LS 600h L

Hybrid 2007 Model

Emergency Response Guide

(November 2007)

FOREWORD

In November 2007, Lexus will release the Lexus LS 600hL petrol-electric hybrid vehicle in Australia. Except where noted in this guide, basic vehicle systems and features for the LS 600hL are the same as those on the conventional, non-hybrid, Lexus LS 460. This LS 600hL Emergency Response Guide has been published to educate and assist emergency responders in the safe handling of the LS 600hL hybrid technology.

High voltage electricity powers the electric motor, generator, A/C compressor, and inverter/converter. All other automotive electrical devices such as the horn, radio, and gauges are powered from a separate 12 Volt battery. Numerous safeguards have been designed into the LS 600hL to help ensure the high voltage, approximately 288 Volts, Nickel Metal Hydride (NiMH) Hybrid Vehicle (HV) battery pack is kept safe and secure in an accident.

The LS 600hL utilises the following electrical systems:

- Maximum 650 Volts AC
- Nominal 288 Volts DC
- Maximum 46 Volts AC / DC
- Nominal 12 Volts DC

LS 600hL features:

- A mechanical all-wheel drive hybrid powertrain.
- A boost converter in the inverter assembly that boosts to 650 Volts the available voltage to the electric motor.
- A high voltage Hybrid Vehicle battery pack rated at 288 Volts.
- A high voltage motor driven Air Conditioning compressor rated at 288 Volts.
- An Electric Power Steering (EPS) assist motor rated at 46 Volts.
- Active stabiliser suspension system motors rated at 46 Volts.
- Supplemental Restraint System (SRS) - dual stage frontal airbags, front knee airbags, front seat and optional rear seat side airbags, side curtain airbags, front and rear seat belt pretensioners, and when equipped with an optional rear seat Ottoman, a passenger side rear seat cushion airbag.
- A body electrical system rated at 12 Volts, negative chassis ground.

High voltage electrical safety is an important factor in the emergency handling of the LS 600hL Hybrid Synergy Drive. It is important to recognise and understand the disabling procedures and warnings throughout the guide.

Additional topics in the guide include:

- Lexus LS 600hL identification.
- Major Hybrid Synergy Drive component locations and descriptions.
- Extrication, fire, recovery, and additional emergency response information.
- Roadside assistance information.

By following the information in this guide, Emergency Responders should be able to safely perform a rescue involving the Lexus LS 600hL hybrid vehicle.

2007 LS 600hL

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2007 LS 600hL

ABOUT THE LS 600hL

The LS 600hL sedan joins the RX 400h and GS 450h as a hybrid model for Lexus. Hybrid Synergy Drive means that the vehicle contains a petrol engine and an electric motor for power. The two hybrid power sources are stored on board the vehicle:

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

The result of combining these two power sources is improved fuel economy and reduced emissions. The petrol engine also powers an electric generator to recharge the battery pack; unlike a pure all electric vehicle, the LS 600hL never needs to be recharged from an external electric power source.

Depending on the driving conditions one or both sources are used to power the vehicle.
The following illustration demonstrates how the LS 600hL operates in various driving modes.

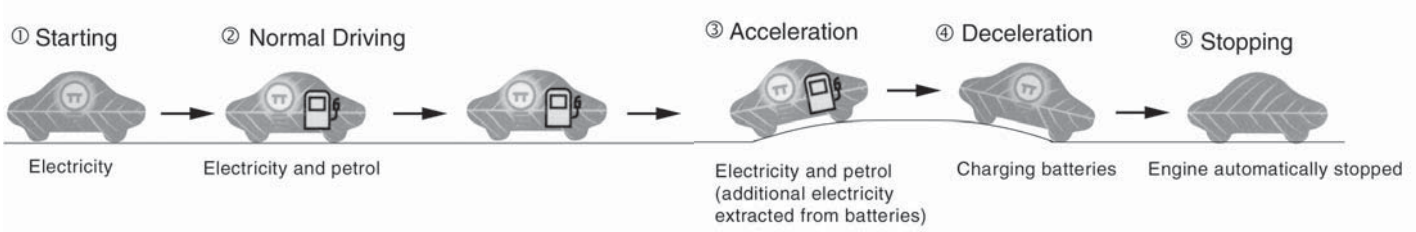
❶ During light acceleration at low speeds, the vehicle is powered by the electric motor. The petrol engine is shut off.

