(Slide 1/26) Hybrid Emergency Response Information

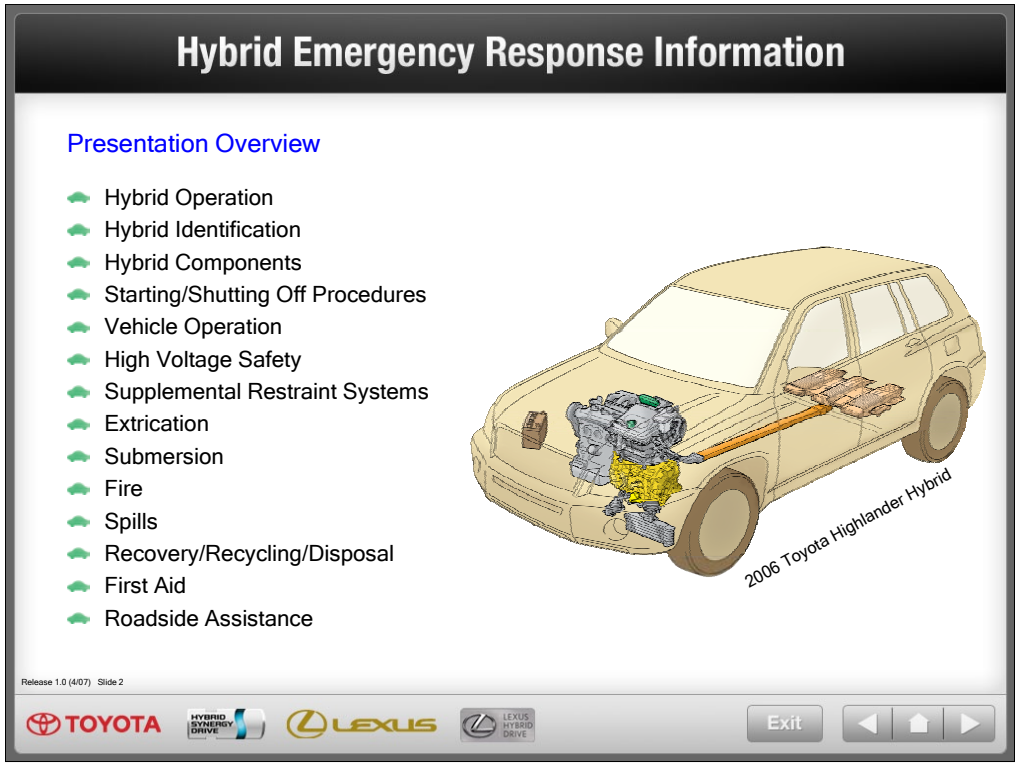
The Toyota/Lexus PowerPoint presentation was developed for trainers responsible for educating responders in the safe operation of Hybrid Electric Vehicles (HEVs), and is not intended to replace an agency's standard operating procedures for vehicle rescue.

HEVs differ from conventional gasoline engine vehicles by including a high voltage electrical power system. Responders are concerned with potential high voltage exposure when responding to a HEV incident. To educate responders, Toyota/Lexus published Emergency Response Guides (ERGs) for each make/model hybrid that were used as the basis for the material contained in this overview. This presentation does not provide information on other manufacturer's hybrid vehicles.

Instructor Note: The presenter of this program should become familiar with Toyota/Lexus hybrids vehicles, ERGs, and this PowerPoint prior to presenting. The material contained in this presentation is applicable to Toyota/Lexus hybrid vehicles prior to the summer of 2007.

Toyota/Lexus hybrid ERGs are available at the following websites:

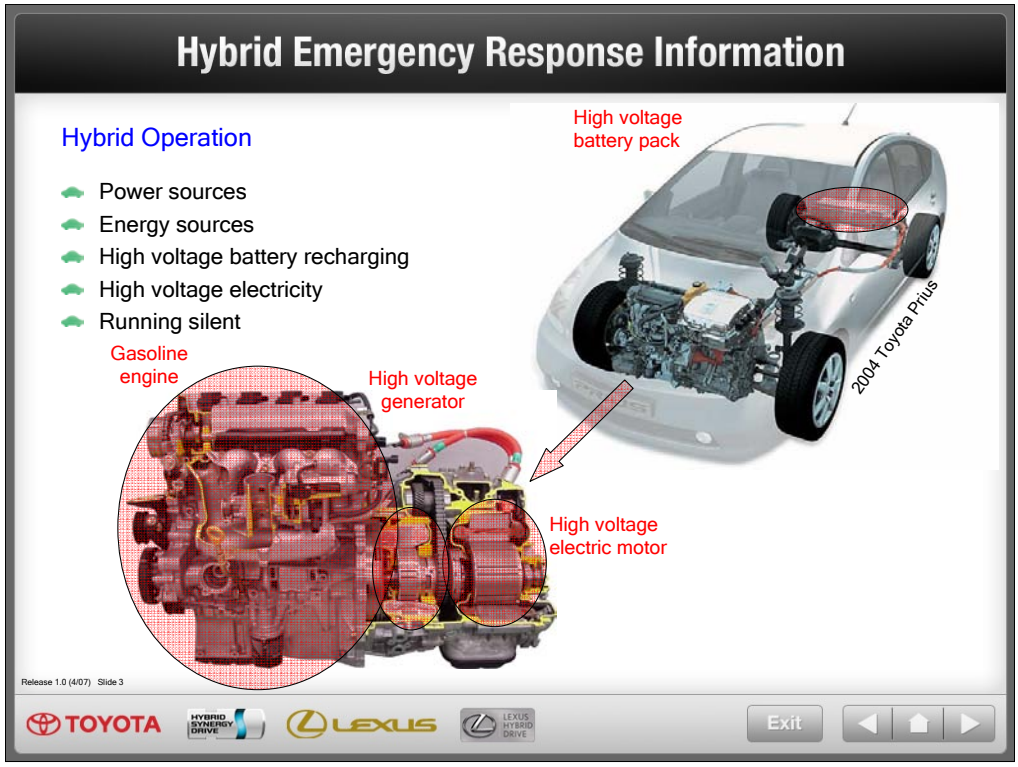
http://techinfo.toyota.com
http://techinfo.lexus.com



Slide (2/26) Presentation Overview

The presentation will cover 14 topics. Some topics, such as the starting/shutting off procedures and supplemental restraint systems are shared with conventional vehicles, but it is important to understand these features on hybrid vehicles.

Hybrid Operation
Hybrid Identification
Hybrid Components
Starting/Shutting Off Procedures
Vehicle Operation
High Voltage Safety
Supplemental Restraint Systems
Extrication
Submersion
Fire
Spills
Recovery/Recycling/Disposal
First Aid
Roadside Assistance



(Slide 3/26) Hybrid Operation

The illustration shows a view of the 2004 Prius hybrid vehicle.

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

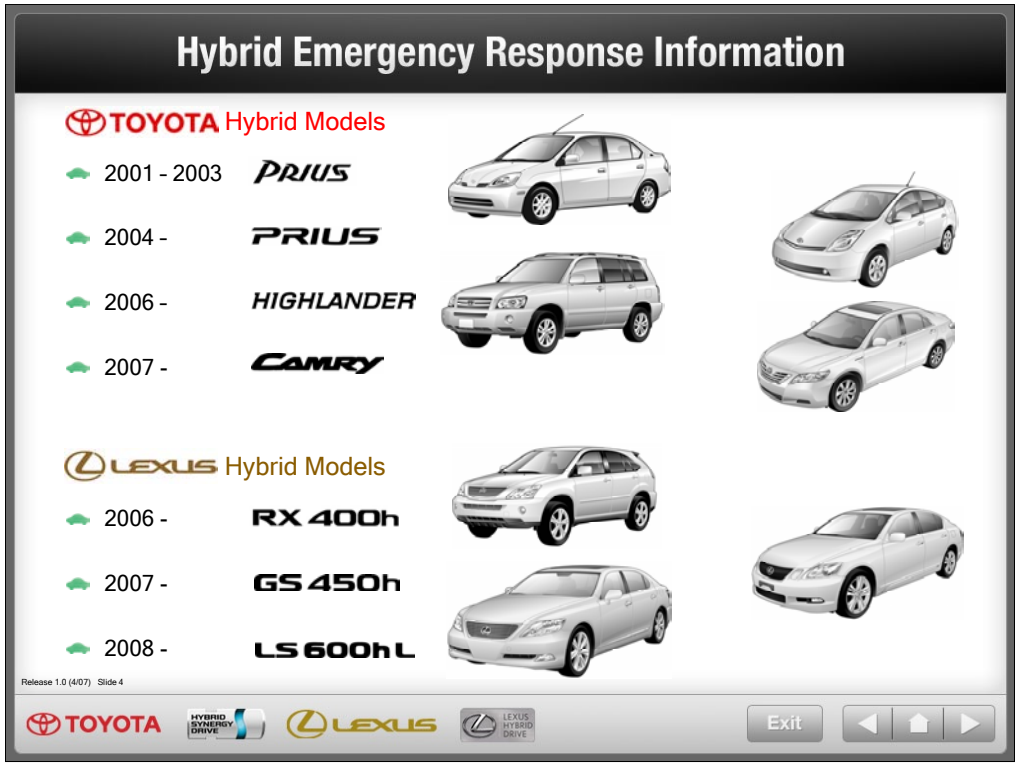
Power sources (first click)
Hybrids combine two power sources a gasoline engine and a high voltage electric motor. Toyota/Lexus hybrids may operate on the gasoline engine only, the electric motor only, or a combination of both.

Energy sources (second click)
The gasoline energy source is stored in the fuel tank for the internal combustion engine and the electrical energy source is stored in the high voltage battery pack for the electric motor.

High voltage battery recharging (third click)
The high voltage battery pack is recharged by the gasoline engine powered generator or by regeneration of the electric motor during braking. Current hybrids do not need to be plugged into an electrical outlet.

High voltage electricity (fourth click)
The high voltage electricity in Toyota/Lexus hybrids operate in the range of 200 - 650 Volts.

Running silent (fifth click)
When the vehicle is stopped, the gasoline engine and electric motor are off allowing it to run silent; however, the vehicle remains **On and operational**.



Slide (4/26) Toyota/Lexus Hybrid Models

Toyota/Lexus began selling their first hybrid electric vehicle in May of 2000. As of the summer of 2007, hybrid vehicles available from Toyota/Lexus are as follows.

