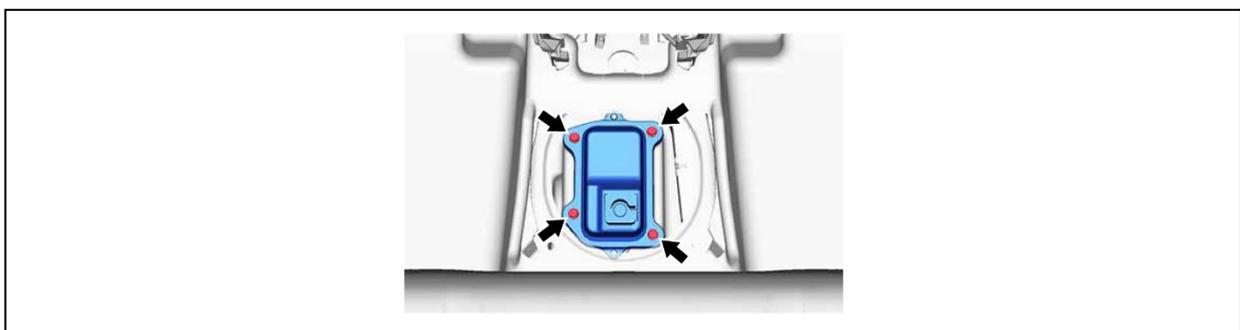
6. Remove No. 1 rear floor service hole cover.

a.



7. Remove No. 2 traction battery cover.

a.



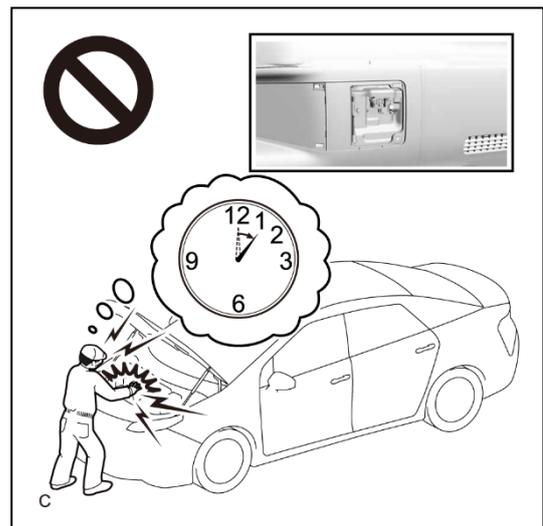
## 8. Remove service plug grip.

### CAUTION:

- Be sure to wear insulated gloves.
- Do not inspect or service the high voltage system with the service plug grip installed.
- To reduce the risk of electric shock, make sure to remove the service plug grip to cut off the high voltage circuit before servicing the vehicle.

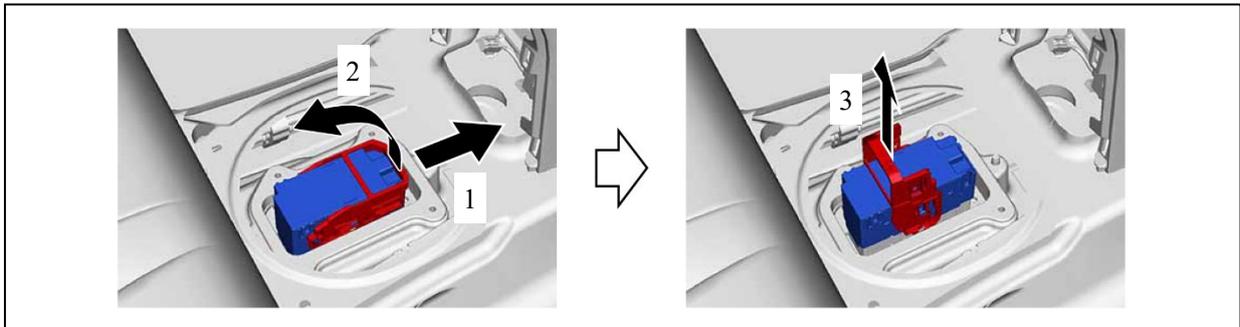


- To reduce the risk of electric shock, make sure to wait at least 10 minutes after removing the service plug grip to fully discharge the high voltage capacitor inside the inverter with converter assembly.
- Keep the removed service plug grip in your pocket to prevent other technicians from accidentally installing it while you are servicing the vehicle.



	<p><b>NOTICE:</b></p> <ul style="list-style-type: none"> <li>• After removing the service plug grip, turning the ignition switch to ON (READY) may cause a malfunction. Do not turn the ignition switch to ON (READY) unless instructed by the repair manual.</li> <li>• Do not touch the terminals of the service plug grip.</li> <li>• If the service plug grip has been struck or dropped, replace it.</li> </ul> <p><b>HINT:</b></p> <p>Waiting for at least 10 minutes is required to discharge the high voltage capacitor inside the inverter with converter assembly.</p>
---	--

a.



(1) While wearing insulated gloves, rotate the handle of the service plug grip and remove the service plug grip as indicated by the arrows, in the order shown in the illustration.

**CAUTION:**

- Do not allow any foreign matter to fall into the HV supply battery assembly.
- Take steps to prevent foreign material from falling into the HV supply battery assembly after removing the service plug grip.

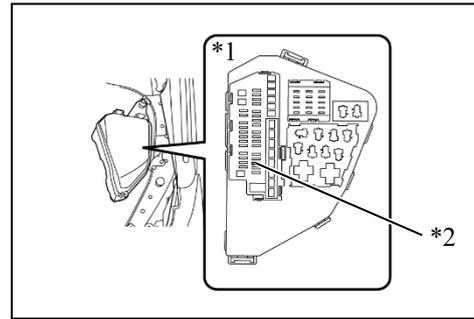
9. Carry the removed service plug grip in your pocket to prevent other technicians from accidentally installing it while you are servicing the vehicle.

10. Make other staff aware that a high-voltage system is being dismantled by using the following sign: CAUTION: HIGH-VOLTAGE. DO NOT TOUCH (see page 47).

11. If the service plug grip cannot be removed due to damage to the vehicle, remove the **IGP-MAIN NO. 1** fuse.

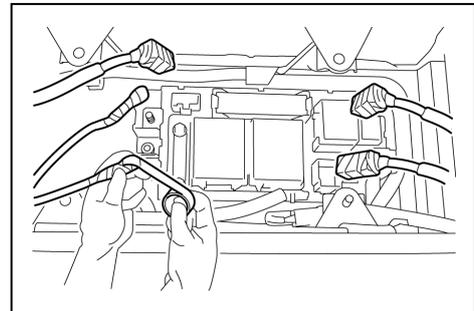
**CAUTION:**

**This operation shuts off the HV system. Be sure to wear insulated gloves because high voltage is not shut off inside the HV battery. When it is possible to remove the service plug grip, remove it and continue the procedure.**



	No. 1 Engine Room Relay Block and No. 1 Junction Block Assembly
*1	No. 1 Engine Room Relay Block and No. 1 Junction Block Assembly
*2	IGP-MAIN NO. 1 Fuse

12. After disconnecting or exposing a high-voltage connector or terminal, insulate it immediately using insulating tape. Before disconnecting or touching a bare high-voltage terminal, wear insulated gloves.



13. Check the HV battery and nearby area for leakage. If you find any liquid, wear rubber gloves and goggles, and wipe up the liquid using waste rags etc.
14. If the electrolyte comes in contact with your skin, wash the area thoroughly with soap and plenty of water, and seek medical care. If the electrolyte comes in contact with an article of clothing, take it off immediately. Prolonged contact with the electrolyte may cause skin irritation.
15. If the electrolyte comes in contact with your eyes, call out loudly for help. Do not rub your eyes. Wash them immediately with a large amount of water and seek medical care.
16. With the exception of the HV battery, remove parts by following procedures which are similar to conventional Lexus vehicles. For the removal of the HV battery, refer to the following pages.

Person in charge:

**CAUTION:**  
**HIGH-VOLTAGE.**  
**DO NOT TOUCH.**

**CAUTION:**  
**HIGH-VOLTAGE.**  
**DO NOT TOUCH.**

Person in charge:

When performing work on the HV system, fold this sign and put it on the roof of the vehicle.

## Removal of HV battery (for HEV Model)



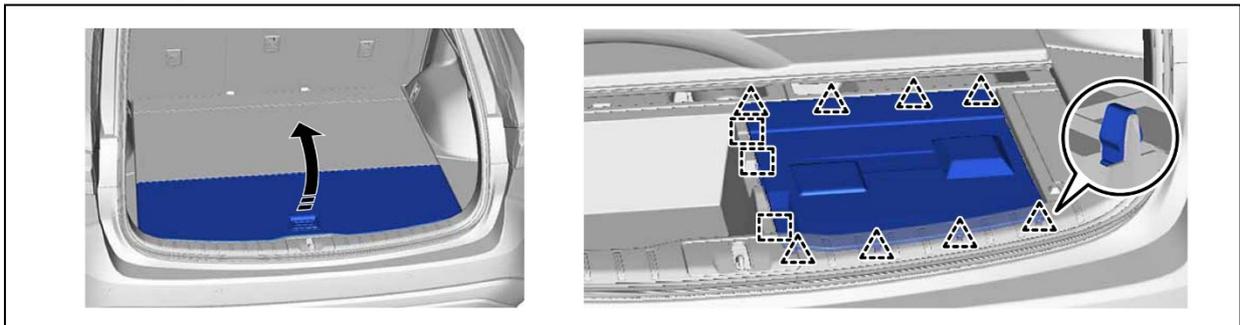
### **WARNING:**

- *Be sure to wear insulated gloves when handling high-voltage parts.*
- *Even if the vehicle is shut off and the relays are off, be sure to remove the service plug grip before performing any further work.*
- *Power remains in the high voltage electrical system for 10 minutes even after the HV battery pack is shut off because the circuit has a condenser that stores power.*
- *Make sure that the tester reading is 0 V before touching any high-voltage terminals which are not insulated.*
- *The SRS may remain powered for up to 90 seconds after the vehicle is shut off or disabled. To prevent serious injury or death from unintentional SRS deployment, avoid cutting the SRS components.*

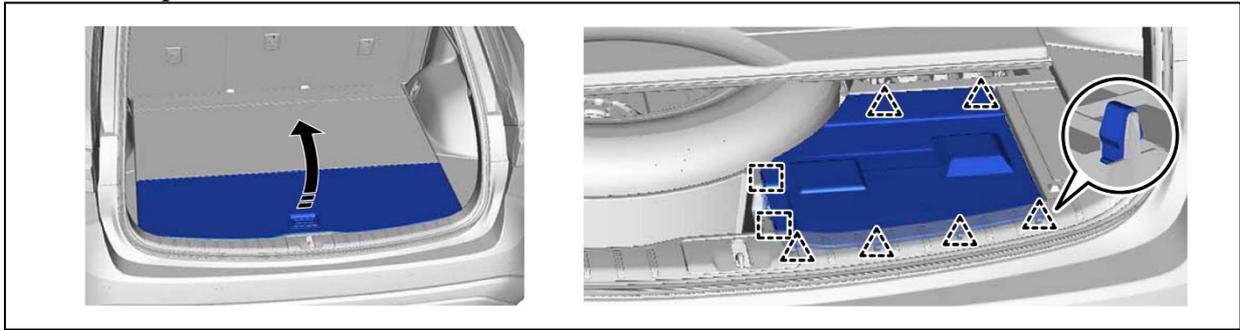
1. SHUT OFF IGNITION (**READY** indicator is off)

2. REMOVE BATTERY SERVICE COVER PLATE

a. w/o Spare Tire:

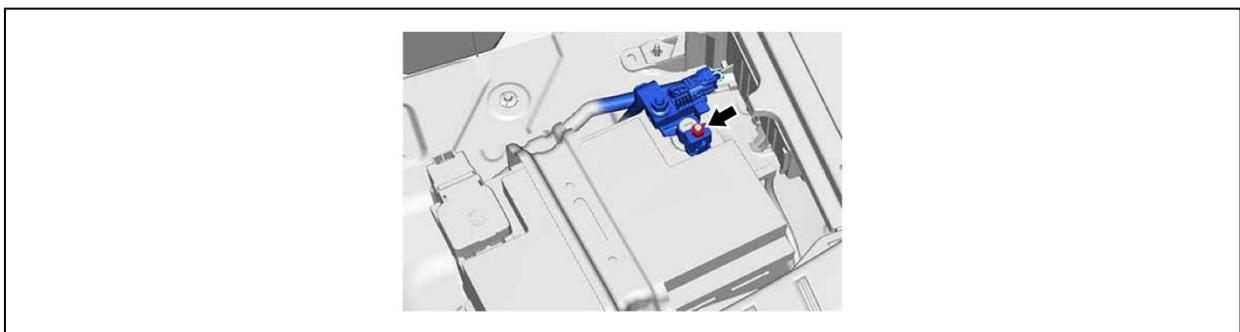


b. w/ Spare Tire:



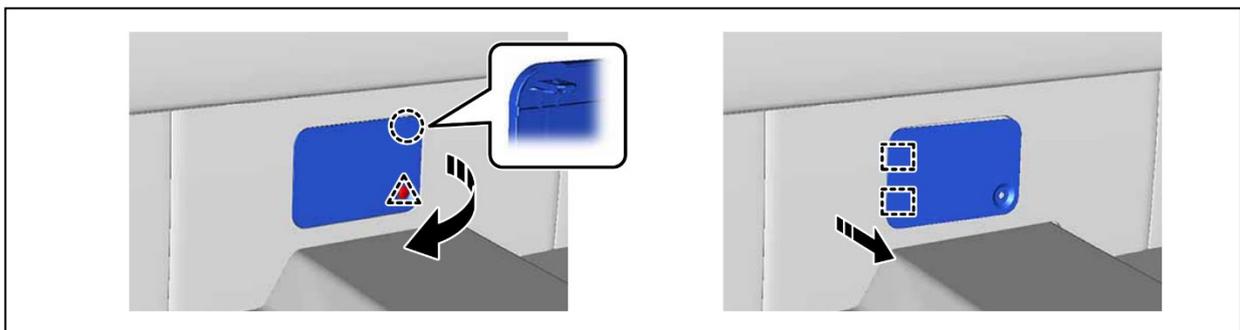
### 3. DISCONNECT CABLE FROM NEGATIVE AUXILIARY BATTERY TERMINAL

a.



### 4. REMOVE BATTERY SERVICE HOLE COVER

a.



## 5. REMOVE SERVICE PLUG GRIP

### CAUTION:

- Be sure to wear insulated gloves.
- Do not inspect or service the high voltage system with the service plug grip installed.
- To reduce the risk of electric shock, make sure to remove the service plug grip to cut off the high voltage circuit before servicing the vehicle.



- To reduce the risk of electric shock, make sure to wait at least 10 minutes after removing the service plug grip to fully discharge the high voltage capacitor inside the inverter with converter assembly.
- Keep the removed service plug grip in your pocket to prevent other technicians from accidentally installing it while you are servicing the vehicle.



**NOTICE:**

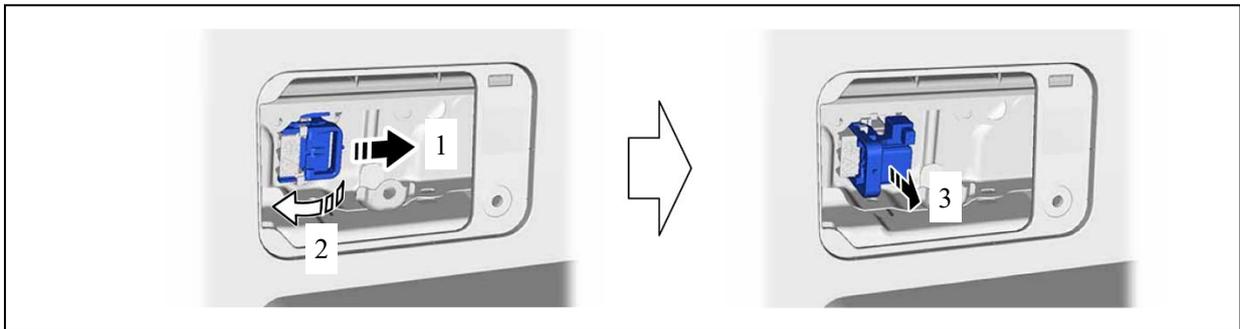
- After removing the service plug grip, turning the ignition switch to ON (READY) may cause a malfunction. Do not turn the ignition switch to ON (READY) unless instructed by the repair manual.
- Do not touch the terminals of the service plug grip.
- If the service plug grip has been struck or dropped, replace it.



