

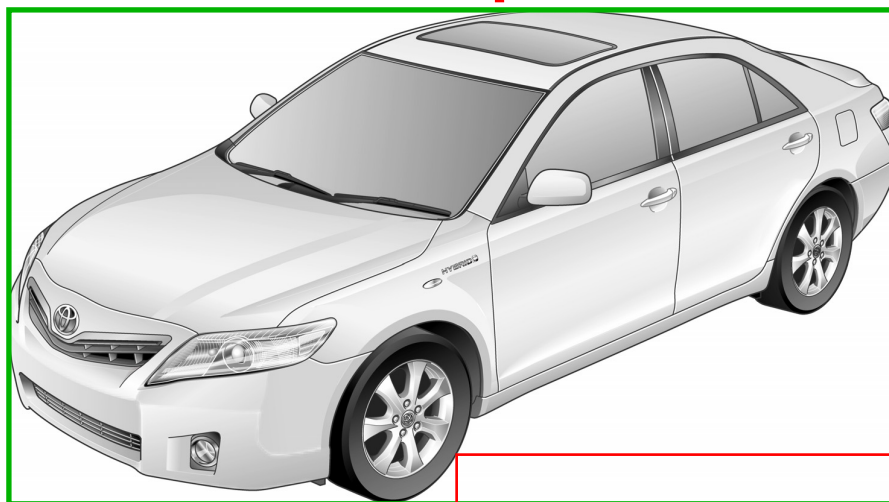


CAMRY

Petrol-Electric

Hybrid Synergy Drive

HYBRID VEHICLE DISMANTLING MANUAL



AHV40 Series

Foreword

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

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High voltage electricity powers the electric motor, generator, A/C compressor, and inverter/converter. All other automotive electrical devices such as the headlights, power steering, horn, radio, and gauges are powered from a separate 12 Volts battery. Numerous safeguards have been designed into the Camry to help ensure the high voltage, approximately 245 Volts, Nickel Metal Hydride (NiMH) Hybrid Vehicle (HV) battery pack is kept safe and secure in an accident.

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Additional topics contained in the guide include:

- Toyota Camry identification.
- Major hybrid component locations and descriptions.

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By following the information in this guide, dismantlers will be able to handle the Hybrid Camry-electric vehicle as safely as the dismantling of a conventional petrol engine automobile.

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About the Camry

The Hybrid Camry sedan joins the Prius hybrid as a hybrid model for Toyota. *Hybrid Synergy Drive* means that the vehicle contains a petrol engine and an electric motor for power. The two hybrid power sources are stored on board the vehicle:

1. Petrol stored in the fuel tank for the petrol engine.
2. Electricity stored in a high voltage Hybrid Vehicle (HV) battery pack for the electric motor.

The result of combining these two power sources is improved fuel economy and reduced emissions. The petrol engine also powers an electric generator to recharge the battery pack; unlike a pure all electric vehicle, the Hybrid Camry 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 Hybrid Camry operates in various driving modes.

- ❶ During light acceleration at low speeds, the vehicle is powered by the electric motor.

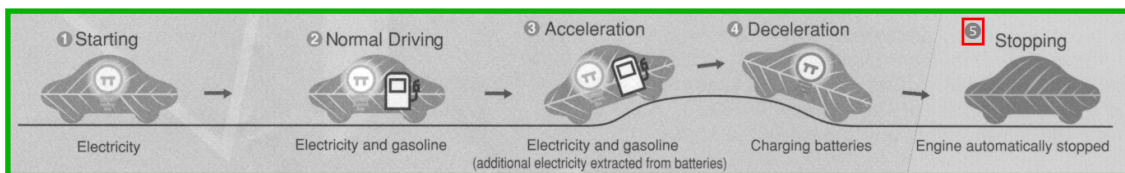
The petrol engine is shut off.

- ❷ During normal driving, the vehicle is powered mainly by the petrol engine. The petrol engine also powers the generator to recharge the battery pack.

- ❸ During full acceleration, such as climbing a hill, both the petrol engine and the electric motor power the vehicle.

- ❹ During deceleration, such as when braking, the vehicle regenerates the kinetic energy from the front wheels to produce electricity that recharges the battery pack.

- ❺ While the vehicle is stopped, the petrol engine and electric motor are off, however the vehicle remains on and operational.



Camry Identification

In appearance, the Hybrid Camry is nearly identical to the conventional, non-hybrid Toyota Camry.

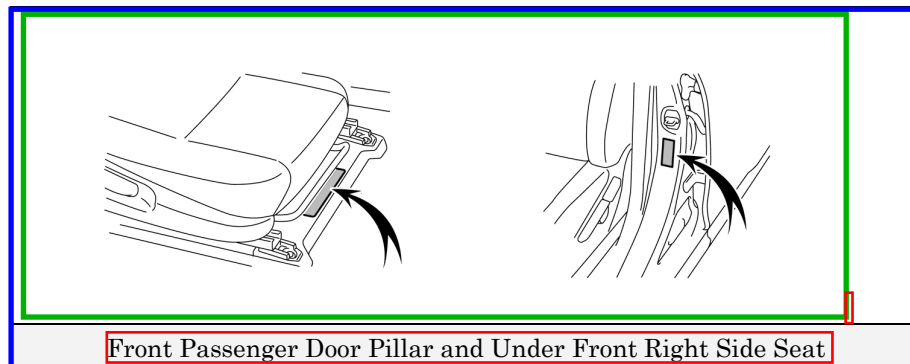
The Hybrid Camry is a 4-door sedan. Exterior, interior, and engine compartment illustrations are provided to assist in identification.

The alphanumeric 17 character Vehicle Identification Number (VIN) is provided on the right side floor and left side door pillar.

Example VIN:

6T153FK4#####

A Hybrid Camry is identified by the first 6 alphanumeric characters, **6T153F**.



Front Passenger Door Pillar and Under Front Right Side Seat

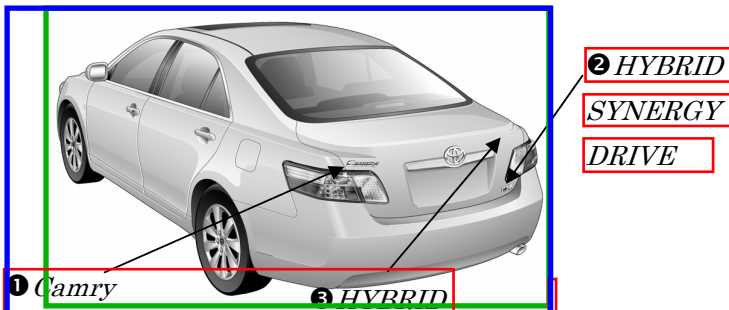
Exterior

① *Camry* logo on the boot door.

② **HYBRID SYNERGY DRIVE** logo on the boot lid.

③ **HYBRID** logo on each front fender.

④ Petrol fuel filler door located on the driver passenger rear quarter panel.



Exterior Rear and Passenger Side View



Exterior Passenger Side View

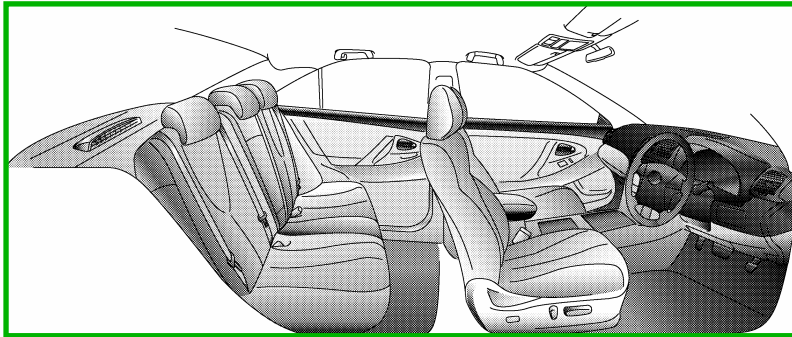


Exterior Front View

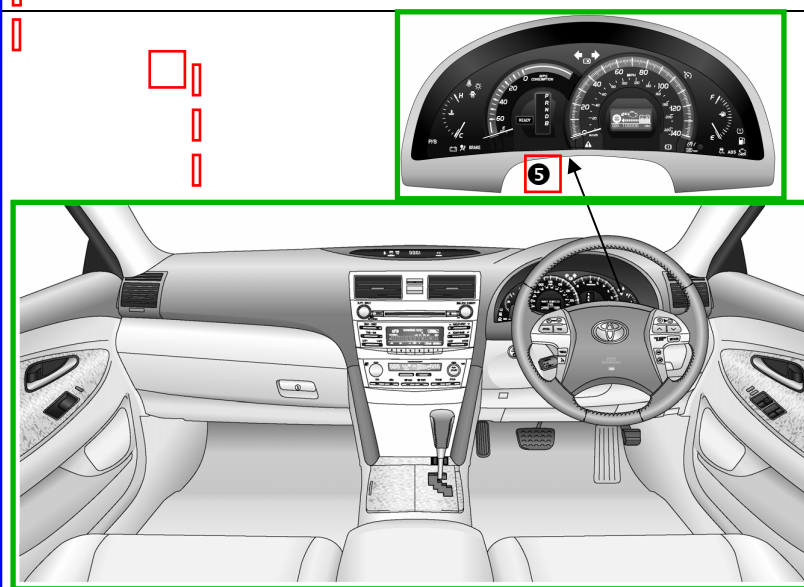
Camry Identification (Continued)

Interior

- ⑤ The instrument cluster (speedometer, fuel gauge, and warning lights) located in the dash behind the steering wheel, is different than the one on the conventional, non-hybrid Camry.
- ⑥ In place of a tachometer, a fuel meter showing litre per 100 km consumption is used. A multi-information display showing energy flow is provided in the centre of the speedometer.