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

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

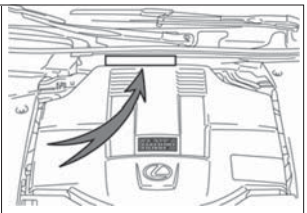
❹ During deceleration, such as when braking, the vehicle regenerates the kinetic energy from the wheels to produce electricity that recharges the battery pack.

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



LS 600hL IDENTIFICATION

Passenger Side Windshield



Engine Compartment Cowl

Base of Passenger B Pillar

VIN Plate Locations

In appearance, the 2007 LS 600hL is nearly identical to the conventional, non-hybrid Lexus LS 460. The LS 600hL is a 4-door sedan and the suffix "L" indicates a long wheelbase. 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, driver door pillar, and engine compartment.

Example VIN: JTHDU46F840020208

An LS 600hL is identified by the first 6 alphanumeric characters **JTHDU4.**

Exterior

❶ LEXUS LS 600hL logos on the rear luggage compartment lid.

❷ HYBRID logos on the rear door mouldings.

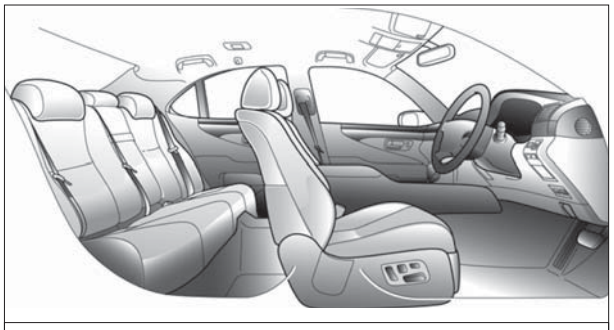
❸ Petrol fuel filler door located on the passenger side rear quarter panel.

Exterior Front View

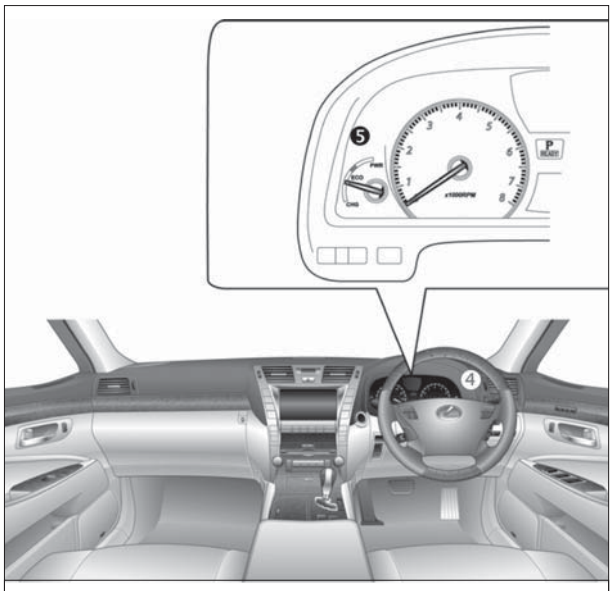
Exterior Rear View

Exterior Rear and Left Side View

Exterior Left Side View



Interior View



Instrument Cluster View

Interior

❹ The instrument cluster (speedometer, fuel gauge, warning lights) located in the dash behind the steering wheel, is different than the one on the conventional, non-hybrid LS 460.