**HINT:**

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

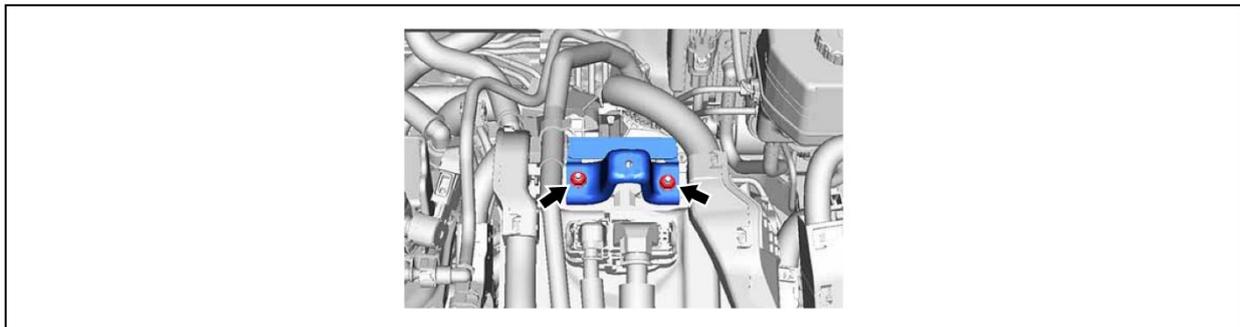
a.



- (1) While wearing insulated gloves, rotate the handle of the service plug grip and remove the service plug grip as indicated by the arrows, in the order shown in the illustration.

**6. REMOVE NO. 2 INVERTER PROTECTOR (for A25A-FXS)**

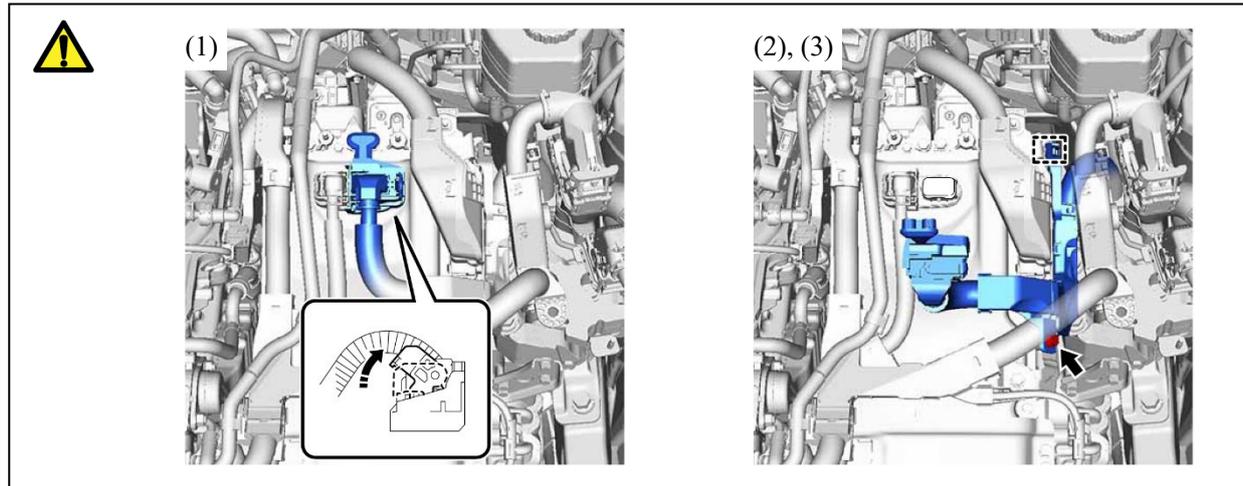
a.



## 7. DISCONNECT ENGINE ROOM MAIN WIRE (for A25A-FXS)

	<p><b>CAUTION:</b> <b>Be sure to wear insulated gloves.</b></p> <p><b>NOTICE:</b> Do not allow any foreign matter or water to enter the hybrid motor control inverter assembly.</p>
---	---

a.



- (1) Move the lock lever as shown in the illustration and disconnect the hybrid motor control inverter assembly connector.

**NOTICE:**

- Do not touch the waterproof seal or terminals of the connector.
  - Do not damage the terminals, connector housing or hybrid motor control inverter assembly during disconnection.
  - Cover the hole where the cable was connected with tape (non-residue type) or equivalent to prevent entry of foreign matter.
  - Insulate the disconnected terminals with insulating tape.
- (2) Remove the bolt.
- (3) Disengage the clamp and disconnect the engine room main wire.

## 8. REMOVE CONNECTOR COVER ASSEMBLY (for A25A-FXS)

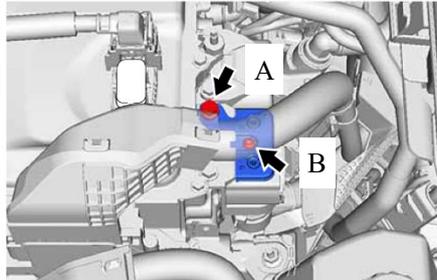


**CAUTION:**  
Be sure to wear insulated gloves.

a.



(1), (2)



- (1) Remove the bolt (A).
- (2) Using a T20 "TORX" socket wrench, remove the bolt (B) and connector cover assembly from the hybrid motor control inverter assembly.

### NOTICE:

- Do not touch the connector cover assembly waterproof seal.
- Do not allow any foreign matter or water to enter the hybrid motor control inverter assembly.

## 9. CHECK TERMINAL VOLTAGE (for A25A-FXS)

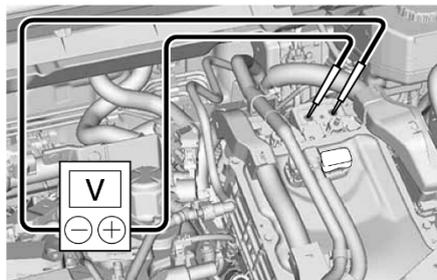


**CAUTION:**  
Be sure to wear insulated gloves.

a.



(1)



(1) Using a voltmeter, measure the voltage between the terminals of the 2 phase connectors.

**Standard Voltage:**

**0 V**

**NOTICE:**

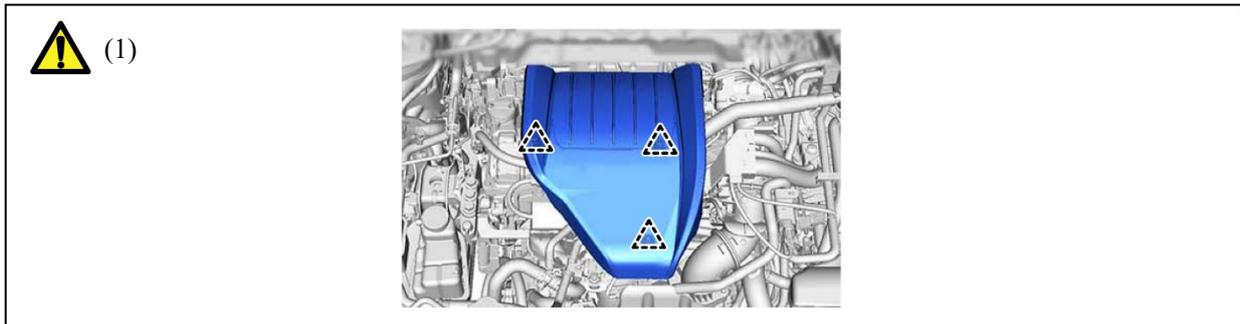
Do not allow any foreign matter or water to enter the hybrid motor control inverter assembly.

**HINT:**

Use a measuring range of DC 750 V or more on the voltmeter.

## 10. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (for T24A-FTS)

a.



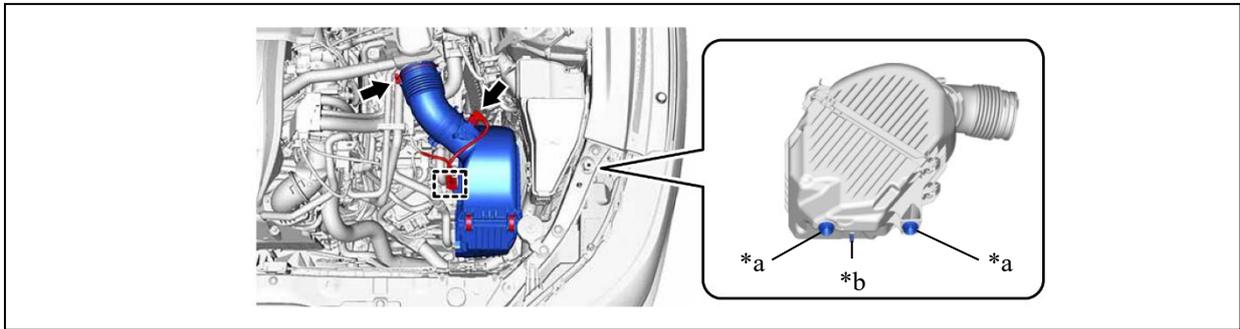
(1) Disengage the 3 clips and remove the No. 1 engine cover sub-assembly.

**NOTICE:**

Pull the No. 1 engine cover sub-assembly straight up when removing. If the No. 1 engine cover sub-assembly is not pulled straight up when removing, it may become damaged.

11. REMOVE AIR CLEANER ASSEMBLY WITH NO. 1 AIR CLEANER HOSE (for T24A-FTS)

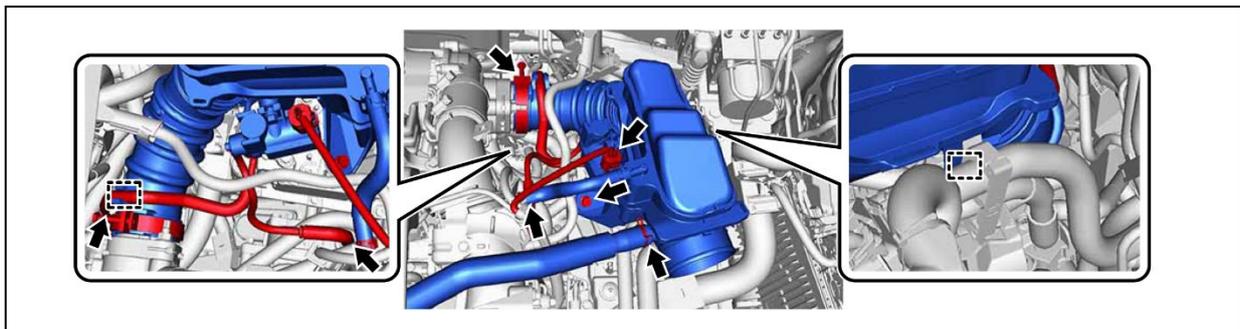
a.



*a	Grommet	*b	Pin
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12. REMOVE AIR CLEANER HOSE ASSEMBLY (for T24A-FTS)

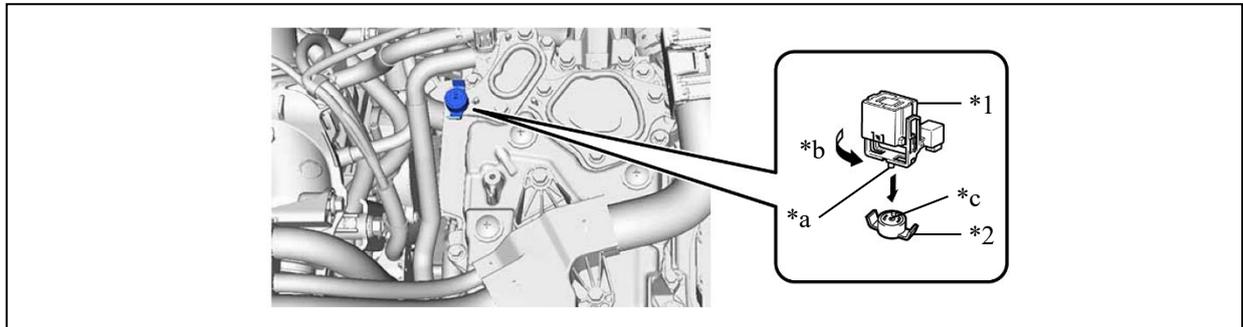
a.



### 13. REMOVE BATTERY COVER LOCK STRIKER (for T24A-FTS)

	<p><b>CAUTION:</b> Be sure to wear insulated gloves.</p>
---	--

a.



*1	Service Plug Grip	*2	Battery Cover Lock Striker
*a	Projection	*b	Turn
*c	Button	-	-

(1) Using the service plug grip, remove the battery cover lock striker.

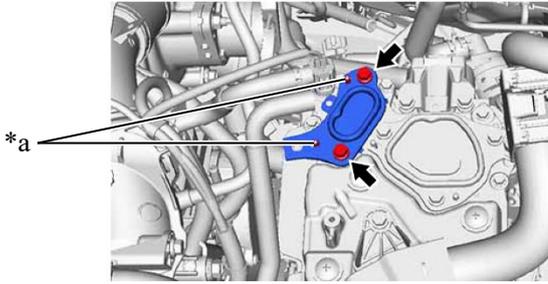
**HINT:**

Insert the projection of the service plug grip and turn the button of the battery cover lock striker counterclockwise to release the lock.

#### 14. REMOVE INVERTER TERMINAL COVER (for T24A-FTS)

	<p><b>CAUTION:</b> Be sure to wear insulated gloves.</p>
---	--

a.

	<p>(1)</p>	
---	------------	--

*a	Guide Pin	-	-
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(1) Remove the 2 bolts and disengage the 2 guide pin, and remove the inverter terminal cover.

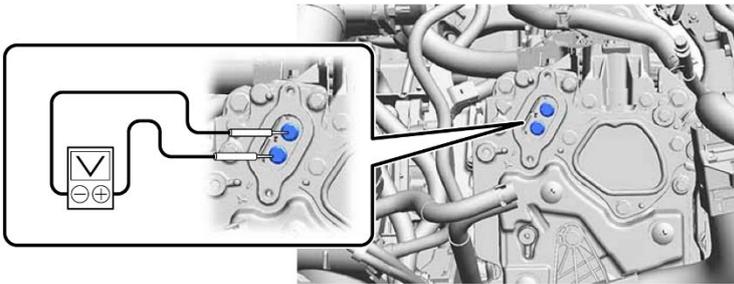
**NOTICE:**

- Do not touch the inverter cover gasket if not replacing it.
- Do not allow any foreign matter or water to enter the EV converter assembly.

#### 15. CHECK TERMINAL VOLTAGE (for T24A-FTS)

	<p><b>CAUTION:</b> Be sure to wear insulated gloves.</p>
---	--

a.

	<p>(1)</p>	
---	------------	--

(1) Using a voltmeter, measure the voltage between the terminals of the 2 phase connectors.