Interior View

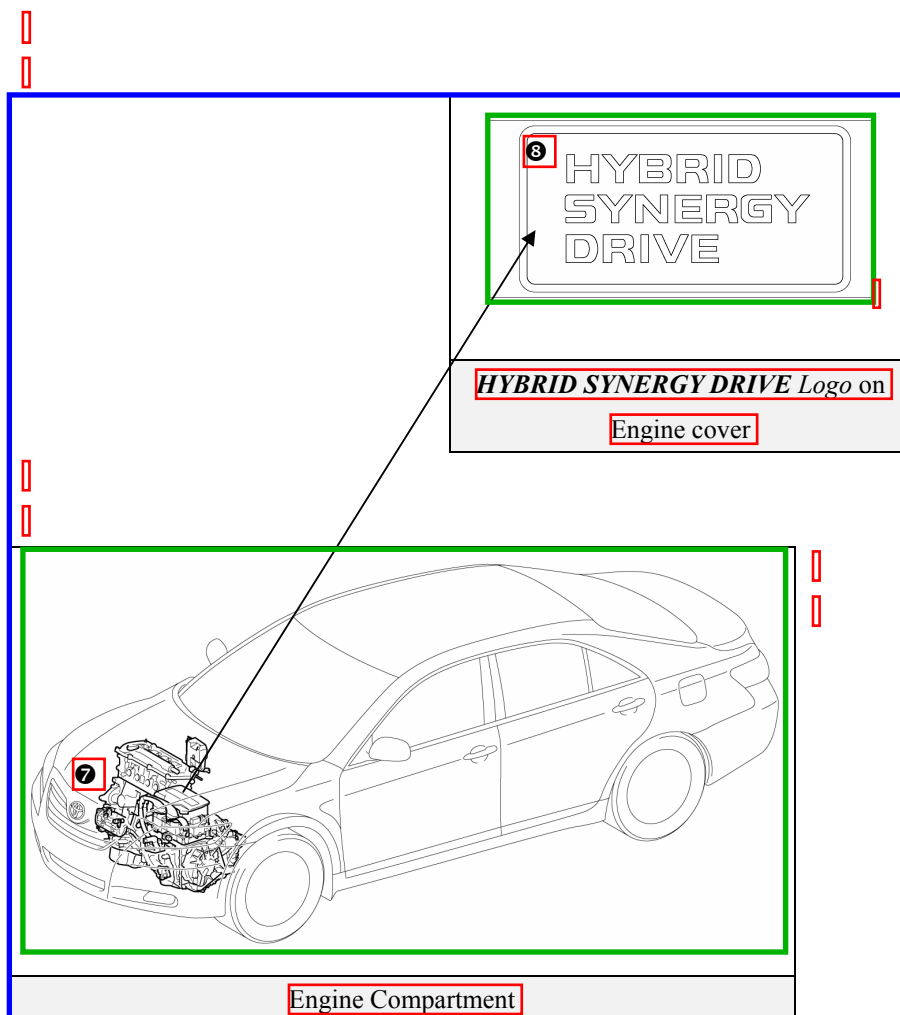


Instrument Cluster View

Engine Compartment

⑦ 2.4-litre Aluminium alloy petrol engine.

⑧ High voltage inverter/converter assembly with logos on the cover.



Hybrid Component Locations & Descriptions

Component	Location	Description
12 Volts Auxiliary Battery ❶	Boot	A lead-acid battery that supplies power to the low voltage devices.
Hybrid Vehicle (HV) Battery Pack ❷	Boot Area, Mounted to Cross Member and behind Rear Seat	244.8 Volts Nickel Metal Hydride (NiMH) battery pack consisting of 34 low voltage (7.2 Volts) modules connected in series.
Power Cables ❸	Under Carriage and Engine Compartment	Orange coloured power supply cables carry high voltage Direct Current (DC) between the HV battery pack, inverter/converter, and A/C compressor. These cables also carry 3-phase Alternating Current (AC) between the inverter/converter, electrical motor, and generator.
Inverter/Converter ❹	Engine Compartment	Boosts and inverts the high voltage electricity from the HV battery pack to 3-phase AC electricity that drives the electric motor. The inverter/converter also converts AC electricity from the electric generator and electric motor (regenerative braking) to DC that recharges the HV battery pack.
Petrol Engine ❺	Engine Compartment	Provides two functions: 1) Powers vehicle. 2) Powers generator to recharge the HV battery pack. The engine is started and stopped under control of the vehicle computer.
Electric Generator ❻	Transaxle	3-phase high voltage AC generator that is contained in the transaxle and recharges the HV battery pack.
Electric Motor ❼	Transaxle	3-phase high voltage AC permanent magnet electric motor contained in the transaxle. Used to power the front wheels.
A/C Compressor ❸	Engine Compartment	3-phase high voltage AC electrically driven motor compressor.
12 Volts DC-DC Converter ❾	Inside HV Battery Pack Assembly in Boot	Converts 244.8 Volts DC from the HV battery pack to 12 Volts DC for low voltage vehicle power.
Fuel Tank and Fuel Line ❿	Undercarriage, Driver Side	The fuel tank provides petrol via single fuel line to the engine. The fuel line is routed along the driver side under the floor pan.

Specifications

Petrol Engine: 110 KW, 2.4-litre Aluminium Alloy Engine

Electric Motor: 105 KW, Permanent Magnet Motor

Transmission: Automatic Only

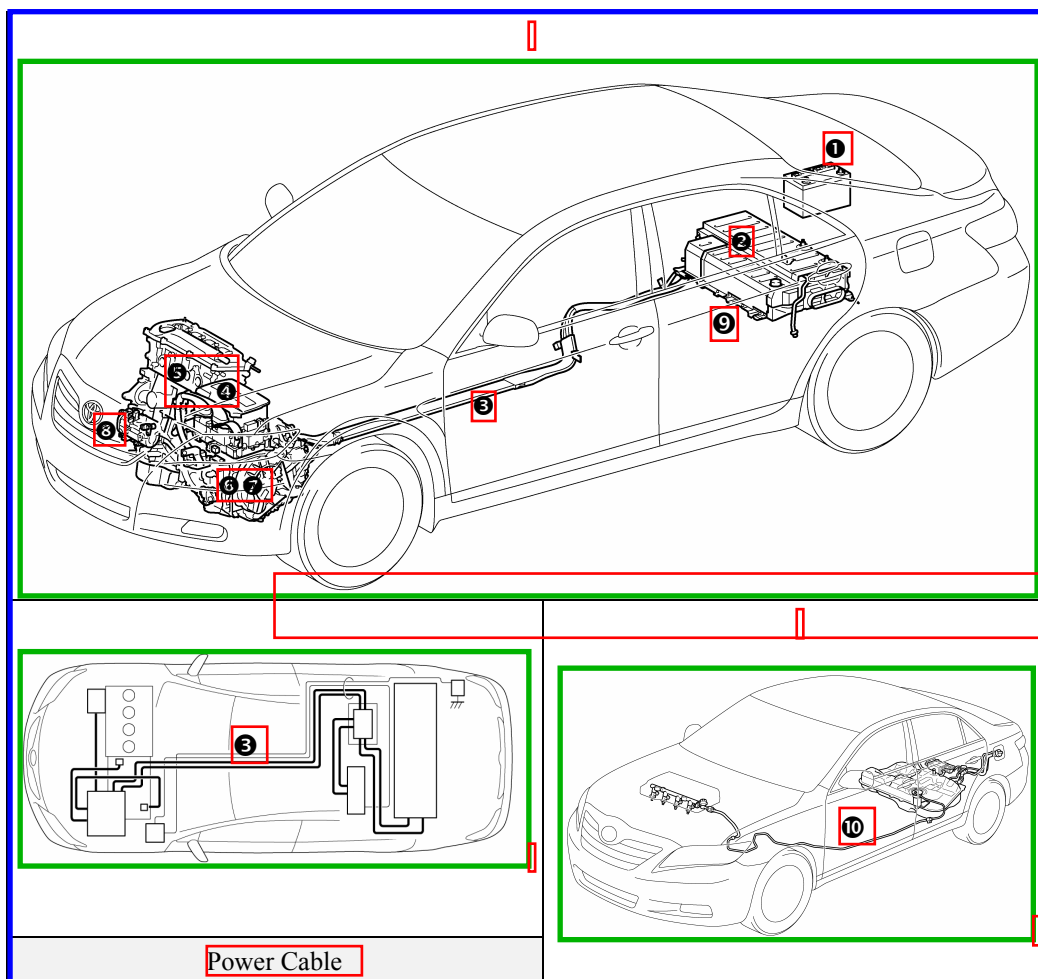
HV Battery: 244.8 Volts Sealed NiMH Battery Pack

Curb Weight: 1,650 kg

Fuel Tank: 65 litres

Frame Material: Steel Unibody

Body Material: Steel Panels



Hybrid Synergy Drive Operation

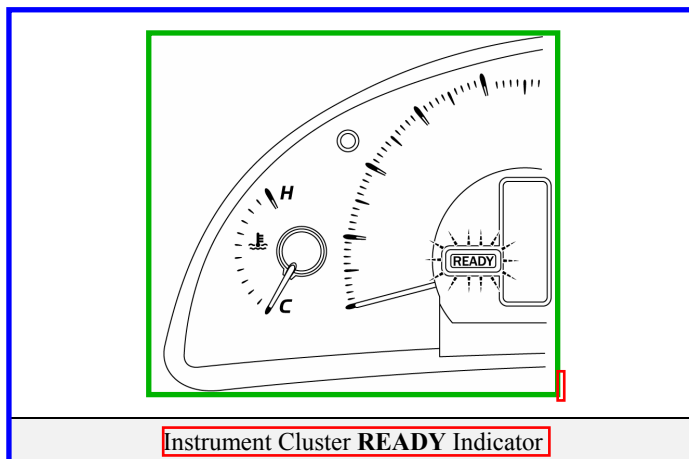
Once the **READY** indicator is illuminated in the instrument cluster, the vehicle may be driven.

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

Vehicle Operation

- With the Hybrid Camry, the petrol 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 motor only.
 2. The petrol engine only.
 3. A combination of both the electric motor and the petrol engine.

The vehicle computer determines the mode in which the vehicle operates to improve fuel economy and reduce emissions. The driver cannot manually select the mode.



Hybrid Vehicle (HV) Battery Pack and Auxiliary Battery

The Hybrid Camry contains a high voltage, Hybrid Vehicle (HV) battery pack that contains sealed Nickel Metal Hydride (NiMH) battery modules.

HV Battery Pack

- The HV battery pack is enclosed in a metal case and is securely mounted in the boot area behind the rear seat. The metal case is isolated from high voltage and concealed by fabric covers.
- The HV battery pack consists of 34 low voltage (7.2 Volts) NiMH battery modules connected in series to produce approximately 244.8 Volts. Each NiMH battery module is non-spillable and sealed in a plastic 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 forms a gel that will not normally leak, even in a collision.

In the unlikely event that the battery pack is overcharged, the modules vent gases directly outside the vehicle through a vent hose.

