



Plug-in Hybrid

Emergency Response Guide



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Prius Plug-in hybrid ERG REV – (04/27/11)

Foreword

The Prius Plug-in hybrid is a demonstration vehicle deployed in limited numbers to selected areas from May 2010. It differs from a conventional Prius hybrid in that it contains a higher capacity Lithium-ion (Li-ion) battery that can be plug-in charged by connecting an external electric power source when the vehicle is not in use. This significantly enhances the all electric driving range of the Prius Plug-in hybrid compared to a conventional Prius hybrid. When the battery is depleted, the Prius Plug-in hybrid functions as a conventional Prius hybrid, switching between gasoline and electric modes. While many features of the Prius Plug-in hybrid are shared with the 2010 3rd generation Prius hybrid, emergency responders should recognize and understand the new features of the Prius Plug-in hybrid covered in this guide.

High voltage electricity powers the electric motor, generator, air conditioning compressor and inverter/converter. All other automotive electrical devices such as the headlights, radio, and gauges are powered from a separate 12 Volt system. Numerous safeguards have been designed into the Prius Plug-in hybrid to help ensure the high voltage, approximately 346 Volt, Li-ion Hybrid Vehicle (HV) battery assembly is kept safe and secure in an accident.

The Prius Plug-in hybrid utilizes the following electrical systems:

- Maximum 650 Volts AC
- Nominal 346 Volts DC
- Nominal 220-240 Volts AC
- Maximum 27 Volts DC
- Nominal 12 Volts DC

Prius Plug-in hybrid features:

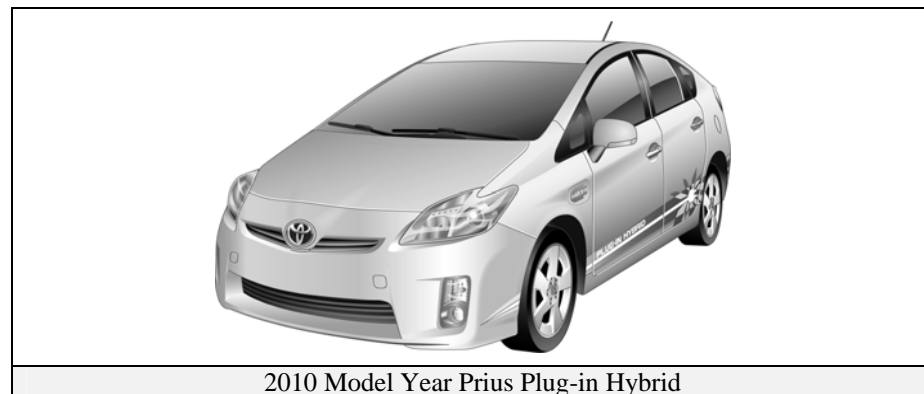
- An electric vehicle charge cable rated at 220-240 Volts.
- An onboard battery charger – 220-240 Volt input/346 Volt output.
- A boost converter in the inverter/converter that boosts the available voltage to the electric motor to 650 Volts.
- A high voltage Hybrid Vehicle (HV) Li-ion battery assembly rated at 346 Volts.

- A high voltage motor driven Air Conditioning (A/C) compressor rated at 346 Volts and a heat pump type remote air conditioning system.
- A body electrical system rated at 12 Volts, negative chassis ground.
- Supplemental Restraint System (SRS) – dual stage frontal airbags, front seat mounted side airbags, side curtain airbags, front seatbelt pretensioners, and driver knee airbag.

High voltage electrical safety remains an important factor in the emergency handling of the Prius Plug-in Hybrid Synergy Drive. It is important to recognize and understand the disabling procedures and warnings throughout the guide.

Additional topics in the guide include:

- Prius Plug-in hybrid identification.
- Major Hybrid Synergy Drive component locations and descriptions.
- Extrication, fire, recovery, and additional emergency response information.
- Roadside assistance information.



This guide is intended to assist emergency responders in the safe handling of a Prius Plug-in hybrid vehicle during an incident.

NOTE:

Emergency Response Guides for Toyota hybrid and alternative fuel vehicles may be viewed at <http://techinfo.toyota.com>.

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About the Prius Plug-in Hybrid

The Prius Plug-in hybrid contains a gasoline engine, an electric motor, and a newly developed large capacity Li-ion battery. It is the first Toyota hybrid that allows the HV battery to be plugged-in and charged by an external power source. Two 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 Prius Plug-in hybrid operates in various driving modes.

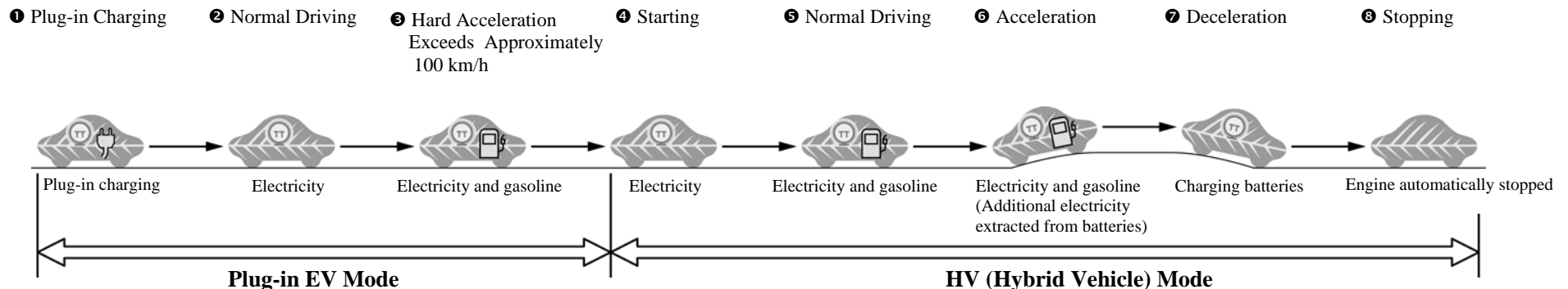
Plug-in EV (Electric Vehicle) Mode:

- ❶ Utilizing the charge cable assembly connected to a 220-240 Volt outlet, the vehicle's HV battery can be charged within 2 hours.
- ❷ When the HV battery is sufficiently charged, the vehicle will basically run on the power of the electric motor for approximately 21 km.
- ❸ If the vehicle exceeds approximately 100 km/h or accelerates suddenly when traveling in plug-in EV mode, the gasoline engine and motor work together to power the vehicle.

When the HV battery is discharged the vehicle operates in Hybrid Vehicle mode

HV (Hybrid Vehicle) Mode:

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



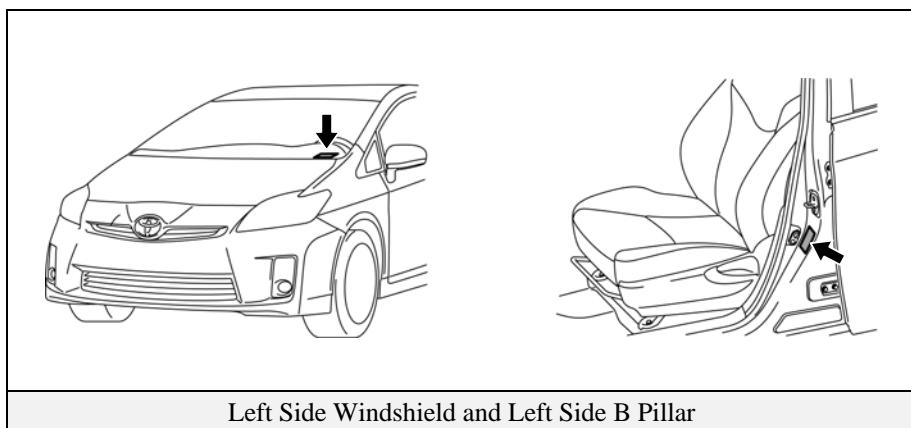
Prius Plug-in Hybrid Identification

In appearance, the 2010 model year Prius Plug-in hybrid is a 5-door hatchback. Exterior, interior, and engine compartment illustrations are provided to assist in identification.

The alphanumeric 17 character Vehicle Identification Number (VIN) is provided in the front windshield cowl and on the left side door pillar.

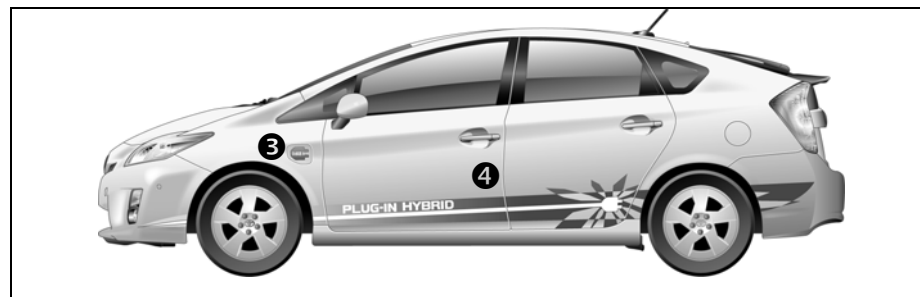
Example VIN: JTDKN36PA82020211

A Prius Plug-in hybrid is identified by the first 8 alphanumeric characters **JTDKN36P**.

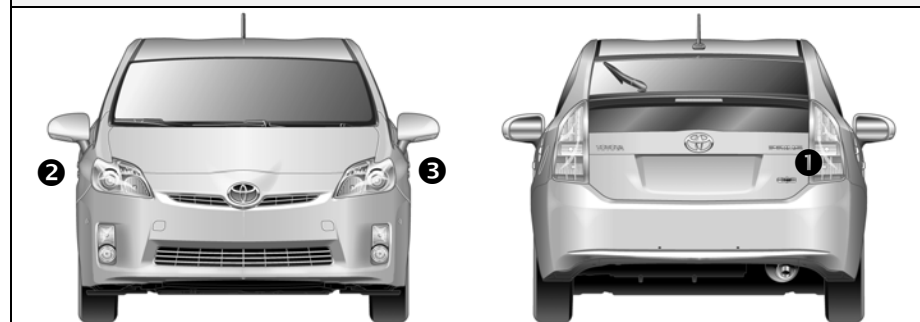


Exterior

- 1 **PRIUS** and **HYBRID SYNERGY DRIVE** logos on the hatch.
- 2 **PLUG-IN HYBRID** logo on the front right fender.
- 3 Charge inlet door with **PLUG-IN HYBRID** logo, located on left side front fender.
- 4 Plug-in Hybrid decals located on the sides of the vehicle.



Exterior Left Side View



Exterior Front and Rear View

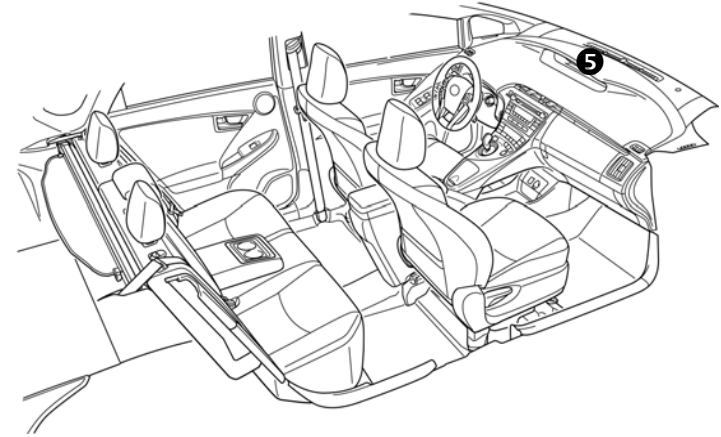


Exterior Rear and Left Side View

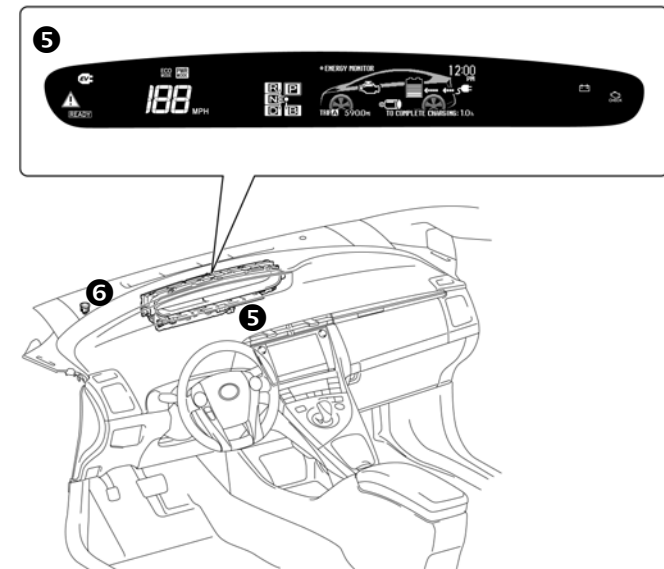
Prius Plug-in Hybrid Identification (Continued)

Interior

- ⑤ An instrument cluster (speedometer, **READY** light, shift position indicators, warning lights) located in center of the dash and near the base of the windshield.
- ⑥ A plug-in charge indicator light located on the upper dash near the left side windshield.



Interior View

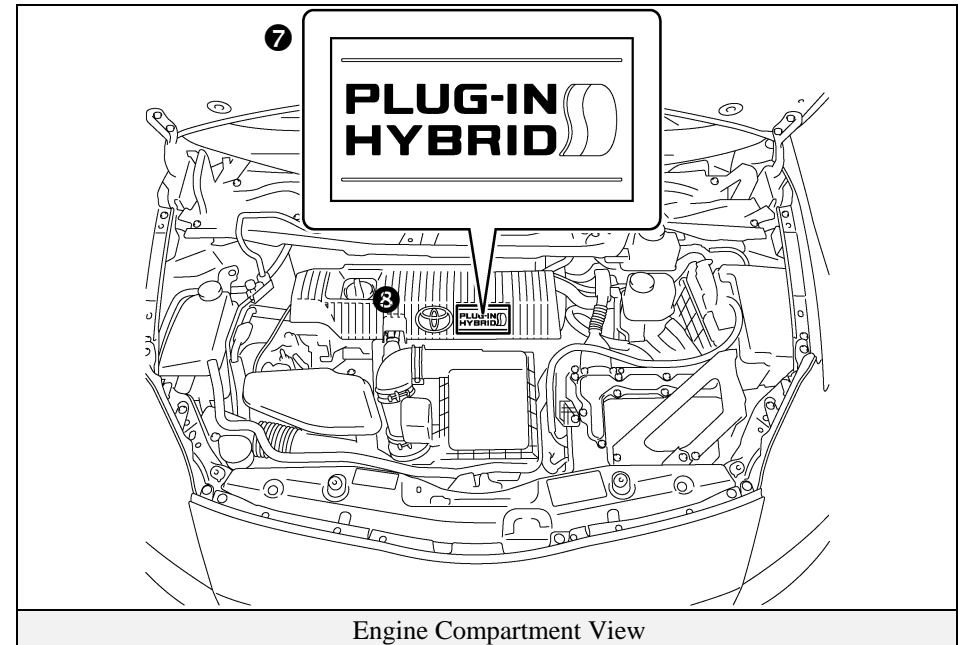


Instrument Cluster View

Prius Plug-in Hybrid Identification (Continued)