**Standard Voltage:**

**0 V**

**NOTICE:**

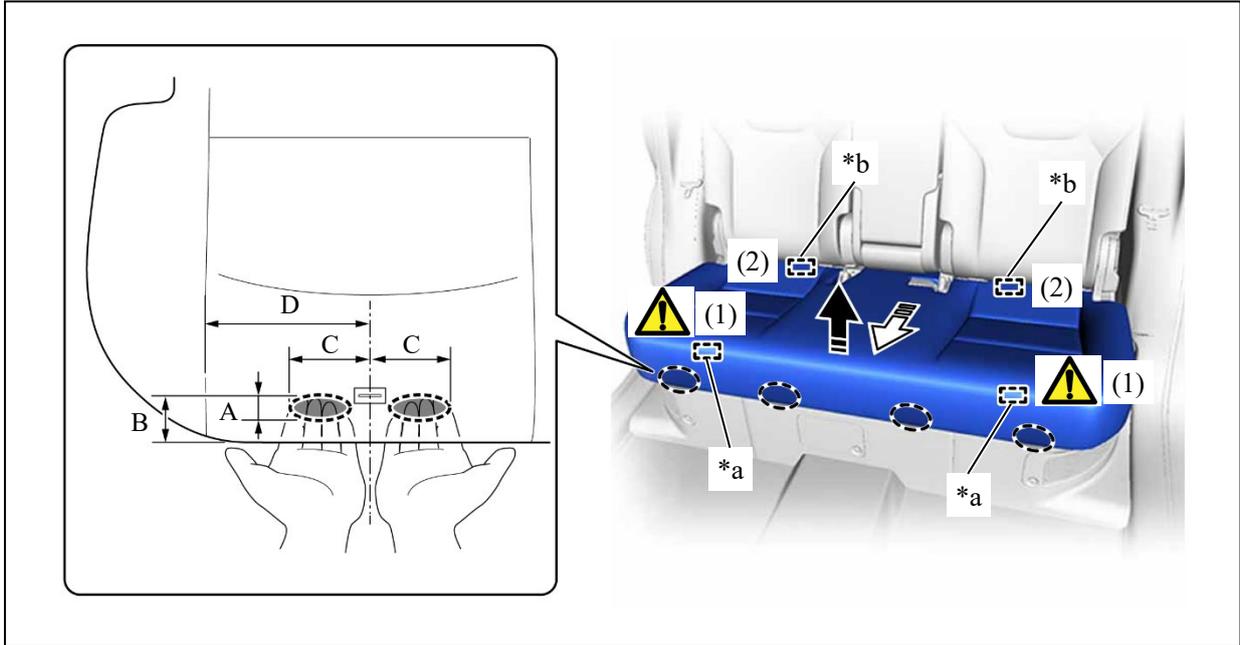
Do not allow any foreign matter or water to enter the EV converter assembly.

**HINT:**

Use a measuring range of DC 750 V or more on the voltmeter.

16. REMOVE REAR SEAT CUSHION ASSEMBLY

a.



*a	Rear Seat Cushion Frame Hook (Front Side)	*b	Rear Seat Cushion Frame Hook (Rear Side)
	Place Hand Here		Remove in this Direction (1)
	Remove in this Direction (2)	-	-

- (1) Lift the front edge of the rear seat cushion assembly as shown in the illustration and disengage the 2 rear seat cushion frame hooks on the front side of the rear seat cushion assembly from the rear seat cushion lock hooks.

Area	Measurement	Area	Measurement
A	30 mm (1.18 in.)	B	60 mm (2.36 in.)
C	80 mm (3.15 in.)	D	20 mm (0.787 in.)

**NOTICE:**

- Disengage each hook at the front part of the rear seat cushion frame one area at a time.
- Be sure to hold the parts of the seat cushion assembly directly next to the rear seat cushion frame hooks when lifting it. Lifting a different part of the cushion may deform the rear seat cushion frame.

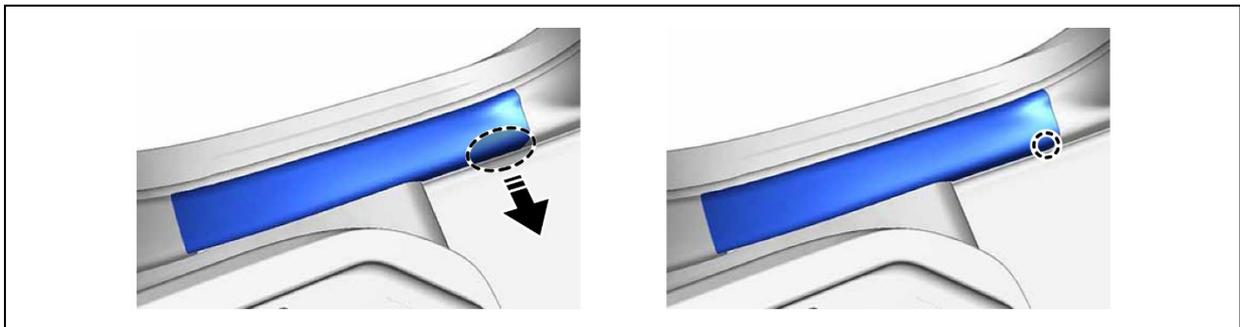
- (2) Disengage the 2 rear seat cushion frame hooks on the rear side of the rear seat cushion assembly as shown in the illustration.
- (3) Disconnect each connector.
- (4) Remove the rear seat cushion assembly.

**NOTICE:**

Be careful not to damage the vehicle body.

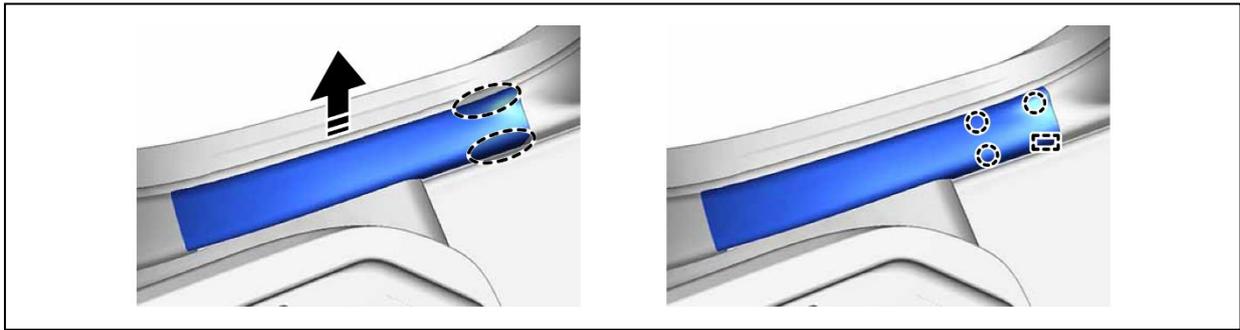
## 17. REMOVE REAR DOOR SCUFF PLATE LH

a.



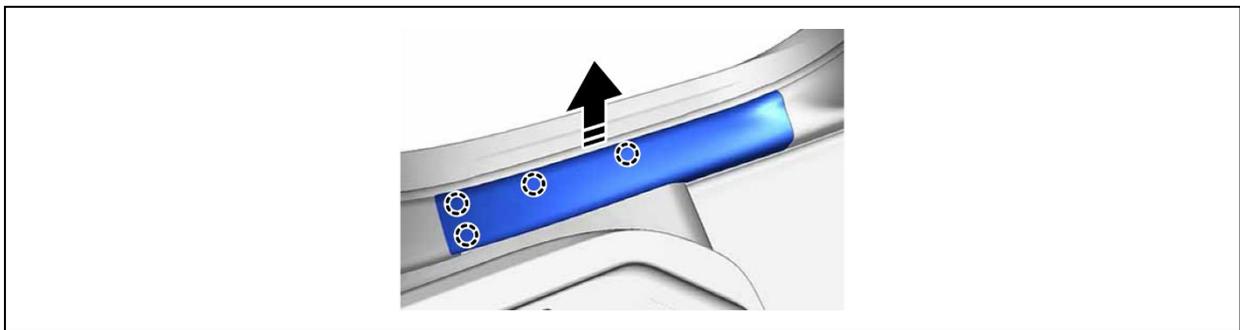
	Place Hand Here		Remove in this Direction
---	-----------------	---	--------------------------

b.



	Place Hand Here		Remove in this Direction
---	-----------------	---	--------------------------

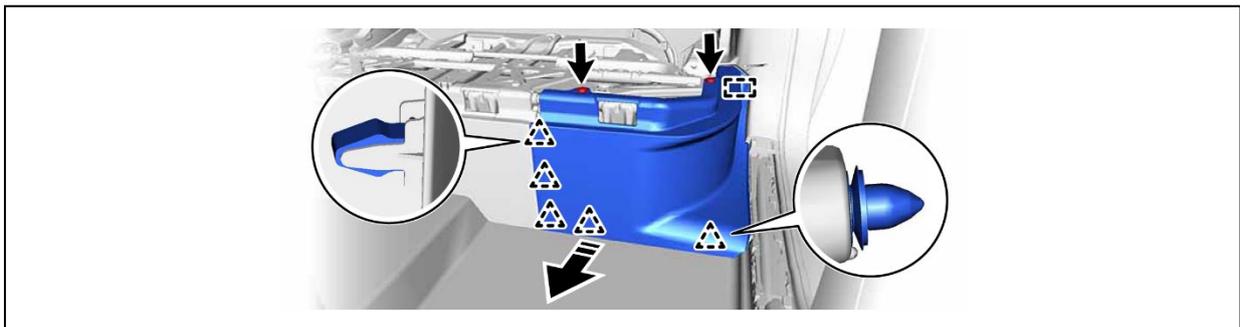
c.



	Remove in this Direction	-	-
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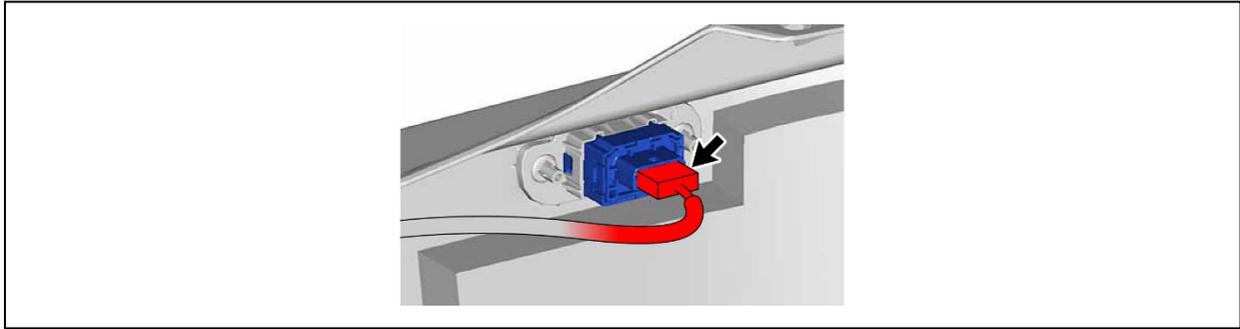
### 18. REMOVE NO. 3 BATTERY SERVICE COVER BOARD

a.



	Remove in this Direction	-	-
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b. w/ Rear Power Seat System:



19. REMOVE REAR DOOR SCUFF PLATE RH

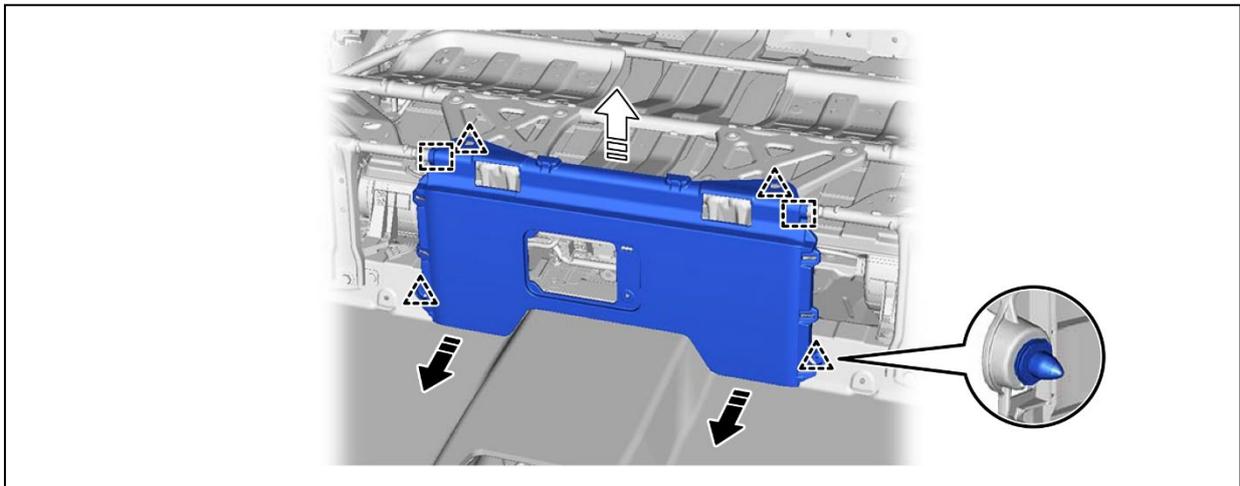
(1) Use the same procedure as for the LH side.

20. REMOVE NO. 2 BATTERY SERVICE COVER BOARD

(1) Use the same procedure as for the No. 3 battery service cover board.

21. REMOVE NO. 1 BATTERY SERVICE COVER BOARD

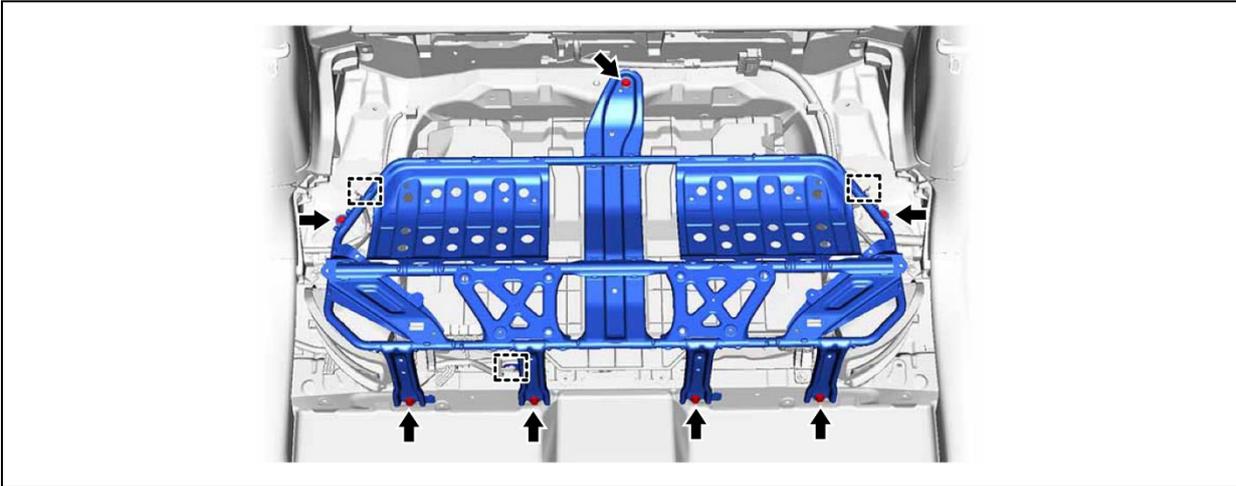
a.



	Remove in this Direction (1)		Remove in this Direction (2)
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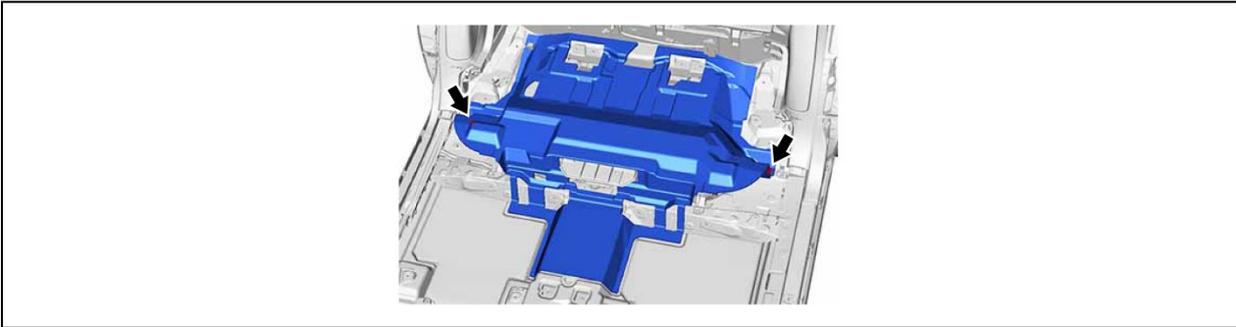
22. REMOVE REAR SEAT CUSHION LEG SUB-ASSEMBLY

a.