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

Toyota Hybrid Models
2001 - 2003 Prius (first click)
The 1st generation Prius is a compact 4 door front wheel drive sedan.

2004 - Prius (second click)
A complete model redesign occurred in the 2004 model year changing the 2nd generation Prius from a 4 door sedan to a 5 door hatch back. It retained a front wheel drive configuration.

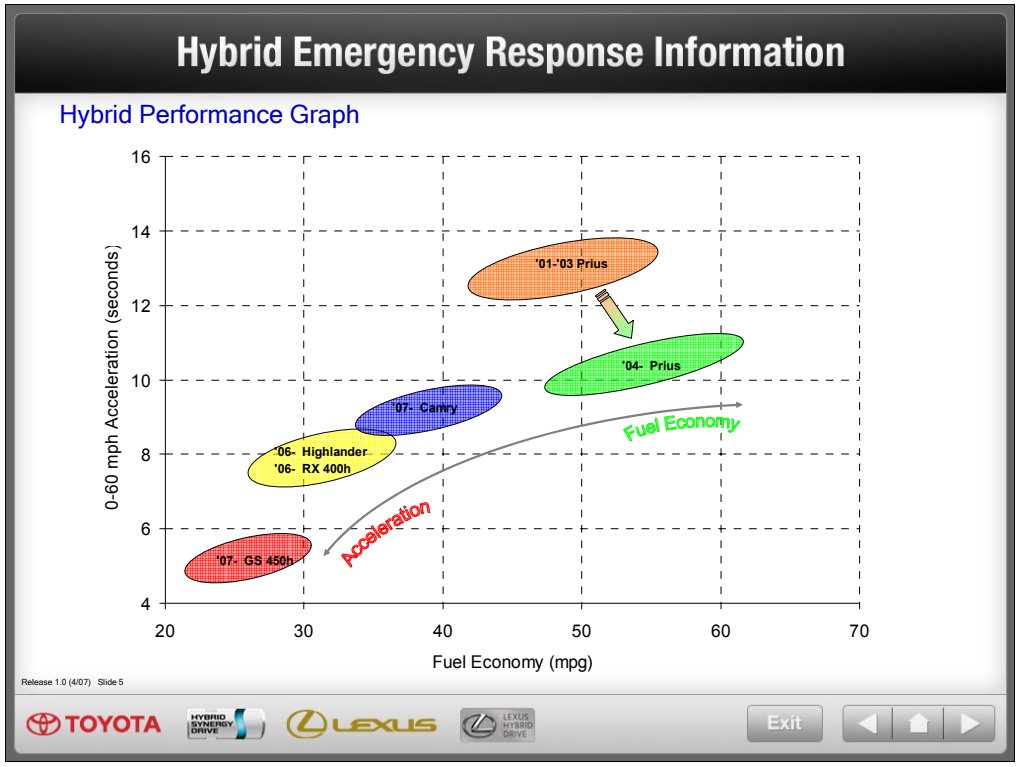
2006 - Highlander Hybrid (third click)
The Highlander hybrid is a 4 door sport utility vehicle and is available in 2 wheel (front wheel drive) or 4 wheel drive.

2007 - Camry Hybrid (fourth click)
The Camry hybrid is a 4 door front wheel drive sedan.

Lexus Hybrid Models (fifth click)
2006 - RX 400h
The RX 400h is a 4 door luxury utility vehicle and is available in 2 wheel (front wheel drive) or 4 wheel drive.

2007 - GS 450h (sixth click)
The GS 450h is a 4 door rear wheel drive luxury sport sedan.

2008 - LS 600h L (seventh click)
The LS 600h L is a 4 door all wheel drive luxury sedan.



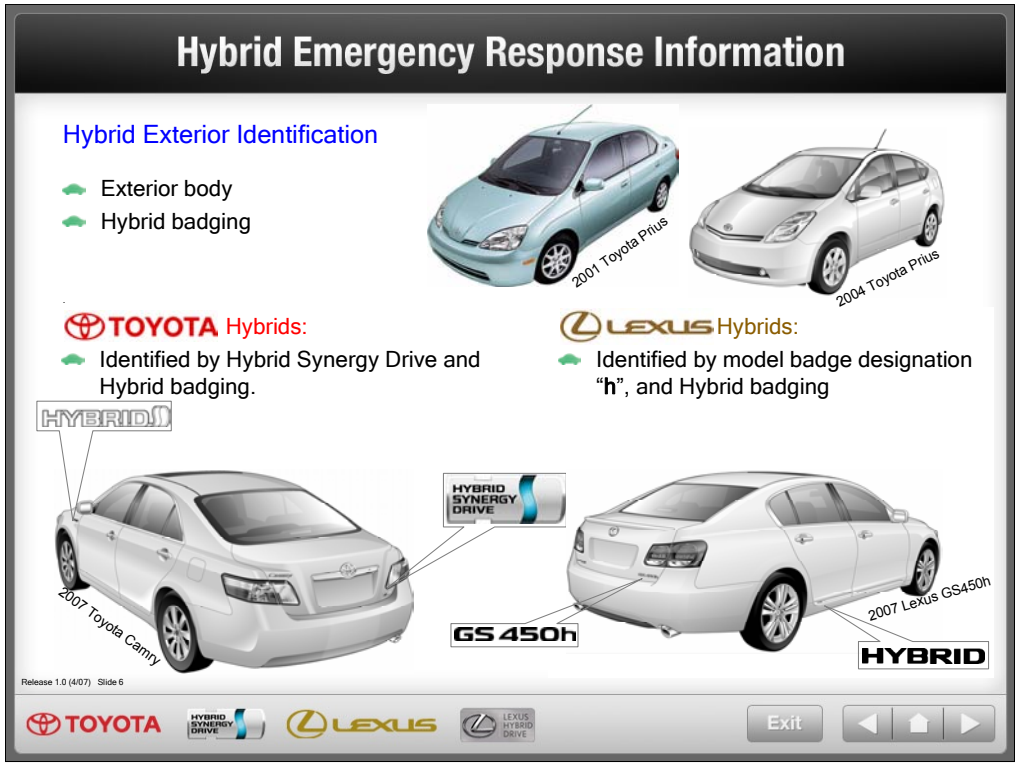
(Slide 5/26) Hybrid Performance Graph

In general, hybrids achieve better fuel economy than comparable gasoline engine only models. Hybrids may also be tuned for acceleration performance. The hybrid performance graph shows the relationship between fuel economy and acceleration performance for Toyota/Lexus hybrid vehicles.

At the fuel economy end of the graph is the Prius which may achieve 60 miles per gallon. At the acceleration end of the graph is the GS 450h which may achieve a 0-60 mph acceleration time in the 5 second range.

The Camry, Highlander, and RX 400h hybrids achieve a balance between fuel economy and acceleration.

Instructor Note: Performance figures for the Lexus LS 600h L have not yet been released.



(Slide 6/26) Hybrid Exterior Identification

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

Exterior body
The 1st and 2nd generation Prius are the only Toyota/Lexus vehicles with a unique hybrid only exterior body. Other Toyota/Lexus vehicles are available as both conventional and hybrid, sharing a common exterior body.

Hybrid badging (first click)
Toyota hybrid identification markings include the Hybrid Synergy Drive badge on the trunk or hatch in use from the 2004 model year. Beginning with the 2007 model year, hybrid badging is added to both driver and passenger side front fenders.

Lexus hybrids utilize the "**h**" designation in the vehicle model name badge such as GS 450**h,** and beginning with the 2007 model year hybrid badging is added on both driver and passenger side rear rocker panels or moldings.

(Slide 7/26) Hybrid Interior Identification

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

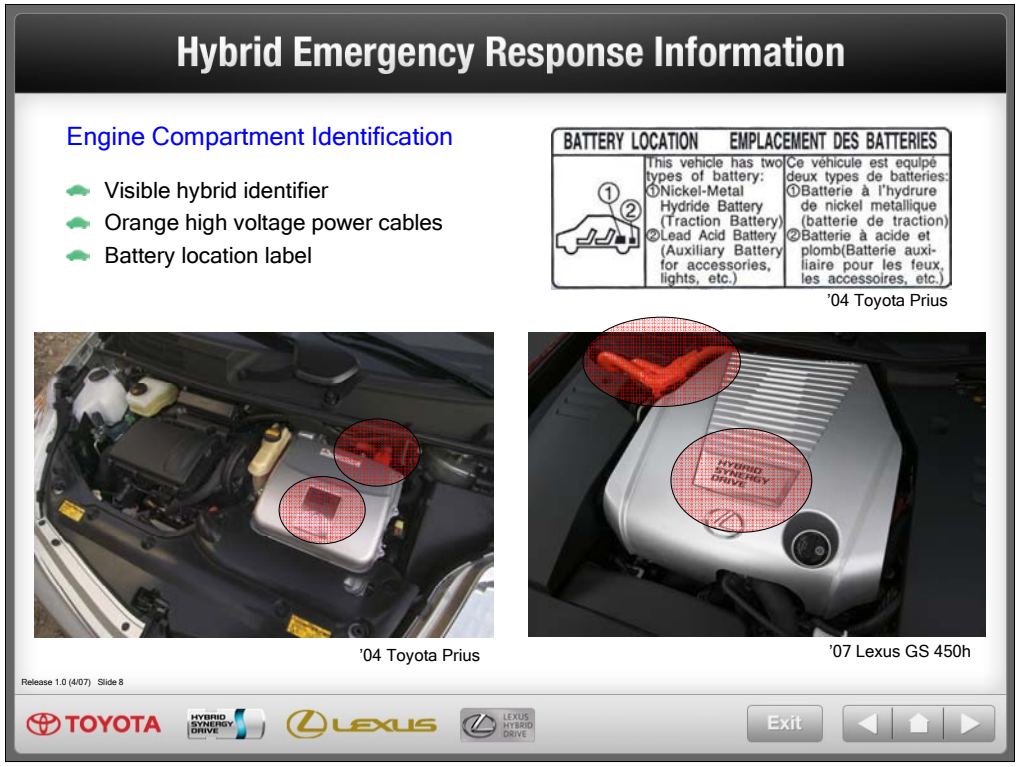
Conventional and hybrid interiors nearly identical
Except for the Prius, both conventional and hybrid vehicles share common interior designs making it difficult to distinguish a hybrid version.

Instrument cluster READY indicator (first click)
Toyota/Lexus hybrid vehicles utilize a **READY** indicator light in the instrument cluster that is illuminated when the vehicle is **On and operational**.