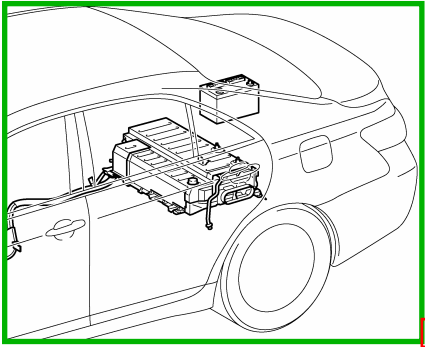
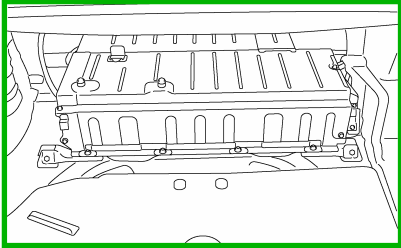
HV Battery Pack	
Battery pack voltage	244.8 V
Number of NiMH battery modules in the pack	34
NiMH battery module voltage	7.2 V
NiMH battery module dimensions	118 x 20 x 276 mm
NiMH module weight	1.0 kg
NiMH battery Pack dimensions	190 x 850 x 495 mm
NiMH battery Pack weight	52 kg

Components to Which High Voltage is Applied

- Electric Motor
- Power Cables
- Inverter/Converter
- DC-DC Converter
- A/C Compressor
- Electric Generator

HV Battery Pack Recycling

The HV battery pack is recyclable. Contact the nearest Toyota dealer.

			
244.8 Volts HV Battery Pack		HV Battery Pack (Viewed from the Boot)	

High Voltage Safety


The HV battery pack powers the high voltage electrical system with DC electricity. Positive and negative orange coloured high voltage power cables are routed from the battery pack, under the vehicle floor pan to the engine compartment, and connected to the inverter/converter. The inverter/converter contains a circuit that boosts the HV battery voltage from 244.8 up to 650 Volts DC. The inverter creates 3-phase AC to power the motor and generator located in the transaxle. Power cables are routed from the inverter to each high voltage motor (electric motor, electric generator, and A/C compressor). The following systems are intended to help 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 pack.
- Positive and negative high voltage power cables ❷ connected to the HV battery pack are controlled by 12 Volt normally open relays ❸. When the vehicle is shut off, the relays stop electrical flow from leaving the HV battery pack.

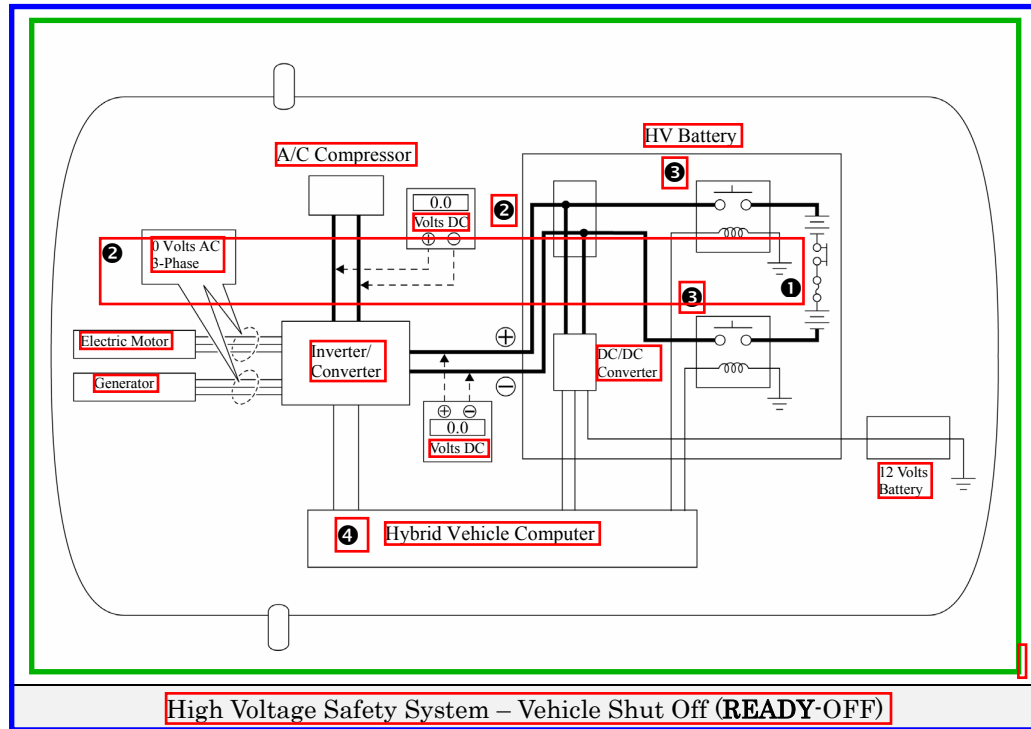


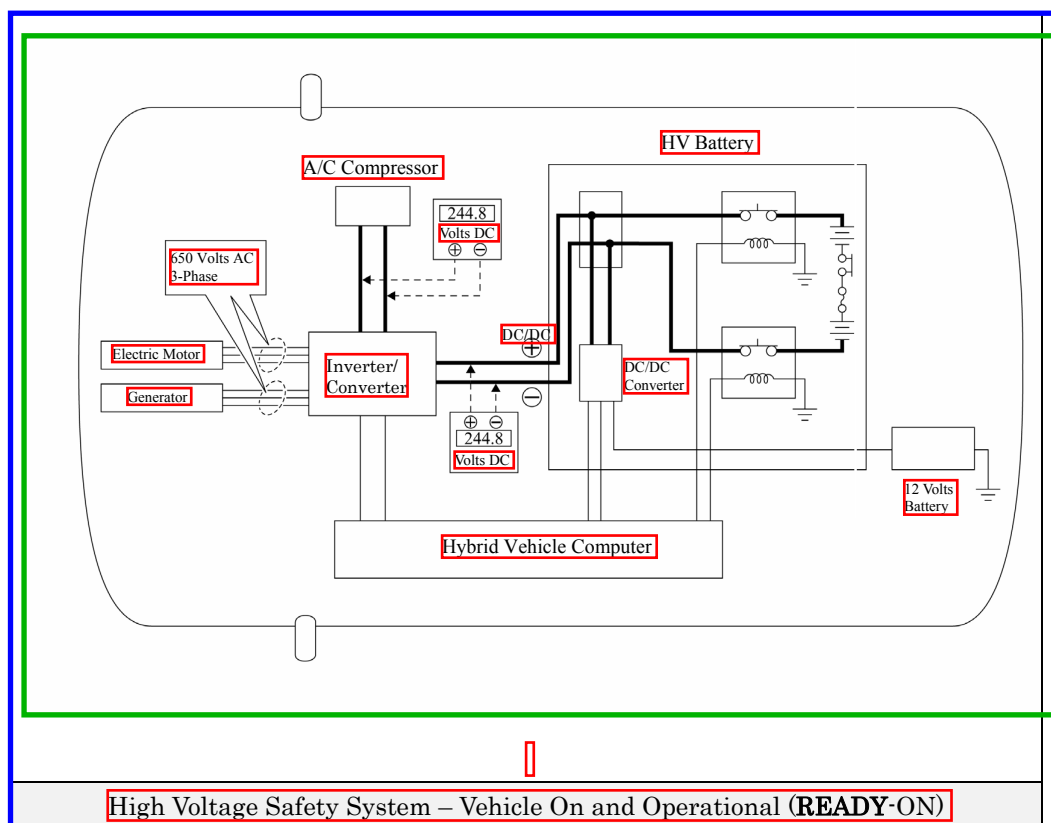
The high voltage system may remain powered for up to 10 minutes after the vehicle is shut off or disabled. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or opening any orange high voltage power cable or high voltage component.

- Both positive and negative power cables ❷ are insulated from the metal chassis, so there is no possibility of electric shock when touching the metal chassis.
- A ground fault monitor ❹ continuously monitors for high voltage leakage to the metal chassis while the vehicle is running. If a malfunction is detected, the hybrid vehicle computer ❹ will illuminate the master warning light  in the instrument cluster and indicate "CHECK HYBRID SYSTEM" on the multi-information display.
- The HV battery pack relays will automatically open to stop the electrical flow in a collision sufficient to activate the SRS.

Service Plug

- The high-voltage circuit is cut by removing service plug (See page 16).





Precaution to be observed when dismantling the vehicle



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.*

Necessary items

- Protective clothing (insulated gloves, rubber gloves, safety goggles, and safety shoes).
- Vinyl tape for insulation.
- Before wearing insulated the vehicle gloves, make sure that they are not cracked, ruptured, torn, or damaged in any other way. Do not wear wet insulated gloves.

Spillage

The Camry contains the same common automotive fluids used in other non-hybrid Toyota vehicles, with the exception of 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 the plastic battery module would be a rare occurrence.

Similar to the use of baking soda to neutralise a lead-acid battery electrolyte spill, a dilute boric acid solution or vinegar can be used to neutralise a NiMH battery electrolyte spill.

In an emergency, Toyota Material Safety Data Sheets (MSDS) are available with the Hybrid Vehicle Dismantling Manual.

- Handle NiMH electrolyte Spills Using The following Personal Protective Equipment (PPE):

- Splash shield or safety goggles. Folding down helmet shields is not acceptable for alkaline spillage.
- Rubber, latex or Nitrile gloves.
- Apron suitable for alkaline.
- Rubber boots.