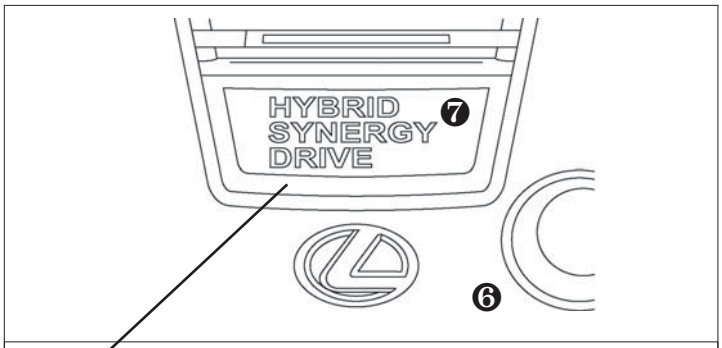
❺ The hybrid system indicator (power meter) is located next to the tachometer.

NOTE:
If the vehicle is shut off, the instrument cluster gauges will be "blacked out", not illuminated.

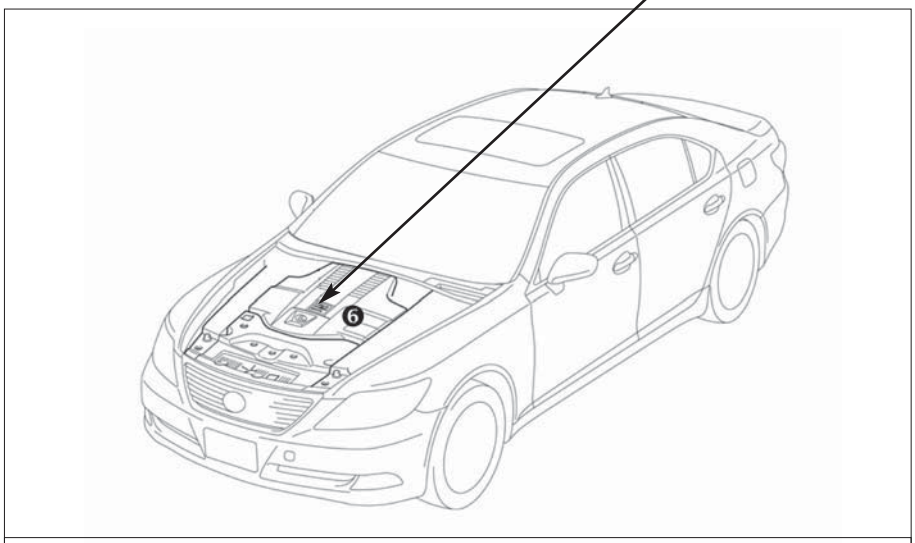
Engine Compartment

❻ 5.0-litre aluminum alloy petrol engine.

❼ Logos on the plastic engine cover.



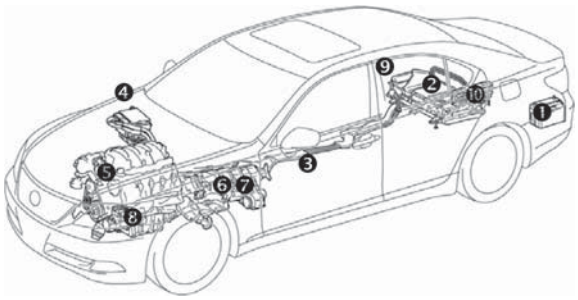
Logo on Cover



Engine Compartment View

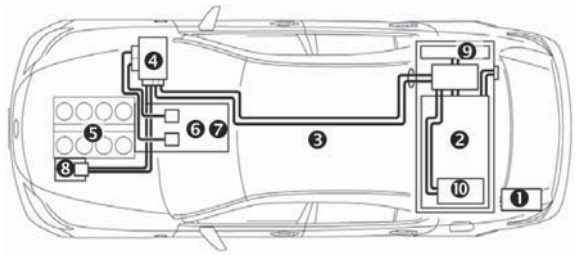
HYBRID SYNERGY DRIVE COMPONENT LOCATIONS AND DESCRIPTIONS