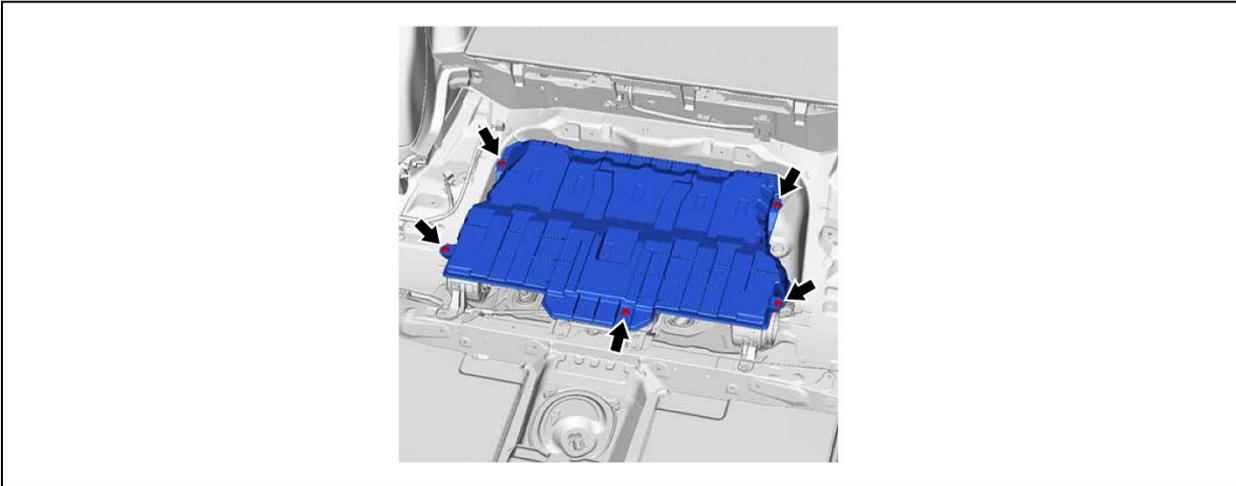
23. REMOVE NO. 2 FLOOR MAT

a.



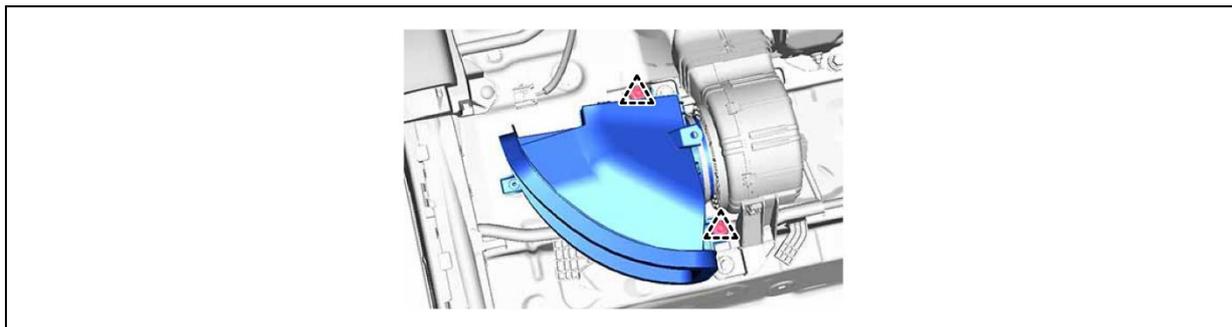
24. REMOVE UPPER HV BATTERY COVER SUB-ASSEMBLY

a.



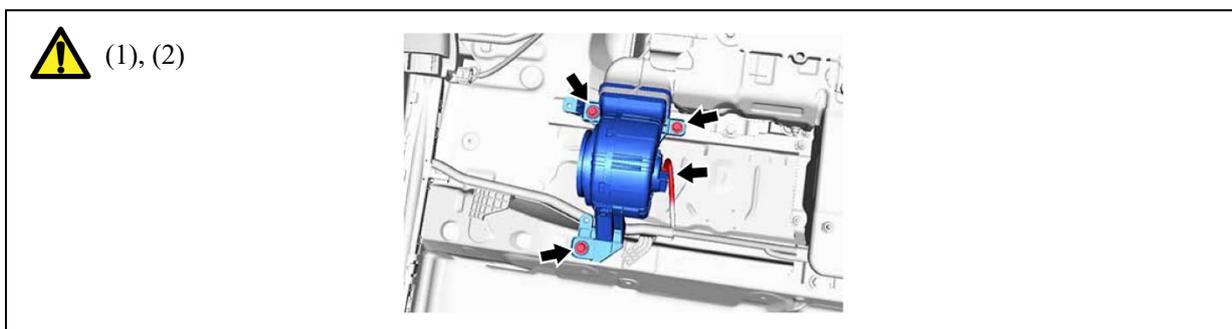
## 25. REMOVE NO. 1 HYBRID BATTERY INTAKE DUCT

a.



## 26. REMOVE NO. 2 BATTERY COOLING BLOWER ASSEMBLY

a.



- (1) Disconnect the No. 2 battery cooling blower assembly connector.
- (2) Remove the 3 bolts and No. 2 battery cooling blower assembly from the HV battery.

### **NOTICE:**

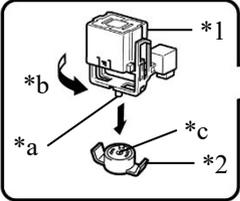
- Be sure not to touch the fan part of the No. 2 battery cooling blower assembly.
- Do not lift the No. 2 battery cooling blower assembly using the wire harness.

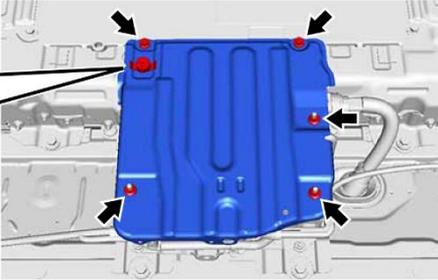
27. REMOVE NO. 6 HV BATTERY SHIELD SUB-ASSEMBLY

	<p><b>CAUTION:</b>  <b>Be sure to wear insulated gloves.</b></p>
---	--

a. for A25A-FXS:

	<p>(1), (2)</p>
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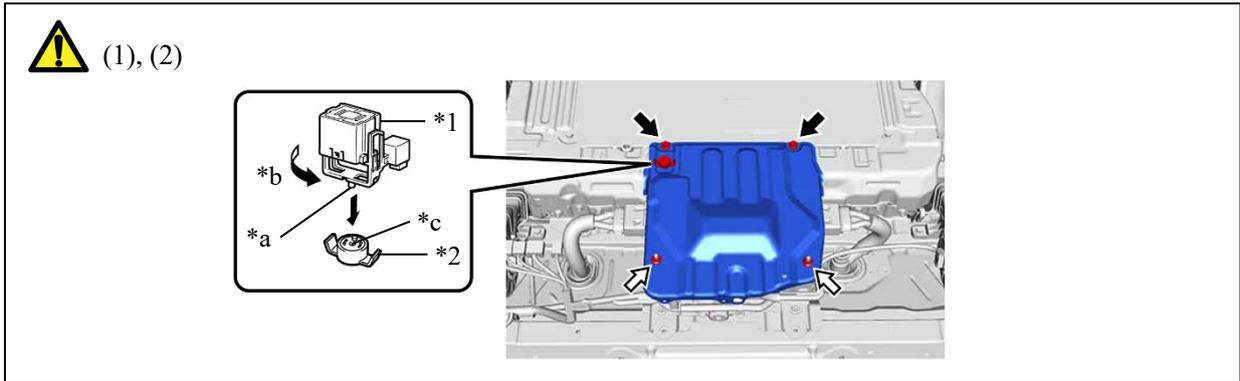




*1	Service Plug Grip	*2	Battery Cover Lock Striker
*a	Projection	*b	Turn
*c	Button	-	-

- (1) Insert the projection of the service plug grip and turn the button of the No. 6 HV battery shield sub-assembly counterclockwise to release the lock to remove the No. 6 HV battery shield sub-assembly.
- (2) Remove the 2 bolts, 3 nuts and No. 6 HV battery shield sub-assembly from the HV battery.

b. for T24A-FTS:



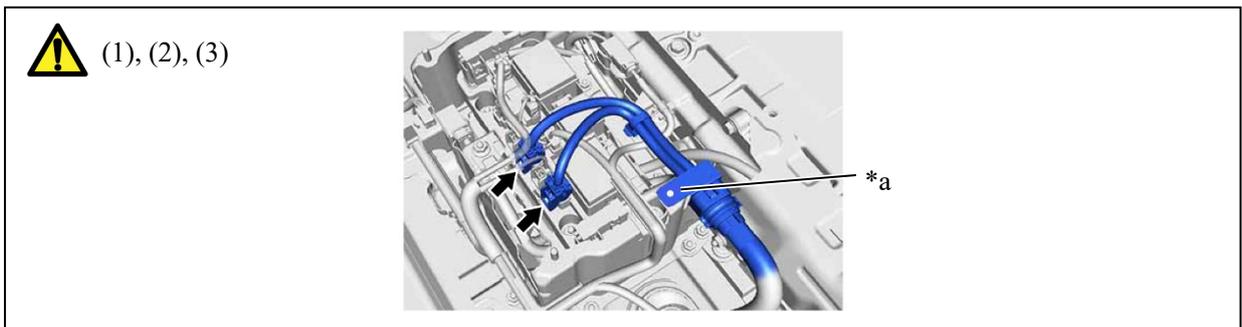
*1	Service Plug Grip	*2	Battery Cover Lock Striker
*a	Projection	*b	Turn
*c	Button	-	-

- (1) Insert the projection of the service plug grip and turn the button of the No. 6 HV battery shield sub-assembly counterclockwise to release the lock to remove the No. 6 HV battery shield sub-assembly.
- (2) Remove the 2 bolts, 2 nuts and No. 6 HV battery shield sub-assembly from the HV battery.

## 28. DISCONNECT HV FLOOR UNDER WIRE (for A25A-FXS)



a.



*a	Shield Ground	-	-
----	---------------	---	---

- (1) Disconnect the 2 No. 1 traction battery device box assembly connectors.

**NOTICE:**

Insulate each disconnected high-voltage connector with insulating tape. Wrap the connector from the wire harness side to the end of the connector.

- (2) Disengage the clamp.
- (3) Remove the nut and disconnect the shield ground from the HV battery.

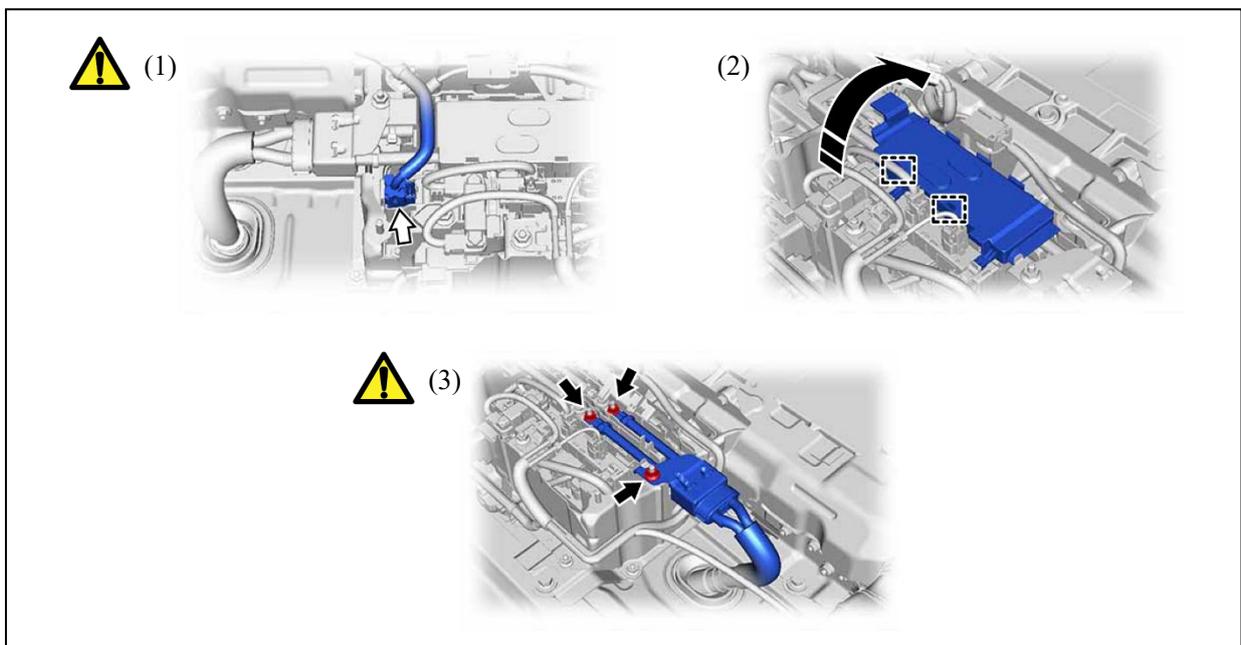
## 29. DISCONNECT NO. 2 HV FLOOR UNDER WIRE (for T24A-FTS)



**CAUTION:**

**Be sure to wear insulated gloves.**

a.



- (1) Disconnect the connector.

**NOTICE:**

To prevent the wire harness from being caught, make sure to bundle the wire harness using insulating tape or equivalent.

- (2) Disengage the claw and open the No. 2 traction battery device box cover as shown in the illustration.
- (3) Using an insulated tool, Remove 3 nuts and disconnect the floor under wire and No. 2 floor under wire.

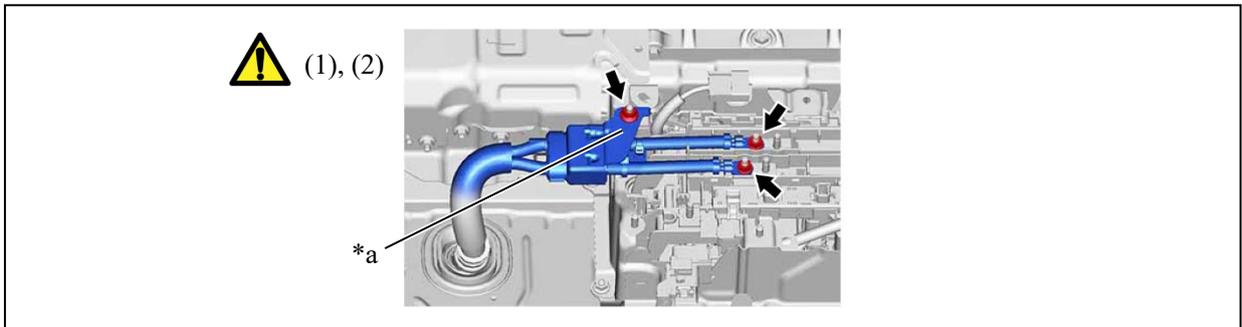
**NOTICE:**

To prevent the wire harness from being caught, make sure to bundle the wire harness using insulating tape or equivalent.

30. DISCONNECT HV BATTERY CHARGER WIRE (for T24A-FTS)

	<b>CAUTION:</b> <b>Be sure to wear insulated gloves.</b>
---	---

a.



*a	Shield Ground	-	-
----	---------------	---	---

- (1) Using an insulated tool, remove the 3 nuts and disconnect the HV battery charger wire.

**NOTICE:**

To prevent the wire harness from being caught, make sure to bundle the wire harness using insulating tape or equivalent.