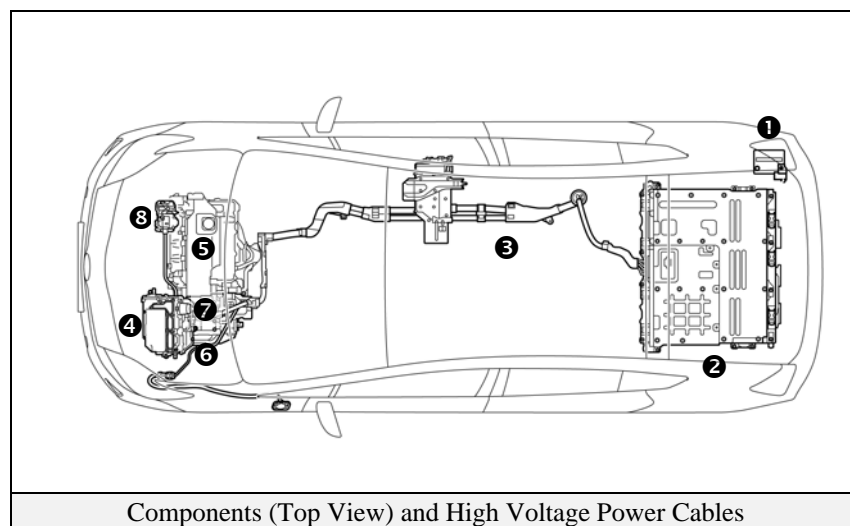
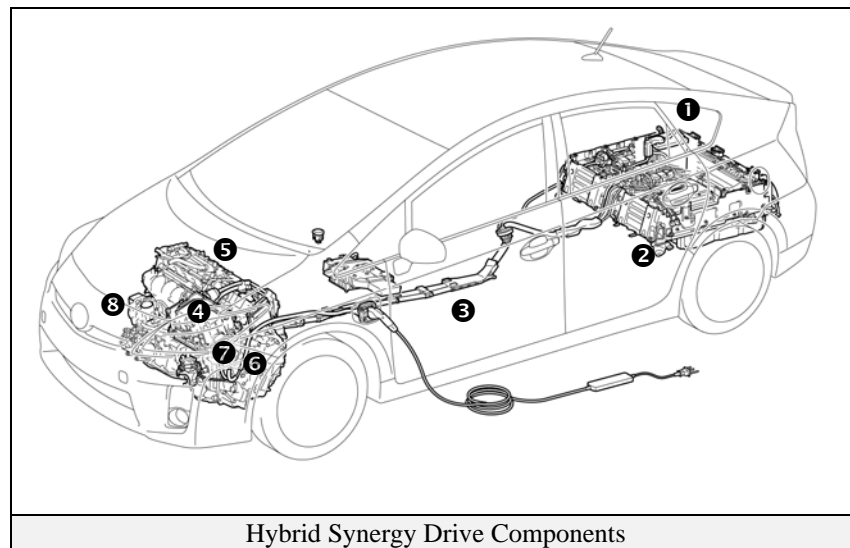
Engine Compartment

- ⑦ 1.8-liter aluminum alloy gasoline engine.
- ⑧ Logo on the plastic engine cover.



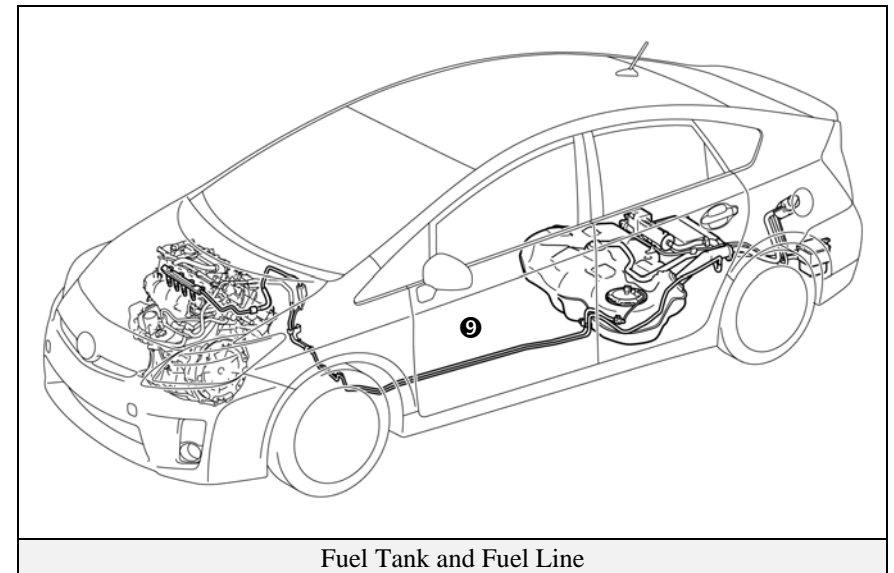
Hybrid Synergy Drive Component Locations & Descriptions

Component	Location	Description
12 Volt 1 Auxiliary Battery	Right Side of Cargo Area	A lead-acid battery that supplies power to the low voltage devices.
Hybrid 2 Vehicle (HV) Battery Assembly	Cargo Area	346 Volt Lithium-ion (Li-ion) battery pack consisting of 3.6 Volt cells connected in a series-parallel circuit.
Power 3 Cables	Undercarriage and Engine Compartment	Orange colored power cables carry high voltage Direct Current (DC) between the HV battery assembly, inverter/converter, and A/C compressor. These cables also carry 3-phase Alternating Current (AC) between the inverter/converter, electric motor, and generator.
Inverter/ Converter 4	Engine Compartment	Boosts and inverts the high voltage electricity from the HV battery assembly 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 charges the HV battery assembly.
Gasoline 5 Engine	Engine Compartment	Provides two functions: 1) Powers vehicle. 2) Powers generator to charge the HV battery assembly. The engine is started and stopped under control of the vehicle computer.
Electric 6 Motor	Engine Compartment	3-phase high voltage AC permanent magnet electric motor contained in the front transaxle. It is used to power the front wheels.
Electric 7 Generator	Engine Compartment	3-phase high voltage AC generator that is contained in the transaxle and charges the HV battery assembly.
A/C Compressor (with Inverter) 8	Engine Compartment	3-phase high voltage AC electrically driven motor compressor.



Hybrid Synergy Drive Component Locations & Descriptions (Continued)

Component	Location	Description
Fuel Tank and Fuel Line ⑨	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.



Hybrid Synergy Drive Component Locations & Descriptions (Continued)

Key Specifications:

Gasoline Engine: 98 hp (73 kW), 1.8-liter Aluminum Alloy Engine

Electric Motor: 80 hp (60 kW), Permanent Magnet Motor

Transmission: Automatic Only (electrically controlled continuously variable transaxle)

HV Battery Assembly: 346 Volt Sealed Li-ion-Battery

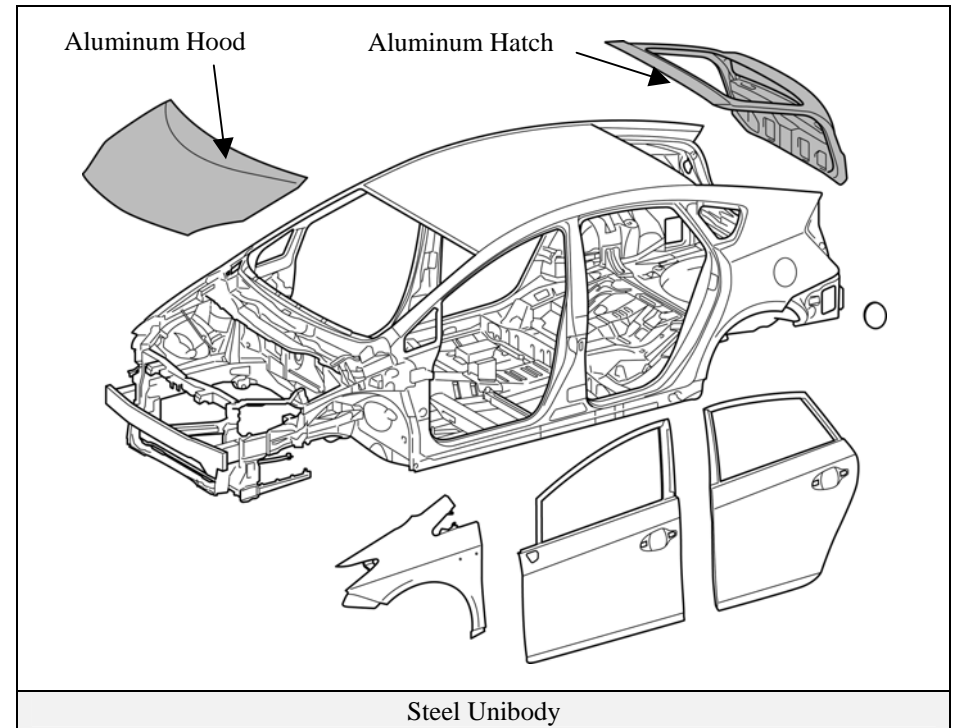
Curb Weight: 3,307 lbs/1,500 kg

Fuel Tank: 11.9 gals/45.0 liters

Frame Material: Steel Unibody

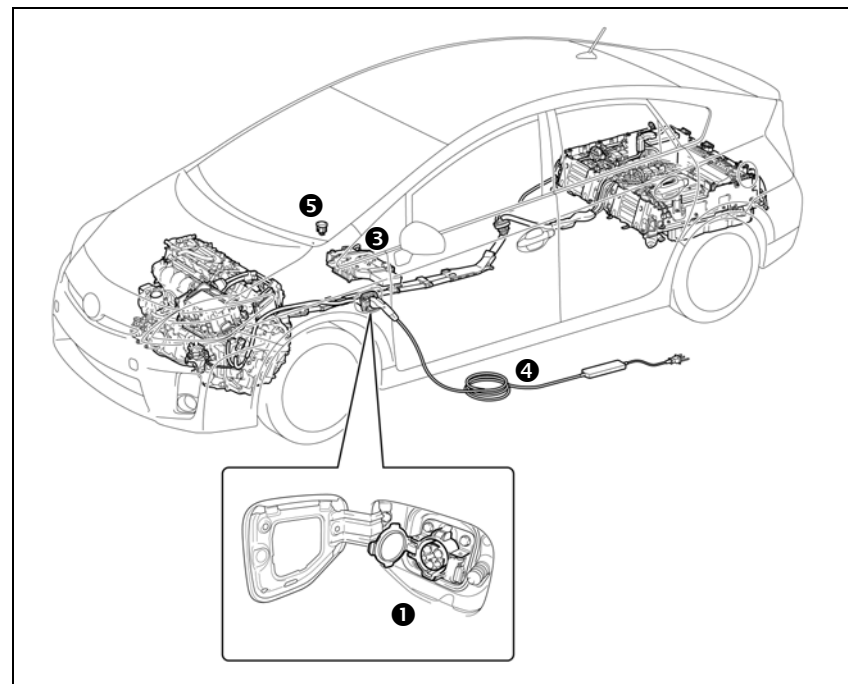
Body Material: Steel Panels except for Aluminum Hood and Hatch

Seating Capacity: 5 passenger

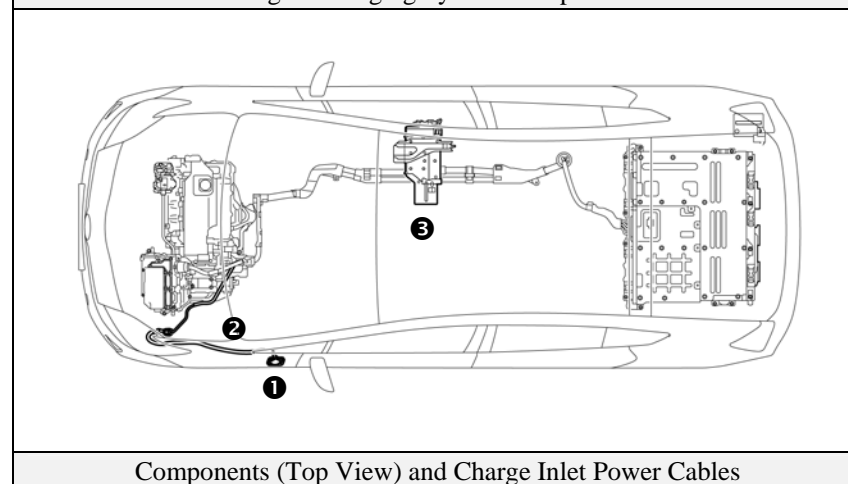


Plug-in Charging System Component Locations & Descriptions

Component	Location	Description
Charge Inlet ❶	Left Side Front Fender	Connects to the charge cable assembly charge connector. Supplies the electrical power from an external power source to the vehicle.
Power Cable for Charging ❷	Left Side behind front fender	Power cable connecting the charge inlet and charger assembly.
Charger Assembly ❸	Under Front Right Side Seat	Boosts the AC power supplied from an external power source and converts it to DC to charge the HV battery assembly and operate the A/C compressor.
Charge Cable Assembly ❹	Left Side Front Fender	Connects to the charge inlet and supplies power from an external power source to the vehicle.
Charge Indicator ❺	Upper Dash near Left Side Windshield	Illuminates, flashes, or goes off to indicate the plug-in charging status. Also illuminates to indicate the operation of the remote air conditioning system.



Plug-in Charging System Components



Components (Top View) and Charge Inlet Power Cables

Smart Key System

The Prius Plug-in hybrid smart key system consists of a smart key transceiver that communicates bi-directionally, enabling the vehicle to recognize the smart key in proximity to the vehicle. Once recognized, the smart key will allow the user to lock and unlock the doors without pushing smart key buttons, and start the vehicle without inserting it into an ignition switch.

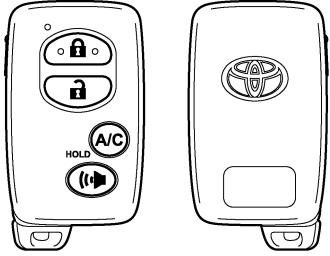
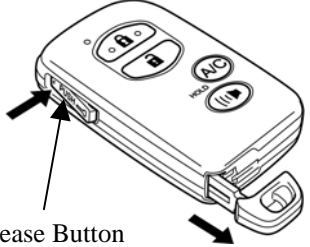
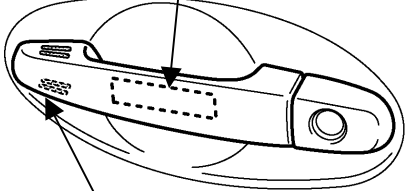
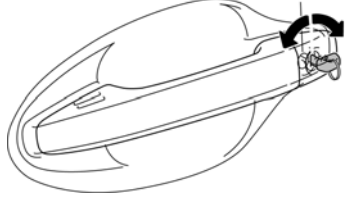
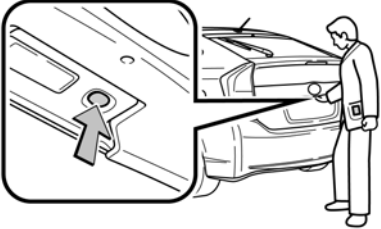
Smart key features:

- Passive (remote) function to lock/unlock the doors and start the vehicle.
- Wireless transmitter buttons to lock/unlock all 5 doors.
- Hidden metal cut key to lock/unlock the doors.

Door (Lock/Unlock)

There are several methods available to lock/unlock the doors.

- Pushing the smart key lock button will lock all doors including the hatch. Pushing the smart key unlock button once unlocks the driver door, twice unlocks all doors.
- Touching the sensor on the backside of the driver door exterior handle, with the smart key in proximity to the vehicle, unlocks the driver door. Touching the sensor on the backside of the front passenger door exterior handle, with the smart key in proximity to the vehicle, unlocks all doors. Touching the lock sensor on either front door, or the lock button for the hatch will lock all doors.
- Inserting the hidden metal cut key in the driver door lock and turning clockwise once unlocks the driver door, twice unlocks all doors. To lock all doors turn the key counter clockwise once. Only the driver door contains an exterior door lock for the metal cut key.