The Prius instrument cluster is located in the upper, center portion of the dashboard.

kW power meter (second click)
Hybrid vehicles may be equipped with a power meter showing energy kW output in place of a tachometer. If the vehicle is shut off, the instrument cluster gauges may be "blacked out," not illuminated.

Shift lever position "B" for low gear (third click)
Hybrid vehicles may be equipped with a shift lever position "B" for regenerative brake in place of a low gear.



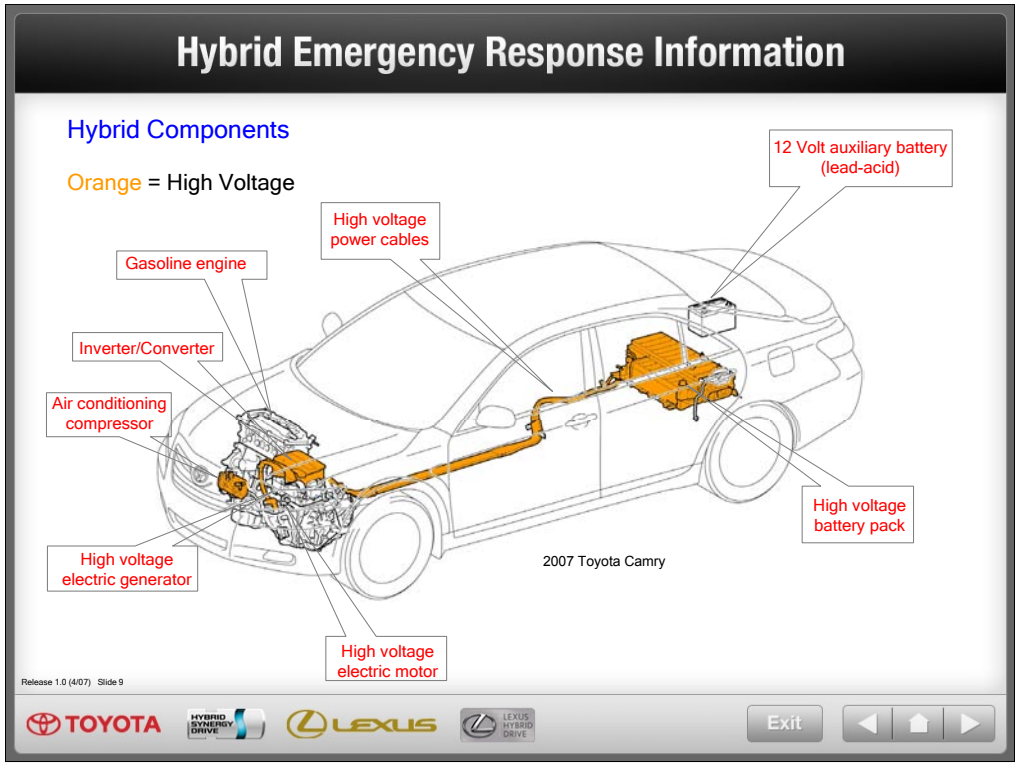
(Slide 8/26) Engine Compartment Identification

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

Visible hybrid identifier (first click)
Hybrid models typically have a cover in the engine compartment that identifies it as a hybrid.

Orange high voltage power cables (second click)
Orange color coded high voltage power cables may be visible in the engine compartment.

Battery location label (third click)
Hybrid models have an under hood label that identifies battery locations. There are two types of batteries in a hybrid vehicle:
- 12 Volt low voltage automotive lead-acid auxiliary battery
- 201 to 288 Volt high voltage Nickel Metal Hydride (NiMH) battery (traction battery)



(Slide 9/26) Hybrid Components

12 Volt auxiliary battery
A 12 Volt automotive type lead-acid battery powers the vehicle's low voltage 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 location of the auxiliary battery varies by hybrid model but generally is located in the engine compartment, cargo, or trunk area.

High voltage battery pack
A high voltage NiMH battery pack powers the vehicle's high voltage system. Battery pack voltages vary by hybrid model and range from 201 to 288 Volts. The positive and negative terminals of the high voltage battery pack are insulated from the metal vehicle chassis. High voltage battery pack locations vary by model and are located either behind or under the second row seat.

High voltage power cables
High voltage power cables carry high voltage electricity between the battery pack and high voltage components. These cables are color coded orange to distinguish them as high voltage. The power cables are routed outside and underneath the vehicle, and are insulated from the metal vehicle chassis.

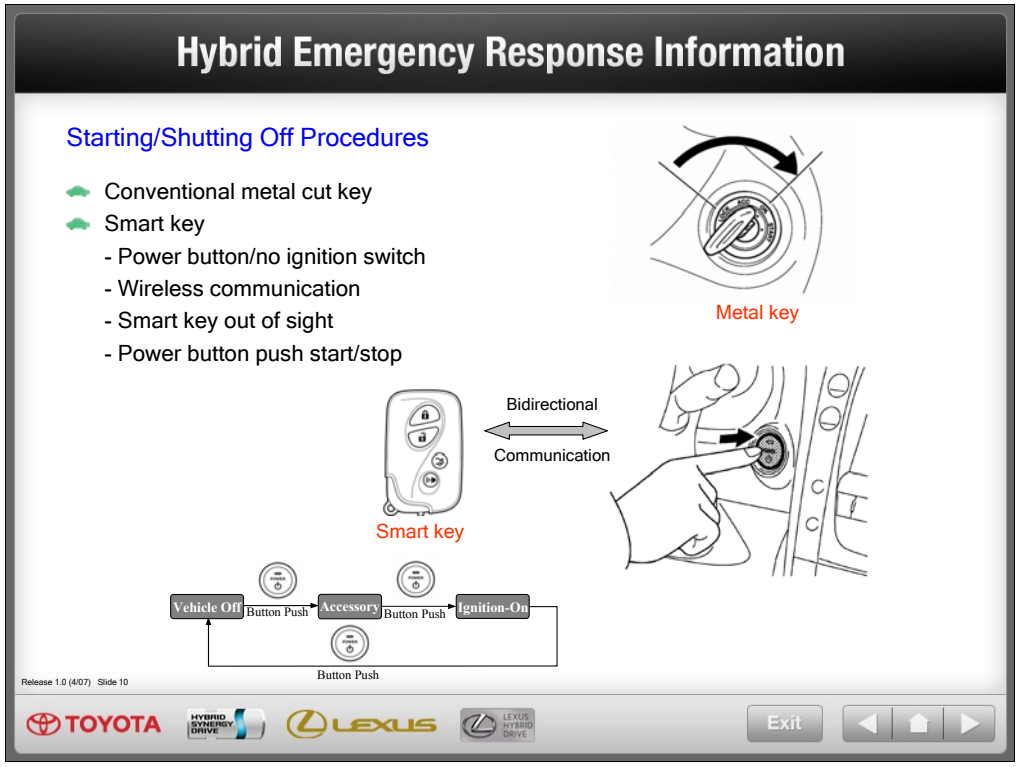
Gasoline engine
The internal combustion gasoline engine is similar to a conventional vehicle.

Inverter/converter
The inverter/converter distributes the high voltage electricity to and from the battery pack, electric motor, and generator.

High voltage electric motor
The high voltage permanent magnet electric motor contained in the transmission is used to drive the wheels.

High voltage electric generator
The high voltage permanent magnet generator contained in the transmission is used to recharge the high voltage battery pack.

Air conditioning compressor
The high voltage electrically driven compressor is used for air conditioning.



(Slide 10/26) Starting/Shutting Off Procedures

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

Toyota/Lexus hybrids may be equipped with conventional or smart key systems. Starting/shutting off procedures are different for the two systems.

Conventional metal cut key
Certain hybrids utilize a conventional metal cut key and ignition switch. To start, turn to the key to the Start (On) position. To shut off, turn the key to the Lock (Off) position. Applies to 1st generation Prius, Highlander, and RX 400h hybrids.

Smart key
The 2nd generation Prius, Camry, GS 450h, and LS 600h L hybrids utilize an electronic smart key. Smart keys are also used on conventional, non-hybrid Toyota/Lexus vehicles.

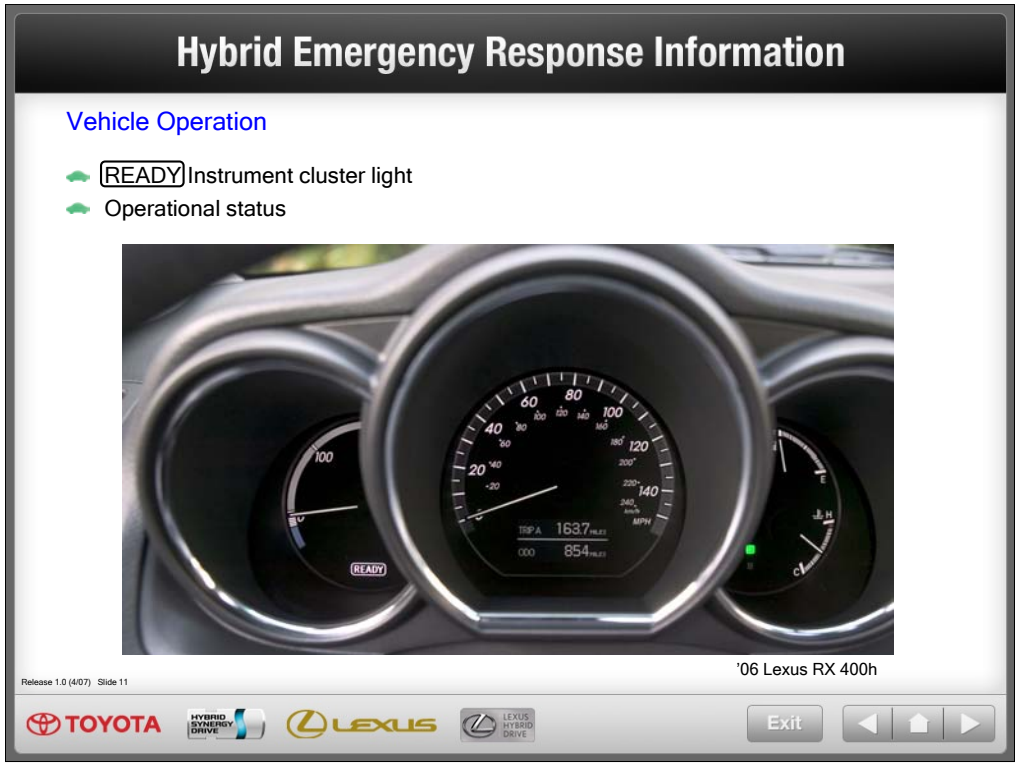
- Power button/no ignition switch **(first click)**
  The smart key system eliminates the ignition switch and replaces it with a power button.