*Actual position of Inverter ❹ is passenger side (LHS)



Hybrid Synergy Drive Components

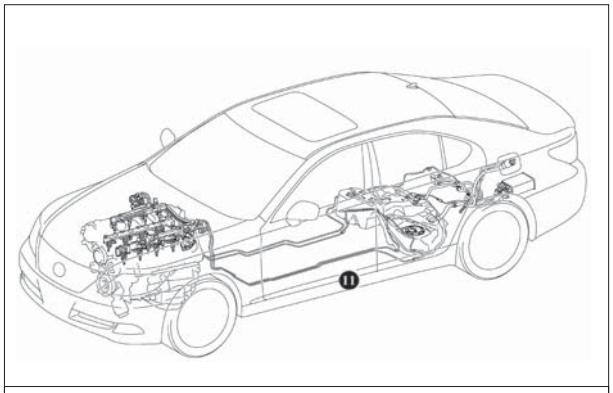
*Actual position of Inverter ❹ is passenger side (LHS)



Components (Top View) and High Voltage Power Cables

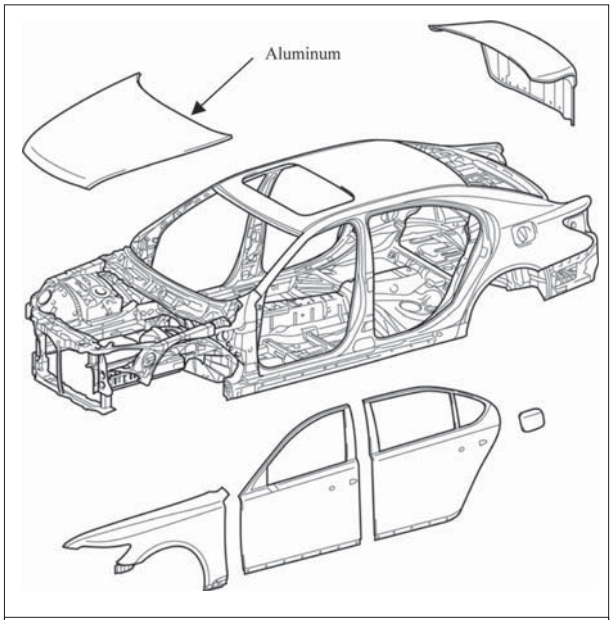
COMPONENT	LOCATION	DESCRIPTION
12-Volt ❶ Auxiliary Battery	Luggage Compartment	A lead-acid battery that supplies power to the low voltage devices.
Hybrid ❷ Vehicle (HV) Battery Pack	Luggage Compartment Area, Mounted to Cross Member and behind Rear Seat	288-Volt Nickel Metal Hydride (NiMH) battery pack consisting of 20 low voltage (14.4-Volt) modules connected in series.
Power ❸ Cables	Under Carriage and Engine Compartment	Orange coloured power supply cables carry high-voltage Direct Current (DC) between the HV battery pack, power control unit, and A/C compressor. These cables also carry 3-phase Alternating Current (AC) between the power control unit, electric motor, and generator.
Inverter/ Converter ❹*	Engine Compartment	Boosts and inverts the high voltage electricity from the HV battery pack to 3-phase AC electricity that drives the electric motor. The inverter assembly also converts AC electricity from the electric generator and electric motor (regenerative braking) to DC that recharges the HV battery pack.
Petrol ❺ Engine	Engine Compartment	Provides two functions: 1) powers vehicle: 2) powers generator to recharge the HV battery pack. The engine is started and stopped under control of the vehicle computer.
Electric ❻ Generator	Transmission	3-phase high-voltage AC generator that is contained in the transmission and recharges the HV battery pack.
Electric ❼ Motor	Transmission	3-phase high-voltage AC permanent magnet electric motor contained in the transmission and drives the four wheels through the transfer case and propeller shafts.