	 <p>Release Button</p>
Smart Key (Fob)	Hidden Metal Cut Key for Door Lock
 <p>Unlock Touch Sensor</p> <p>Lock Touch Sensor</p>	 <p>Use the Hidden Metal Cut Key</p>
Driver Door Unlock Touch Sensor and Lock Touch Sensor	Front Driver Door Lock
	
Hatch Lock Button	

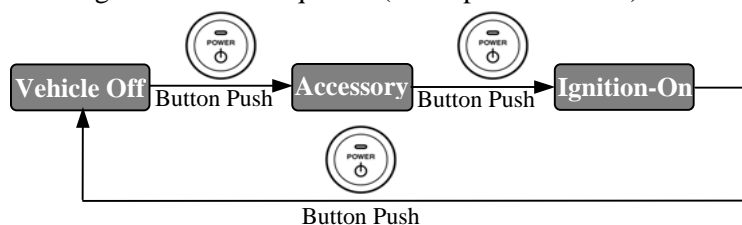
Smart Key System (Continued)

Vehicle Starting/Stopping

The smart key has replaced the conventional metal cut key, and the power button with an integral status indicator light has replaced the ignition switch. The smart key only needs to be in proximity to the vehicle to allow the system to function.

- With the brake pedal released, the first push of the power button operates the accessory mode, the second push operates the ignition-on mode, and the third push turns the ignition off again.

Ignition Mode Sequence (brake pedal released):



- Starting the vehicle takes priority over all other ignition modes and is accomplished by depressing the brake pedal and pushing the power button once. To verify the vehicle has started, check that the power button status indicator light is off and the **READY** light is illuminated in the instrument cluster.
- If the internal smart key battery is dead, use the following method to start the vehicle.
 - Touch the Toyota emblem side of the smart key to the power button.
 - Within the 5 seconds after the buzzer sounds, push the power button with the brake pedal depressed (the **READY** light will illuminate).
- Once the vehicle has started and is on and operational (**READY-ON**), the vehicle is shut off by bringing the vehicle to a complete stop and then depressing the power button once.
- To shut off the vehicle before coming to a stop in an emergency, push and hold down the power button for more than 3 seconds. This procedure may be useful such as at an accident scene in which the **READY** indicator is on and the drive wheels remain in motion.

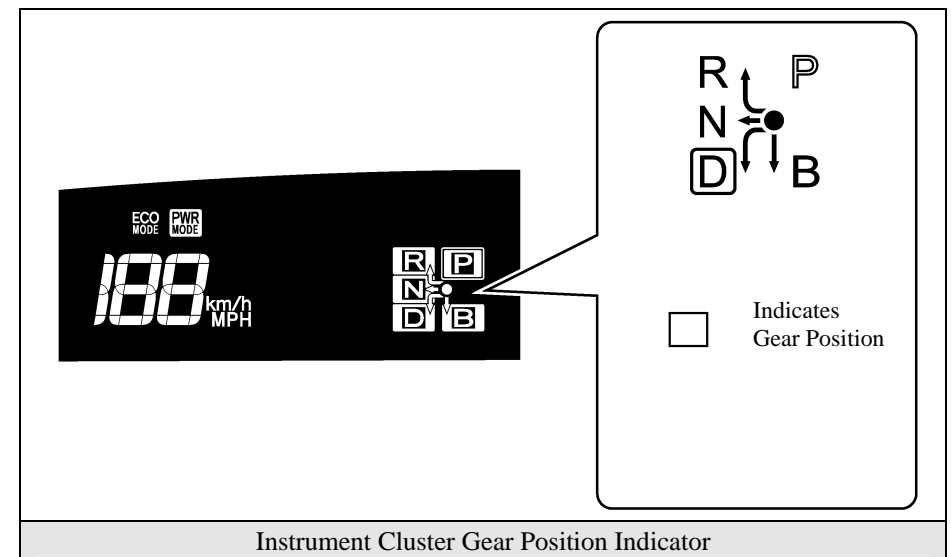
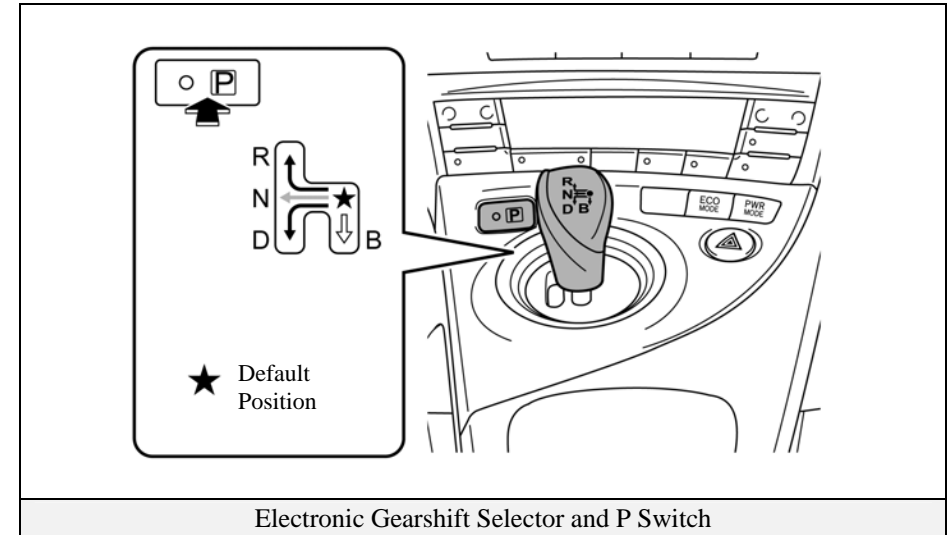
Ignition Mode	Power Button Indicator Light
Off	Off
Accessory	Amber
Ignition-On	Amber
Brake Pedal Depressed	Green
Vehicle Started (READY-ON)	Off
Malfunction	Blinking Amber

Power Button with Integral Status Indicator Light	Ignition Modes (Brake Pedal Released)
Starting Sequence (Brake Pedal Depressed)	Smart Key Recognition (When Smart Key Battery is Dead)

Electronic Gearshift Selector

The Prius Plug-in hybrid electronic gearshift selector is a momentary select shift-by-wire system that engages the transaxle in reverse (**R**), neutral (**N**), drive (**D**), or engine brake (**B**) modes.

- These modes may only be engaged while the vehicle is on and operational (READY-on), except for neutral (**N**) which may also be engaged while in the ignition-on mode. After selecting the gear position **R**, **N**, **D**, or **B** the transaxle remains in that position, identified on the instrument cluster, but the shift selector returns to a default position. To select neutral (**N**), it is necessary to hold the shift selector in the **N** position for approximately 0.5 seconds.
- Unlike a conventional vehicle, the electronic shift selector does not contain a park (**P**) position. Instead, a separate **P** switch located above the shift selector engages park (**P**).
- When the vehicle is stopped, regardless of shift selector position, the electro-mechanical parking pawl is engaged to lock the transaxle into park (**P**) by either depressing the **P** switch or pushing the power button to shut off the vehicle.
- Being electronic, the gearshift selector and the park systems depend on the low voltage 12 Volt auxiliary battery for power. If the 12 Volt auxiliary battery is discharged or disconnected, the vehicle cannot be started and cannot be shifted out of park (**P**).

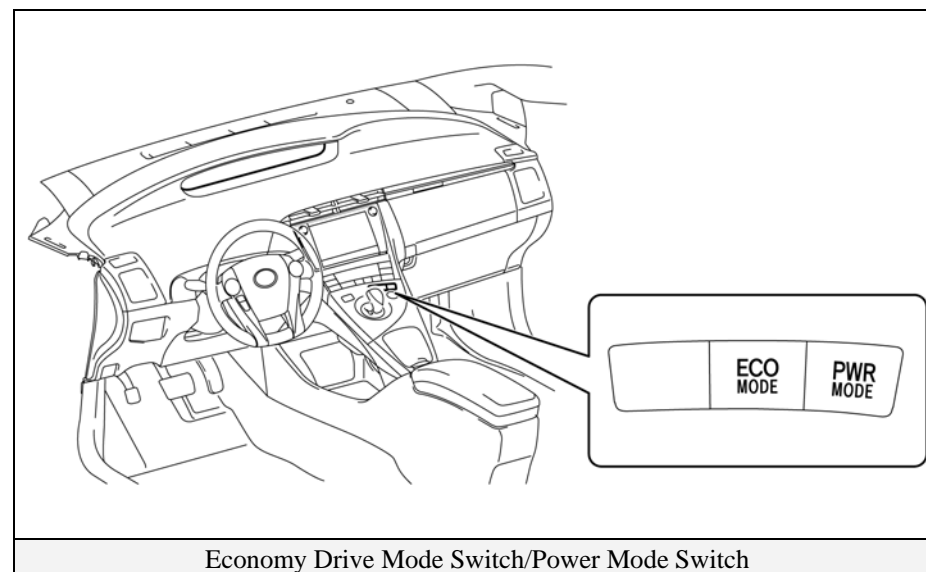
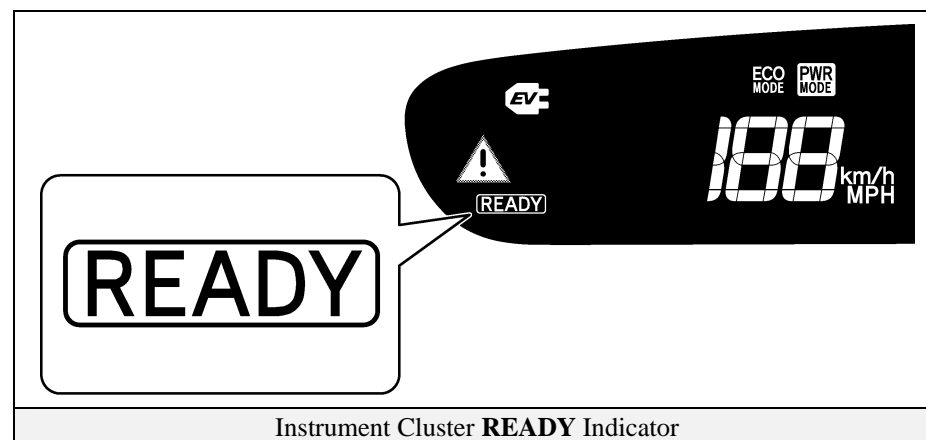


Hybrid Synergy Drive Operation

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 lit, 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 Prius Plug-in hybrid, 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 and instrument cluster lights are off.
- The vehicle may be powered by:
 1. The electric motor only.
 2. The gasoline engine only.
 3. A combination of both the electric motor and the gasoline engine.
- The vehicle computer determines the mode in which the vehicle operates in order to improve fuel economy and reduce emissions. The Prius Plug-in hybrid features plug-in EV (Electric Vehicle) mode, a mode that is automatically selected when the HV battery is charged using an external power source. Power and ECO (Economy) modes are driver selectable.
 1. ECO Mode: When activated, this mode helps enhance fuel economy on trips that involve frequent braking and acceleration.
 2. Power Mode: Optimizes acceleration feel by increasing the power output more quickly at the beginning of accelerator pedal operation.



Hybrid Vehicle (HV) Battery Assembly

The Prius Plug-in hybrid features a large capacity high voltage Hybrid Vehicle (HV) battery assembly that contains newly developed sealed Lithium-ion (Li-ion) battery cells.

HV Battery Assembly

- The HV battery assembly is enclosed in a metal case and is rigidly mounted in the lower part of the cargo area behind the rear seat. The metal case is isolated from high voltage and concealed by a carpeted panel in the cabin area.
- The HV battery assembly consists of 3.6 Volt Li-ion battery cells connected in series-parallel circuit to produce approximately 346 Volts. Each Li-ion battery cell is non-spillable and contained in a sealed metal 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.

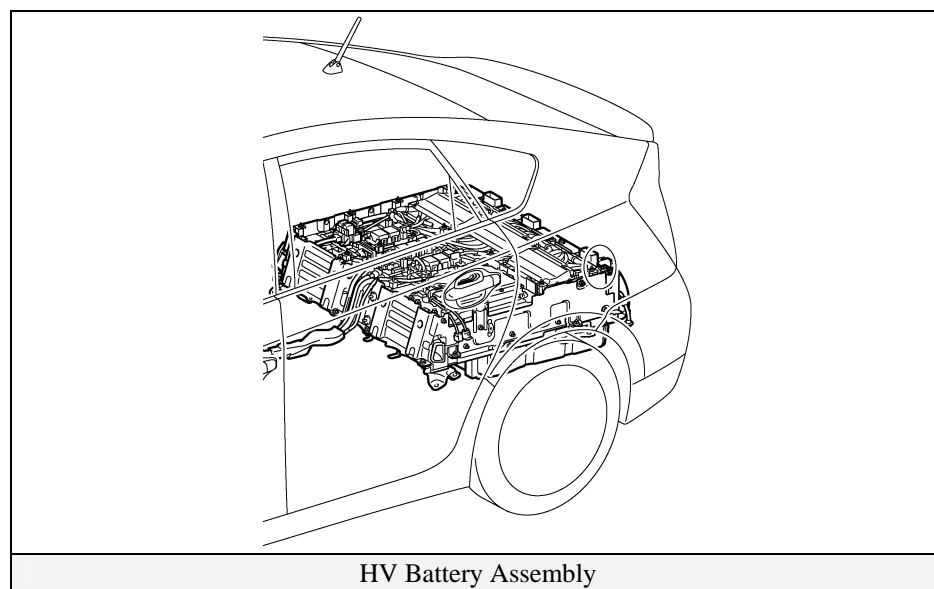
HV Battery Assembly	
Battery assembly voltage	346 V
Number of Li-ion battery cells in the battery	288 cells
Li-ion battery cell voltage	3.6 V
Li-ion battery cell dimensions	4.42 x 4.35 x 0.56 in. (112.2 x 110.6 x 14.1 mm)
Li-ion cell weight	0.54 lbs (245 g)
Li-ion battery assembly dimensions	32.4 x 38.1 x 14.9 in. (822.4 x 967.8 x 378.4 mm)
Li-ion battery assembly weight	333 lbs (151.1 kg)

Components Powered by the HV Battery Assembly

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

HV Battery Assembly Recovery

- If recovery of the HV battery assembly is necessary, contact the nearest Toyota dealer.



Plug-in Charging System

The plug-in charging system uses an on-board charger to convert AC power supplied via the charge cable assembly to DC power that can be used to charge the HV battery assembly. The charging system uses refined charging control to ensure battery durability and prevent fires due to overcharging.

The utility power supplied by the charge cable assembly is converted by the onboard charger assembly to the approximately 346 Volts DC used to charge the HV battery assembly.