### 31. DISCONNECT FLOOR WIRE

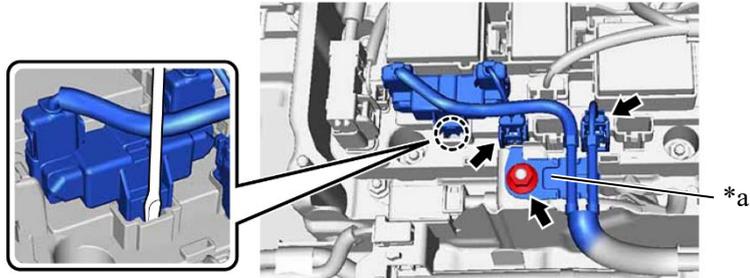


**CAUTION:**  
Be sure to wear insulated gloves.

a. for A25A-FXS (w/ Voltage Inverter):



(1), (2), (3)



*a	Shield Ground	-	-
----	---------------	---	---

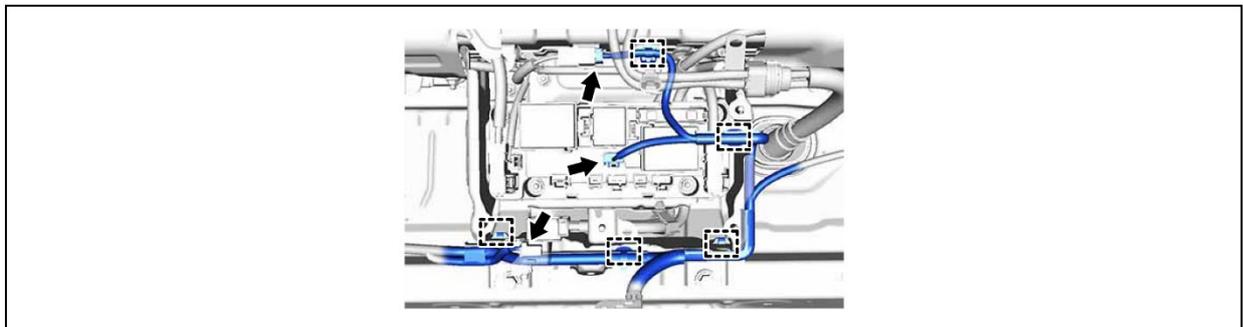
(1) Disconnect the 2 No. 1 traction battery device box assembly connectors.

**NOTICE:**

Insulate each disconnected high-voltage connector with insulating tape. Wrap the connector from the wire harness side to the end of the connector.

- (2) Remove the nut and disconnect the shield ground from the HV battery.
- (3) Using a screwdriver, disengage the claw to disconnect the floor wire.

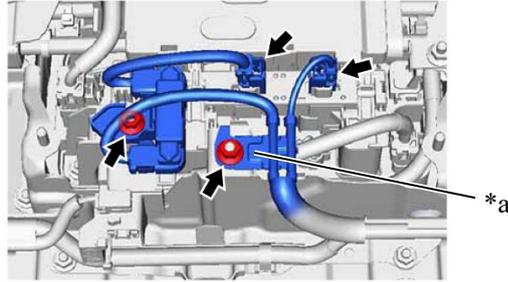
b. for A25A-FXS:



c. for T24A-FTS (w/ Voltage Inverter):



(1), (2), (3)



*a	Shield Ground	-	-
----	---------------	---	---

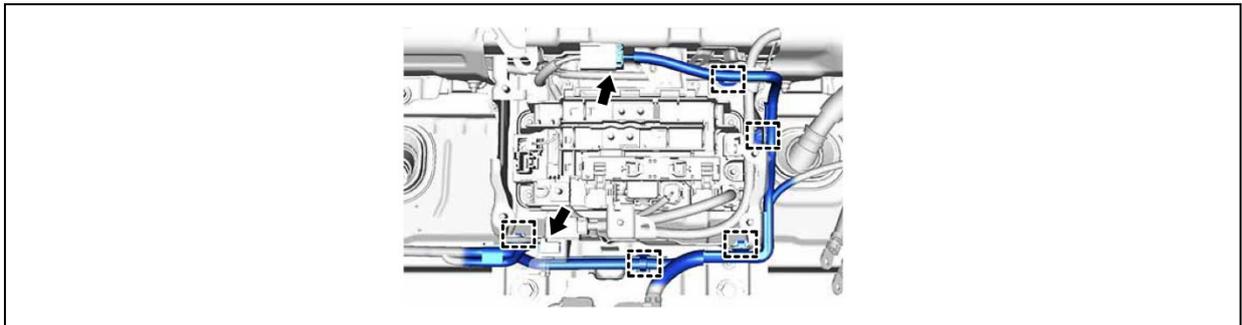
(1) Remove the 2 nuts and disconnect the shield ground from the HV battery.

(2) Disconnect the 2 No. 1 traction battery device box assembly connectors.

**NOTICE:**

Insulate each disconnected high-voltage connector with insulating tape. Wrap the connector from the wire harness side to the end of the connector.

d. for T24A-FTS:



## 32. REMOVE HV BATTERY

### **CAUTION**

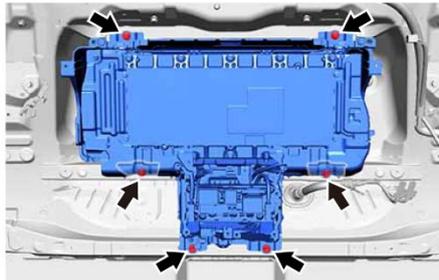
**Be sure to wear insulated gloves.**

### **NOTICE:**

- Do not allow foreign matter, such as grease or oil, to adhere to the bolts of the HV battery.
- To prevent the wire harness from being caught, make sure to bundle the wire harness using insulating tape or equivalent.
- Use cardboard or another similar material to protect the HV battery and vehicle body from damage.
- Since the HV battery is very heavy, 2 people are needed to remove it. When removing the HV battery, be careful not to damage the parts around it.
- When removing the HV battery from the vehicle, do not allow it to contact the vehicle.
- When removing/installing/moving the HV battery, make sure not to tilt it more than 30°.
- Insulate the disconnected terminals or connectors with insulating tape.



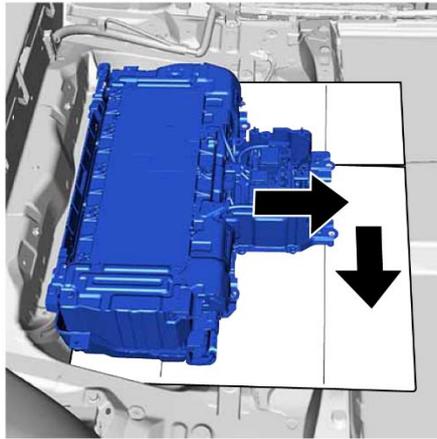
a.



b.



(1), (2), (3)

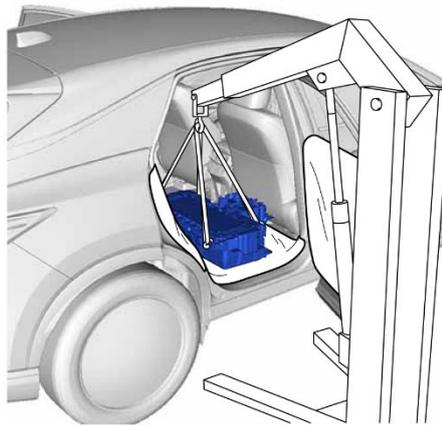


- (1) Tilt the HV battery and place cardboard.
- (2) Pull the HV battery to the front of the vehicle as shown in the illustration.
- (3) Pull the HV battery to the RH side of the vehicle as shown in the illustration.

c.



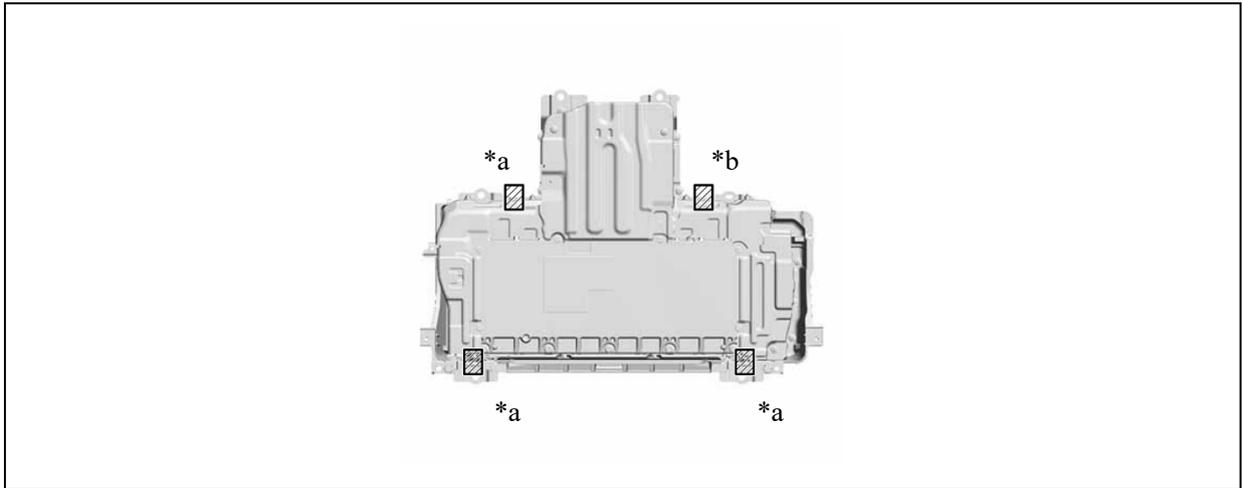
(1), (2)



- (1) To prevent scratches or damage, use protective sheets to protect the vehicle interior and body.
- (2) Using a suitable adaptor such as straps and 4 hooks, remove the HV battery while tilting it.

**NOTICE:**

Set the 4 hooks as shown in the illustration.



*a	Hook installation hole	*b	Hook installation hole of 8 mm or less in thickness
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## Removal of HV battery (for PHEV Model)



### **WARNING:**

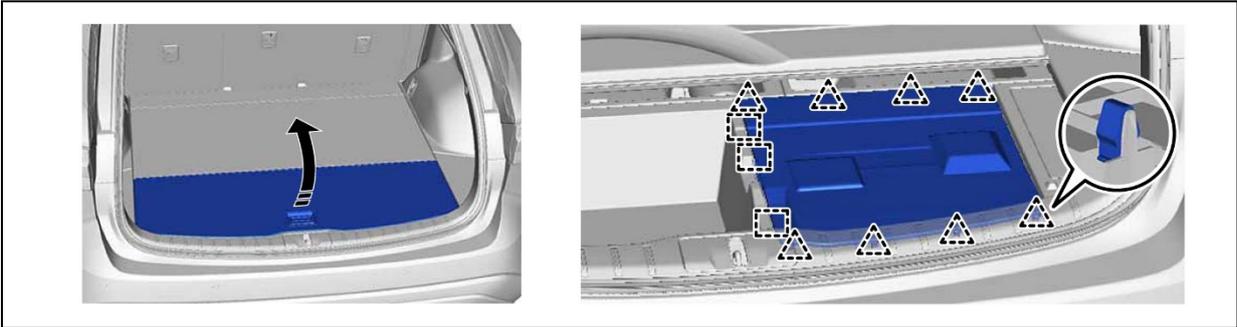
- *Be sure to wear insulated gloves when handling high-voltage parts.*
- *Even if the vehicle is shut off and the relays are off, be sure to remove the service plug grip before performing any further work.*
- *Power remains in the high voltage electrical system for 10 minutes even after the HV battery assembly is shut off because the circuit has a condenser that stores power.*
- *Make sure that the tester reading is 0 V before touching any high-voltage terminals which are not insulated.*
- *The SRS may remain powered for up to 90 seconds after the vehicle is shut off or disabled. To prevent serious injury or death from unintentional SRS deployment, avoid cutting the SRS components.*

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM

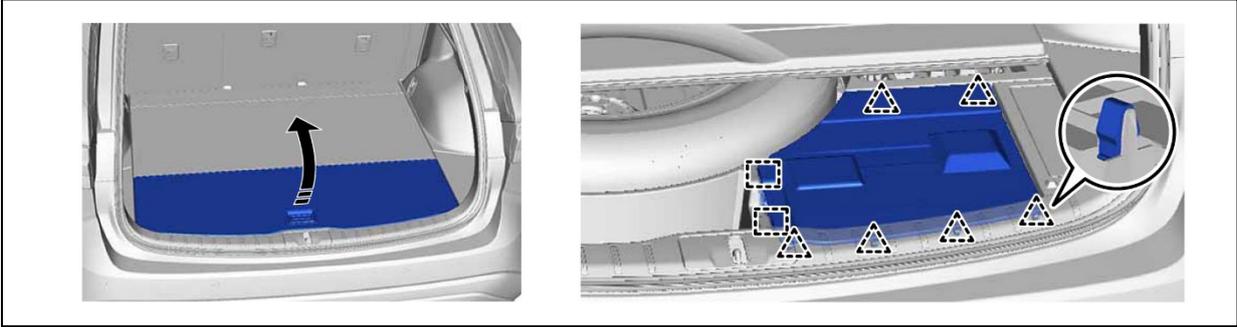
2. SHUT OFF IGNITION (**READY** indicator is off)

3. REMOVE BATTERY SERVICE COVER PLATE

a. w/o Spare Tire:

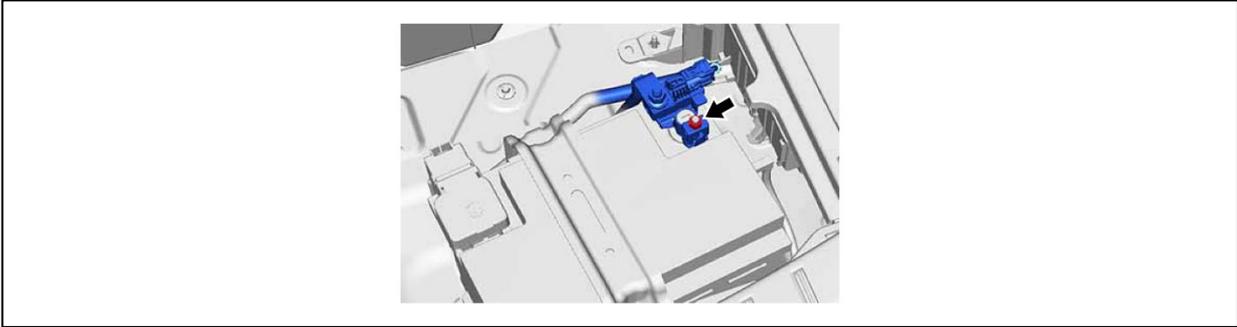


b. w/ Spare Tire:



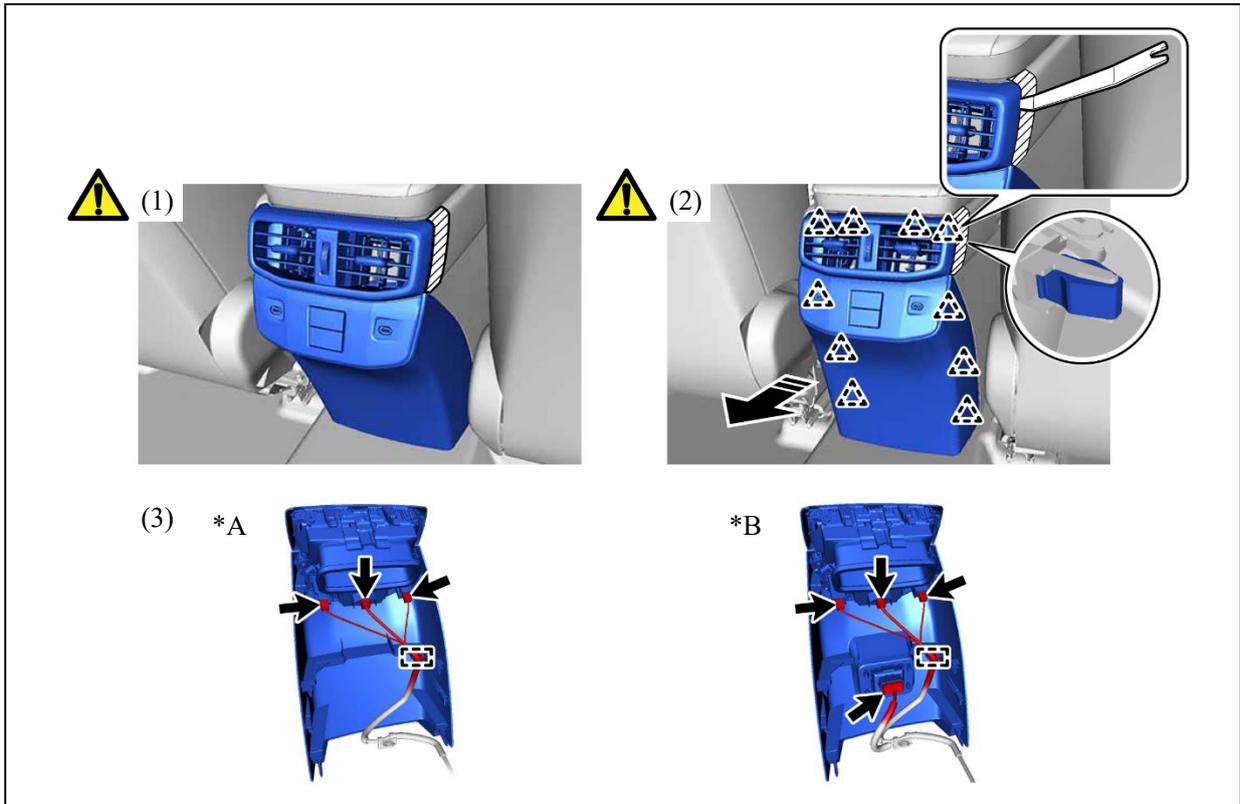
4. DISCONNECT CABLE FROM NEGATIVE AUXILIARY BATTERY TERMINAL

a.