HYBRID SYNERGY DRIVE COMPONENT LOCATIONS AND DESCRIPTIONS



Fuel Tank and Fuel Lines

COMPONENT	LOCATION	DESCRIPTION
A/C ❽ Compressor with Inverter	Engine Compartment	3-phase high voltage AC electrically driven motor compressor.
DC-DC ❾ Converter for 12 Volt Auxiliary Battery	Inside HV Battery Pack in Luggage Compartment	Converts 288-Volts from the HV battery pack to 12-Volts for low voltage vehicle power.
DC-DC ❿ Converter for EPS and Active Stabiliser Suspension System	On HV Battery Pack	Converts 288 Volts from the HV battery pack to 46 Volts for EPS and active stabiliser suspension system power. Dull yellow coloured sheathing identifies 46 Volt wires that are routed under the vehicle body to power the EPS and the active stabiliser suspension system.
Fuel Tank ⓫ and Fuel Lines	Undercarriage, Driver Side and Centre	The fuel tank provides petrol via fuel lines to the engine. The source fuel lines are routed under the vehicle along the centre tunnel and the return line is routed along the driver side under the floor pan.



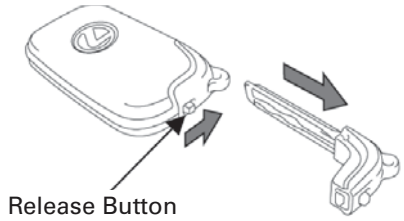
Steel Unibody

Key Specifications

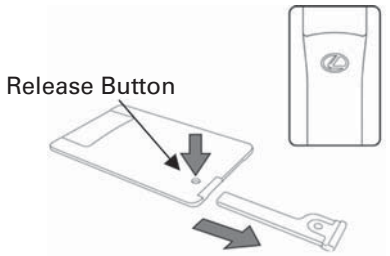
Petrol Engine:	290 kW, 5.0- litre Aluminum Alloy Engine
Electric Motor:	165 kW, Permanent Magnet Motor
Transmission:	Automatic Only (Electrically Controlled Continuously Variable Transmission)
HV Battery:	288-Volt Sealed NiMH Battery
Curb Weight:	2,270-2,430 kg
Fuel Tank:	84 litres
Fuel Economy:	11.3/8.0 (City/Hwy) litres/100 km
Frame Material:	Steel Unibody
Body Material:	Steel Panels except for Aluminium Bonnet

SMART ENTRY AND START SYSTEM

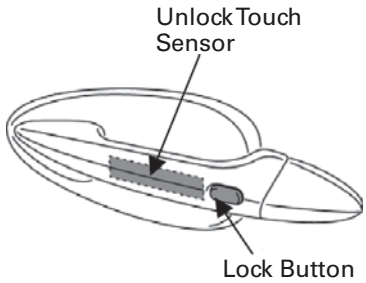
Smart Key



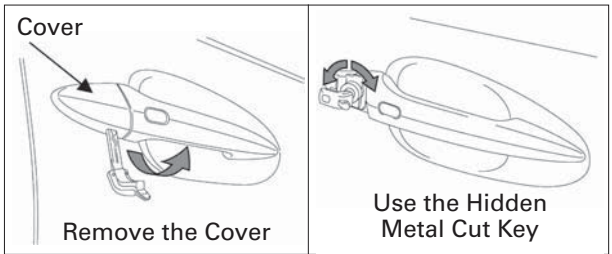
Hidden Metal Cut Key For Door Lock



Card Key and Hidden Metal Cut Key For Door Lock



Driver Door Unlock Touch Sensor and Lock Button



Hidden Front Driver Door Lock

The LS 600hL smart entry system consists of a smart key transceiver that communicates bi-directionally enabling the vehicle to recognise the key in close proximity to the vehicle. Once recognised, the key will allow the user to lock and unlock the doors without pushing key buttons, and start the vehicle without inserting it into an ignition switch.