Safety Concerns

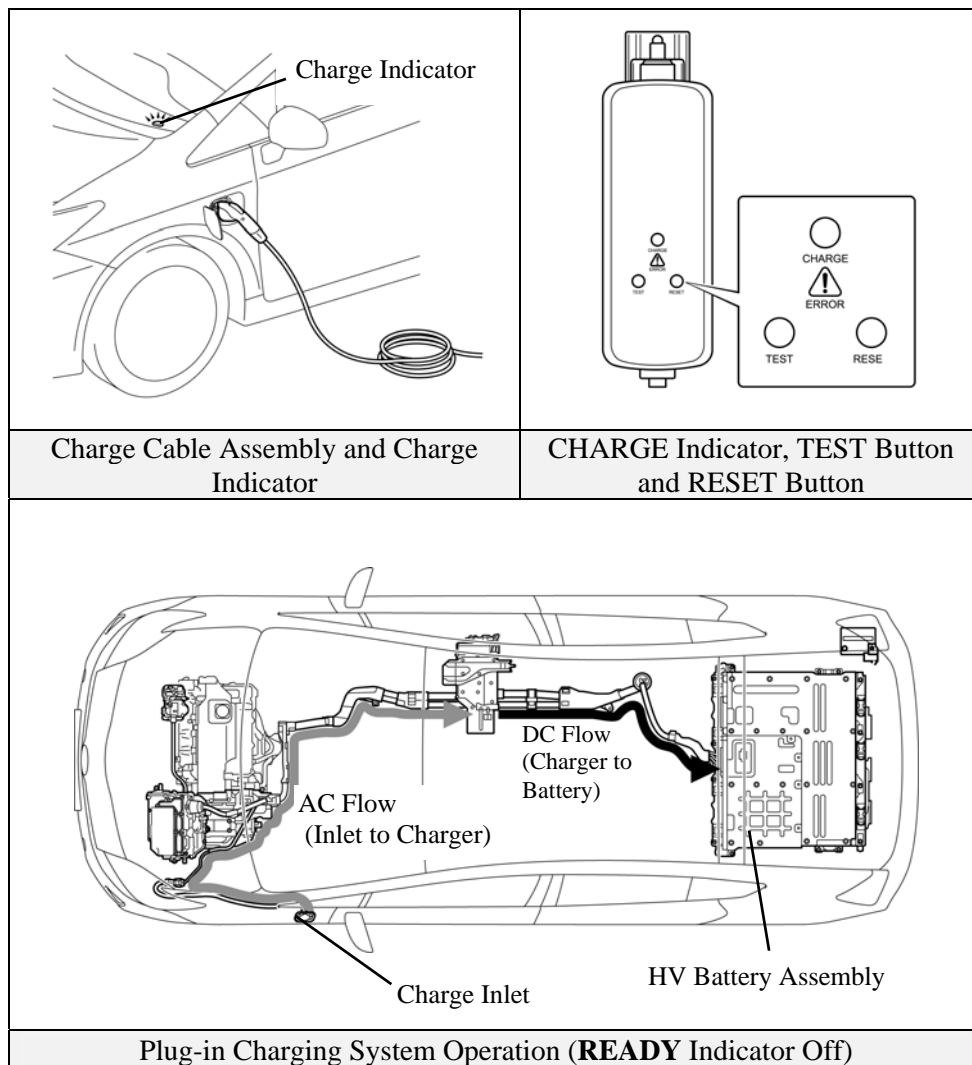
Since the operation of the plug-in charging system allows high voltage electrical flow when the vehicle is shut off, it is important to recognize how the system is activated, deactivated, and disabled.

System Activation:

The following steps provide a simplified explanation on how to charge the vehicle.

1. Confirm that the vehicle is off and in park (P).
2. Connect the charge cable assembly to a suitable 220-240 Volt wall receptacle.
3. Confirm the presence of power, and test the CCID (Charging Circuit Interrupter Device).
4. Connect the charge cable assembly to the vehicle charge inlet connector.
5. Confirm that the vehicle's charge indicator illuminates.

When charging, the high voltage cables are energized. Utility electricity flows from the charge inlet, its voltage is then boosted and it is provided to the HV battery assembly and air conditioning compressor. Charging normally completes within 2 hours and will stop automatically.



Plug-in Charging System (Continued)

System Deactivation:

The following steps explain how to stop charging.

1. Disconnect the charge cable assembly connector from the vehicle. To disconnect it, push the orange lock release button on the top of the connector and pull it away from the vehicle.
2. Close the charge inlet cap and charge inlet door.
3. Disconnect the plug of the charge cable assembly from the electrical outlet.

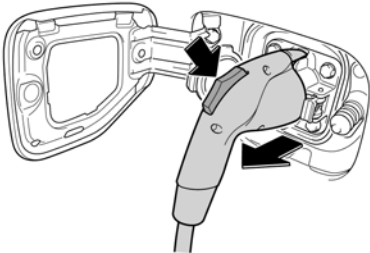
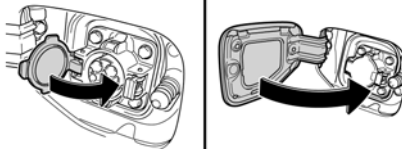
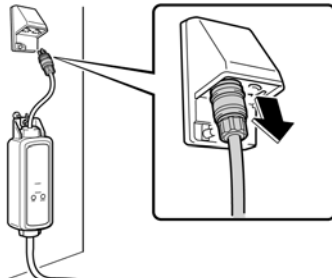
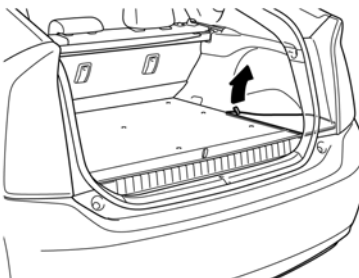
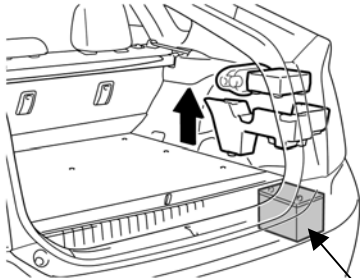
When the charging system is deactivated, high voltage cables are de-energized and the high voltage electrical flow stops in the charge cable assembly and vehicle.

WARNING:

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

System Disabling:

To disable the charging system, disconnect the 12 Volt auxiliary battery after performing the above deactivation procedure.

	
Disconnect Charge Cable Connector	Close Charge Inlet Cap and Charge Inlet Door
	
Disconnect Plug	Remove Battery Cover
	
Remove Tire Repair Kit and Foam Insert	

Remote Air Conditioning System

The remote air conditioning system is provided to enhance occupant comfort by heating or cooling the vehicle interior while the vehicle is shut off and the charge cable assembly is plugged in.

The remote air conditioning system is similar to a remote engine start system used in a conventional gasoline vehicle to precondition the vehicle interior while the vehicle is parked. Unlike a conventional gasoline vehicle, the Prius Plug-in hybrid does not start the gasoline engine. Instead, to heat or cool the vehicle interior, it utilizes power from the charge cable assembly to operate the high voltage air conditioning compressor. The compressor operates in a conventional manner for cooling, and it operates as a heat pump for heating. The system can only be activated remotely by pushing the smart key A/C button and will operate for up to 30 minutes when certain conditions are met.

Safety Concerns

Since the operation of the remote air conditioning system allows high voltage electrical flow, it is important to recognize how the system is activated, deactivated, and disabled.

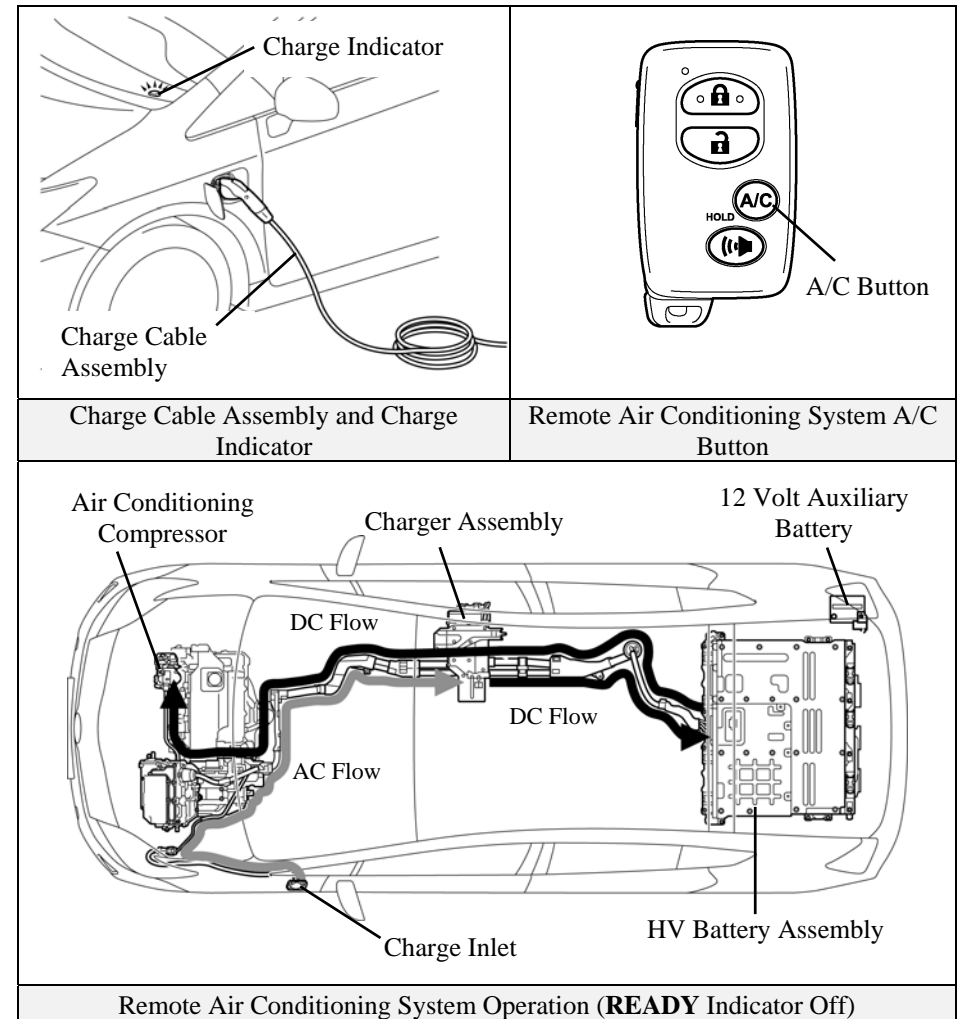
System Activation:

When the remote air conditioning system is activated, the high voltage cables are energized. Household electricity flows from the charge inlet, its voltage is then boosted and it is provided to the HV battery assembly and air conditioning compressor. The system can operate when all of the following operating conditions are met:

- The charge cable assembly is connected.
- The doors and hood are closed.
- The vehicle Power switch is off.
- The brake pedal is not being depressed.
- The shift position is park (P).
- The charge level of the HV battery assembly is above a specified level.
- There is a difference between the set temperature and actual cabin temperature.

The following points can be used to confirm that the remote air conditioning system is operating:

- Air is flowing from the interior vehicle vents, and blower fan noise or compressor noise is heard.
- The charge cable assembly is connected and the charge indicator is illuminated.
- The instrument cluster lights are on, the READY indicator is off, and all of the conditions in the preceding list are met.



Remote Air Conditioning System (Continued)

System Deactivation:

When the system is deactivated, the A/C system stops. The system is deactivated when any one of the following conditions occurs:

- When the system has operated for more than about 30 minutes.
- When the vehicle interior nears the set temperature.
- When a door is opened, the hood is opened, or the brake pedal is depressed.
- When the smart key A/C button is pushed twice within 3 seconds.
- When the operating conditions are not met.

NOTE:

- It is not possible to operate the remote A/C system and perform plug in charging of the HV battery assembly at the same time. If plug in charging is being performed and the remote A/C system is turned on, plug in charging will stop.
- Plug in charging will not resume after the remote A/C system deactivates.

WARNING:

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

System Disabling:

Operation of the remote air conditioning system can be disabled by disconnecting the charge cable assembly (see page 15 for illustration). Perform the following steps to remove the charge cable assembly.

1. Disconnect the charge cable assembly connector from the vehicle. To disconnect it, push the orange lock release button on the top of the connector and pull it away from the vehicle.
2. Close the charge inlet cap and charge inlet door.
3. Disconnect the plug of the charge cable assembly from the electrical outlet.

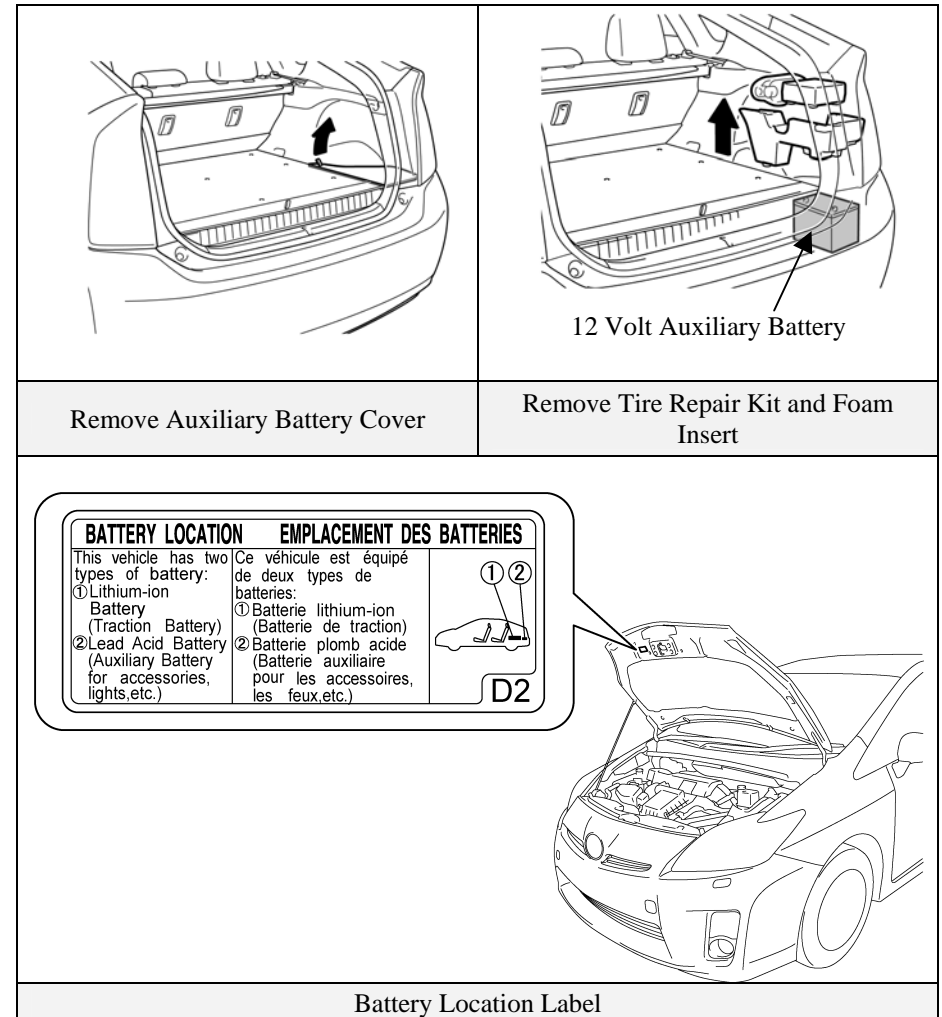
Low Voltage Battery

Auxiliary Battery

- The Prius Plug-in hybrid contains a sealed lead-acid 12 Volt battery. The 12 Volt auxiliary battery powers the vehicle's electrical system similar to a conventional vehicle. As with conventional vehicles, the negative terminal of the auxiliary battery is grounded to the metal chassis of the vehicle.
- The auxiliary battery is located in the cargo area. It is concealed by a fabric cover, tire repair kit, and foam insert on the right side in the rear quarter panel well.

NOTE:

An under hood label shows the location of the HV battery assembly (traction battery) and 12 Volt auxiliary battery.