- Neutralise NiMH Electrolyte

- Use a boric acid solution or vinegar.
- Boric acid solution - 800 grams boric acid to 20 litres water or 5.5 ounces boric acid to 1 gallon of water

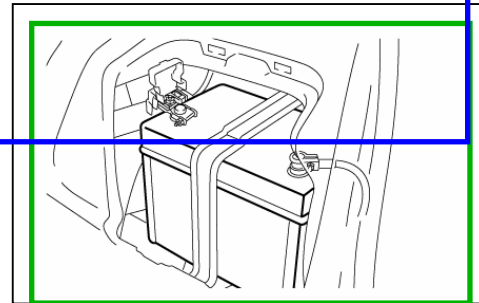
Dismantling a vehicle



WARNING:

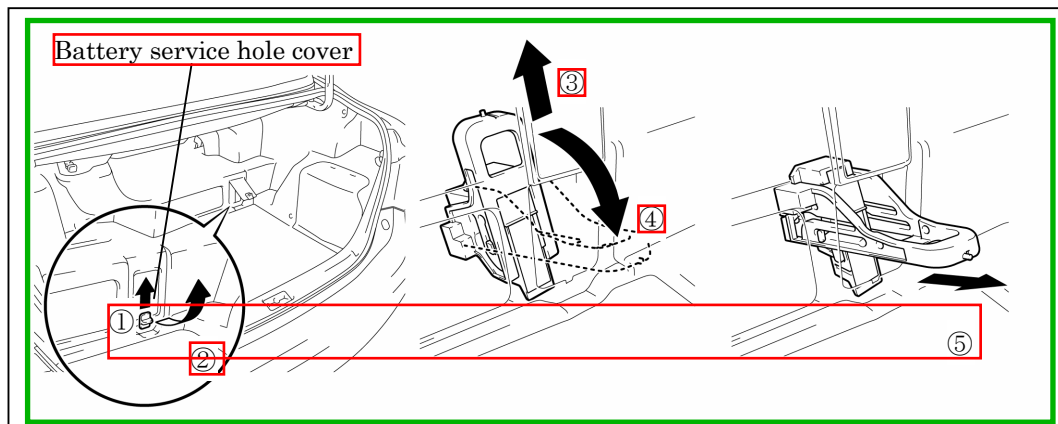
- The high voltage system may remain powered for up to 10 minutes after the vehicle is shut off or disabled. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or opening any orange high voltage power cable or any high voltage component.

1. Shut off ignition. Then disconnect the negative (-) terminal of the auxiliary battery.



2. Remove the service plug grip.

- a) Wear insulated gloves and raise the service plug grip as shown in the illustration. Then, remove the service plug grip.
- b) Apply electrical tape to the socket of the service plug grip to insulate it.



3. Carry the removed service plug in your pocket to prevent other staff from reinstalling it while you are dismantling the vehicle.

4. Make other staff aware that a high-voltage system is being dismantled by using the following sign: CAUTION: HIGH VOLTAGE. DO NOT TOUCH DURING OPERATION (see page 18).

5. If the service plug cannot be removed due to damage to the rear portion of

the vehicle, remove the IGCT No. 2 fuse.

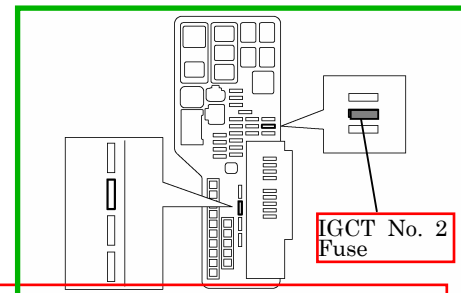
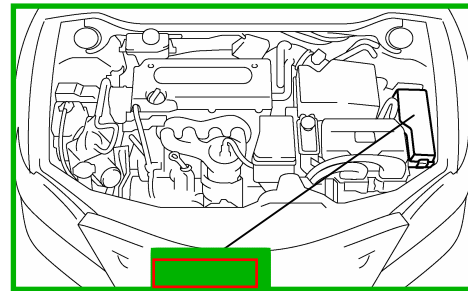
Caution:

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, remove it and continue the procedure.



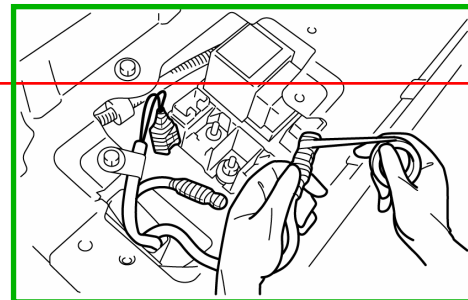
6. After disconnecting or exposing a high-voltage connector or terminal, insulate it immediately using insulation tape. Before touching a bare high-voltage terminal, wear insulated gloves.

7. 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 neutralise the liquid using a saturated

boric acid solution or vinegar. Then wipe up the liquid using waste rags etc.

- a) If the electrolyte adheres to your skin, wash the skin immediately using a saturated boric acid solution or a large amount of water. If the electrolyte adheres to any article of clothing, take the clothing off immediately.
- b) If the electrolyte comes into contact with your eye(s), call out loudly for help.



Do not rub your eye(s). Instead, wash the eye(s) with a dilute boric acid solution or a large amount of water and seek medical care.

8. Remove the parts by following the procedures which are similar to the Toyota vehicles with exception of HV battery. As for the removal of HV battery, refer to the following pages.



<div><div><div>Person in charge:</div><div>DO NOT TOUCH. HIGH-VOLTAGE. CAUTION:</div></div><div><div>CAUTION: HIGH-VOLTAGE. DO NOT TOUCH.</div><div>Person in charge:</div></div><div>When performing work on the HV system, fold this sign and put it on the roof of the vehicle.</div></div>
--

Removal of HV battery

HV battery removal



WARNING:

- Be sure to wear insulated gloves when handling high-voltage parts.
- Even if the vehicle is shut off and the relay is off, be sure to remove the service plug grip before performing any steps.
- 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.
- Make sure that the tester reading is 0 V before touching any high-voltage terminals which are not insulated.

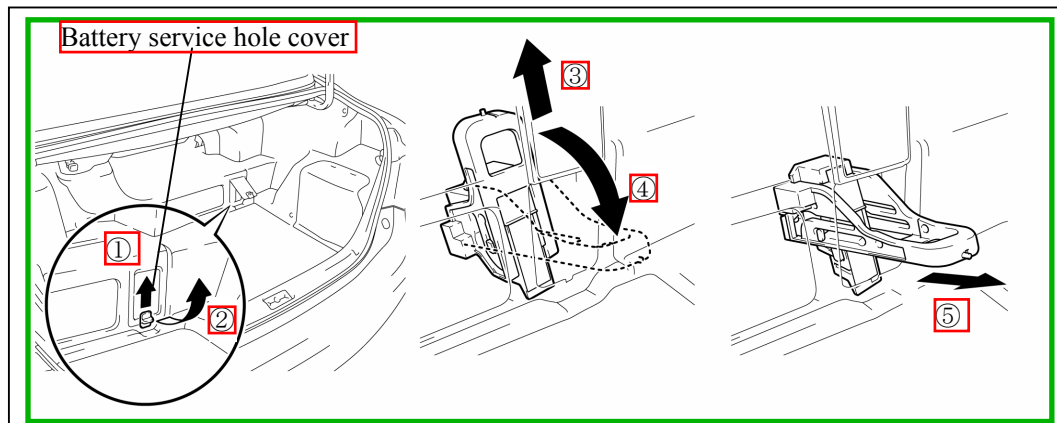
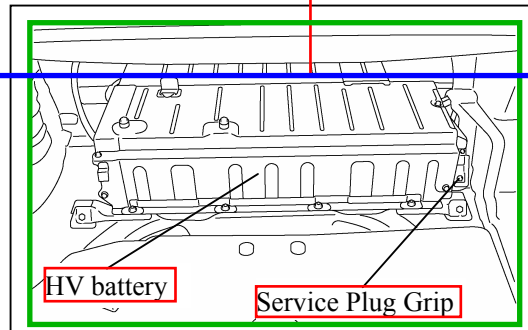
1. Disconnect the cable from the auxiliary battery negative terminal.

2. Remove the service plug grip.

a) Remove the battery service hole cover.

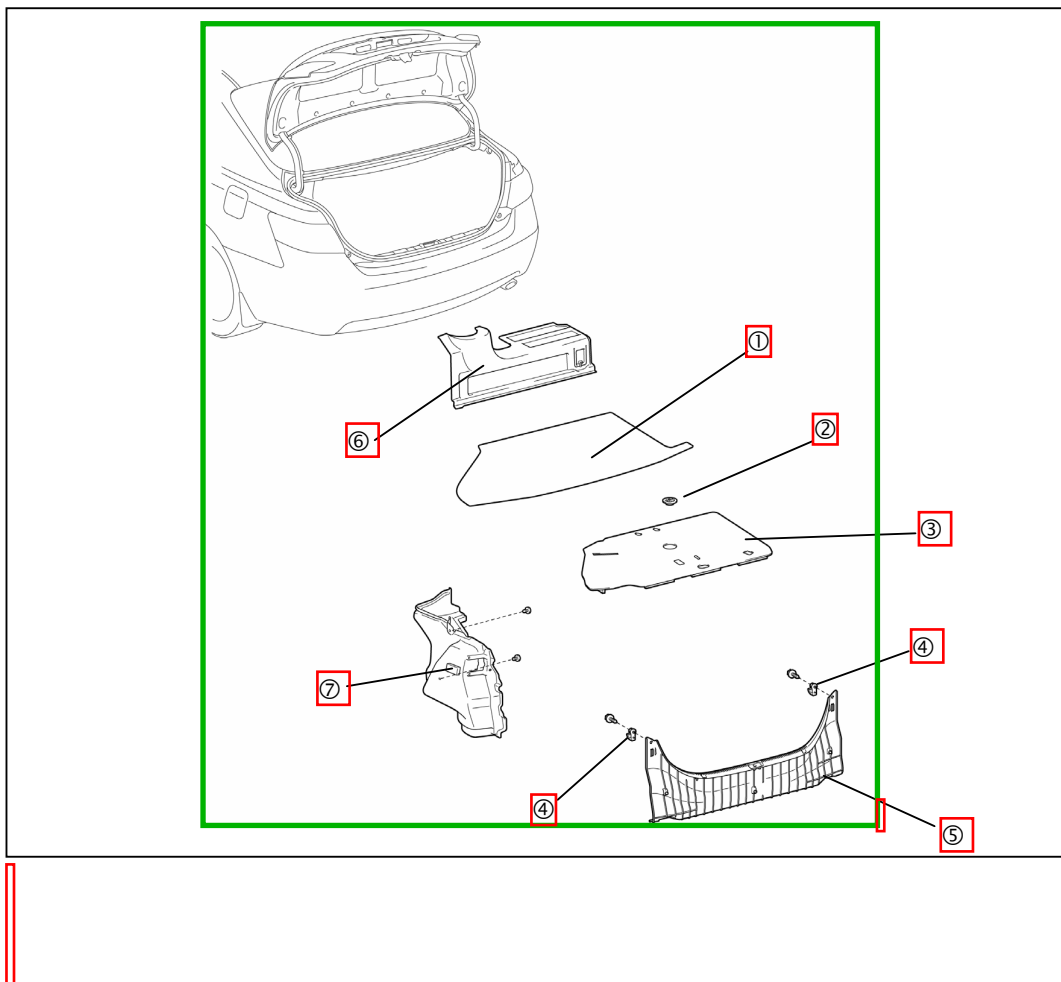
b) Wear insulated gloves and raise the service plug grip as shown in the illustration. Then, remove the service plug grip.

c) Apply electrical tape to the socket of the service plug grip to insulate it.