Key features:

- Passive (remote) function to lock/unlock the doors and start the vehicle.
- Wireless transmitter buttons to lock/unlock the doors and unlock the luggage compartment.
- Hidden metal cut key to lock/unlock the doors and luggage compartment from the exterior.

The LS 600hL is equipped with two types of keys:

- Smart key
- Card key

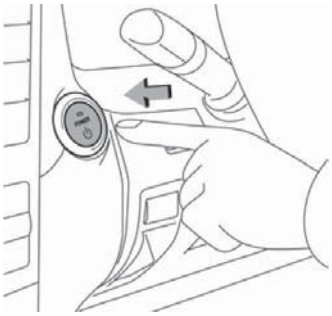
The card key is designed to be stored in a wallet and has all the same functions as the smart key, except push buttons.

Door (Lock/Unlock)

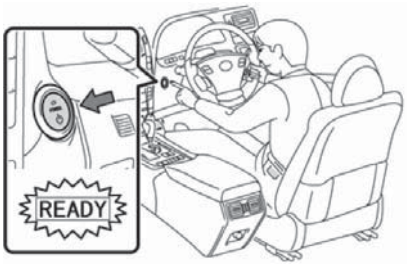
Three methods are available to lock/unlock the doors.

1. Pushing wireless key lock/unlock buttons.
2. Touching the sensor on the backside of any exterior door handle, with the key in close proximity to the vehicle, unlocks the doors. Pushing the lock button on any exterior door handle locks the doors.
3. Removing the driver door handle cover, inserting the hidden metal cut key in the driver door lock and turning the key 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.

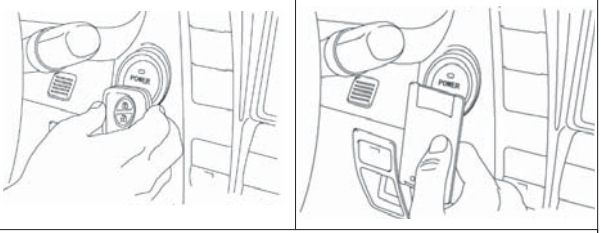
Power Button with Integral Status Indicator Light



Ignition Modes (Brake Pedal Released)



Starting Sequence (Brake Pedal Depressed)



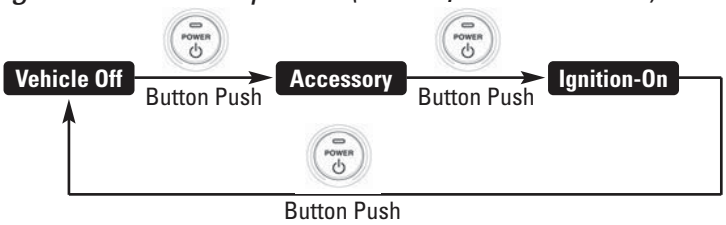
Smart Key Recognition (When Smart Key Battery is Dead)

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.

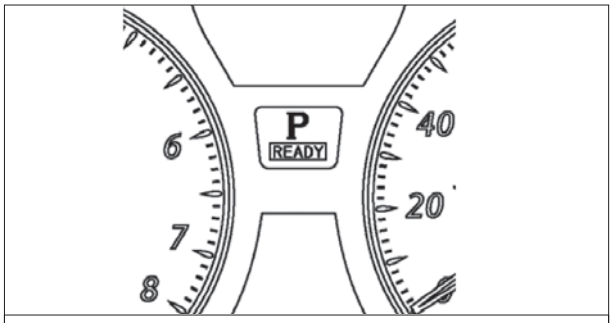
Ignition Mode Sequence (Brake pedal released):