High Voltage Safety


The HV battery assembly powers the high voltage electrical system with DC electricity. Positive and negative orange colored high voltage power cables are routed from the HV battery assembly, under the vehicle floor pan, to the inverter/converter. The inverter/converter contains a circuit that boosts the HV battery voltage from 346 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 motor (electric motor, electric generator, and A/C compressor). The following systems are intended to help keep occupants in the vehicle and emergency responders safe from high voltage electricity:

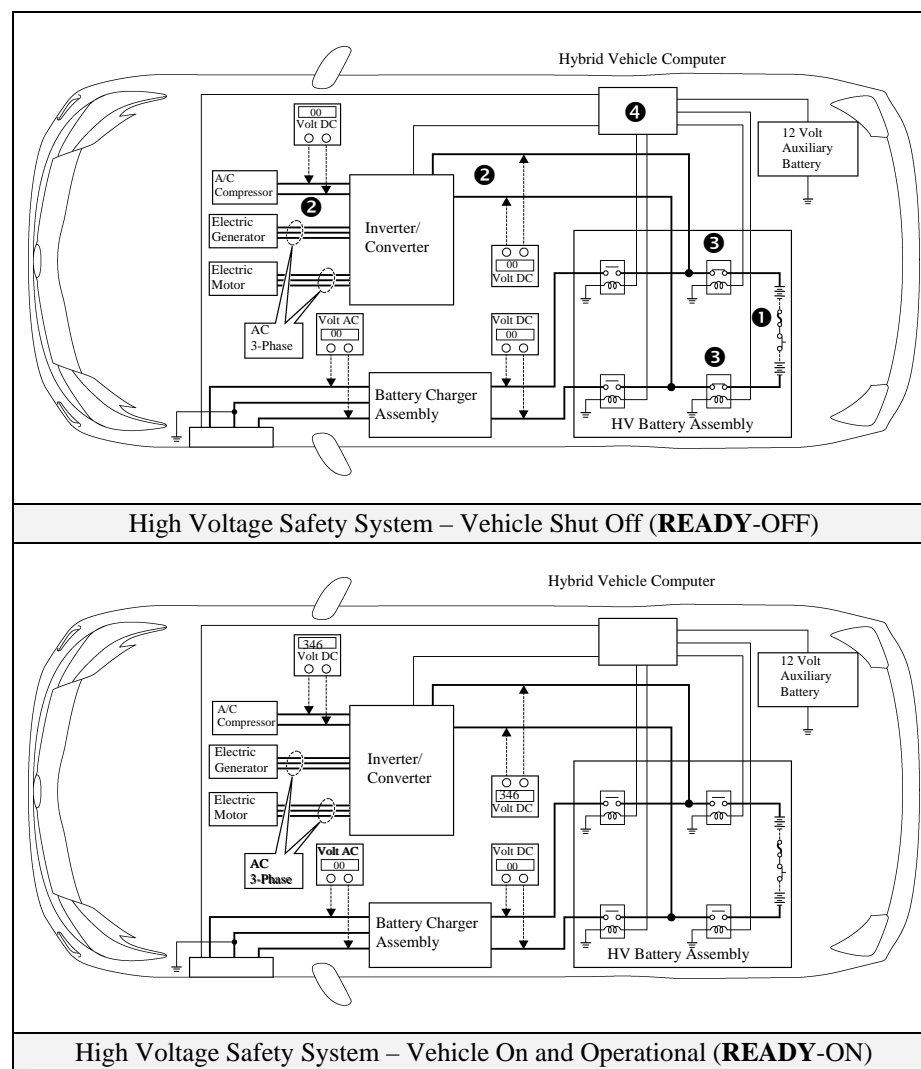
High Voltage Safety System

- High voltage fuses ❶ provide short circuit protection in the HV battery assembly.
- Positive and negative high voltage power cables ❷ connected to the HV battery assembly are controlled by 12 Volt normally open relays ❸. When the vehicle is shut off and not charging, the relays stop electrical flow from leaving the HV battery assembly.

⚠ WARNING:

The high voltage system, including the charging system, may remain powered for up to 10 minutes after the vehicle is shut off, disabled, or charging stops. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or breaching 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 illuminate the master warning light  in the instrument cluster and indicate “Check Hybrid System” on the multi-information display.



Plug-in Charging Safety

The HV battery assembly can be charged using power from an external power outlet. AC power is supplied to the charge inlet by the charge cable assembly and sent to the charger assembly. There are basically 2 circuits in the charger assembly: one is an AC/DC converter circuit and the other is a booster circuit used to boost the charger input voltage to 346 Volts. DC power from the charger assembly is used to charge the HV battery assembly. To provide information about charging or remote air conditioning status, the hybrid vehicle computer illuminates the charge indicator on the instrument panel pad during charging and when the remote air conditioning system is on. When remote air conditioning system operation or charging completes, relays are opened to stop charging system high voltage power flow.

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



Plug-in Charging System Safety System

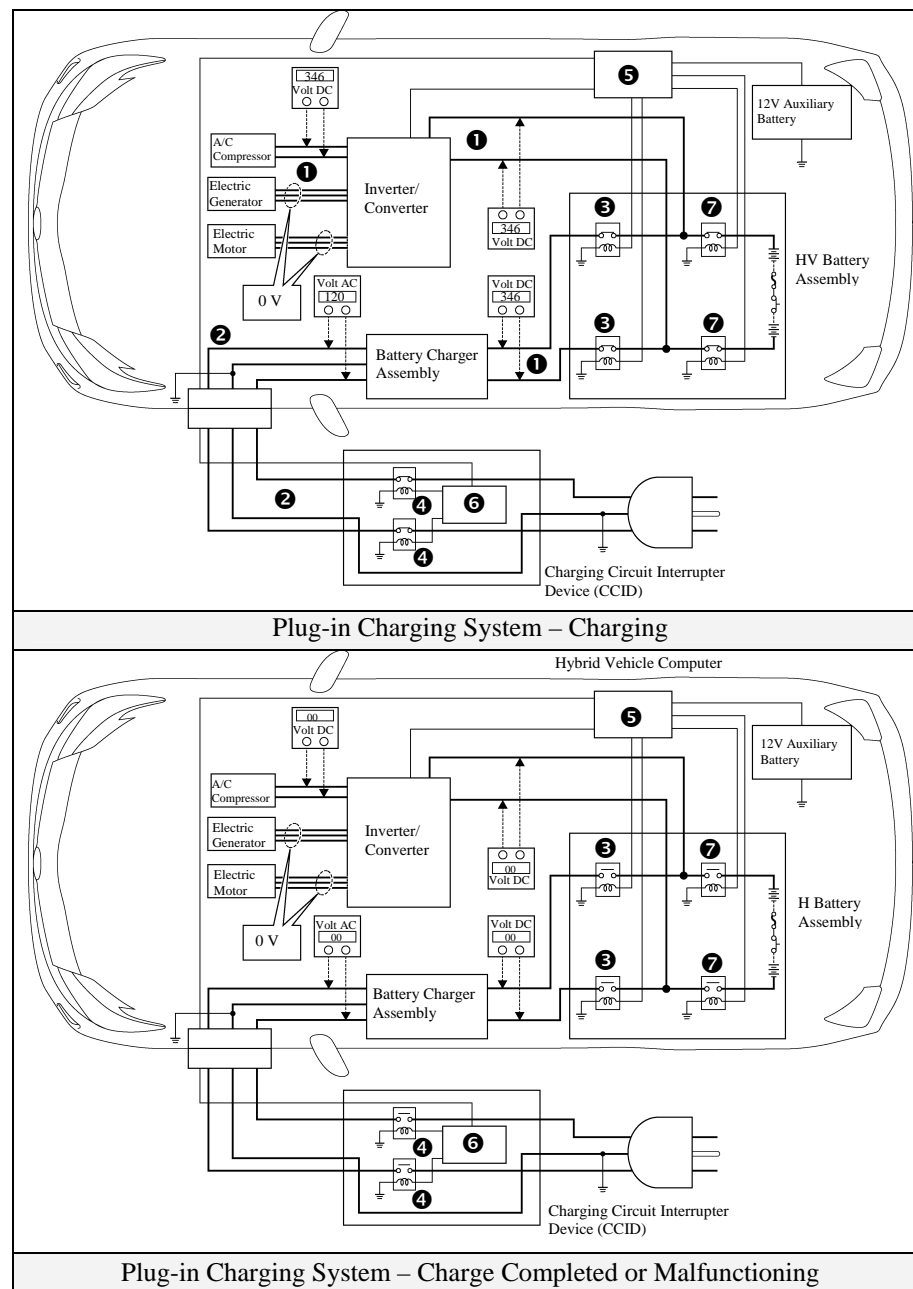
- The hybrid vehicle computer monitors the charging system based on information from various sensors. If the hybrid vehicle computer detects a malfunction, charging is stopped, relays are opened, and the charge indicator flashes to indicate the presence of the malfunction.

WARNING:

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

Plug-in Charging Safety (Continued)

- The AC cables ② are connected to the charger assembly. The high voltage DC power cables from the charger assembly ① are connected to the HV battery assembly and are controlled by 12 Volt normally open charge relays ③, HV system main relays ⑦ and AC leakage cut relays ④. When charging is not being performed, or the remote air conditioning system is not operating, the charge relays ③ and HV system main relays ⑦ electrical flow from the HV battery assembly to the charger assembly, and the relays in the CCID (Charging Circuit Interrupter Device) ④ stop the supply of household power to the vehicle.
- Both the high voltage power cables ① and the AC 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.
- Ground fault monitors ⑤ and ⑥ continuously monitor for high voltage leakage to the metal chassis while the vehicle is charging. If a malfunction is detected, the CCID will illuminate its error light .
- The CCID contains a power light, an error light , a TEST button, and a reset button. When the charge cable assembly is connected to a 220-240 Volt outlet, the power light illuminates. The TEST and RESET buttons function like a conventional residential GFCI (Ground Fault Circuit Interrupter). Pushing the TEST button opens the CCID relays, and pushing the RESET button resets the circuit.



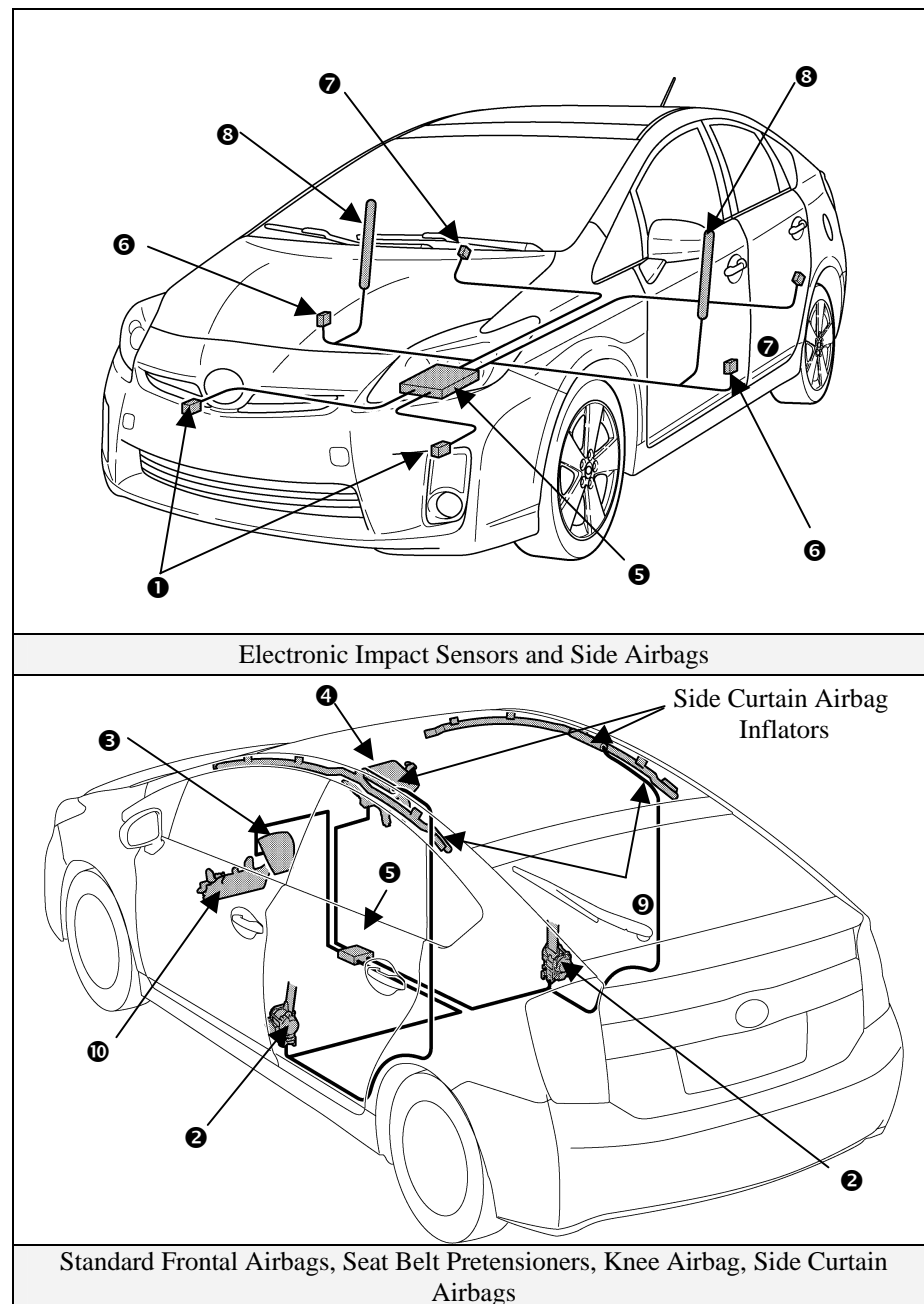
SRS Airbags & Seat Belt Pretensioners

Standard Equipment

- Electronic frontal impact sensors (2) are mounted in the engine compartment ① as illustrated.
- Front seat belt pretensioners are mounted near the base of the B-pillars ②.
- A frontal driver airbag ③ is mounted in the steering wheel hub.
- A frontal passenger airbag ④ is integrated into the dashboard and deploys through the top of the dashboard.
- The SRS computer ⑤, which contains an impact sensor, is mounted on the floor pan underneath the instrument panel, forward of the shift lever.
- Front electronic side impact sensors (2) are mounted near the base of the B-pillars. ⑥
- Rear electronic side impact sensors (2) are mounted near the base of the C-pillars. ⑦
- Front seat side airbags ⑧ are mounted in the front seatbacks.
- Side curtain airbags ⑨ are mounted along the outer edge inside the roof rails.
- A driver knee airbag ⑩ is mounted on the lower portion of the dash.
- Active (mechanical non-pyrotechnic) front seat headrests (see description on page 30).

WARNING:

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 breaching the SRS components.

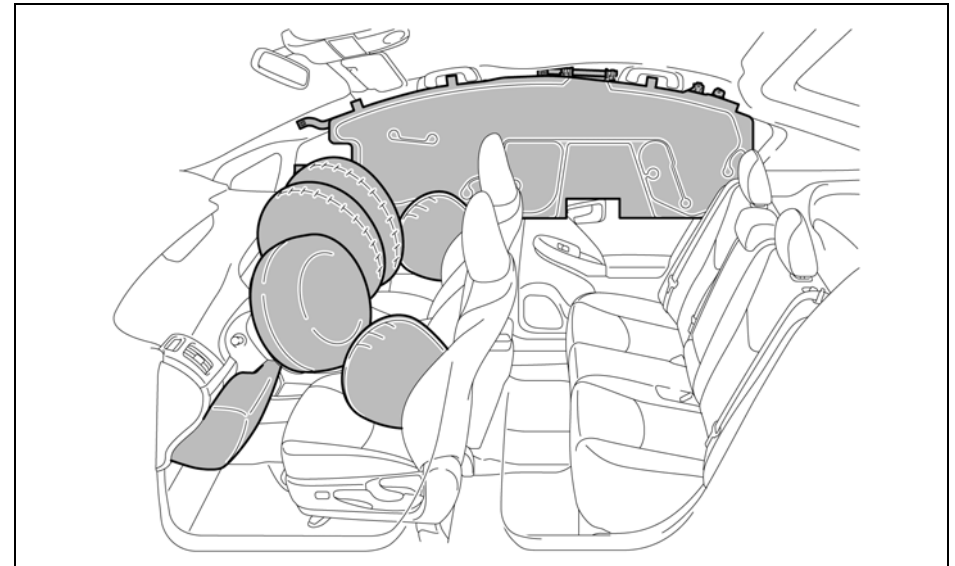
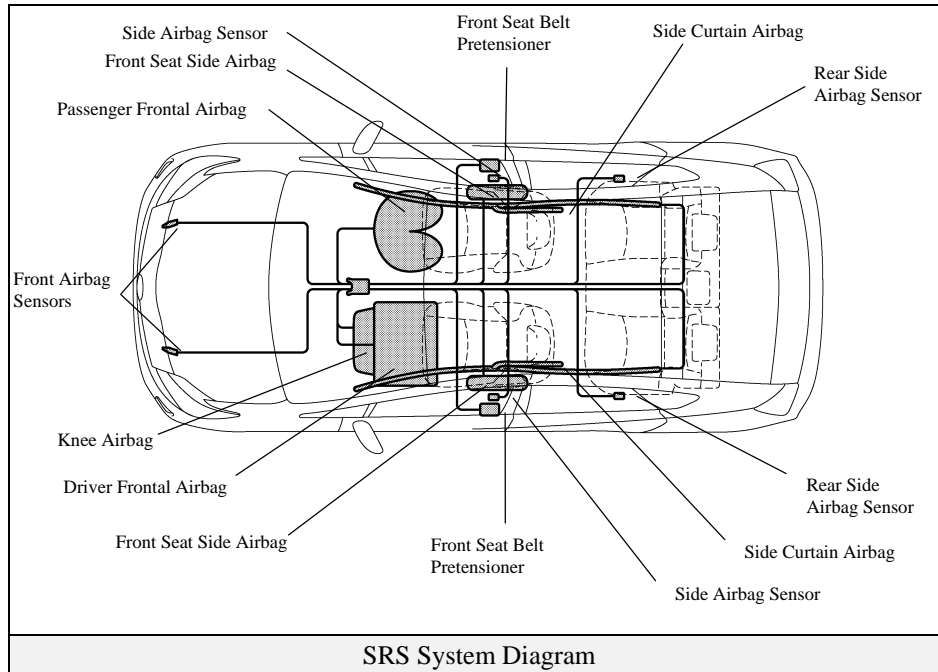