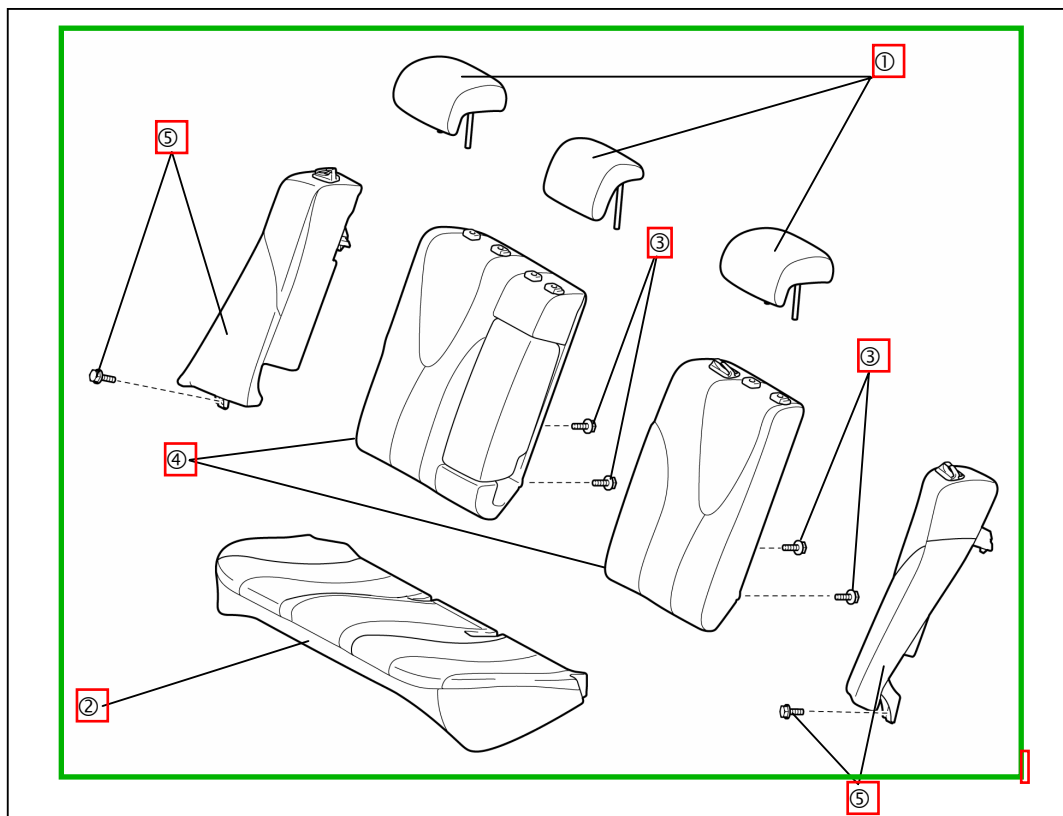
3. Remove the luggage compartment rear trim cover LH.

- ① Remove the luggage compartment floor mat.
- ② Remove the spare wheel cover clamp.
- ③ Remove the spare wheel cover assembly.
- ④ Remove the No. 1 luggage compartment trim hooks.
- ⑤ Remove the rear floor finish plate.
- ⑥ Remove the luggage compartment rear trim cover.
- ⑦ Remove the luggage compartment inner trim cover LH.



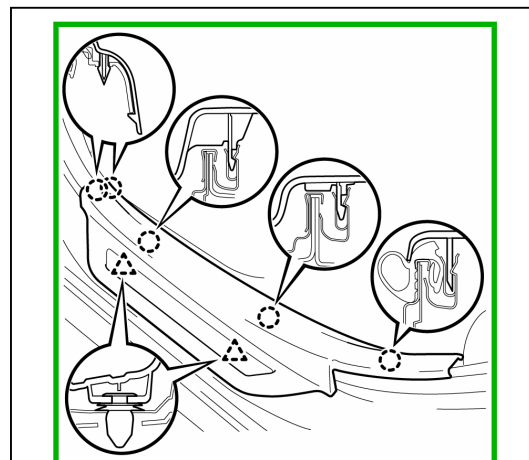
4. Remove the rear side seatback assemblies LH, centre and RH.

- ① Remove the rear seat headrest assemblies.
- ② Remove the rear seat cushion assembly.
- ③ Remove the 4 bolts on the rear side of the seatback.
- ④ Remove the separate type rear seatbacks LH and RH.
- ⑤ Remove the 2 bolts and rear side seatback assemblies.

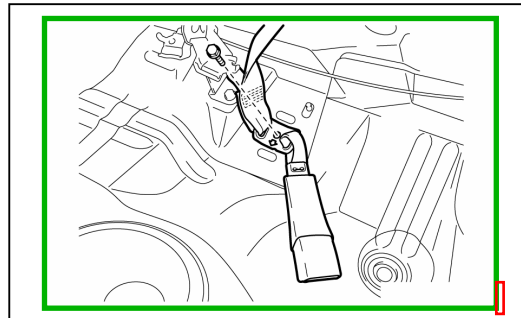


5. Remove the rear door scuff plates LH and RH.

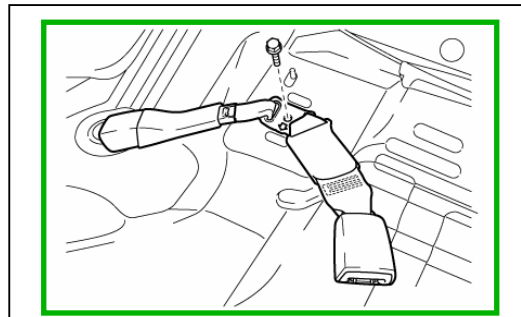
6. Remove the rear door opening trim weather strips LH and RH.



7. Disconnect the rear seat inner with centre belt assembly LH.

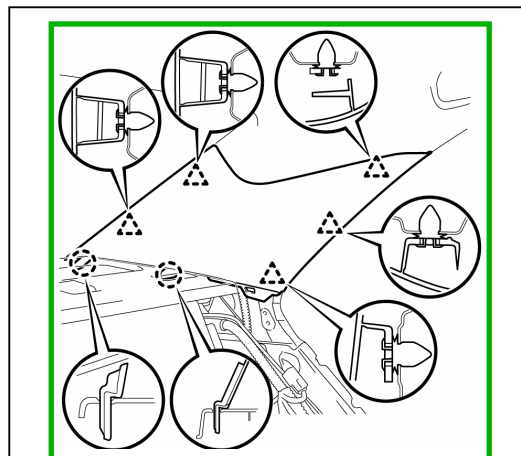


8. Remove the rear seat inner with centre belt assembly RH.

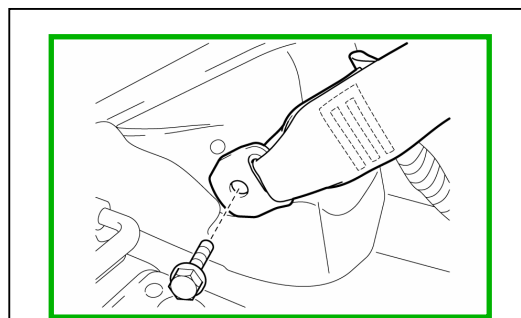


9. Remove the roof side inner garnishes LH and RH.

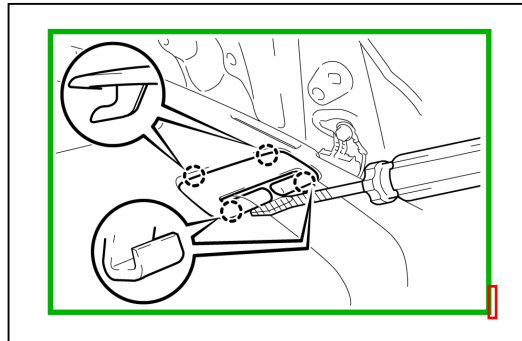
- a) Disengage the 5 clips and 2 claws, and remove the roof side inner garnish.



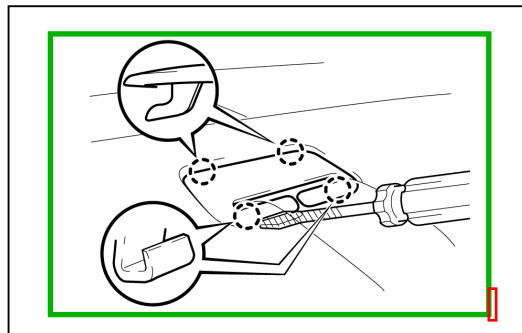
10. Remove the rear seat outer belt assemblies LH and RH.



11. Using a screwdriver, disengage the 4 claws and remove the rear seat shoulder belt cover.

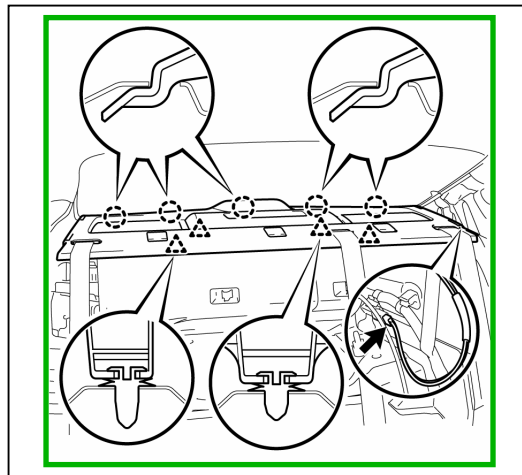


12. Using a screwdriver, disengage the 4 claws and remove the rear seat shoulder belt hole cover.

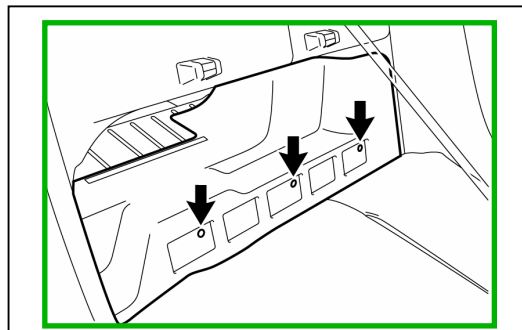


13. Remove the package tray trim panel assembly.

- a) Disconnect the connector.
- b) Disengage the 4 clips and 5 claws.
- c) Pass the 3 rear seat belt floor anchors through the package tray trim panel assembly, then remove the package tray trim panel assembly.