- Wireless communication **(second click)**
  The electronic smart key consists of a wireless transceiver that communicates bi-directionally enabling the vehicle to recognize the smart key in close proximity to the vehicle.

- Smart key out of sight **(third click)**
  Due to the bi-directional wireless communication and elimination of the ignition switch, responders should be aware the smart key may be out of sight such as in a pocket or purse.

- Power button push start/stop **(fourth click)**
  Once recognized, the smart key allows the user to start the vehicle by depressing the brake pedal and pushing the power button. Once started, pushing the power button will shut off the vehicle.

  Pushing the power button with the foot off the brake pedal cycles the vehicle from Off to Accessory to Ignition-On. The vehicle will start in any cycle when the brake pedal is depressed and the power button is pushed.



(Slide 11/26) Vehicle Operation

READY Instrument cluster light
Toyota/Lexus hybrid vehicles utilize a **READY** indicator light in the instrument cluster that is illuminated when the vehicle is **On and operational**.

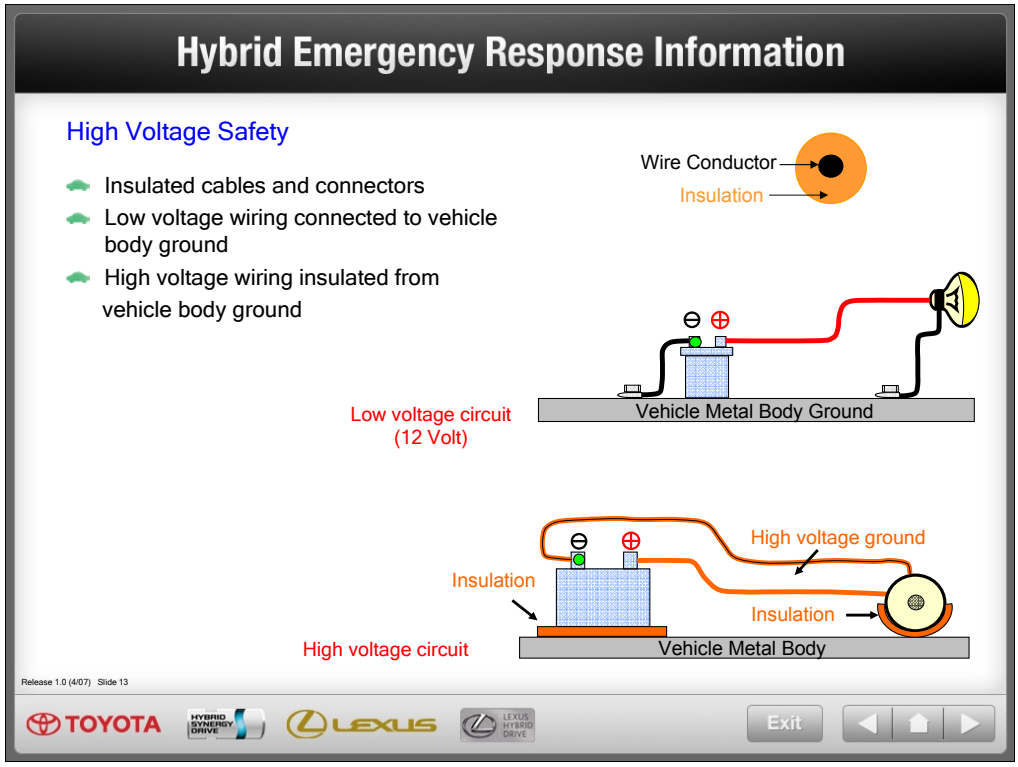
When the vehicle is on and the wheels are stopped, the gasoline engine and electric motor may be off **allowing the vehicle to run silently**.

Operational Status
The gasoline engine may stop and start at any time while the vehicle is on and the **READY** indicator is illuminated. Never assume that the vehicle is shut off just because the engine is off and the vehicle is silent. Responders should always look for the illuminated **READY** light to verify if the vehicle is **On and operational**.

(Slide 12/26) Hybrid Voltage Safety

High voltage battery pack
The high voltage battery pack varies by make/model and ranges between 201 to 288 Volts DC. A high voltage battery pack consists of multiple low voltage NiMH battery modules (7.2, 9.6, or 14.4 Volts) connected in series.

The high voltage battery pack location varies by make/model and is located either behind or under the vehicle's second row seats.



(Slide 13/26) High Voltage Safety

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points/animation.

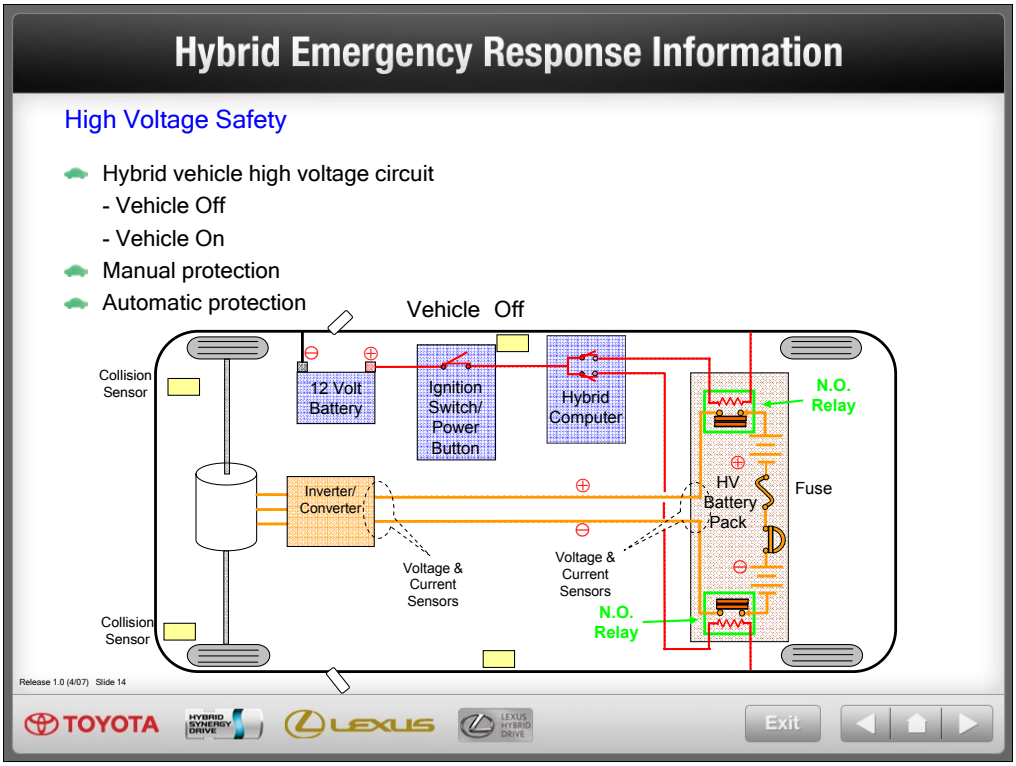
Insulated cables and connectors
All high voltage power cables and connectors are color coded bright orange. The power cables and connectors are insulated to prevent contact with the bare wire conductor.

Low voltage wiring connected to vehicle body ground (first click)
The 12 Volt low voltage circuit uses the vehicle metal body as a ground (refer to illustration).

(second click) Shows animation of the low voltage circuit electrical flow through the vehicle metal body ground.
A responder contacting the vehicle metal body ground and a bare positive/hot wire completes the low voltage circuit.

High voltage wiring insulated from vehicle body ground (third click)
The high voltage circuit does not use the vehicle metal body as ground (refer to illustration). Instead, a separate ground high voltage power cable is routed from the battery to the component. The battery and component are insulated from the vehicle metal body ground.

(fourth click) Shows animation of the high voltage circuit electrical flow though the high voltage power cables.
A responder contacting the vehicle metal body and a bare high voltage positive/hot wire does not complete the high voltage circuit because the high voltage ground is insulated from the metal vehicle body.



(Slide 14/26) High Voltage Safety

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points/animation.

Hybrid vehicle high voltage circuit
The high voltage battery pack (brown shaded box) contains individual low voltage battery modules connected in series to produce high voltage. High voltage power cables (orange dotted lines) are routed from the high voltage battery pack underneath the vehicle to the inverter/converter in the engine compartment.

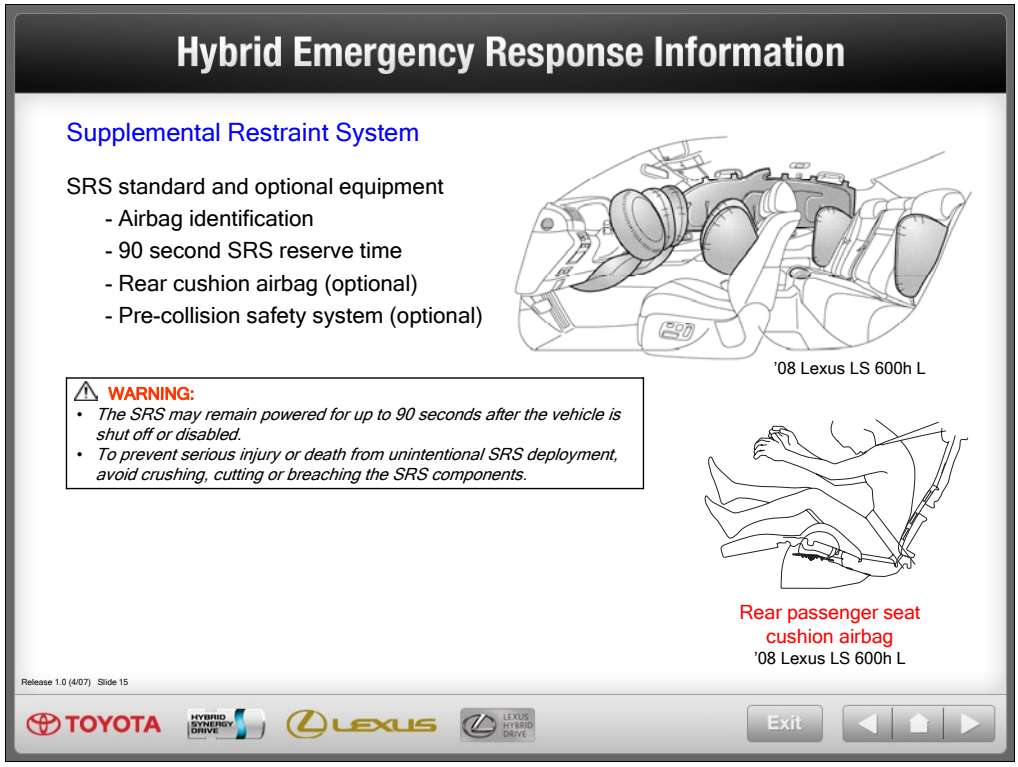
Within the high voltage battery pack there is a fuse and normally open relays (green boxes) on both the positive and negative battery terminals. These two relays are controlled by the 12 Volt battery, ignition switch/power button, and the hybrid computer (blue shaded boxes).