SRS Airbags & Seat Belt Pretensioners (Continued)

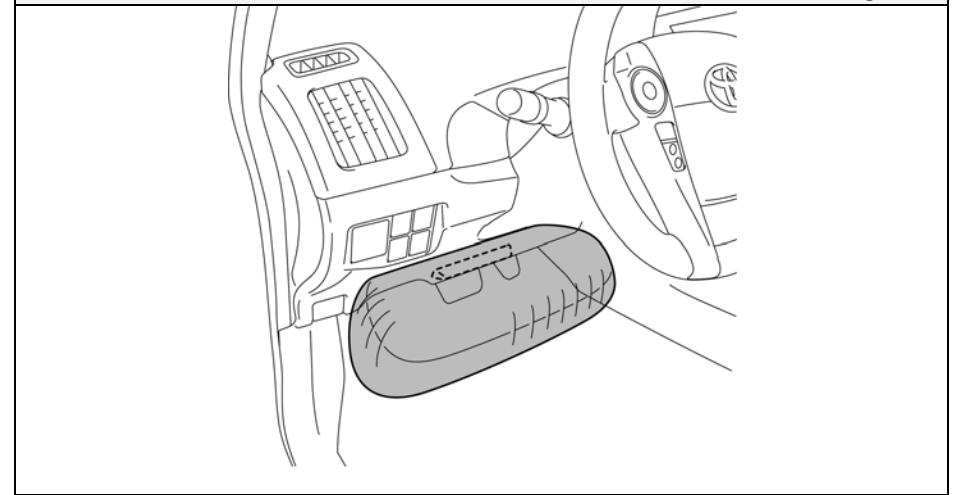
NOTE:

The front seatback mounted side airbags and the side curtain airbags may deploy independently of each other.

The knee airbag deploy simultaneously with the frontal airbags.



Frontal, Knee, Front and Rear Seatback Mounted Side, Side Curtain Airbags.



Driver Knee Airbag and Inflator

Emergency Response

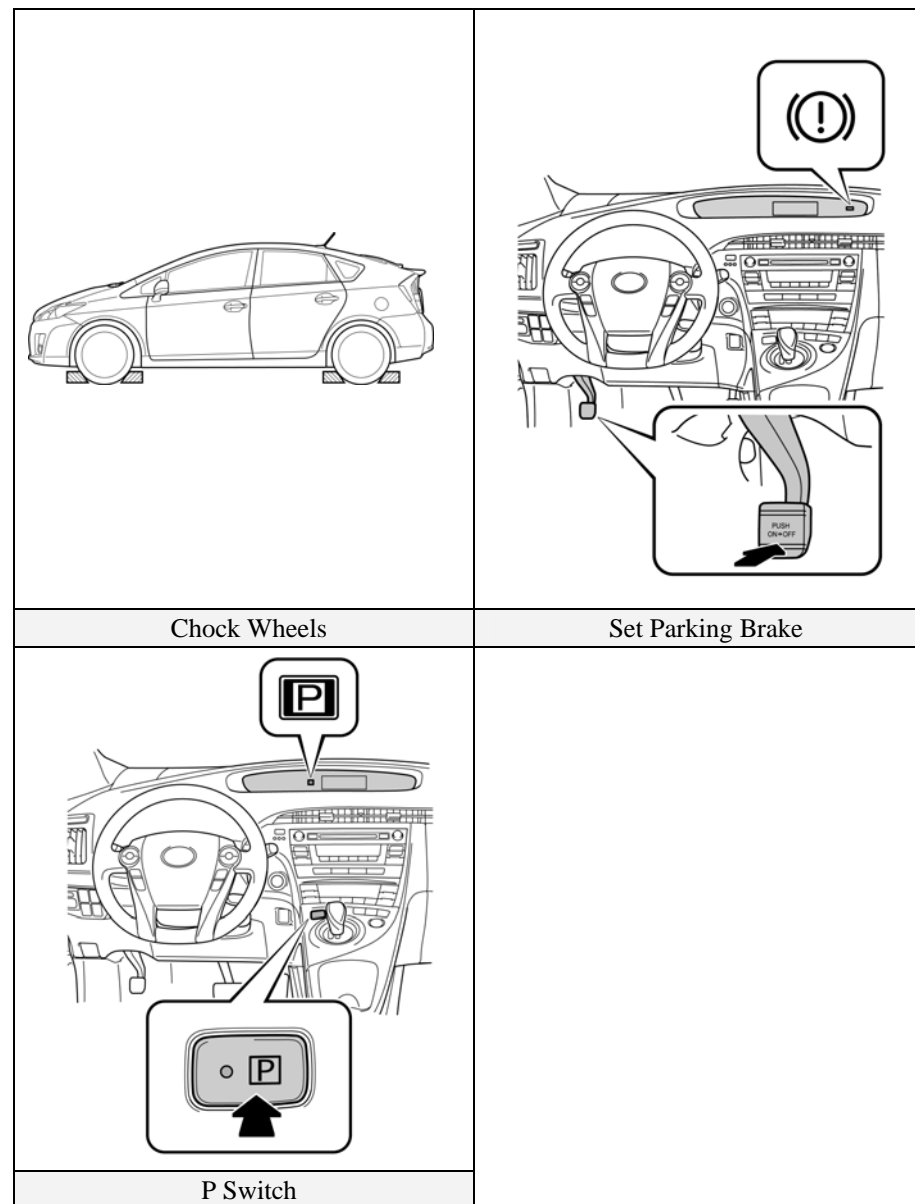
On arrival, emergency responders should follow their standard operating procedures for vehicle incidents. Emergencies involving the Prius Plug-in hybrid may be handled like other automobiles except as noted in these guidelines for Extrication, Fire, Overhaul, Recovery, Spills, First Aid, and Submersion.

WARNING:

- *Never assume the Prius Plug-in hybrid is shut off simply because it is silent.*
- *Always observe the instrument cluster for the **READY** indicator status to verify whether the vehicle is on or shut off. The vehicle and remote air conditioning system are shut off when the **READY** indicator is off and the instrument cluster lights are out.*
- *Failure to shut off and disable the vehicle before emergency response procedures are performed may result in serious injury or death from the unintentional deployment of the SRS or severe burns and electric shock from the high voltage electrical system.*

Extrication

- **Immobilize Vehicle**
Chock wheels and set the parking brake.
Push the **P** switch to engage park (P).
- **Disable Vehicle**
Performing either of the following two procedures will shut the vehicle off and disable the HV, SRS, charging and remote air conditioning systems. If the charge cable assembly is connected, perform the four steps on the following page to disconnect the charge cable assembly.



Emergency Response (Continued)

Extrication (Continued)

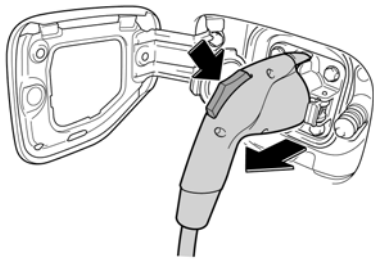
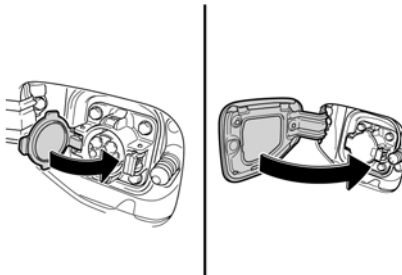
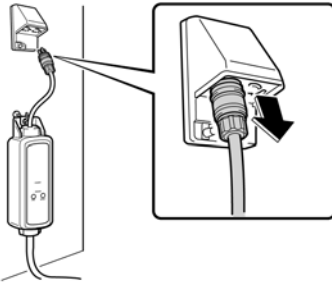
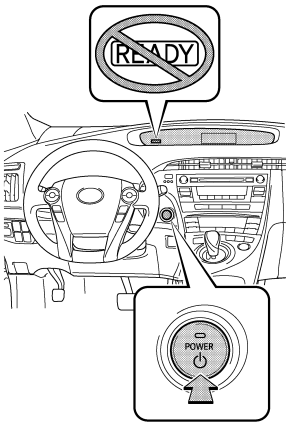
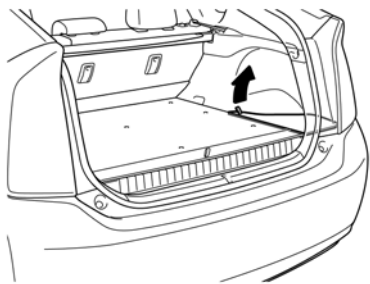
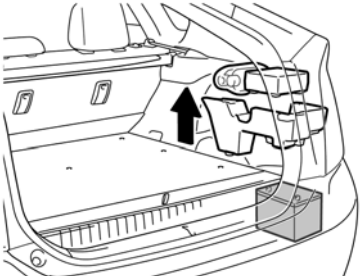
Perform these steps first if the charge cable assembly is connected to the vehicle.

1. Disconnect the charge cable assembly connector from the vehicle. To disconnect it, push the orange lock release button on the top of the connector and pull it away from the vehicle.
2. Close the charge inlet cap and charge inlet door.
3. Disconnect the plug of the charge cable assembly from the electrical outlet.

Performing either of the following two procedures will shut the vehicle off and disable the HV, SRS, charging and remote air conditioning systems.

Procedure #1

1. Confirm the status of the **READY** indicator in the instrument cluster. If the **READY** indicator is illuminated, the vehicle is on and operational.
2. Shut off the vehicle by pushing the power button once.
3. The vehicle is already shut off if the instrument cluster lights are not illuminated. Do **not** push the power button because the vehicle may start.
4. If the smart key is easily accessible, keep it at least 16 feet (5 meters) away from the vehicle.
5. Disconnect the 12 Volt auxiliary battery under the cover, tire repair kit, and foam insert in the cargo area to prevent accidental restarting of the vehicle.

	
Disconnect Charge Cable Connector	Close Charge Inlet Cap and Charge Inlet Door
	
Disconnect Plug	Shut Off Vehicle (READY-OFF)
	
Remove Auxiliary Battery Cover	Remove Tire Repair Kit and Foam Insert

Emergency Response (Continued)

Extrication (Continued)

Procedure #2 (Power button is inaccessible)

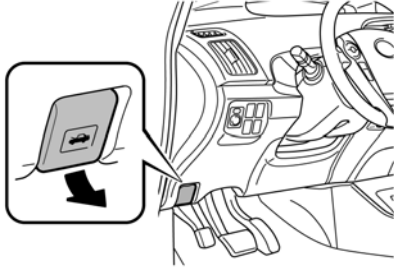
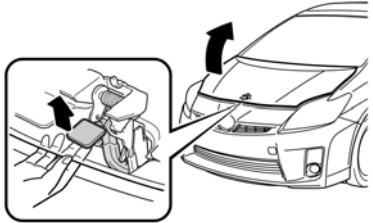
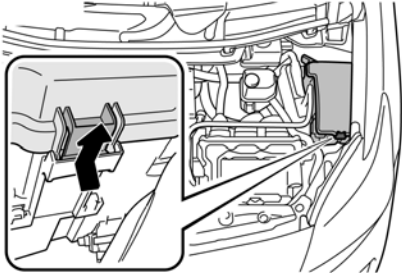
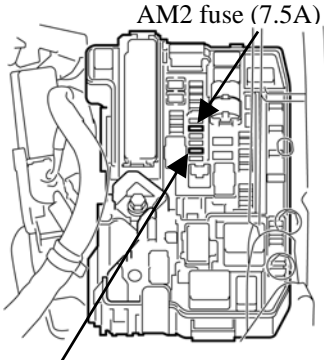
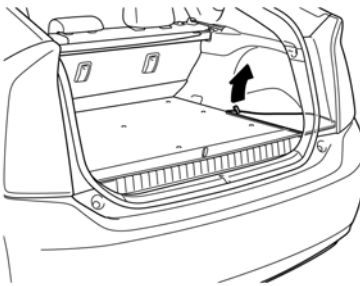
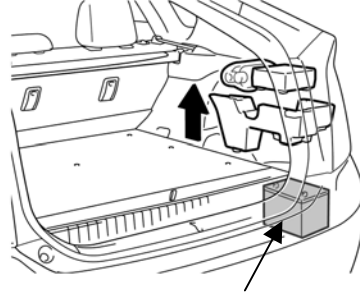
1. Open the hood.
2. Remove the fuse box cover.
3. Remove the **IGCT** fuse (30A green colored) and **AM2** fuse (7.5A brown colored) in the engine compartment fuse box (refer to illustration). If the correct fuse cannot be recognized, pull all fuses in the fuse box.
4. Disconnect the 12 Volt auxiliary battery under the tire repair kit and foam insert in the cargo area.

NOTE:

Before disconnecting the 12 Volt auxiliary battery, if necessary, lower the windows, unlock the doors and open the hatch as required. Once the 12 Volt auxiliary battery is disconnected, power controls will not operate.

⚠ WARNING:

- The high voltage system, including the charging system, may remain powered for up to 10 minutes after the vehicle is shut off, disabled, or charging stops. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or breaching any orange high voltage power cable or high voltage component.
- 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 breaching the SRS components.
- If none of the disabling procedures can be performed, proceed with caution as there is no assurance that the high voltage electrical system, SRS, or fuel pump are disabled.

	
Remote Hood Release	Hood Latch Release
	 <p>AM2 fuse (7.5A)</p> <p>IGCT fuse (30A)</p>
Remove Fuse Box Cover	IGCT and AM2 Fuse Location in Engine Compartment Fuse Box
	 <p>12 Volt Auxiliary Battery</p>
Remove Battery Cover	Remove Tire Repair Kit and Foam Insert

Emergency Response (Continued)

Extrication (Continued)

- Stabilize Vehicle

Crib at (4) points directly under the front and rear pillars.

Do not place cribbing under the high voltage power cables, exhaust system, or fuel system.