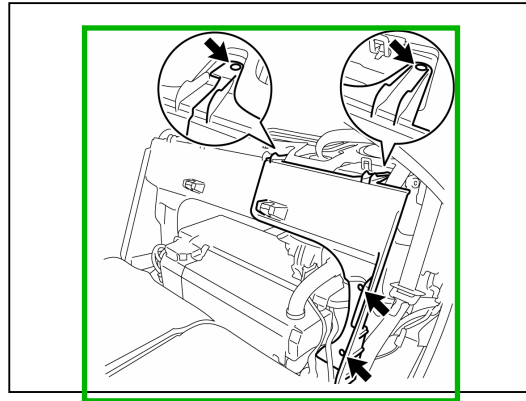


14. Remove the 3 clips and front luggage compartment trim cover.

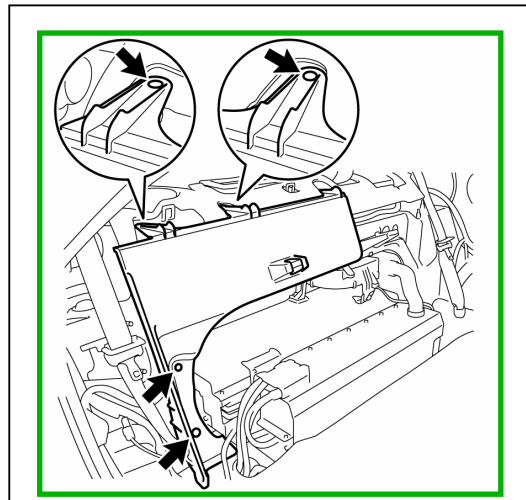


15. Remove the room partition boards
LH and RH.

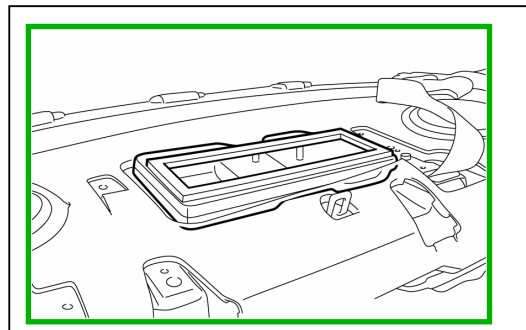
a) Remove the 4 clips and room
partition board LH.



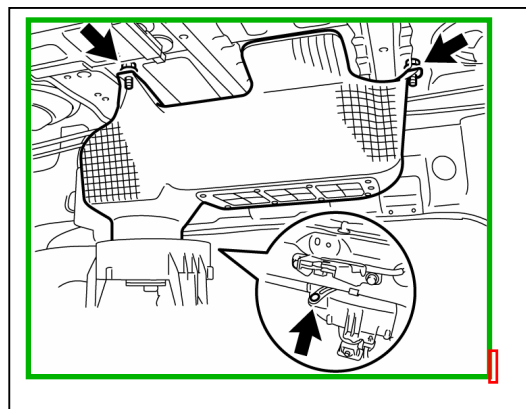
b) Remove the 4 clips and room
partition board RH.



16. Remove the No. 1 HV battery intake
duct.

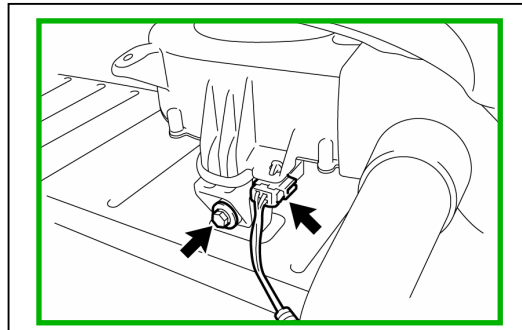


17. Remove the 2 bolts, clip, and No. 2
HV battery intake duct.

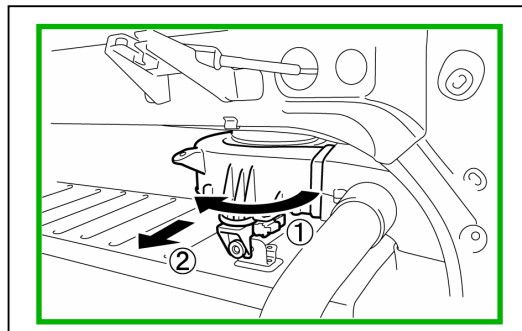


18. Remove the battery cooling blower assembly.

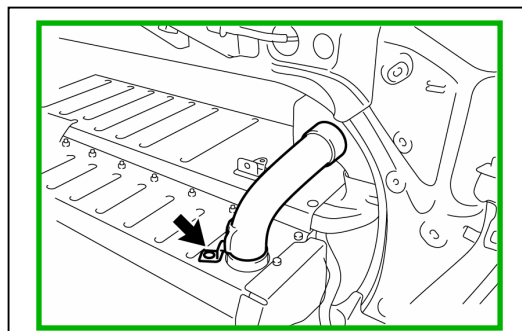
- a) Remove the bolt from the battery cooling blower assembly.
- b) Disconnect the connector from the battery cooling blower assembly.



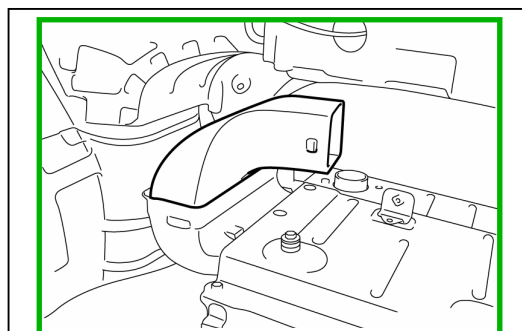
- c) Remove the battery cooling blower assembly as shown in the illustration.



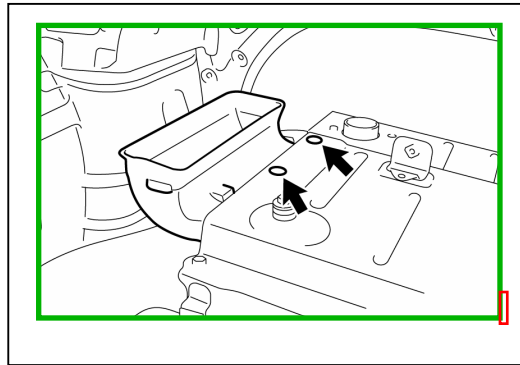
19. Remove the clip and No. 5 HV battery intake duct.



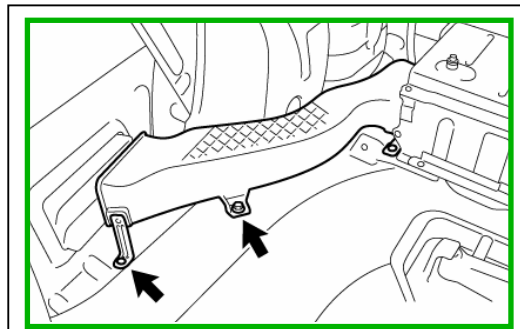
20. Remove the No. 3 HV battery intake duct.



21. Remove the 2 clips and No. 4 HV battery intake duct.

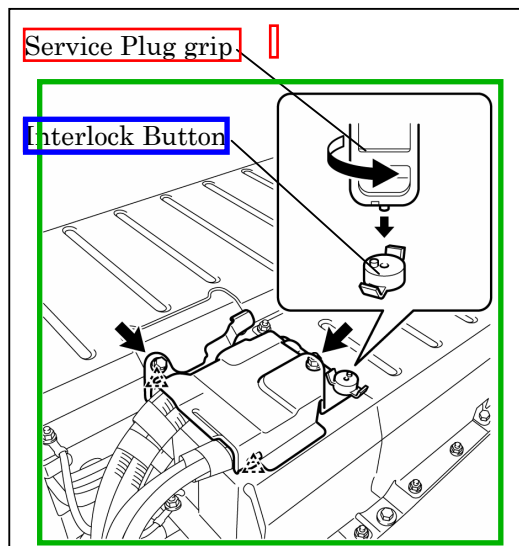


22. Remove the 2 clips nut and No. 2 HV battery exhaust duct.



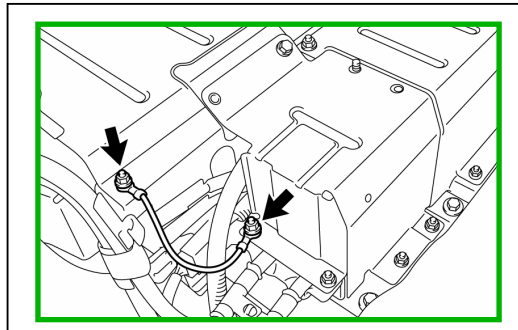
23. Remove the wire harness clamp bracket.

- a) Using the service plug grip, release the interlock button.
- b) Remove the bolt, nut, and wire harness clamp bracket.
- c) Disconnect the 2 wire harness clamps.

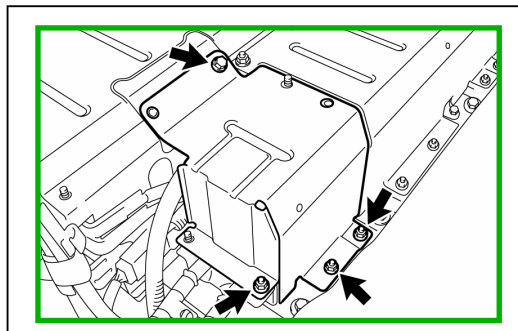


24. Remove the upper battery carrier sub-assembly.

- a) Remove the 2 nuts and ground cable.

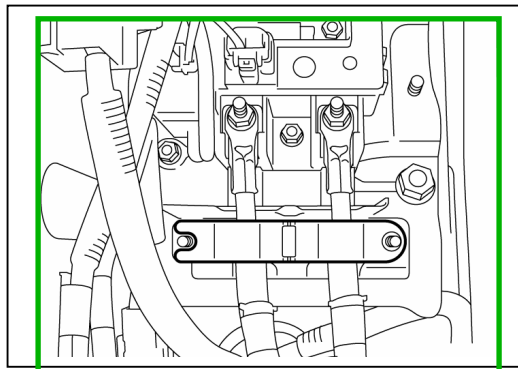


- b) Remove the 3 nuts, bolt, and upper battery carrier sub-assembly.