- Vehicle Off **(first click)**
  When the ignition switch/power button is **Off**, no 12 Volt battery power (red dotted lines) is supplied to the hybrid computer which keeps the high voltage battery pack positive and negative relays open (green boxes). The high voltage circuit is **Off**, and no electricity flows from the high voltage battery pack to the power cables (orange dotted lines).

- Vehicle On **(second click)**
  When the ignition switch/power button is turned **On**, 12 Volt battery power (red solid lines) is supplied to the hybrid computer.
  (third click) The hybrid computer powers the high voltage battery pack positive and negative relays (green boxes) which allows them to close (orange contacts).
  (fourth click) Once the relays close, the high voltage circuit is **On** and electricity flows from the high voltage battery pack to the power cables (orange solid lines).

Manual protection (fifth click)
To manually disable the high voltage system, turn the ignition switch/power button **Off**. This stops electrical flow from the high voltage battery pack to the power cables.

Automatic protection (sixth click)
The hybrid computer provides automatic disabling of the high voltage system.
SRS collision sensors (yellow shaded boxes) and high voltage current/voltage sensors (black dashed callouts) are monitored by the hybrid computer. When airbags deploy or when a current/voltage imbalance is detected, the hybrid computer automatically opens the positive and negative relays to stop electrical flow from the high voltage battery pack to the power cables.
A fuse located in the high voltage battery pack also provides automatic high voltage disabling during an overload condition.



(Slide 15/26) Supplemental Restraint System

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

SRS standard and optional equipment
Hybrid vehicles are equipped with the same standard and optional supplemental restraint systems offered in conventional vehicles within the same model line. Responders should consult the make/model hybrid emergency response guide for standard and optional supplemental restraint systems.

Once the airbags have deployed in a collision, they will not re-deploy. All Toyota/Lexus hybrid vehicle dual stage airbag inflators are normally designed to ignite both stages either simultaneously or within a fraction of a second. The front passenger airbag deployment is governed by the occupant classification system.

Seatback mounted side impact airbags and the curtain airbags may deploy independently of each other.

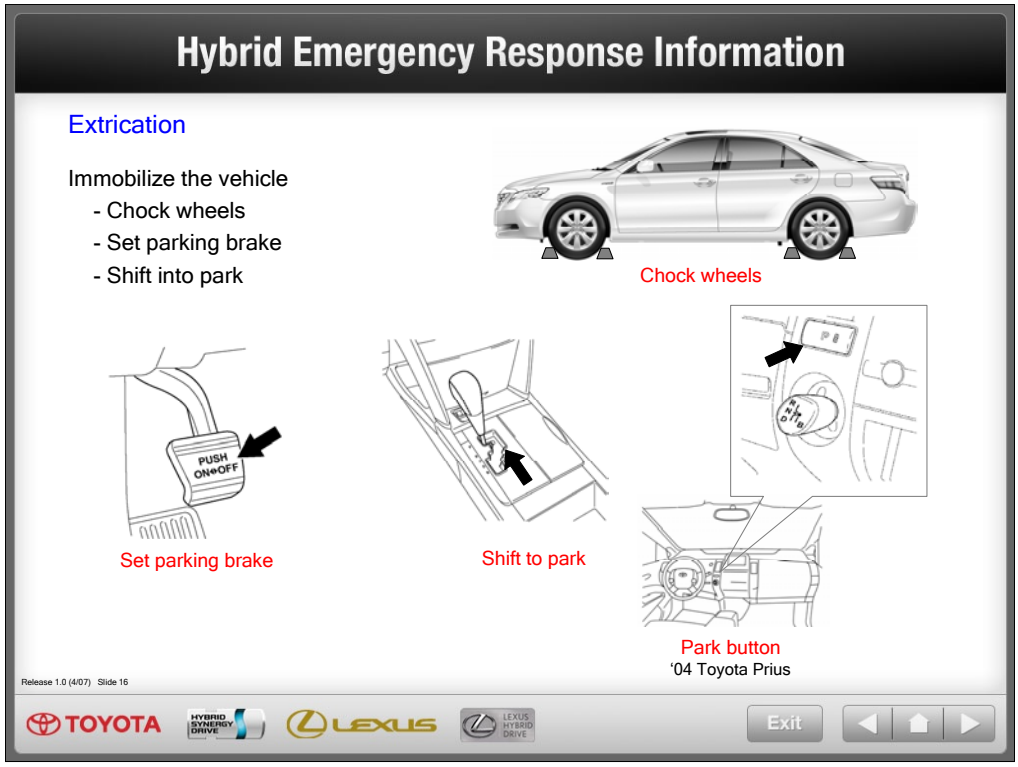
- Airbag identification **(first click)**
  Hybrid vehicles use standard SRS identifiers located near the airbag.

- 90 second SRS reserve time **(second click)**
  See warning box below.

- Rear cushion airbag (optional) **(third click)**
  The Lexus LS 600h L is available with an optional passenger side rear Ottoman seat that contains a seat cushion airbag. The seat cushion airbag is designed to deploy and be contained within the seat cushion to help restrain the lower hip area during a collision when the frontal airbags deploy.

- Pre-collision safety system (optional) **(fourth click)**
  Lexus vehicles may be equipped with a pre-collision safety system containing a radar sensory system, occupant seat sensor, and electric motor-pyrotechnic seatbelt pretensioners. During a pre-collision event, each front seatbelt pretensioner has an electric motor that retracts the slack in the front seatbelt. When conditions stabilize, the electric motor reverses itself. When the airbags deploy, the pyrotechnic pretensioner functions normally.

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 crushing, cutting or breaching the SRS components.*



(Slide 16/26) Extrication

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

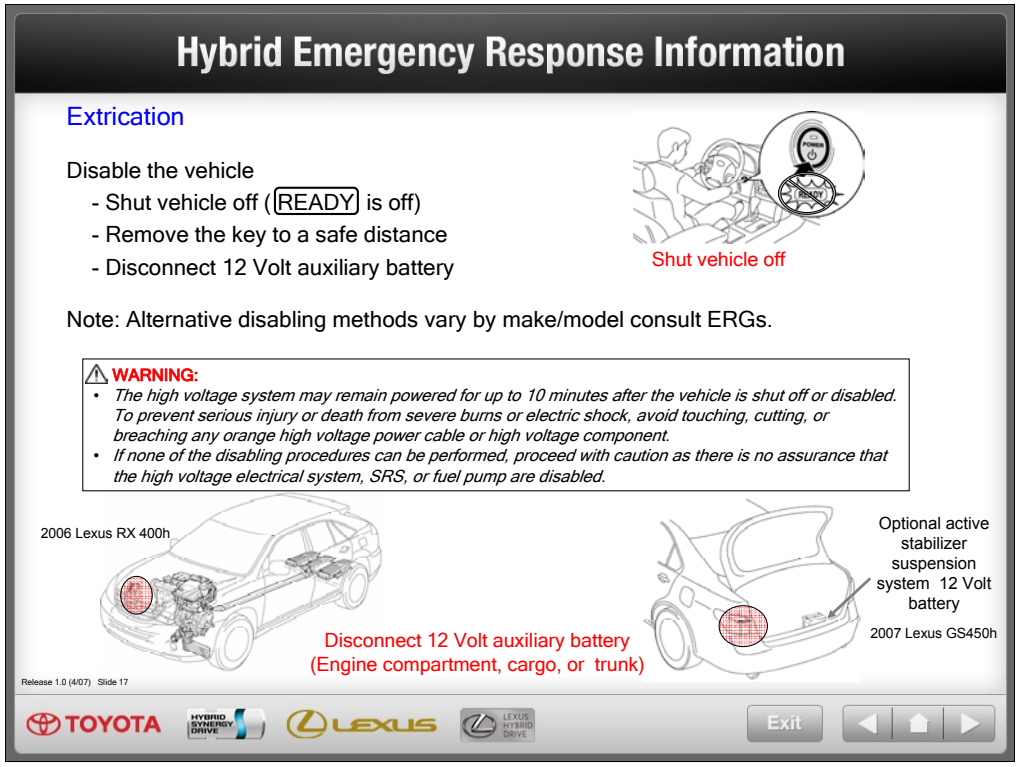
There are three extrication tasks common to all motor vehicle incidents:

1) Immobilize the vehicle
2) Disable the vehicle
3) Stabilize the vehicle

Immobilize the vehicle
- Chock wheels **(first click)**
- Set parking brake **(second click)**
- Shift into park **(third click)**

Hybrid vehicles may run silent while on and operational. It is important to chock the wheels fore and aft to prevent the vehicle from moving. Setting the parking brake and shifting the shift selector into the Park position will prevent the vehicle from moving on its own.

(fourth click) The '04 Toyota Prius uses an electronic gearshift selector. Unlike a conventional vehicle, the electronic gearshift selector does not contain a park position. Instead, a separate "**P**" button located above the gearshift selector engages the park position when pushed.



(Slide 17/26) Extrication

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

Disable the vehicle

- Shut vehicle off (insure **READY** indicator is off) **(first click)**

  Shutting off the vehicle will accomplish the following:
  > Shuts down the hybrid system.
  > Stops electrical flow from the high voltage battery pack.
  > Stops the gasoline fuel pump.
  > Stops 12 Volt battery power to the SRS system.

- Remove the key to a safe distance. **(second click)**

  Removing the key to a safe distance prevents unintentional restarting of the vehicle.

- Disconnect 12 Volt auxiliary battery **(third click)**

  Disconnecting the 12 Volt auxiliary battery will accomplish the following:
  > Prevents unintentional restarting of the vehicle.
  > Prevents accidental power to the SRS system.