- Access Patients

Glass Removal

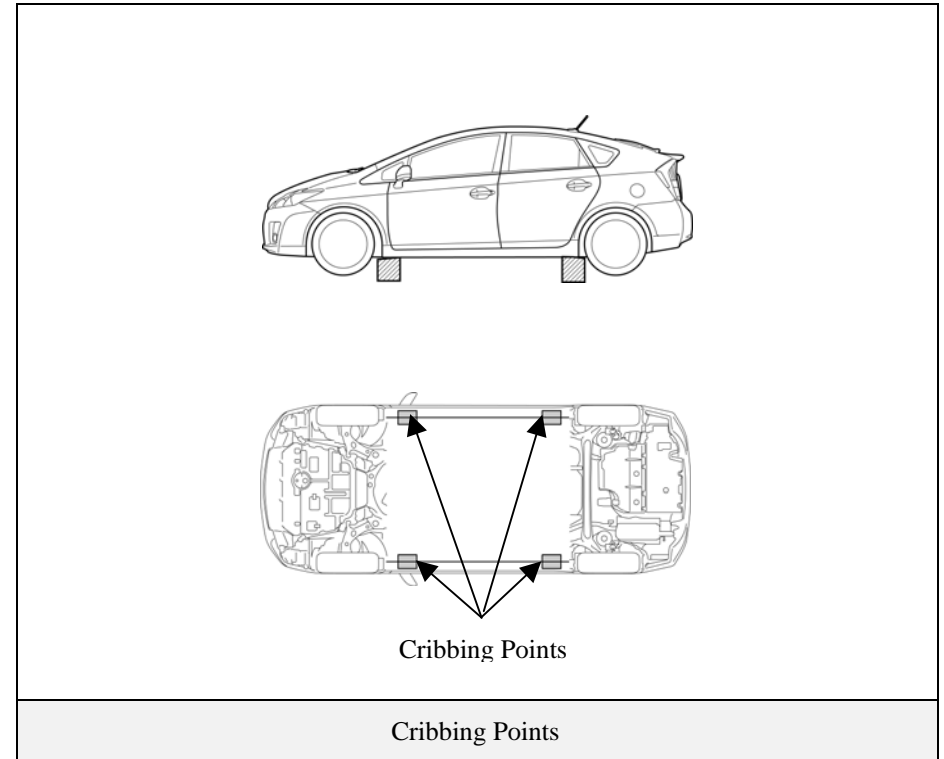
Use normal glass removal procedures as required.

SRS Awareness

Responders need to be cautious when working in close proximity to undeployed airbags and seat belt pretensioners. Front dual stage airbags automatically ignite both stages within a fraction of a second.

Door Removal/Displacement

Doors can be removed by conventional rescue tools such as hand, electric, and hydraulic tools. In certain situations, it may be easier to pry back the vehicle body to expose and unbolt the hinges.



Emergency Response (Continued)

Extrication (Continued)

Roof Removal

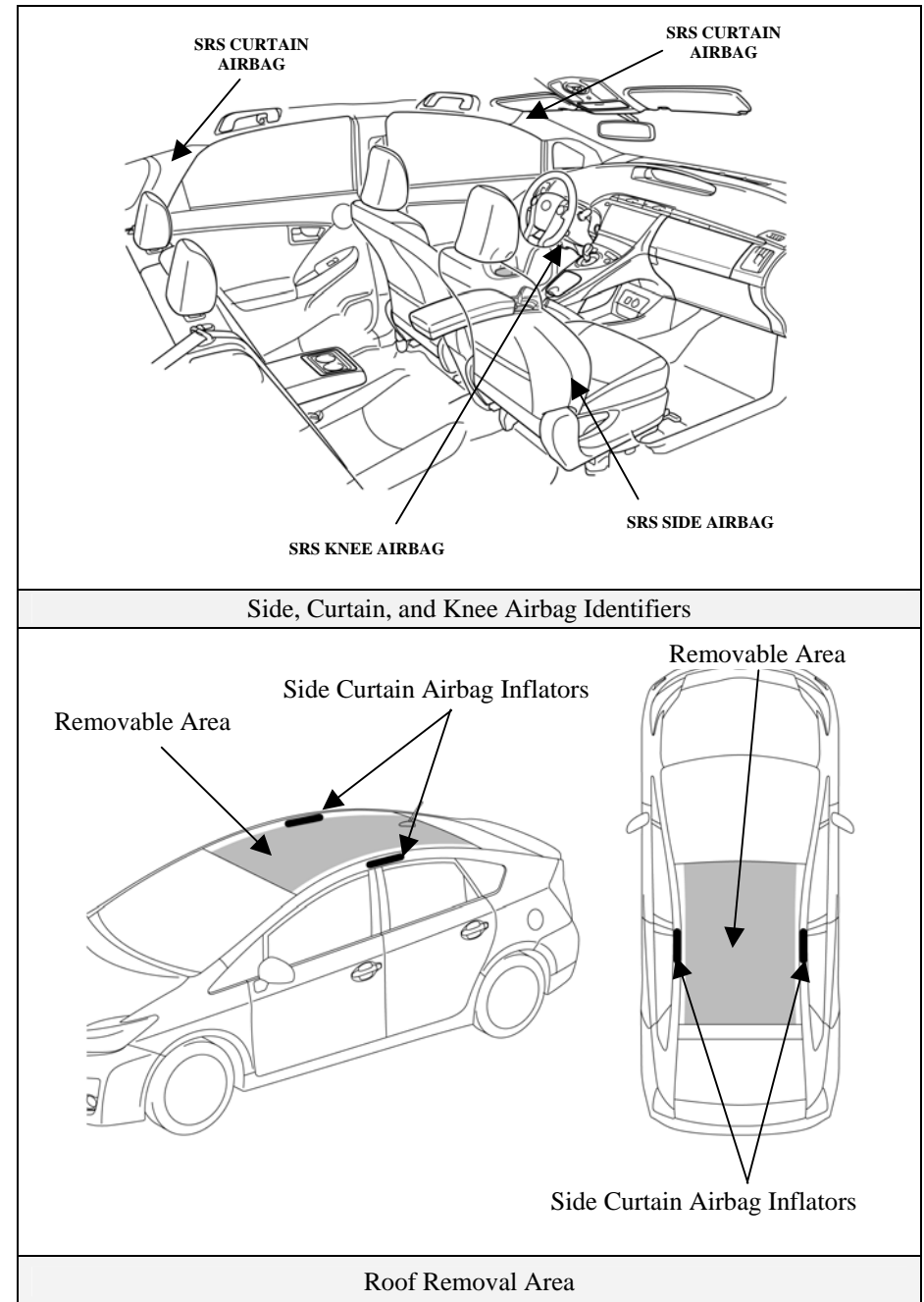
The Prius Plug-in hybrid is equipped with side curtain airbags. When undeployed, total roof removal is not recommended. Patient access through the roof can be performed by cutting the roof center section inboard of the roof rails as illustrated. This would avoid breaching the side curtain airbags, inflators, and wiring harness.

NOTE:

The side curtain airbags may be identified as illustrated on this page (additional component details on page 21).

Dash Displacement

The Prius Plug-in hybrid is equipped with side curtain airbags. When undeployed, total roof removal is not recommended to avoid breaching the side curtain airbags, inflators, and SRS harnesses. As an alternative, dash displacement may be performed by using a Modified Dash Roll.



Emergency Response (Continued)

Extrication (Continued)

NOTE:

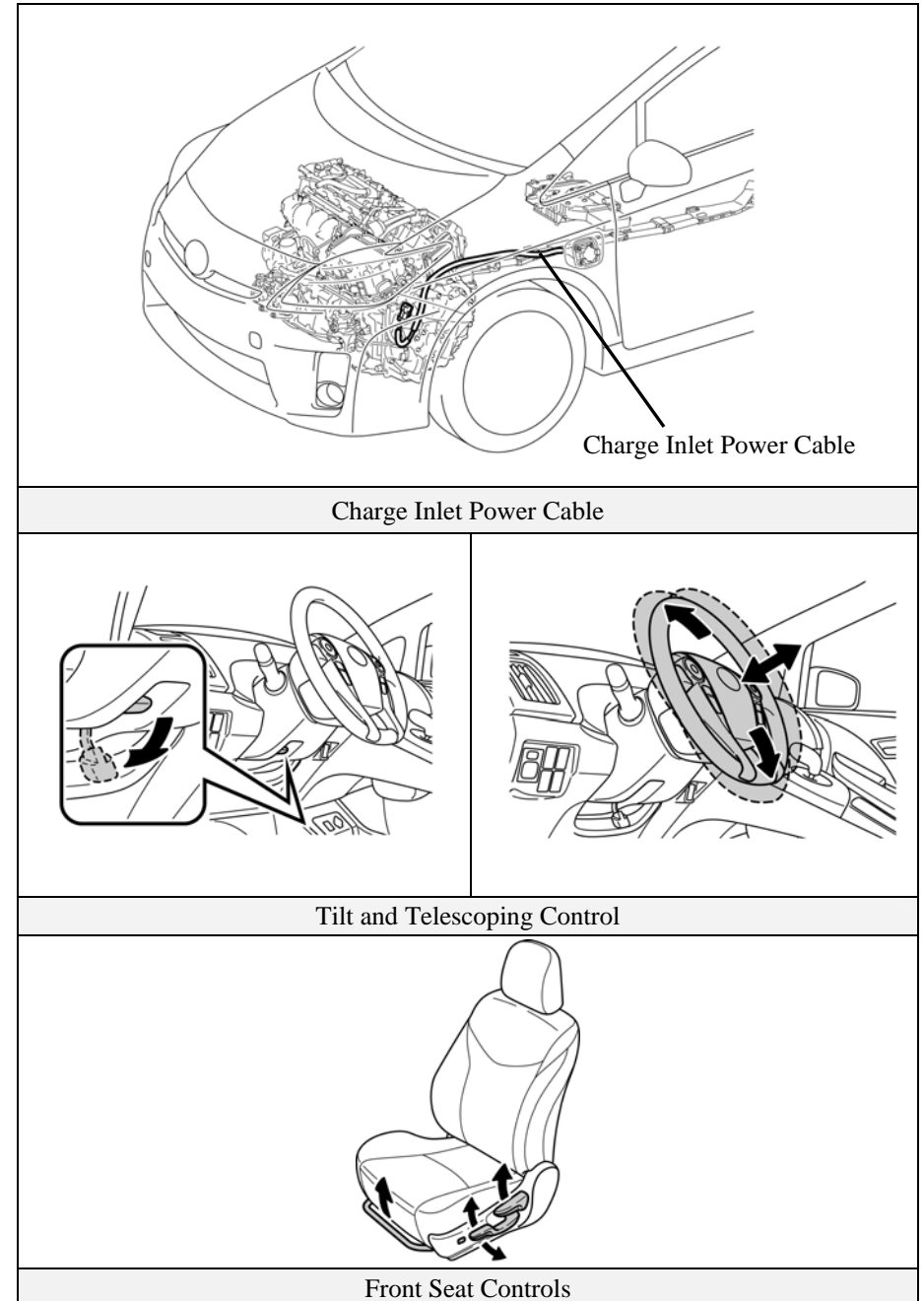
The Prius Plug-in hybrid has an orange power cable that is energized during charging. The charge power cable is routed along the left side front fender apron member (top rail) that is concealed by the front fender panel.

Rescue Lift Air Bags

Responders should not place cribbing or rescue lift air bags under the high voltage power cables, exhaust system, or fuel system.

Repositioning Steering Wheel and Front Seats

Telescopic steering wheel and seat controls are shown in the illustrations.



Emergency Response (Continued)

Extrication (Continued)

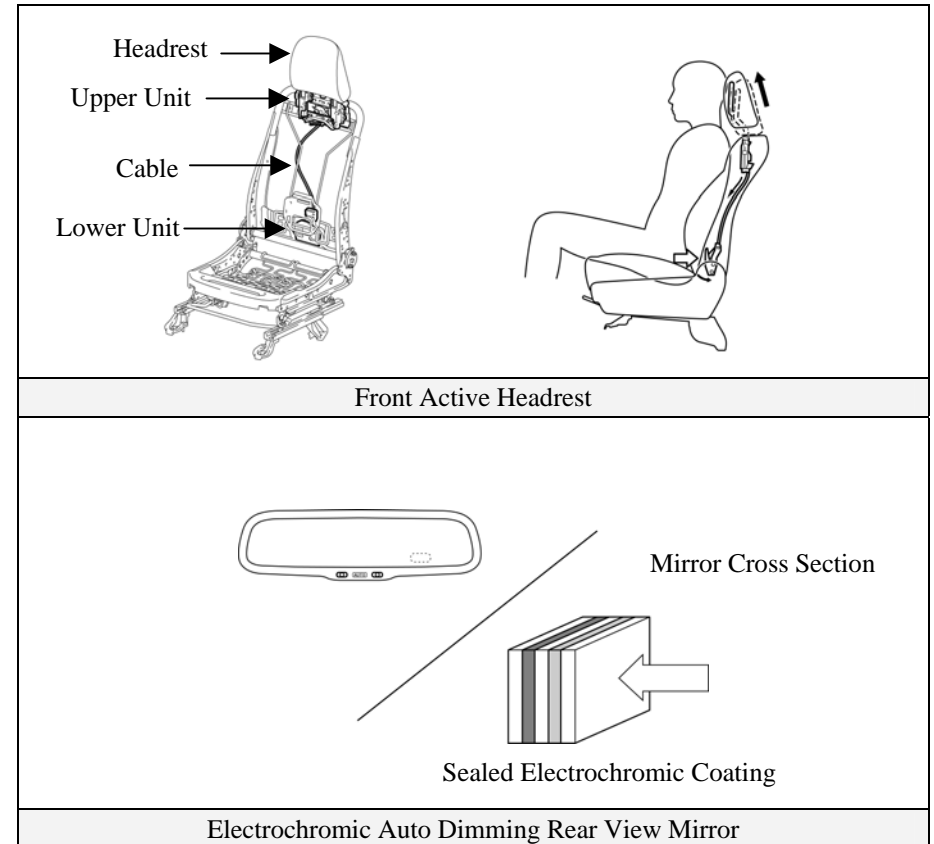
Active Headrest Removal

The Prius Plug-in hybrid is equipped with active headrests, located in both front seatbacks. The active headrests are mechanical non-pyrotechnic head supports that are designed to reduce neck injuries in the event of a rear collision.

No special methods are required to remove the headrests. Push the release button and lift to remove the headrest.

NOTE:

The Prius Plug-in hybrid is equipped with an optional electrochromic auto dimming rear view mirror. The mirror contains a minimal amount of transparent gel sealed between two glass plates that will not normally leak.



Emergency Response (Continued)

Fire

- **Extinguishing Agent**
Water has been proven to be a suitable extinguishing agent.
- **Initial Fire Attack**
Perform a fast, aggressive fire attack.
Divert the runoff from entering watershed areas.
Attack teams may not be able to identify a Prius Plug-in hybrid until the fire has been knocked down and overhaul operations have commenced.
- **Fire When Vehicle Charging**
When extinguishing a fire when charging, the vehicle and charge cable assembly may come in contact with water. As soon as possible, shut off the power to the electrical outlet before disconnecting the charge cable assembly. Perform the charge cable assembly disconnection procedure contained in the Extrication section on page 25.
- **Fire in the HV Battery Assembly**
Should a fire occur in the Li-ion HV battery assembly, attack crews should utilize a water stream or fog pattern to extinguish any fire within the vehicle except for the HV battery assembly.

When allowed to burn themselves out, the Prius Plug-in hybrid Li-ion battery cells burn rapidly and are reduced to a combination of ashes and metal components.

Offensive Fire Attack

Normally, flooding a Li-ion HV battery assembly with copious amounts of water at a safe distance will effectively control the HV battery assembly fire by cooling the adjacent Li-ion battery cells to a point below their ignition temperature. The remaining cells on fire, if not extinguished by the water, will burn themselves out.

However, flooding the Prius Plug-in hybrid HV battery assembly is not recommended due to the battery case design and location

preventing the responder from properly applying water through the available vent openings safely. Therefore, it is recommended that the incident commander allow the Prius Plug-in hybrid HV battery assembly to burn itself out.

Defensive Fire Attack

If the decision has been made to fight the fire using a defensive attack, the fire attack crew should pull back a safe distance and allow the Li-ion battery cells to burn themselves out. During this defensive operation, fire crews may utilize a water stream or fog pattern to protect exposures or to control the path of smoke.