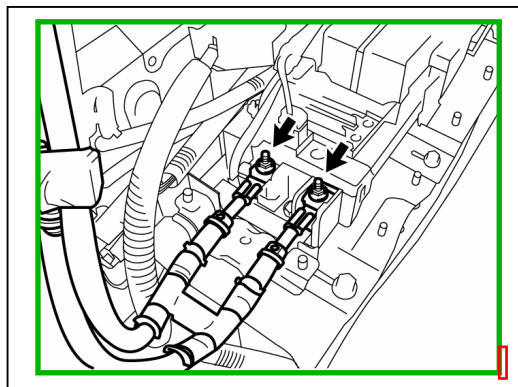


25. Disconnect the frame wire.

- a) Remove the battery shield contact.



- b) Remove the 2 nuts and disconnect the frame wire (High Voltage cable).

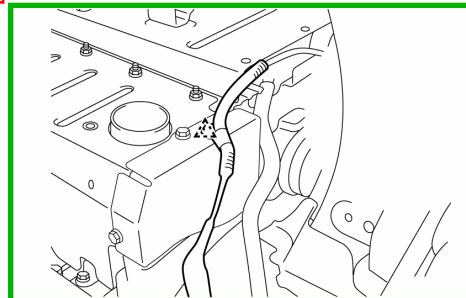


Caution:

Insulate the terminals that the high voltage cable was connected to using something such as insulating tape.

26. Install the spare wheel cover assembly.
27. Install the spare wheel cover clamp.
28. Install the luggage compartment floor mat.
29. Remove the HV battery.

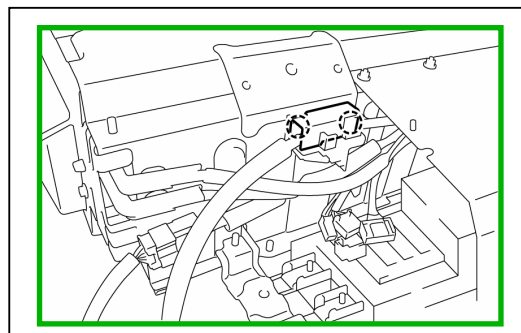
- a) Disconnect the wire harness clamp from the No. 1 battery cover.



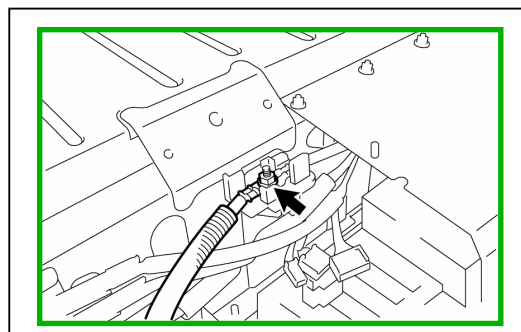
- b) Release the 2 claws and remove the terminal block cover.

Caution:

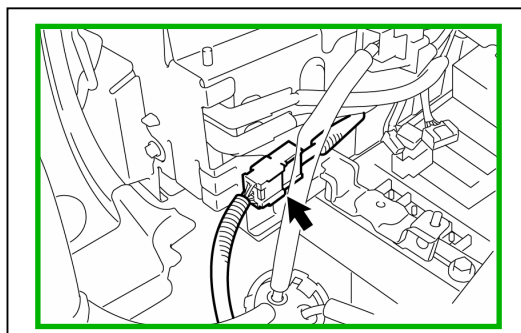
Make sure that the negative terminal is disconnected from the auxiliary battery before performing the next step.



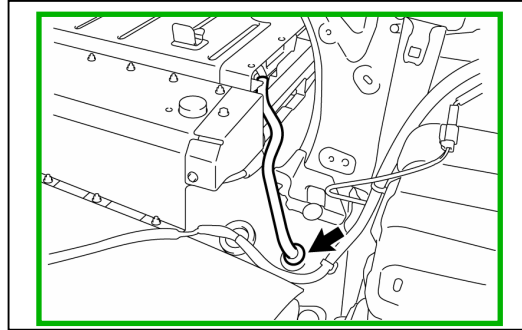
- c) Remove the nut and disconnect the frame wire (AMD cable).



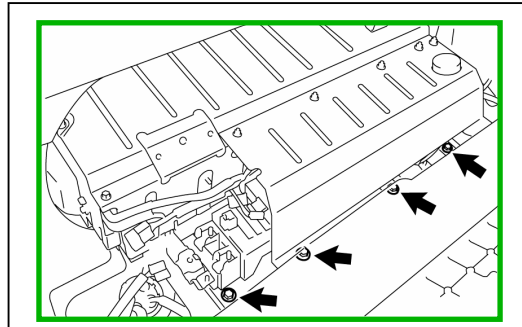
- d) Disconnect the battery pack wire connector.



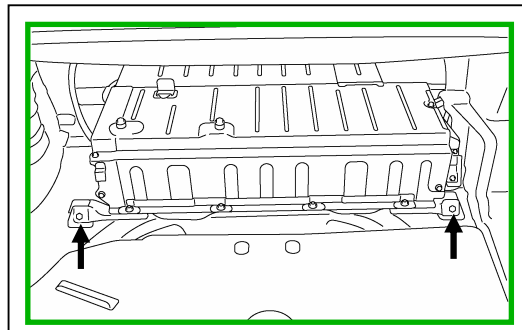
- e) Remove the grommet and battery room ventilation hose.



- f) Remove the 4 bolts from the HV battery.

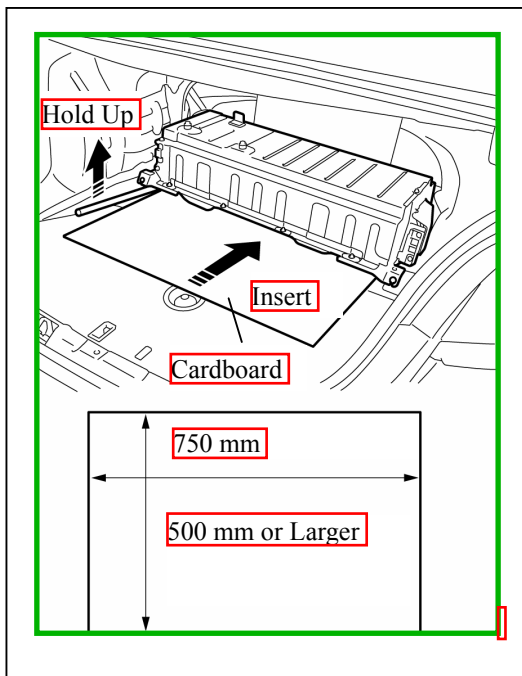


- g) Remove the 2 bolts from the HV battery.

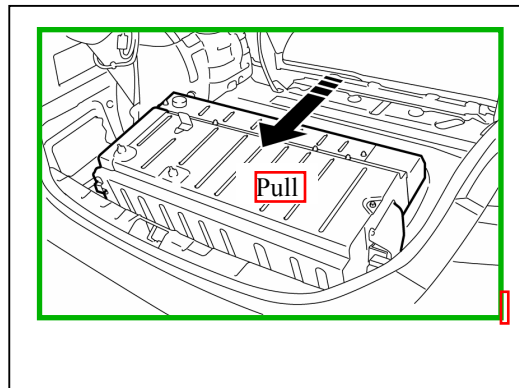


- h) Prepare a piece of cardboard of 750 mm (29.53 in.) X 500 mm (19.69 in.) or larger.

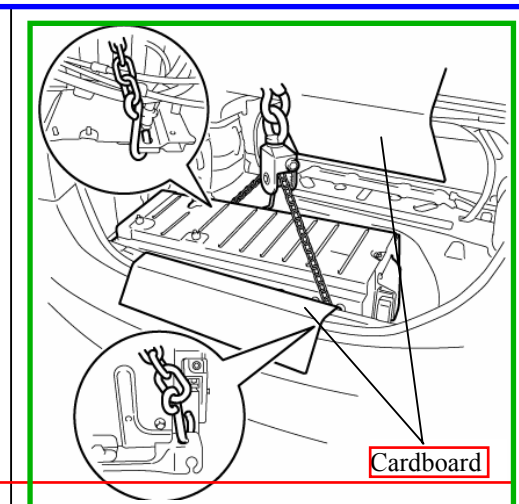
- i) Using a tire lever to hold up the HV battery, insert the cardboard until it cannot be inserted any further.



- i) Pull the HV battery together with the cardboard toward the rear of the vehicle.



- j) Using an engine sling device, remove the HV battery while tilting the HV battery 45° at the rear end.



30. The HV battery pack is recyclable. Contact your Toyota distributor which is found on the HV Battery Caution Label or contact the nearest Toyota Dealer.

(See the next page)

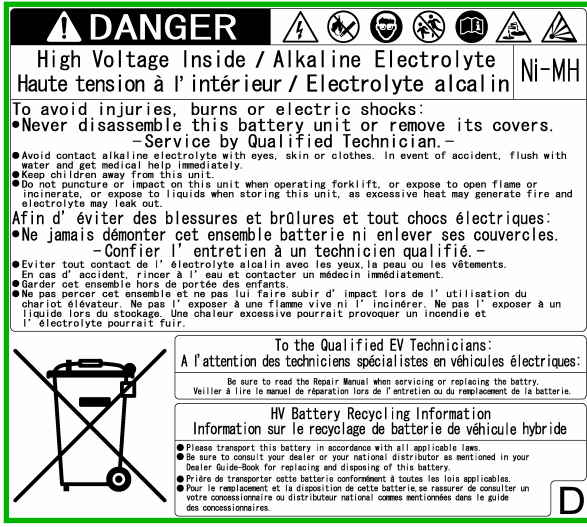
Caution:

After removing the HV battery, do not connect the service plug to the HV battery.

HV Battery Caution Label

Hint:

The label content may change due to regulatory revisions, etc.



Product Safety Data Sheet Information

HYBRID BATTERY ASSY, HV		Prismatic Nickel Metal-hydride Battery Module	
Parts Name	Parts No.	Model name	PSDS
BATTERY ASSY, HV	EV-PNR22A (G9280-47080)	EV-MP6R5R02 (GEN II)	Attached
BATTERY ASSY, HV	EV-PNR34A (G9280-75010)	EV-MP6R5R02 (GEN II)	Attached

Product Safety Data Sheet

This product (a battery) is an "Article" pursuant to 29CFR1910.1200 and, as such, is not subject to the OSHA Hazard Communication Standard requirements for preparation of a Material Safety Data Sheets, (MSDS).
This Product Safety Data Sheet is prepared only to provide information to our customers.