  The 12 Volt auxiliary battery, shown in the red shaded circles, is located in the engine compartment, trunk, or cargo area depending on the hybrid model.

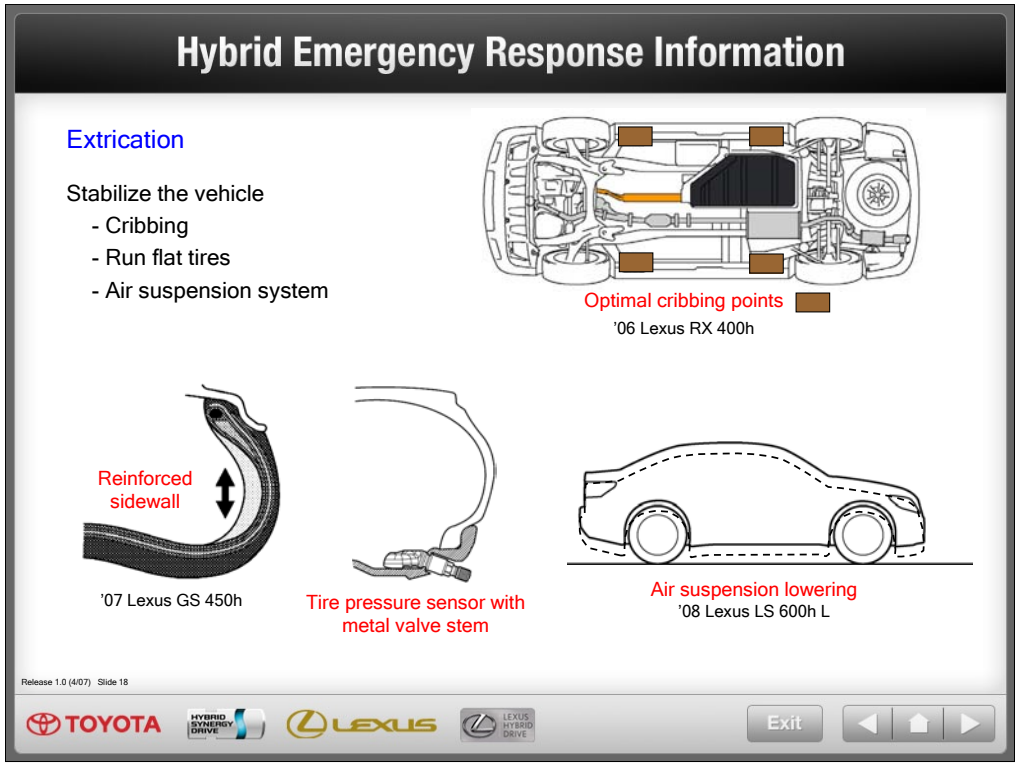
Note: (fourth click)

The GS 450h may be optionally equipped with an active stabilizer suspension system powered by a separate 12 Volt lead-acid battery. This battery does not power the vehicle's low voltage system. Responders need to identify and distinguish the auxiliary battery from the active stabilizer suspension system battery. When in doubt, during power disconnect, disable both 12 Volt batteries in the trunk.

It may not always be possible to disable a vehicle using a single method. For this reason alternative disabling procedures have been developed to give the responder flexibility during the various types of collisions. Alternative disabling procedures are available to shut the vehicle off. Refer to specific make/model ERGs.

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 breaching any orange high voltage power cable or high voltage component.*
- *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.*



(Slide 18/26) Extrication

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

Stabilize the vehicle

- Cribbing **(first click)**

  Cribbing the vehicle transfers the weight from the suspension system to the frame onto the cribbing. Do not place cribbing or other rescue equipment under any orange color coded power cables, exhaust system, or fuel tank.

- Run flat tires **(second click)**

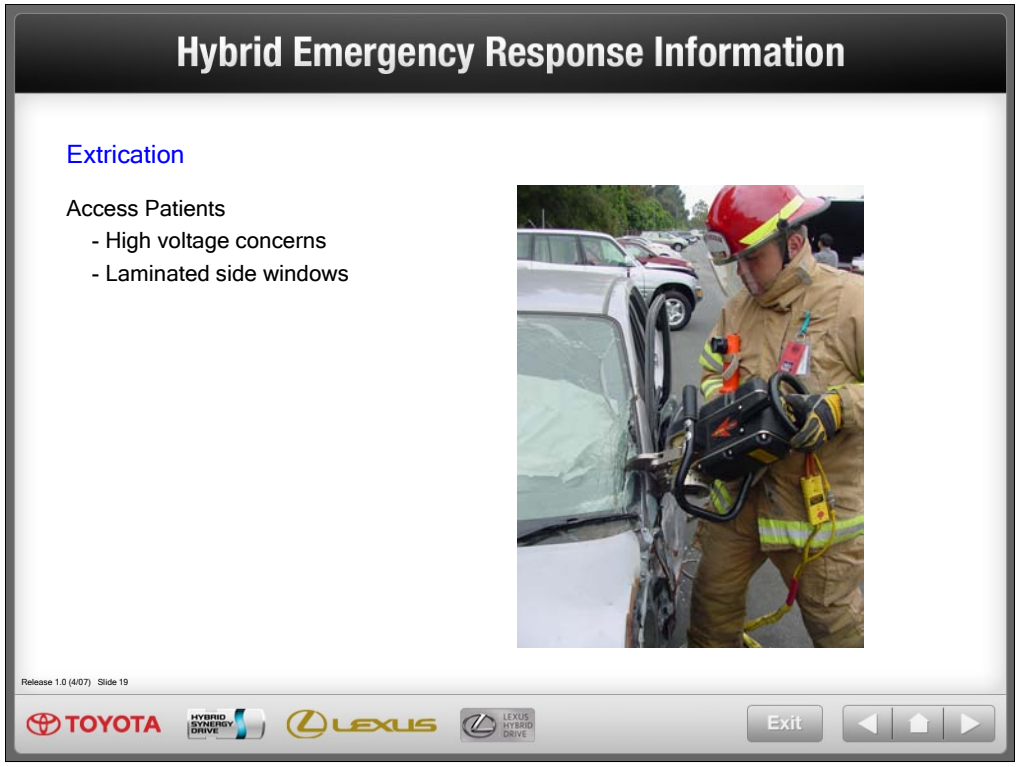
  A optional feature on the Lexus GS 450h is run flat tires. Run flat tires have reinforced sidewalls that will support the vehicle's weight even when punctured, unlike conventional tires.

  Unlike conventional tires, the run flat tires when deflated may only drop 1 inch (2.54 cm) due to the stiffness of the sidewall. Like conventional tires, responders should not stab tires with a knife, doing so could cause serious injury to the hand.

  Run flat tires are equipped with tire pressure warning sensors with metal valve stems and will not pull out like rubber valve stems. Snapping the stem with pliers or removing the cap and Schrader valve will release the air in the tires.

- Air suspension system **(third click)**

  A feature on the 2008 Lexus LS 600h L hybrid is an air suspension system. The air suspension consists of a pneumatic air cylinder in place of a coil spring. In the case of air pressure loss, the vehicle suspension will lower.



(Slide 19/26) Extrication

Access Patients

- High voltage concerns

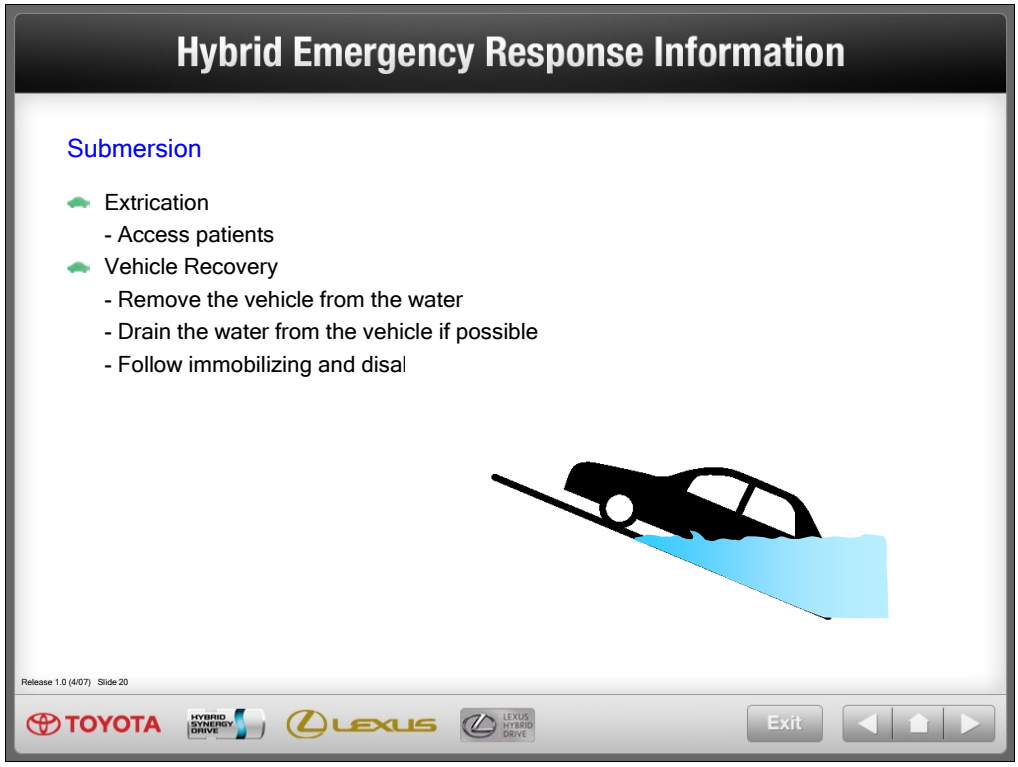
Normal extrication tasks associated with hybrid vehicle rescue can be performed without concern for electric shock. It is important to note high voltage power cables are routed outside and under the floor pan and away from the pillars, roof rails and rocker channels. There are no high voltage power cables routed in normal cut areas for the following extrication tasks:

> Glass removal
> Door removal/displacement
> Dashboard displacement
> Roof removal/displacement

- Laminated side windows

A feature available on the 2008 Lexus LS 600h L is laminated glazing for the side windows. This is a feature that can reduce the overall glass removal time, since laminated glass does not shatter like tempered safety glass, and may be left in place.

Side laminated glass has similar properties as laminated windshield glass and can be removed using the same methods and cutting tools.