WARNING:

- *Burning batteries may irritate the eyes, nose, and throat. To prevent injury wear personal protective equipment suitable for organic solvents including SCBA.*
- *The battery cells are contained within a metal case and accessibility is limited.*
- *To avoid serious injury or death from severe burns or electric shock, **never** breach or remove the high voltage battery assembly cover under any circumstance including fire.*
- *To prevent serious injury or death, shut off the utility circuit supplying power to the charge cable assembly before disconnecting it if the CCID or charge cable assembly are submerged in water.*

Emergency Response (Continued)

Overhaul

During overhaul, immobilize and disable the vehicle if not already done. Refer to illustrations starting on page 24. The HV battery assembly cover should **never** be breached or removed under any circumstances including fire. Doing so may result in severe electrical burns, shock, or electrocution.

- Immobilize Vehicle

Chock wheels and set the parking brake.
Push the **P** switch to engage park (P).

- Disable Vehicle

Perform these steps first if the charge cable assembly is connected to the vehicle

1. Disconnect the charge cable assembly connector from the vehicle. To disconnect it, push the orange lock release button on the top of the connector and pull it away from the vehicle.
2. Close the recharge inlet cap and charge inlet door.
3. Disconnect the plug of the charge cable assembly from the electrical outlet.

Performing either of the following two procedures will shut the vehicle off and disable the HV, SRS, charging and remote air conditioning systems.

Procedure #1

1. Confirm the status of the **READY** indicator in the instrument cluster. If the **READY** indicator is illuminated, the vehicle is on and operational.
2. Shut off the vehicle by pushing the power button once.
3. The vehicle is already shut off if the instrument cluster lights are not illuminated. Do **not** push the power button because the vehicle may start.
4. If the smart key is easily accessible, keep it at least 16 feet (5 meters) away from the vehicle.
5. Disconnect the 12 Volt auxiliary battery under the cover and tools in the cargo area to prevent accidental restarting of the vehicle.

Procedure #2

1. Open the hood and remove the fuse box cover.
2. Remove the **IGCT** fuse (30A green colored) and **AM2** fuse (7.5A brown colored) in the engine compartment fuse box as illustrated on page 28. If the correct fuse cannot be recognized, pull all fuses in the fuse box.
3. Disconnect the 12 Volt auxiliary battery under and tools the cover in the cargo area.

NOTE:

Before disconnecting the 12 Volt auxiliary battery, if necessary, lower the windows, unlock the doors and open the hatch as required. Once the 12 Volt auxiliary battery is disconnected, power controls will not operate.

WARNING:

- *The high voltage system, including the charging system, may remain powered for up to 10 minutes after the vehicle is shut off, disabled, or charging stops. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or breaching any orange high voltage power cable or high voltage component.*
- *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 breaching the SRS components.*
- *If none of the disabling procedures can be performed, proceed with caution as there is no assurance that the high voltage electrical system, SRS, fuel pump, recharging, or remote air conditioning are disabled.*

Recovery of Li-ion HV Battery Assembly

For information regarding recovery of the HV battery assembly, contact the nearest Toyota dealer.

Emergency Response (Continued)

Spills

The Prius Plug-in hybrid contains the same common automotive fluids used in other non-hybrid Toyota 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 acidic vapor caused by the reaction of the electrolyte with moisture may irritate the nose and throat.*
- *To avoid injury by coming in contact with the electrolyte or acidic vapor, wear personal protective equipment for organic electrolyte including SCBA or protective mask for acidic vapors.*

In an emergency, the Li-ion battery part number G9280-47160 manufacturer's Material Safety Data Sheet (MSDS) is available by contacting:

United States: CHEMTREC at (800) 424-9300
Canada: CANUTEC at *666 or (613) 996-6666 (collect)

- Handle Li-ion 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 gloves or gloves suitable for organic solvents.
 - Apron suitable for organic solvents.
 - Rubber boots or boots suitable for organic solvents.
 - Protective mask for acidic vapors or SCBA.
- Absorbent
 - Suitable absorbent for an organic solvent.

First Aid

Emergency responders may not be familiar with Li-ion electrolyte exposure when rendering aid to a patient. Exposure to the electrolyte is unlikely except in a catastrophic crash or through improper handling. Utilize the following guidelines in the event of exposure.

- Wear Personal Protective Equipment (PPE)
 - Splash shield or safety goggles. Fold down helmet shields are 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 acidic vapors or SCBA
- Absorption
 - Perform gross decontamination by removing affected clothing and properly disposing of the garments.
 - Rinse the affected areas with water for 20 minutes.
 - Transport patients to the nearest emergency medical care facility.
- Inhalation in Non-Fire Situations
 - Contact with the acidic vapor caused by reaction of the electrolyte with moisture may irritate the nose and throat. In severe cases such as confined spaces, move exposed patients to a well ventilated area.
 - Transport patients to the nearest emergency medical care facility.
- Inhalation in Fire Situations
 - Toxic gases are given off as by-products of combustion. All responders in the Hot Zone should wear the proper PPE for fire fighting including SCBA.
 - Move a patient from the hazardous environment to a safe area and administer oxygen.
 - Transport patients to the nearest emergency medical care facility.

Emergency Response (Continued)

First Aid (Continued)

- Ingestion
 - Do not induce vomiting, unless instructed by the doctor.
 - If vomiting occurs naturally, avoid aspiration.
 - Transport patients to the nearest emergency medical care facility.

Submersion

A submerged hybrid vehicle does not have high voltage potential on the metal vehicle body, and is safe to touch.

Access Patients

Responders can access the patient and perform normal extrication procedures. High voltage orange color coded power cables and high voltage components should never be touched, cut, or breached.

Vehicle Recovery

If a hybrid vehicle is fully or partially submerged in water, emergency responders may not be able to determine if the vehicle has been automatically disabled. The Prius Plug-in hybrid may be handled by following these recommendations:

Perform these steps first if the charge cable assembly is connected to the vehicle (see illustrations on page 25)

1. Disconnect the charge cable assembly connector from the vehicle.
To disconnect it, push the orange lock release button on the top of the connector and pull it away from the vehicle.
2. Close the recharge inlet cap and charge inlet door.
3. Disconnect the plug of the charge cable assembly from the electrical outlet.

4. Remove the vehicle from the water
5. Drain the water from the vehicle if possible
6. Follow the immobilizing and disabling procedure starting on page 24.

NOTE:

If park (P) system related components are damaged due to submersion, it may not be possible to shift from park (P) to neutral (N). If this is the case, make sure to tow or move the vehicle with the front wheels off the ground.

WARNING:

To prevent serious injury or death, shut off the utility circuit supplying power to the charge cable assembly before disconnecting it if the CCID or charge cable assembly are submerged in water.

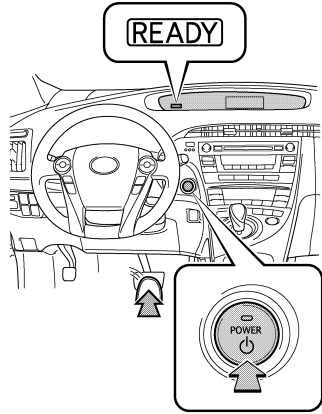
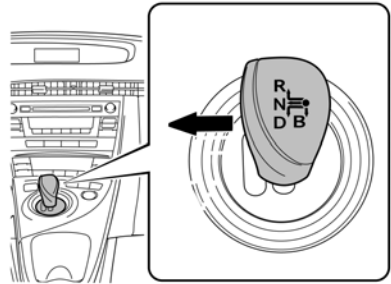
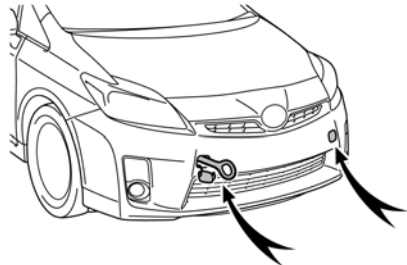
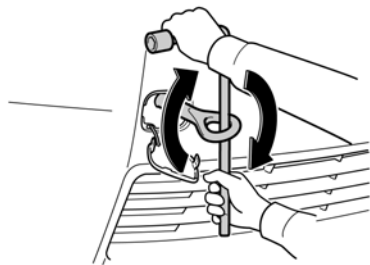
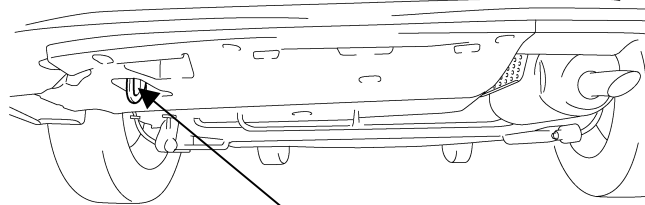
Roadside Assistance

The Prius Plug-in hybrid utilizes an electronic gearshift selector and an electronic **P** switch for park (P). If the 12 Volt auxiliary battery is discharged or disconnected, the vehicle cannot be started nor can it be shifted out of park (P). If discharged, the 12 Volt auxiliary battery can be jump started to allow vehicle starting and shifting out of park (P). Most other roadside assistance operations may be handled like conventional Toyota vehicles.

Towing

The Prius Plug-in hybrid is a front wheel drive vehicle and it **must** be towed with the front wheels off the ground. Failure to do so may cause serious damage to Hybrid Synergy Drive components.

- The vehicle may be shifted out of park (P) into neutral (N) by turning the ignition-on and READY-on modes. To select neutral (N), it is necessary to hold the shift selector in the N position for approximately 0.5 seconds.
- If the 12 Volt auxiliary battery is discharged, the vehicle will not start and shifting out of park (P) is not possible. There is no manual override except to jump start the vehicle, refer to the Jump Starting on page 38.
- If a tow truck is not available, in an emergency the vehicle may be moved using a cable or chain secured to the emergency towing eyelet or rear tow hook for short distances at low speeds (below 18 mph (30km/h)). The eyelet is located with the tools in the cargo area of the vehicle, refer to the illustration on page 37.

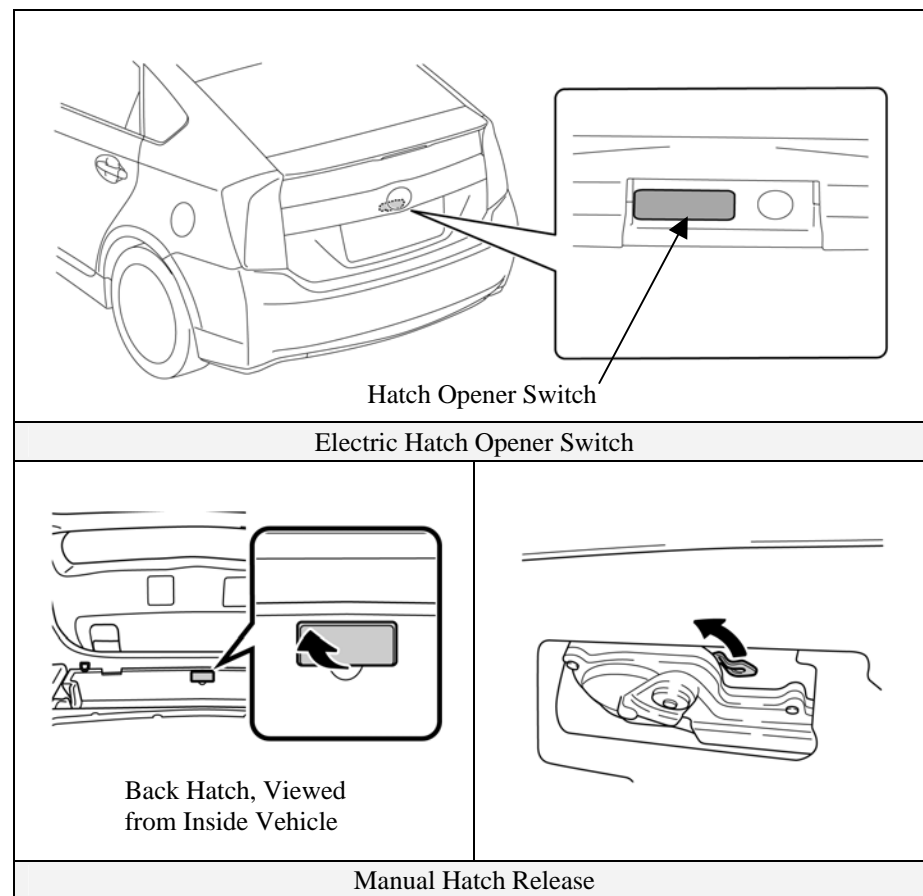
	
Starting Vehicle	Move Gearshift to Desired Position
	
Towing Eyelet Mounting Location	Eyelet Installation
 Rear Hook	
Rear Hook Location	

Roadside Assistance (Continued)

Electric Hatch Opener

The Prius Plug-in hybrid is equipped with an electric hatch opener. In the event of 12 Volt power loss, the hatch cannot be opened from the outside of the vehicle.

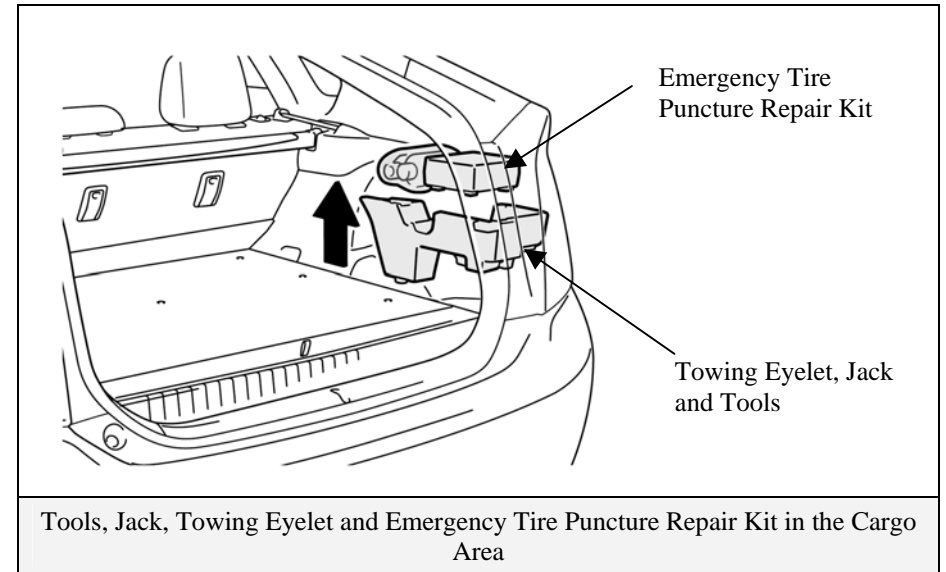
The electric hatch can be opened manually using the release as shown in the illustration.



Roadside Assistance (Continued)

Emergency Tire Puncture Repair Kit

The Prius Plug-in hybrid does not contain a spare tire. Instead, an emergency tire puncture repair kit is provided along with the jack, tools, and towing eyelet located in the passengers side rear panel well shown in the illustration.



Roadside Assistance (Continued)

Jump Starting

The 12 Volt auxiliary battery may be jump started if the vehicle does not start and the instrument cluster gauges are dim or off after depressing the brake pedal and pushing the power button.

The 12 Volt auxiliary battery is located in the cargo area. If the 12 Volt auxiliary battery is discharged, the rear hatch cannot be opened. Instead, the vehicle can be jump started by accessing the remote positive 12 Volt auxiliary battery terminal in the engine compartment fuse box.

- Open the hood, remove the fuse box cover, and open the positive terminal cover.
- Connect the positive jumper cable to the positive terminal.
- Connect the negative jumper cable to a solid ground.
- Place the smart key in proximity to the interior of the vehicle, depress the brake pedal, and push the power button.

NOTE:

If the vehicle does not recognize the smart key after connecting the booster battery to the vehicle, open and close the driver door when the vehicle is shut off.

If the smart key internal battery is dead, touch the Toyota emblem side of the smart key to the power button during the start sequence. See the instructions and illustrations on page 10 for more details.

- The high voltage HV battery assembly cannot be jump started.

Immobilizer

The Prius Plug-in hybrid is equipped with a standard immobilizer system.

- The vehicle can be started only with a registered smart key.