## 5. REMOVE CONSOLE REAR END PANEL SUB-ASSEMBLY

a.

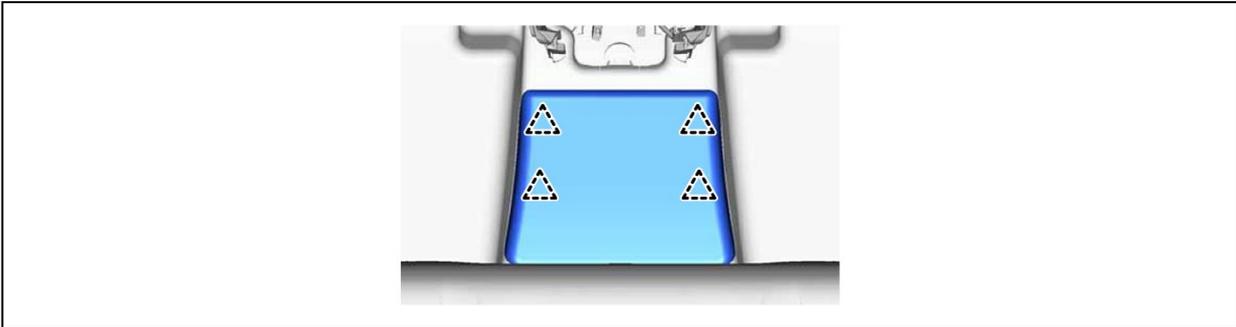


*A	w/o Power Outlet Socket	*B	w/ Power Outlet Socket
	Remove in this Direction	-	-

- (1) Apply protective tape to the area shown in the illustration.
- (2) Using a moulding remover, disengage the 10 clips as shown in the illustration to remove the console rear end panel sub-assembly.
- (3) Disengage the clamp and disconnect each connector.

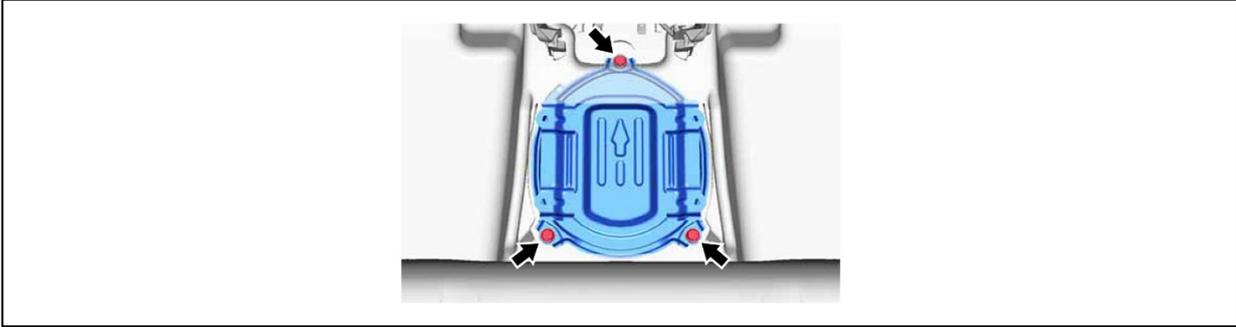
6. REMOVE BATTERY SERVICE HOLE COVER

a.



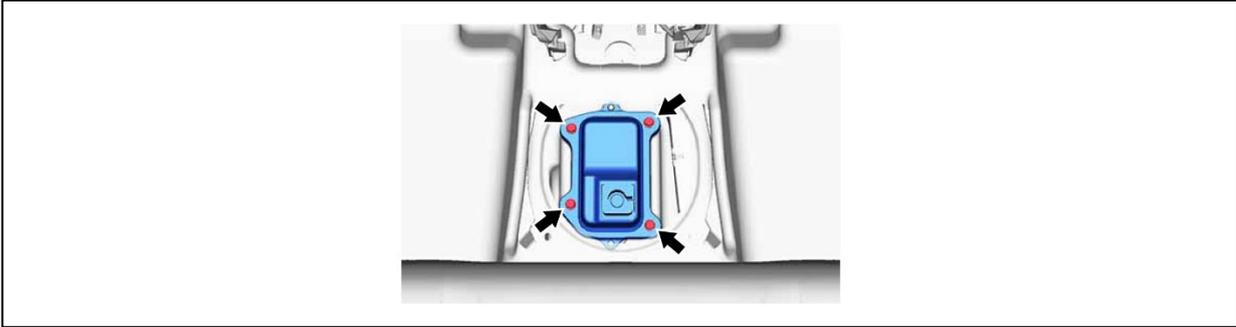
7. REMOVE NO. 1 REAR FLOOR SERVICE HOLE COVER

a.



8. REMOVE NO. 2 TRACTION BATTERY COVER

a.



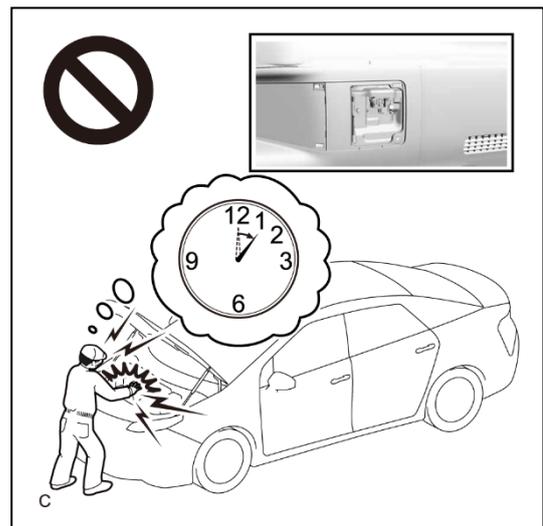
## 9. REMOVE SERVICE PLUG GRIP

### CAUTION:

- Be sure to wear insulated gloves.
- Do not inspect or service the high voltage system with the service plug grip installed.
- To reduce the risk of electric shock, make sure to remove the service plug grip to cut off the high voltage circuit before servicing the vehicle.



- To reduce the risk of electric shock, make sure to wait at least 10 minutes after removing the service plug grip to fully discharge the high voltage capacitor inside the inverter with converter assembly.
- Keep the removed service plug grip in your pocket to prevent other technicians from accidentally installing it while you are servicing the vehicle.





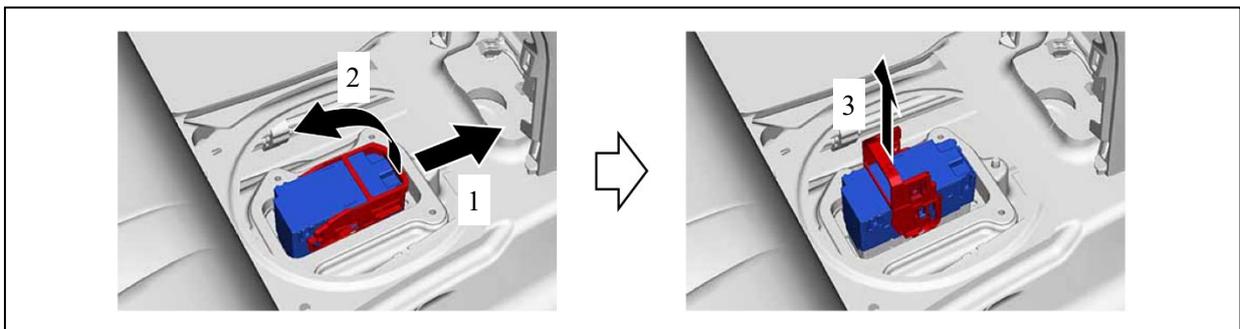
**NOTICE:**

- After removing the service plug grip, turning the ignition switch to ON (READY) may cause a malfunction. Do not turn the ignition switch to ON (READY) unless instructed by the repair manual.
- Do not touch the terminals of the service plug grip.
- If the service plug grip has been struck or dropped, replace it.

**HINT:**

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

a.



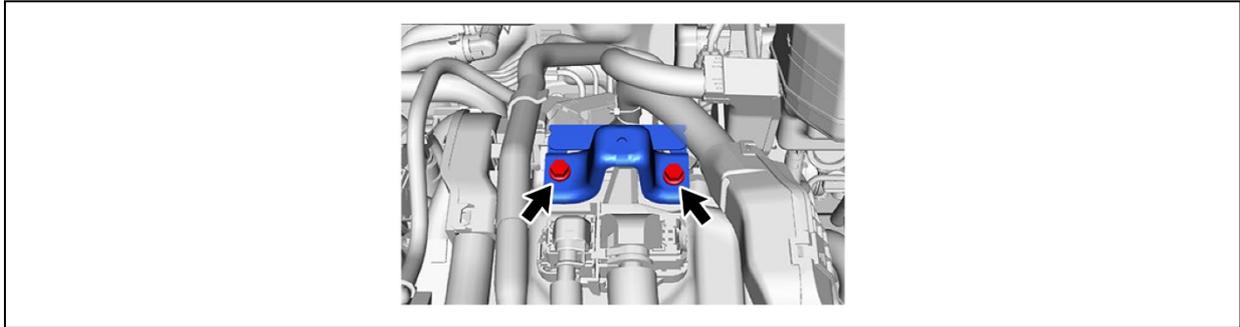
- (1) While wearing insulated gloves, rotate the handle of the service plug grip and remove the service plug grip as indicated by the arrows, in the order shown in the illustration.

**CAUTION:**

- Do not allow any foreign matter to fall into the HV supply battery assembly.
- Take steps to prevent foreign material from falling into the HV supply battery assembly after removing the service plug grip.

## 10. REMOVE NO. 2 INVERTER PROTECTOR

a.



## 11. REMOVE CONNECTOR COVER ASSEMBLY



### **CAUTION:**

**Be sure to wear insulated gloves.**

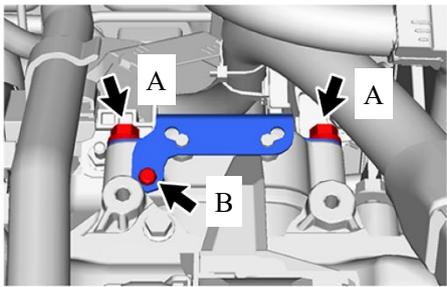
### **NOTICE:**

Do not allow any foreign matter or water to enter the inverter with converter assembly.

a.



(1), (2)



(1) Remove the 2 bolts (A).

(2) Using a T25 "TORX" socket wrench, remove the bolt (B) and connector cover assembly from the inverter with converter assembly.

## 12. CHECK TERMINAL VOLTAGE

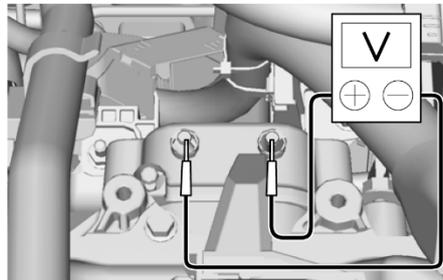


**CAUTION:**  
Be sure to wear insulated gloves.

a.



(1)



(1) Using a voltmeter, measure the voltage between the terminals of the 2 phase connectors.

**Standard voltage: 0 V**

**NOTICE:**

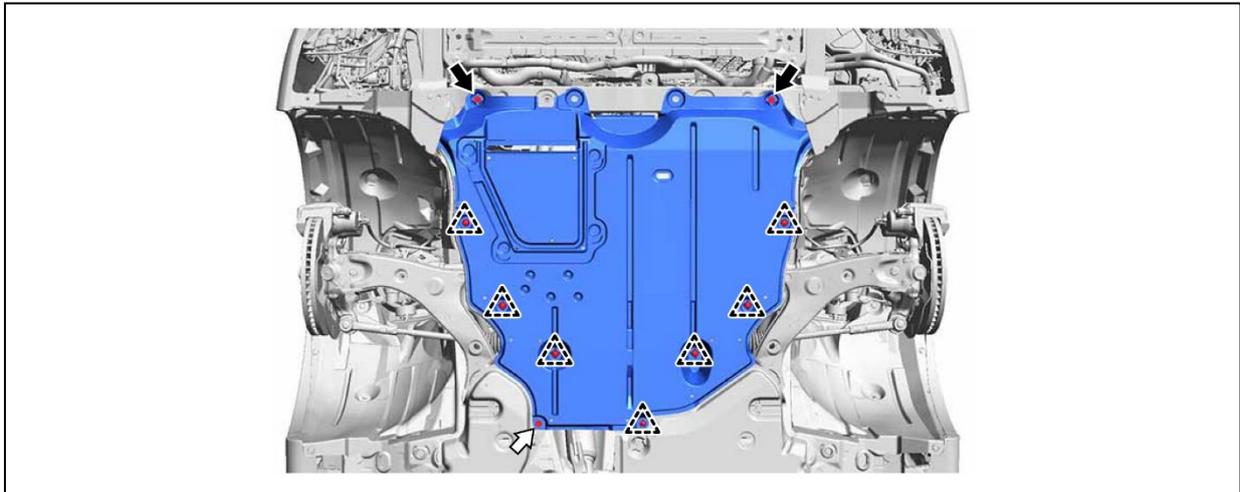
Do not allow any foreign matter or water to enter the inverter with converter assembly.

**HINT:**

Use a measuring range of DC 750 Volt or more on the voltmeter.