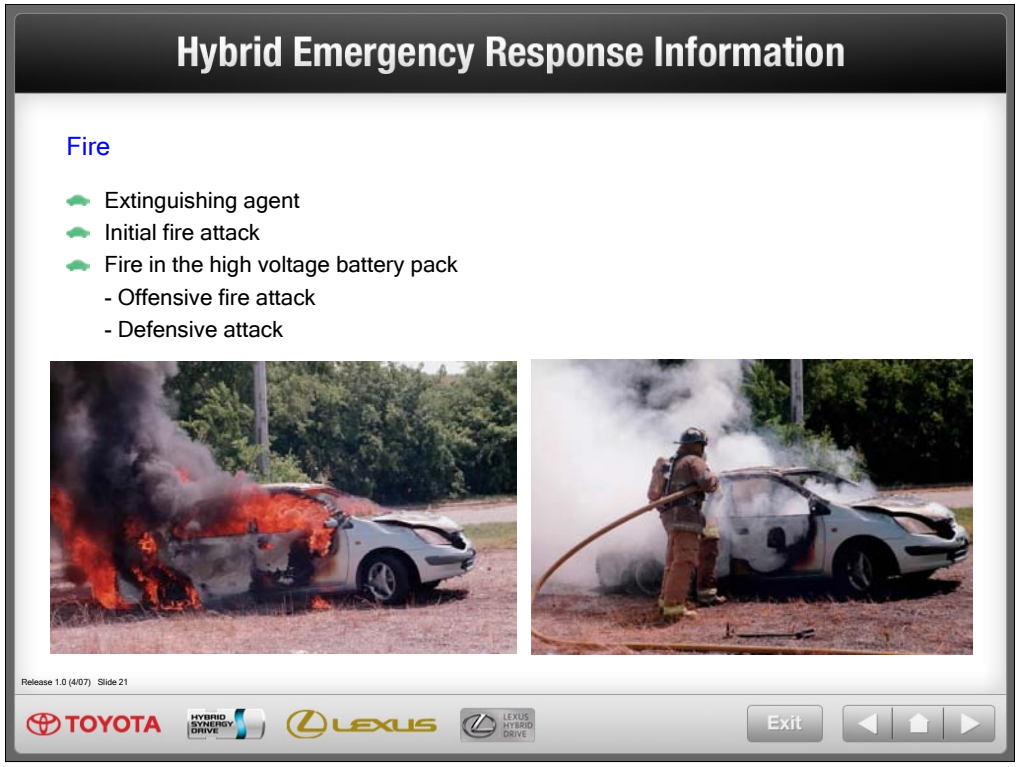
(Slide 20/26) Submersion

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

- Access patients
  When a hybrid is partially or fully submersed in water, responders can access the patient and perform normal extrication procedures without the fear of high voltage shock. High voltage orange color coded power cables and high voltage components should never be touched, cut, or breached.

Vehicle Recovery
If a hybrid is fully or partially submerged in water, emergency responders may not be able to determine if the vehicle has been automatically disabled. Toyota/Lexus hybrids may be safely handled by following these recommendations:

- Remove the vehicle from the water
- Drain the water from the vehicle if possible
- Follow immobilizing and disabling procedures



(Slide 21/26) Fire

Approach and extinguish a hybrid vehicle fire using proper vehicle fire fighting practices as recommended by NFPA, IFSTA, or the National Fire Academy (USA).

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 hybrid until the fire has been knocked down and overhaul operations have commenced.

Fire in the high voltage battery pack
Should a fire occur, attack crews should utilize a water stream or fog pattern to extinguish any fire within the vehicle ***except*** for the high voltage battery pack.

When allowed to burn themselves out, the NiMH battery modules burn rapidly and can quickly be reduced to ashes except for the metal.

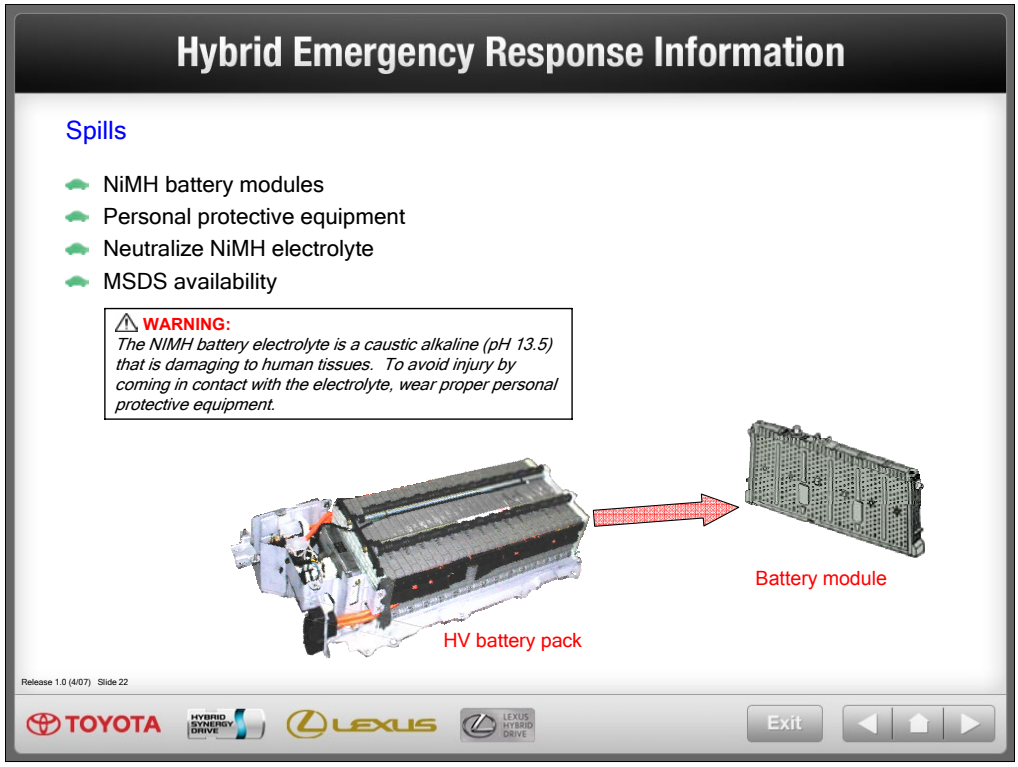
- *Offensive Fire Attack*

  Normally flooding a high voltage NiMH battery pack with copious amounts of water at a safe distance will effectively control the high voltage battery pack fire by cooling the adjacent NiMH battery modules to a point below their ignition temperature. The remaining modules on fire, if not extinguished by the water, will burn themselves out.

  However, flooding the high voltage NiMH battery pack 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 high voltage battery pack 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 NiMH battery modules 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.



(Slide 22/26) Spills

Spills from hybrids vehicles should be contained, cleaned, and removed according to your local agency's standard operating procedures. Hybrids contain the same common automobile fluids used in other conventional non-hybrid vehicles, except for the NiMH electrolyte.

NiMH battery modules
The Nickel Metal Hydride battery electrolyte contains an alkaline solution of potassium hydroxide. Unlike a lead-acid battery which leaks electrolyte if the case is cracked, the NiMH battery electrolyte is absorbed in the cell plates and will not normally leak out if the module is cracked. A catastrophic crash that would breach both the metal battery pack case and the battery module would be a rare occurrence.

Personal protective equipment
Emergency responders may not be familiar with the NiMH electrolyte used in the high voltage battery pack. Should a leak occur, the following items are the minimum recommended personal protective equipment for a NiMH spill:

- Splash shield or safety goggles
- Rubber, latex, or Nitrile gloves
- Apron suitable for alkaline
- Rubber boots

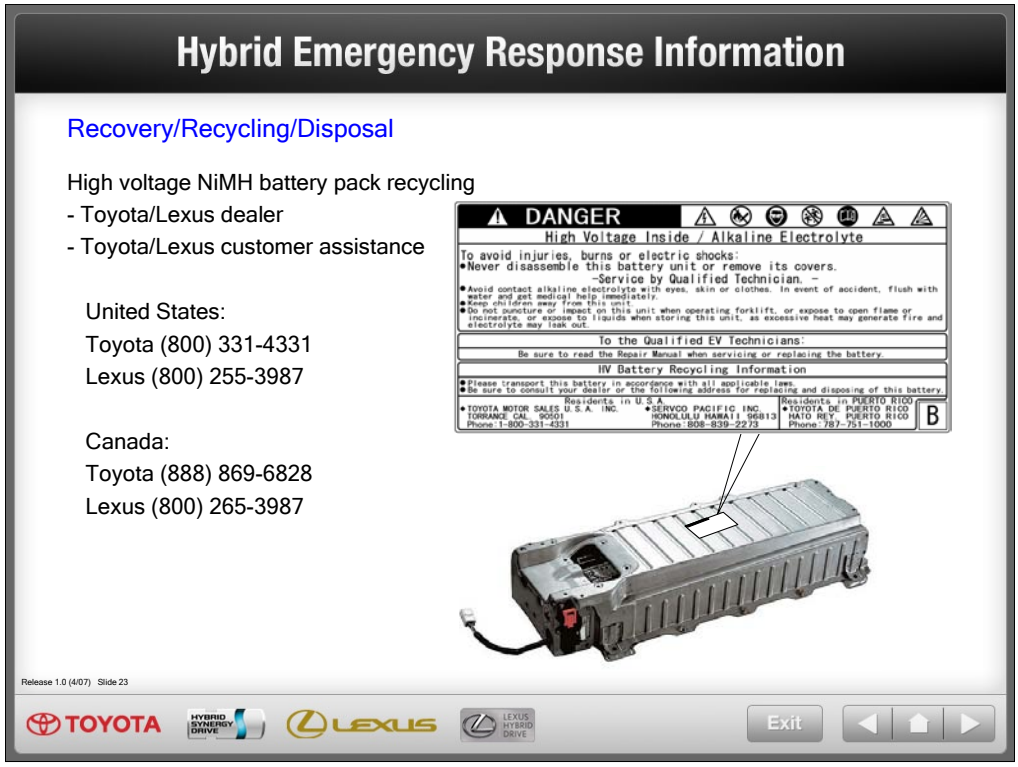
> ⚠ **WARNING:**
> *The NIMH battery electrolyte is a caustic alkaline (pH 13.5) that is damaging to human tissues. To avoid injury by coming in contact with the electrolyte, wear proper personal protective equipment.*

Neutralize NiMH electrolyte
Electrolyte leakage from the HV battery pack is unlikely due to its construction and the amount of available electrolyte contained within the NiMH battery modules. Any spillage would not warrant a declaration as a hazardous material incident. Responders should not confuse a 12 Volt lead-acid battery electrolyte (sulfuric acid) leakage for the NiMH battery electrolyte (potassium hydroxide).