1. PRODUCT IDENTIFICATION

1.1	Product name	Prismatic Nickel Metal Hydride Battery (Module)
1.2	Applicable models	Plastic Case Prismatic Module EV-MP6R5R01 (GEN I) EV-MP6R5R02 (GEN II)
1.3	Product use	Hybrid Vehicle Battery
1.4	Name of manufacturer	Panasonic EV Energy Co., Ltd.
1.5	Address of manufacturer	20, Okasaki, Kosai-City, Shizuoka, 431-0422 Japan
1.6	Phone number of manufacturer	+81-53-577-3592 (Japan)
1.7	Name of person in charge	Osamu Takahashi

1.8 Issue number P0157

2. COMPOSITION & INGREDIENT INFORMATION

Chemical name	Chemical symbol	CAS. No.	Exposure limits in air	
			ACGIH	OSHA
Positive electrode, composed of:				
•Nickel hydroxide	Ni(OH)2	12054-48-7	0.2mg/m3	1mg/m3
•Nickel	Ni	7440-02-0	0.2mg/m3	1mg/m3
•Cobalt	Co	7440-48-4	0.02mg/m3	0.1mg/m3
Negative electrode, composed of:				
•Hydrogen absorbing alloy	*1			
•Iron	Fe	7439-89-6	NA	NA
Alkaline electrolyte	*2			

*1: Main contents contained in hydrogen absorbing alloy
Nickel(Ni)-CAS#7440-02-0, Cobalt(Co)-CAS#7440-48-4,
Manganese (Mn)-CAS#7439-96-5, Aluminum (Al)-CAS#7429-90-5,
Rare earths: Lanthanum (La)-CAS#7439-91-0, Cerium (Ce)-CAS#7440-45-1,
Neodymium (Nd)-CAS#7440-00-8, Praseodymium (Pr)-CAS#7440-10-0

*2: Main contents contained in alkaline electrolyte
Potassium hydroxide (KOH)-CAS#1310-58-3,
Sodium hydroxide (NaOH)-CAS#1310-73-2,
Lithium hydroxide (LiOH)-CAS#1310-65-2

3. HAZARD IDENTIFICATION

This product is not dangerous as long as it is used for prescribed purposes and in accordance with its designated usage. As the product is a storage device for electricity, it may give the user an electric shock. It has no adverse effect on human health or the environment unless the pack and cell casings are breached.

3.1	Physical and chemical hazard	This product does not constitute a physical and chemical hazard as long as it is used for prescribed purposes and in accordance with its designated usage. The alkaline electrolyte or materials in the battery may be dangerous if they leak out of the casing due to dismantle or breach of the battery. This product may cause electric shock, fire, or injury if it is used for purposes other than those prescribed or without following the designated usage.
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3.2	Hazard to human health	This product is not hazardous to human health in normal use. However, if the product dismantles or is breached, the alkaline electrolyte or materials that may leak out of the outer casing may adversely affect human health. This product contains both nickel compounds and cobalt, which are classified as carcinogens by IARC and NTP.
3.3	Hazard to environment	This product is not hazardous to the environment as long as it is used for prescribed purposes and in accordance with its designated usage. However, the contents of the product may have an adverse effect on the environment in the event of their leakage from the casing due to dismantling or breach of the battery.
4. FIRST AID MEASURES		
In the event of the leakage of the alkaline electrolyte or alkaline mixed gas from the battery, the user may come into contact with the liquid or inhale the gas. In such an event, take the appropriate first aid measures from the following.		
4.1	Eye contact	Contact may cause corneal injury and blindness. Wash eyes with large amounts of running water for at least 15 minutes. Seek medical treatment immediately. If appropriate actions are not taken, eye disorders may result.
4.2	Skin contact	Wash the contact area with plenty of water. Seek medical treatment immediately. Clothing, shoes, and socks, etc. which have come into contact with alkaline electrolyte should be taken off immediately. If appropriate actions are not taken, skin inflammation may occur.
4.3	Inhalation	Move the exposed person to fresh air area immediately. Cover up the affected person with a blanket. Seek medical treatment immediately.
4.4	Ingestion	Do not induce vomiting. Seek medical treatment immediately.
5. FIREFIGHTING MEASURES		
In the event of a battery fire, take the following measures.		
5.1	Extinguishing media and method	(1) Use a dry powder acrylonitrile butadiene styrene (ABS) fire extinguisher for fire-fighting. (2) Extinguishing a fire with a large amount of water may be an effective method. However, this should be considered as a supplementary means. If there are no readily available large amounts of water, use dry sand instead; as the application of only a small amount of water may temporarily act as an accelerant and affect the fire adversely while the hydrogen storage alloy is burning.
5.2	Exposure controls and personal protection for fire-fighting	Use air-breathing apparatus when a greater risk is predicted, as noxious fumes may be produced.
5.3	Fire spread prevention	(1) In the case of fire, remove surrounding inflammables immediately. (2) In the case of fire in peripheral devices, move the battery to a safe place immediately.
6. ACCIDENTAL RELEASE MEASURES		
Take the following measures if the alkaline electrolyte has leaked out of the battery.		
6.1		Wipe out the alkaline electrolyte with a cloth. Dispose of the cloth used to wipe out the electrolyte in accordance with applicable laws and regulations.

7. HANDLING & STORAGE INFORMATION		
Observe the following cautions and prohibited items. Handle the battery carefully.		
7.1	Prohibited items	(1) Short-circuiting Short-circuiting may cause burn injury due to ignition or heating effect. (2) Dismantle or modification Alkaline electrolyte leaks when the battery (cell) disintegrates. (3) Overcharging or over-discharging Oxygen or hydrogen may be produced when the battery is overcharged or over-discharged. (4) Use in an airtight container The container may explode due to the gas produced from the battery.
7.2	Cautions	(1) Do not stack a battery on another battery. (2) Do not store batteries on electrically conductive surfaces such as metals. (3) Wear protective glasses and rubber gloves while handling batteries.
8. EXPOSURE CONTROLS & PERSONAL PROTECTION		
Take the following measures in the event of leakage of the alkaline electrolyte or alkaline mixed gas from the battery.		
8.1	Facilities	(1) Store the product in a depository with local exhaust systems for ventilation. (2) Install an exhaust system or exhaust port when the product is used in a container.
8.2	Protective equipment	Wear protective glasses, protective gloves, and disaster masks.
9. PHYSICAL & CHEMICAL PROPERTIES		
9.1	Physical state	Solid
9.2	Order	No order
9.3	pH	Not applicable (ELECTROLYTE : >12)
9.4	Freezing point	Not applicable
9.5	Boiling point	Not applicable (ELECTROLYTE : 100°C; Water)
9.6	Evaporation rate	Not applicable
9.7	Vapor pressure	Not applicable
9.8	Vapor density	Not applicable
9.9	Solubility (Water)	Not applicable (Electrolyte is soluble.)
10. STABILITY & REACTIVITY		
This product is stable as long as it is used for prescribed purposes and in accordance with its designated usage. However, short-circuiting, overcharging/over-discharging, and long-term storage in a high-temperature environment may lead to the ignition or explosion of the battery.		
10.1	Possible causes of fire	Sparks due to short-circuit. A large current is applied to a module or a cell.
10.2	Possible causes of explosion	The battery will not explode by itself unless the safety valve is frequently activated and the battery is kept in an airtight container, in which case the oxygen and hydrogen produced from the battery may trigger an explosion.
10.3	Possible causes of fire and explosion	(1) Overcharging or over-discharging (2) The temperature of the battery at 100°C or higher (3) Overcharging or over-discharging of the battery in an airtight container located close to a heat source
11. TOXICOLOGICAL INFORMATION		
This product is not hazardous as long as it is used for prescribed purposes and in accordance with its designated usage. If the battery disintegrates or is breached, the alkaline electrolyte or contents that have leaked out of the casing may adversely affect human health.		
	Carcinogenicity	The nickel-plated iron of this product is not harmful as long as it is used for prescribed purposes and in accordance with its designated usage. This product contains both nickel compounds and cobalt, which are classified as carcinogens by the International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP).

12. DISPOSAL		
		Batteries should be disposed in accordance with designated provisions by vehicle manufacturers or dealers.
13. TRANSPORTATION INFORMATION		
Refer to "14. REGULATORY INFORMATION" for applicable laws and regulations.		
13.1	Label of contents	The surface of the casing should clearly show that the product is a nickel metal hydride battery. The notice "Non-spillable" should also be added when the product is transported. Refer to "14. REGULATORY INFORMATION" for applicable laws and regulations.
13.2	No short-circuit	The battery terminals should be designed so that external short-circuiting can be avoided. Make sure that batteries do not cause short circuiting during the packaging process.
13.3	No damage and overturn	Use sufficiently strong materials for packaging boxes so that the product is not damaged due to vibration, shocks, falls, stacking, and so on. Pack the product so that the battery does not fall sideways, and is not inverted during transportation.
13.4	Protection from rain water	Avoid contact with rain water during storage and transportation.
13.5	Protection from fire and high temperatures	Do not place the product close to fire during storage and transportation. Avoid storage in a high-temperature environment. Example: Avoid leaving batteries for disposal in a parked vehicle under the scorching sun.
14. REGULATORY INFORMATION		
14.1	Hazardous materials transportation (Hazardous shipping transportation and storage regulations)	<div>(1) United Nations (Transport of Dangerous Goods) <ul style="list-style-type: none"> •UN Number 2800 •Classes 8 •Special Provision 238 </div> <div>(2) International Air Transport Association (IATA) <ul style="list-style-type: none"> •UN Number 2800 •Classes 8 •Special Provision A67 </div> <div>(3) International Maritime Dangerous Code (IMDG) <ul style="list-style-type: none"> •UN Number 2800 •Classes 8 •Special Provision 29,238 </div> <div>(4) Department of Transportation (DOT) <ul style="list-style-type: none"> •UN Number 2800 •Classes 8 •Special Provision 49 CFR 173.159(d) </div>
15. OTHER INFORMATION		
15.1	Cautions	(1)Cautions and prohibited items in this Data Sheet relate to only normal use. (2)This Data Sheet provides only the information of the product, and is not to be taken as a warranty. (3)It is intended for use by persons with technical skills and at their own discretion and risk. (4)The user is responsible for determining that any usage of the data or information in this Data Sheet is in accordance with associated federal, state, and local laws and regulations.
15.2	Date of creation/revision	November 10, 2008