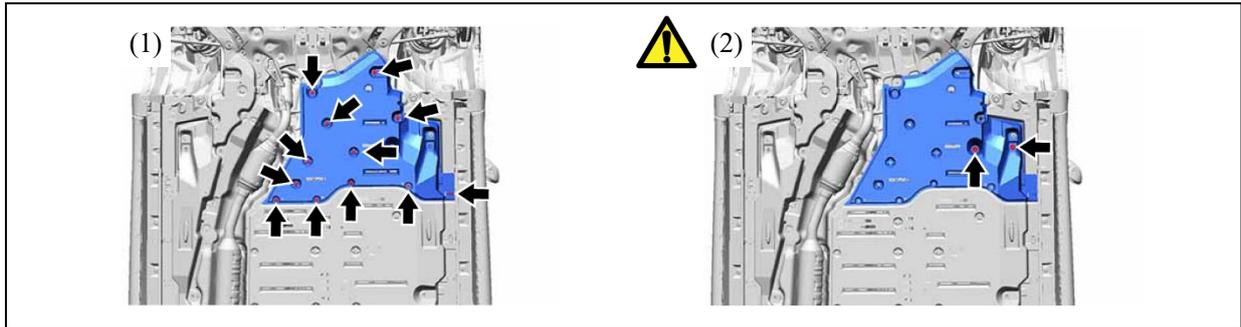
## 13. REMOVE NO. 2 ENGINE UNDER COVER ASSEMBLY

a.



## 14. REMOVE FRONT FLOOR COVER LH

a.



(1) Remove the 2 bolts, 3 screws and 7 clips.

(2) Turn the 2 clips and remove the front floor cover LH from the vehicle body.

### **NOTICE:**

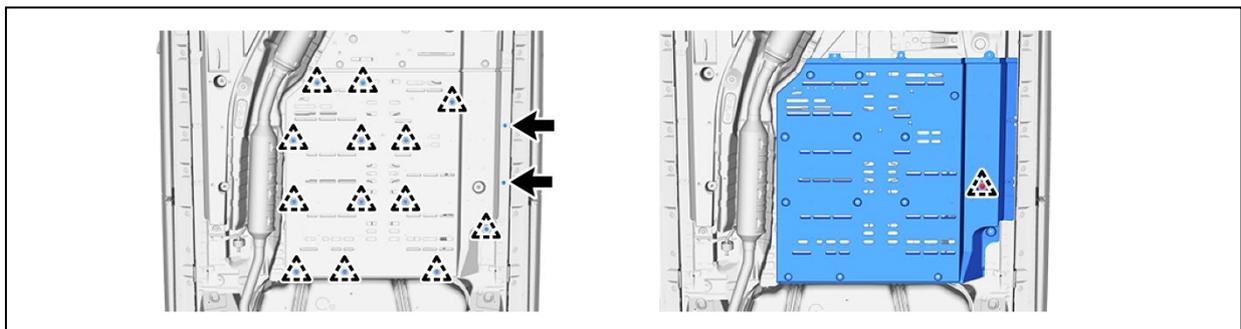
If the 2 clips are not turned when the front floor cover LH is removed, the front floor cover LH or stud bolt may be damaged.

### **HINT:**

Do not remove the clips from the front floor cover LH.

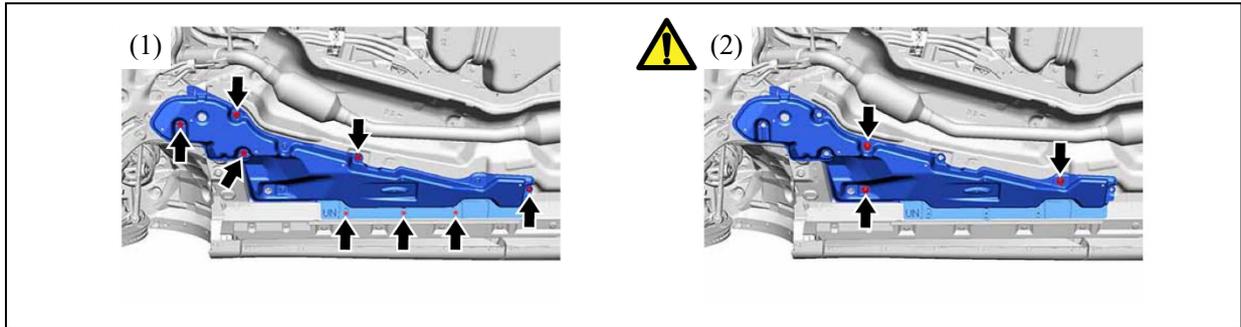
## 15. REMOVE NO. 2 FLOOR UNDER COVER

a.



## 16. REMOVE FRONT FLOOR COVER RH

a.



(1) Remove the 4 bolts, 3 screws and clip.

(2) Turn the 3 clips and remove the front floor cover RH from the vehicle body.

### **NOTICE:**

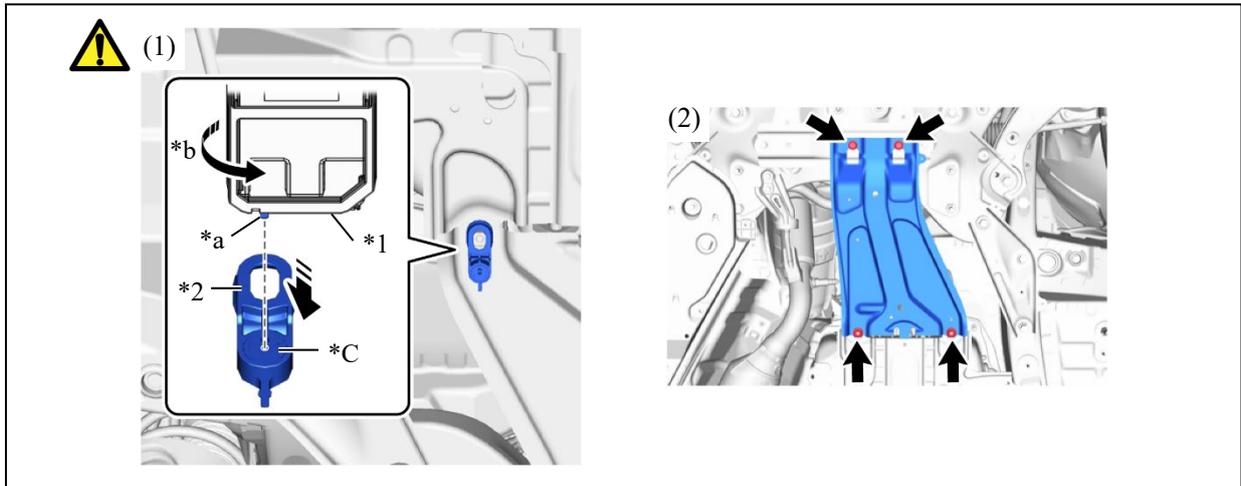
If the 3 clips are not turned when the front floor cover RH is removed, the front floor cover RH or stud bolt may be damaged.

### **HINT:**

Do not remove the clips from the front floor cover RH.

## 17. REMOVE ENGINE UNDER COVER HEAT INSULATOR

a.



*1	Service Plug Grip	*2	No.23 Traction Battery Bracket
*a	Projection	*b	Turn
*c	Button	-	-

- (1) Insert the projection of the service plug grip and turn the button of the No.23 traction battery bracket counterclockwise to release the lock to remove the No.23 traction battery bracket.
- (2) Remove the 2 bolts, 2 nuts and engine under cover heat insulator.

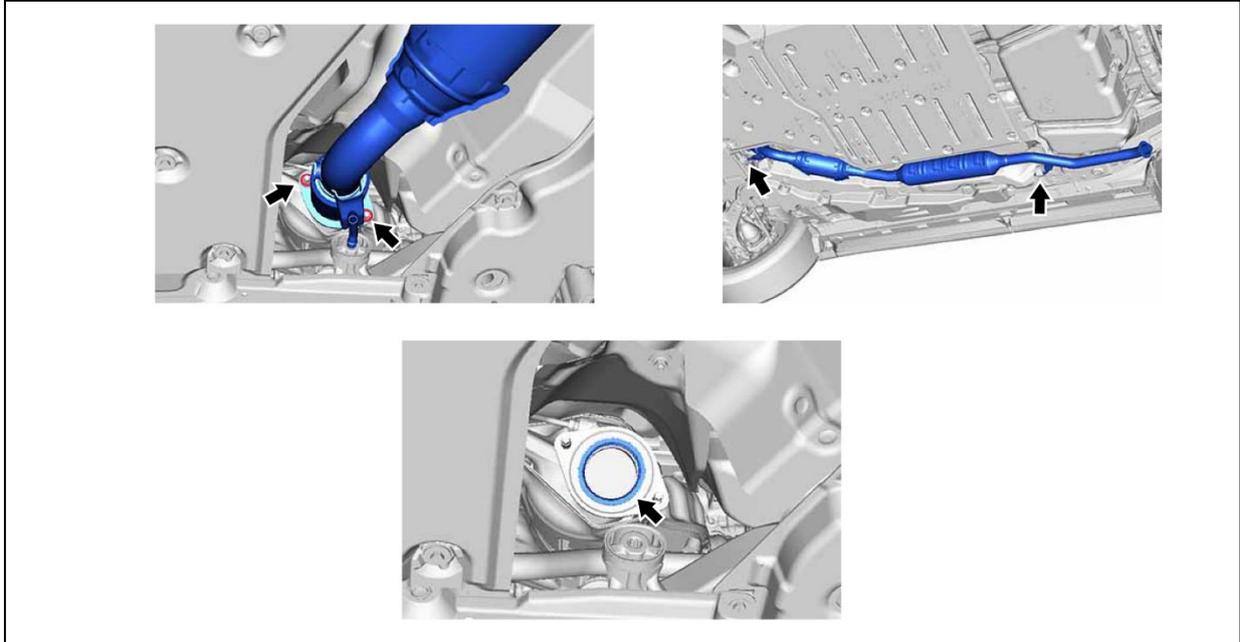
## 18. REMOVE FRONT EXHAUST PIPE ASSEMBLY



### **CAUTION:**

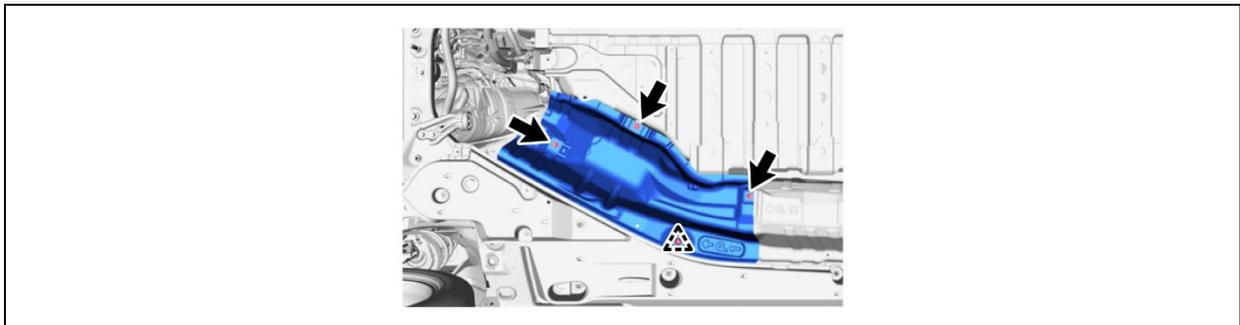
**To prevent burns, do not touch the engine, exhaust pipe or other high temperature components while the engine is hot.**

a.



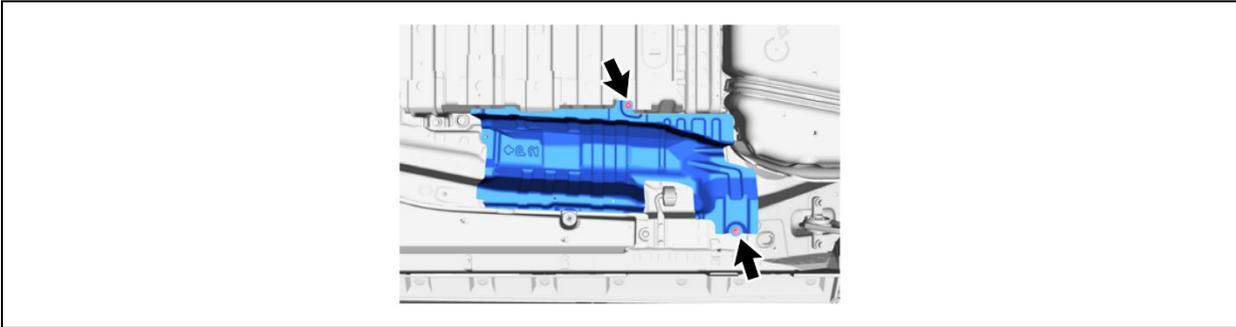
## 19. REMOVE FRONT NO. 2 FLOOR HEAT INSULATOR

a.



20. REMOVE FRONT LOWER NO. 1 FLOOR HEAT INSULATOR

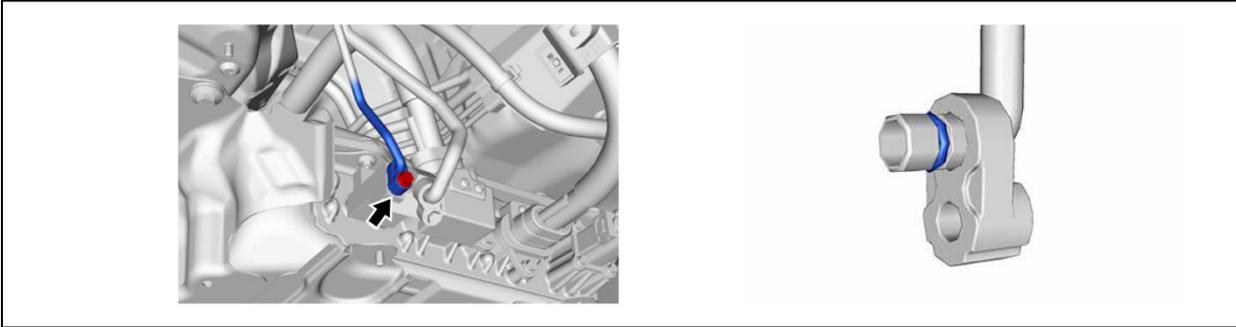
a.



21. DISCONNECT NO. 3 LIQUID TUBE

	<p><b>CAUTION:</b> <b>Be sure to wear insulated gloves and protective goggles.</b></p> <p><b>NOTICE:</b> Seal the openings of the disconnected parts with vinyl tape to prevent entry of moisture and foreign matter.</p>
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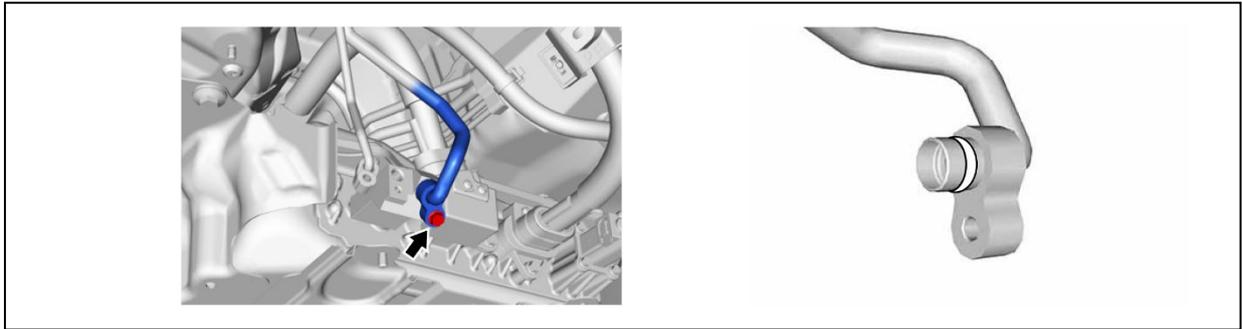
a.