If neutralization of a NiMH battery electrolyte spill is necessary, use the proper personnel protective equipment for a strong alkaline. The electrolyte is water soluble, and can be neutralized with a weak acid solution of boric acid or vinegar.

Boric acid solution: 5.5 ounces (800 grams) boric acid to 1 gallon (20 liters) of water

MSDS availability
During an emergency, Toyota/Lexus MSDS may be requested by contacting:
United States: CHEMTREC at (800) 424-9300
Canada: CANUTEC at *666 or (613) 996-6666



Slide (23/26) Recovery/Recycling/Disposal

High voltage NiMH battery pack recycling

Follow the danger warning label when recycling the high voltage NiMH battery pack. Only trained or qualified personnel should handle the high voltage NiMH battery pack due to the high voltage potential.

For information regarding recycling of the high voltage battery pack, contact:

- Toyota/Lexus new car dealer

- Toyota/Lexus customer assistance

Toyota customer assistance:	United States (800) 331-4331	Canada (888) 869-6828
Lexus customer assistance:	United States (800) 255-3987	Canada (800) 265-3987

(Slide 24/26) First Aid

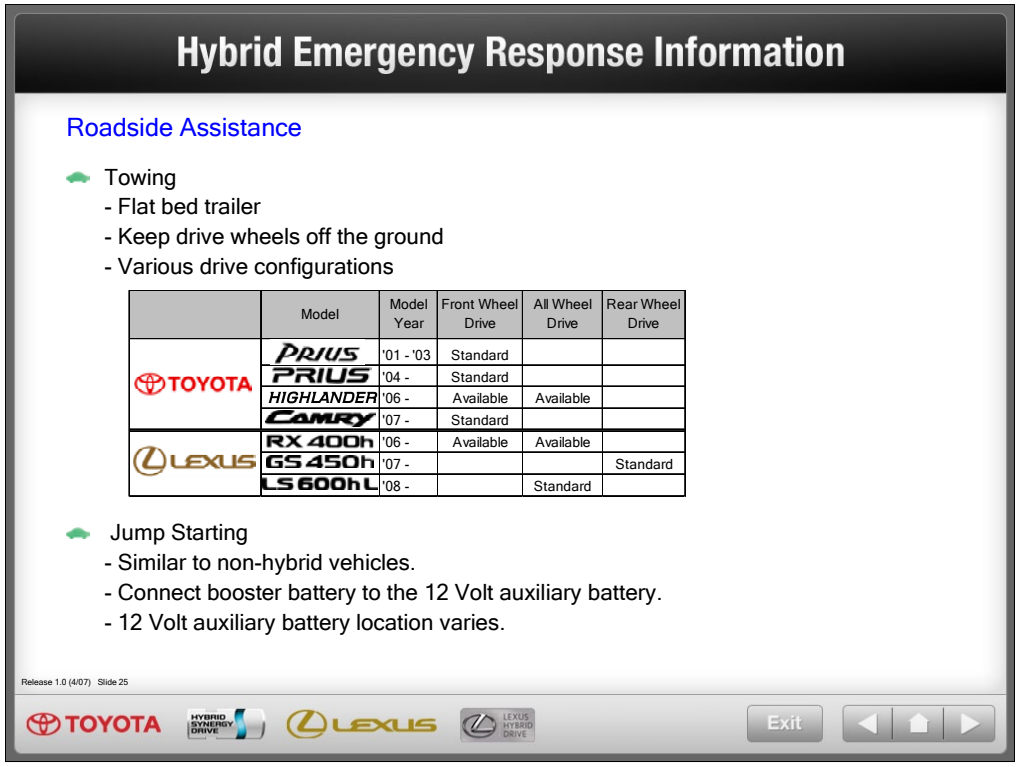
NiMH battery electrolyte
Emergency responders may not be familiar with a NiMH electrolyte exposure. Normally the electrolyte is contained in the plastic or metal case battery module. Unprotected exposure is unlikely except in a catastrophic crash or through improper handling

Personal protective equipment
The NiMH battery electrolyte is a caustic alkaline (pH 13.5) that is damaging to human tissues. To avoid injury by coming in contact with the electrolyte, wear proper personal protective equipment suitable for strong alkaline.
- Splash shield or safety goggles
- Rubber, latex, or Nitrile gloves
- Apron suitable for alkaline
- Rubber boots

Absorption
Responders should perform gross decontamination by removing affected clothing and properly disposing of the garments. Rinse the affected areas with water for 20 minutes and transport the patient to the nearest emergency medical care facility.

Inhalation
Non-Fire Situations: No toxic gases are emitted under normal conditions.
Fire Situations: Toxic gases are given off as by-products of combustion. All responders in the Hot Zone should wear PPE for firefighting including SCBA. Move a patient from the hazardous environment to a safe area and administer oxygen. Transport patient to the nearest emergency medical care facility.

Ingestion
Should a patient ingest the NiMH battery electrolyte, do not induce vomiting, and allow the patient to drink large quantities of water to dilute the electrolyte (never give water to an unconscious person). If vomiting occurs spontaneously, keep patients head lowered and forward to reduce the risk of aspiration. Transport patient to the nearest emergency medical care facility.



(Slide 25/26) Roadside Assistance

Towing

- Flat bed trailer

  Should a hybrid vehicle require towing, a flat bed trailer is the preferred method of towing.

- Keep drive wheels off the ground

  If a flat bed trailer is not available, keep the drive wheels off the ground.

- Various drive configurations

  Toyota/Lexus hybrid vehicles are available in various drive configurations as shown in the table. The Toyota Prius and Camry are front wheel drive vehicles. The Toyota Highlander and Lexus RX 400h are available in front wheel drive or four wheel drive. The Lexus LS 600h L is only available in all wheel drive. The Lexus GS 450h is rear wheel drive.

Jump Starting

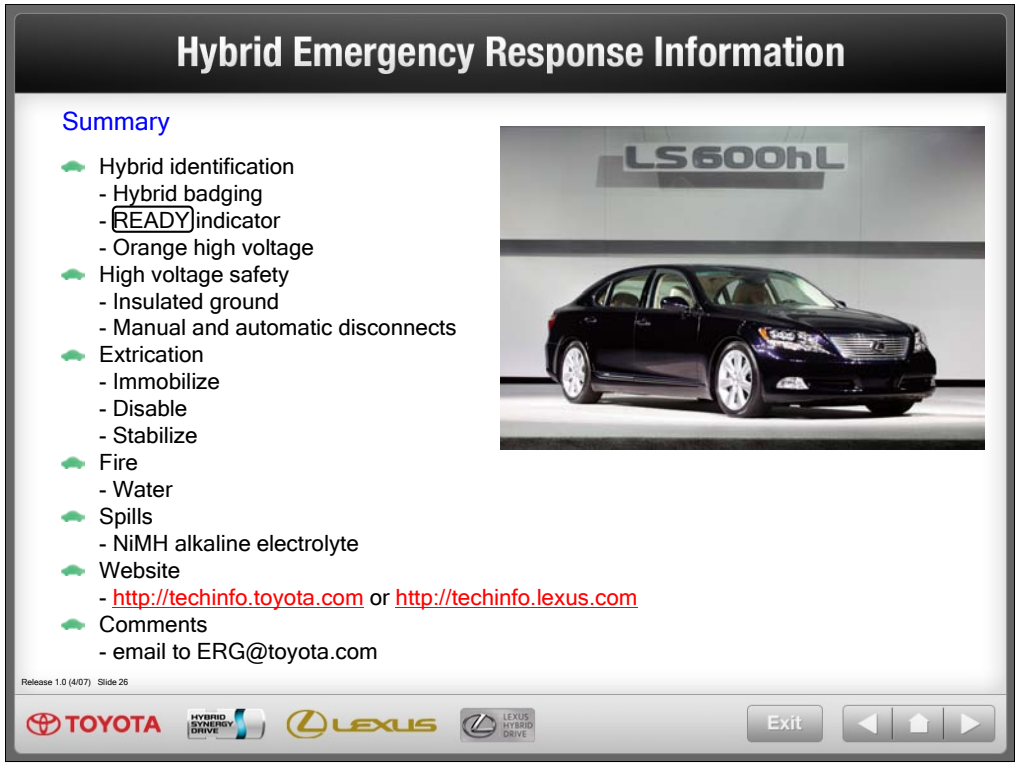
- Similar to non-hybrid vehicles

  If the vehicle does not start and the **READY** indicator remains off, the vehicle may be jump started just like a conventional vehicle.

- Connect booster battery to the 12 Volt auxiliary battery

- 12 Volt auxiliary battery location varies

  The 12 Volt auxiliary battery is located in the engine compartment, trunk, or cargo area depending on hybrid model. The under hood battery label identifies the location of the 12 Volt auxiliary battery.



Slide 26/26 Summary

Instructor Note: This slide uses animation. Mouse click to proceed through the bullet points.

Hybrid Identification (first click)
Hybrids may appear similar to conventional vehicles. Look for hybrid identifiers:
- Hybrid badging
- **READY** indicator
- Orange high voltage power cables

High Voltage Safety (second click)
- The high voltage system is insulated from the metal vehicle body. A responder contacting the vehicle metal body ground is not part of the high voltage circuit.
- Manually shutting the vehicle off stops high voltage electrical flow from the high voltage battery pack. Automatic sensor detection through collision or voltage/current sensors also stops high voltage electrical flow from the high voltage battery pack.

Extrication (third click)
- Hybrids run silent. It's important to immobilize the vehicle to prevent vehicle movement under power or gravity.
- Hybrids contain high voltage electricity. It's important to disable the vehicle to shut off high voltage electrical flow.
- Hybrids are equipped with advanced features like an air suspension system. It's important to stabilize the vehicle to prevent lowering of the vehicle's body.

Fire (fourth click)
- Water is a suitable extinguishing agent for hybrid fires.

Spills (fifth click)
- The alkaline electrolyte in a NiMH battery module will not normally leak out.

Website (sixth click)
- Check the http://techinfo Toyota or Lexus websites for new and updated ERG materials.

Comments (seventh click)
- email comments on this presentation and the ERGs to ERG@toyota.com