## 22. DISCONNECT NO. 9 DISCHARGE TUBE

	<p><b>CAUTION:</b> <b>Be sure to wear insulated gloves and protective goggles.</b></p> <p><b>NOTICE:</b> Seal the openings of the disconnected parts with vinyl tape to prevent entry of moisture and foreign matter.</p>
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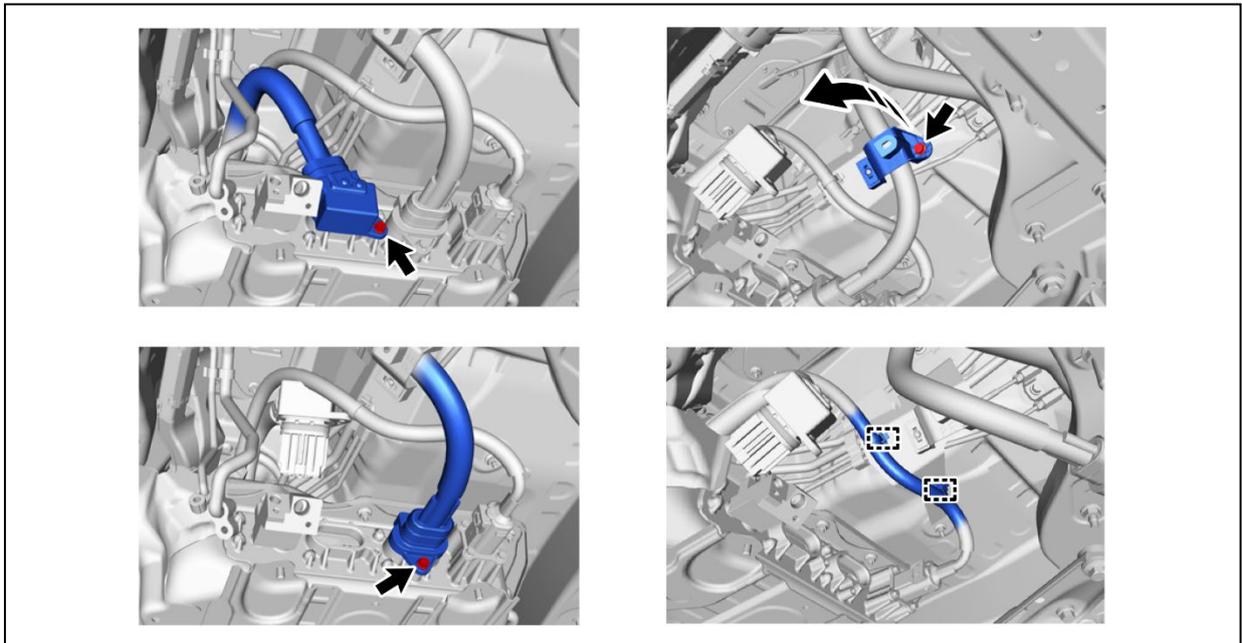
a.



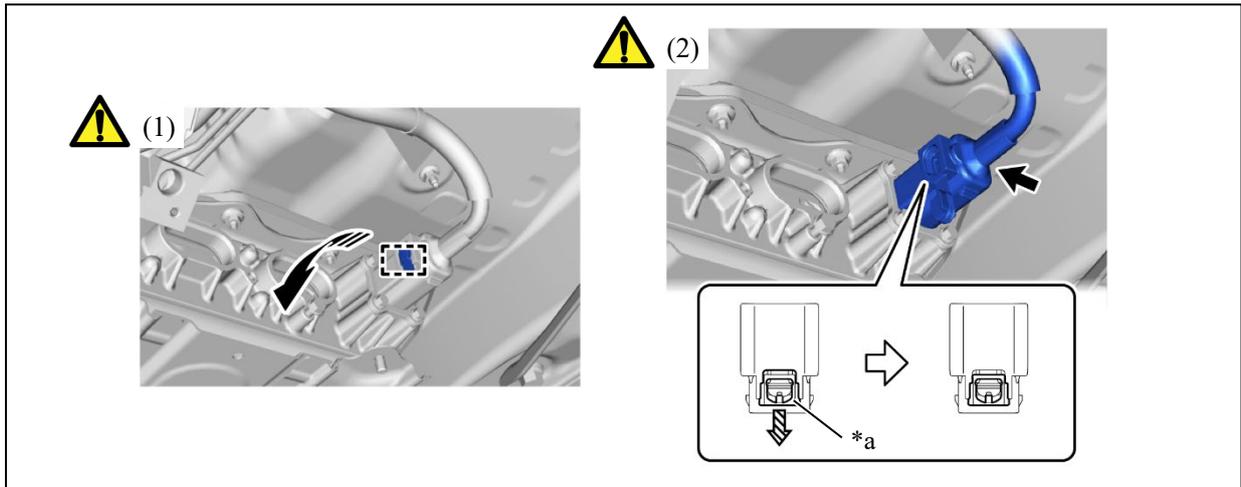
## 23. DISCONNECT HV FLOOR UNDER WIRE

	<p><b>CAUTION:</b> <b>Be sure to wear insulated gloves and protective goggles.</b></p> <p><b>NOTICE:</b> Insulate the disconnected terminals and connector with insulating tape.</p>
---	--

a.



b.



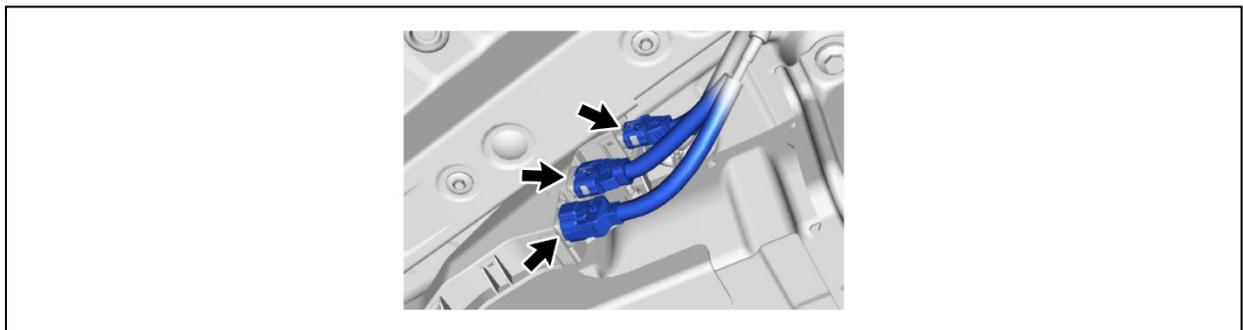
*A	Green-colored Lock	-	-
	Slide	-	-

- (1) Disengage the rubber cap and slide it as shown in the illustration.
- (2) Using a screwdriver, slide the green-colored lock of the connector as shown in the illustration to release it and disconnect the HV floor under wire.

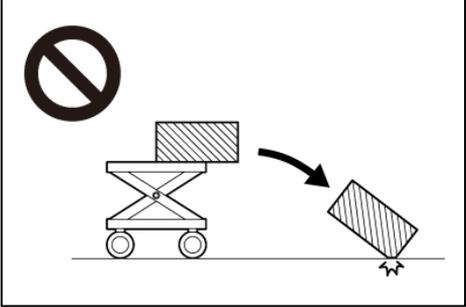
#### 24. DISCONNECT NO. 2 TRACTION BATTERY WIRE

	<p><b>CAUTION:</b> Be sure to wear insulated gloves and protective goggles.</p> <p><b>NOTICE:</b> Insulate the disconnected terminals and connector with insulating tape.</p>
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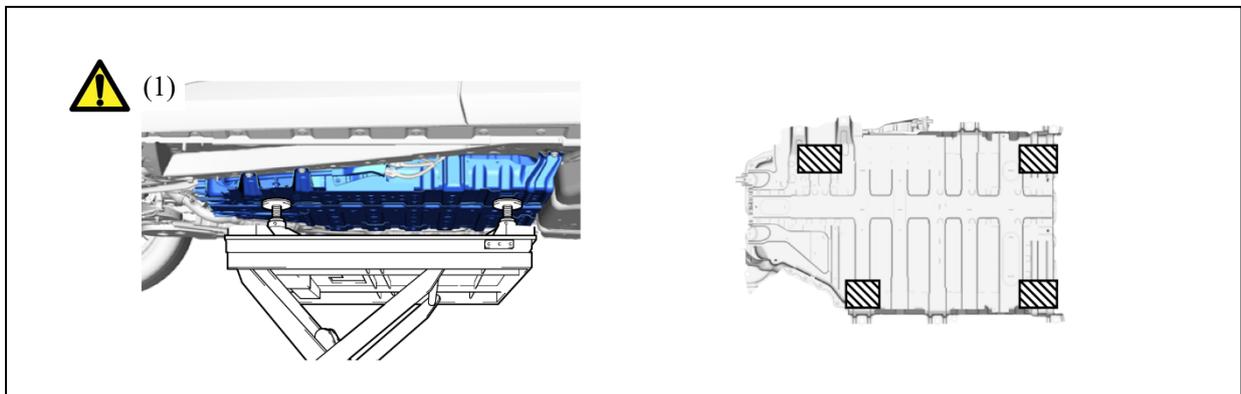
a.



## 25. REMOVE HV SUPPLY BATTERY ASSEMBLY

	<p><b>CAUTION:</b></p> <ul style="list-style-type: none"> <li>• Because the weight of the HV supply battery assembly is extremely heavy, make sure to follow the work procedures described in the repair manual.</li> <li>• If work is not performed according to the procedures described in the repair manual, there is a danger that the components could fall down.</li> <li>• Do not damage the HV supply battery assembly with the fork etc.</li> <li>• Be sure to wear insulated gloves and protective goggles.</li> </ul>	
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a.



	Area That Can Touch the Ground	-	-
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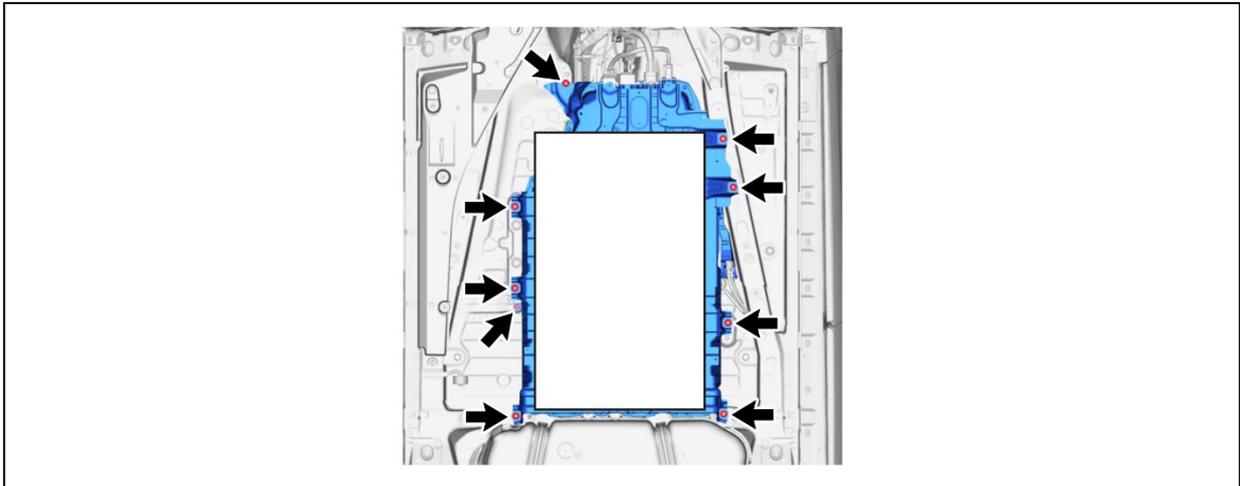
- (1) Using an engine lifter and 4 attachments or equivalent tools, support the HV supply battery assembly as shown in the illustration.

**NOTICE:**

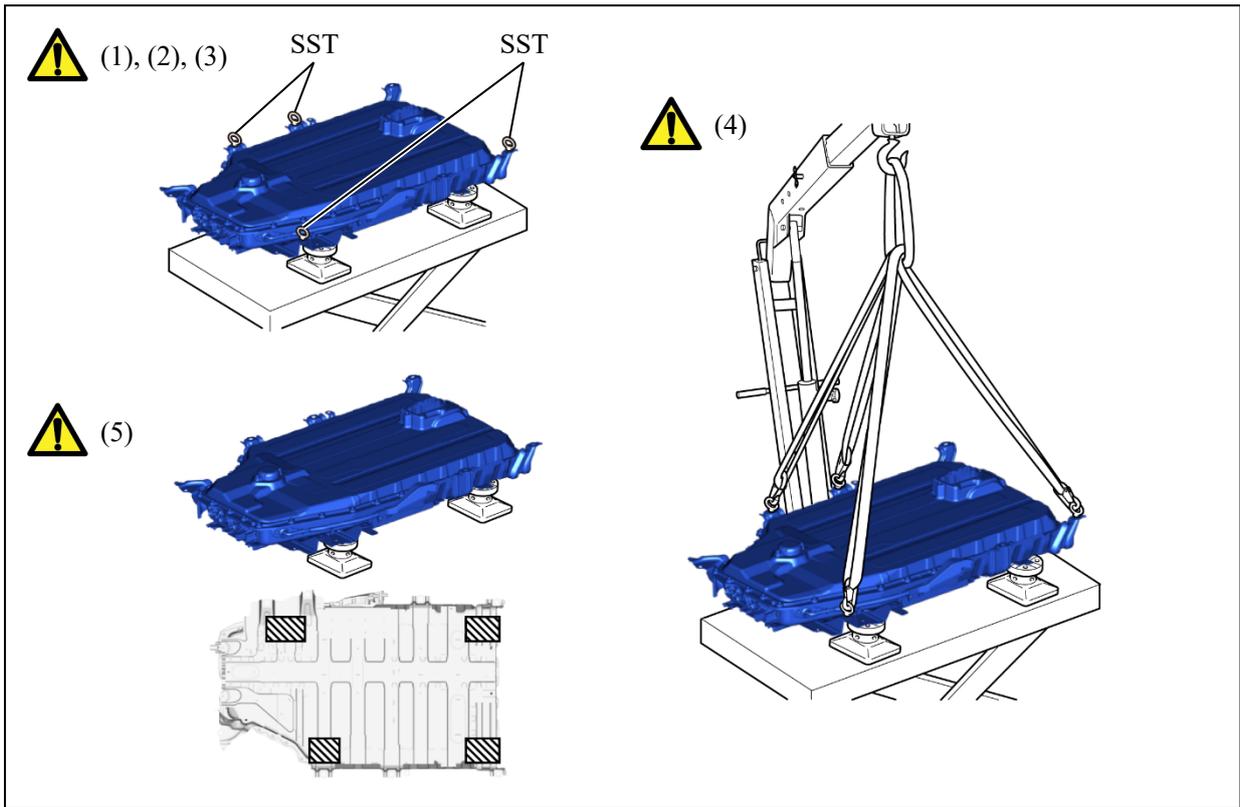
- Do not allow foreign matter, such as grease or oil, to adhere to the bolts of the HV supply battery assembly.

- To prevent the wire harness from being caught, make sure to bundle the wire harness using insulating tape or equivalent.
- Since the HV supply battery assembly is very heavy, 2 people are needed to remove it. When removing the HV supply battery assembly, be careful not to damage the parts around it.
- When removing/installing/moving the HV supply battery assembly, make sure not to tilt it more than 80°.
- Do not apply any load outside of the area that can touch the ground.

b.



c.



	Area That Can Touch the Ground	-	-
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(1) Slowly lower the engine lifter to remove the HV supply battery assembly.

**NOTICE:**

Be careful not to drop the HV supply battery assembly.

(2) Follow the procedure below when moving the HV supply battery assembly from the engine lifter.

(3) Install the SST at the position shown in the illustration.

**SST: 09893-42010**

(4) Using 4 hooks, 4 belt slings and a chain block, hoist the HV supply battery assembly.

**NOTICE:**

When removing/installing/moving the HV supply battery assembly, make sure not to tilt it more than 80°.

(5) Using the height adjustable attachment, set so that the HV supply battery assembly is in contact with the position shown in the illustration, and place the HV supply battery assembly on the height adjustable attachment.

**NOTICE:**

- To prevent the wire harness from being caught, make sure to bundle the wire harness using insulating tape or equivalent.
- When removing/moving the HV supply battery assembly, make sure not to tilt it more than 80°.
- Do not apply any load outside of the area that can touch the ground.
- Do not place the lower surface of the battery on the ground.