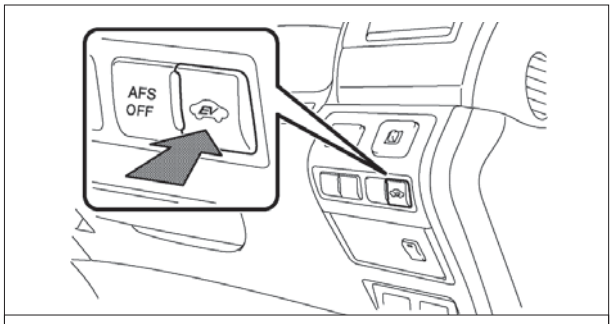
- Starting the vehicle takes priority over all other ignition modes and is accomplished by depressing the brake pedal and pushing the power button once. To verify the vehicle has started, the power button status indicator light is off and the **READY** light is illuminated in the instrument cluster.
- If the internal Smart Key battery is dead, use the following method to start the vehicle.
  1. Touch the Lexus emblem side of the Smart Key to the power button (a buzzer will sound).
  2. Within 10 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, placing the gearshift lever in **P**ark, and then depressing the power button once.

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

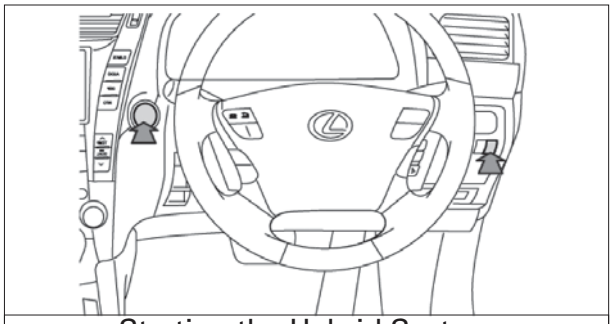
HYBRID SYNERGY DRIVE OPERATION



Instrument cluster **READY** Indicator



EV Mode Switch



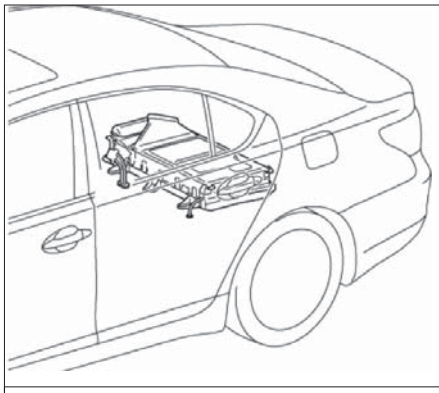
Starting the Hybrid System
in EV Drive Mode

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

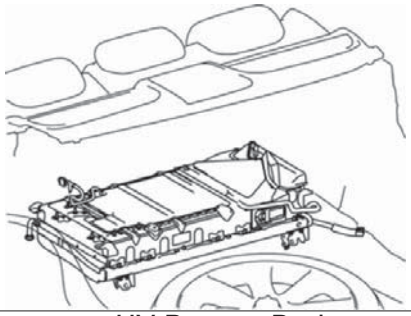
Vehicle Operation

- With the LS 600hL, the petrol engine may stop and start at any time while the **READY** indicator is on.
- Never assume that the vehicle is shut off just because the engine is off. Always look for the **READY** indicator status. The vehicle is shut off when the **READY** indicator is off.
- The vehicle may be powered by:
  1. The electric motor only.
  2. The petrol engine only.
  3. A combination of both the electric motor and the petrol engine.
- The vehicle computer determines the mode in which the vehicle operates in order to improve fuel economy and reduce emissions. A new feature on the LS 600hL is EV (Electric Vehicle) drive mode. When activated, and certain conditions have been met, the vehicle operates with the electric motor powered by the HV battery.
- For the LS 600hL, the vehicle can be started (READY-ON) without starting the petrol engine. This can be done by pushing the power button while pressing the EV mode switch with the brake pedal depressed.

HYBRID VEHICLE (HV) BATTERY PACK



HV Battery Pack



HV Battery Pack
(Viewed from the Luggage Compartment)

The LS 600hL features a high voltage Hybrid Vehicle (HV) battery pack that contains sealed Nickel Metal Hydride (NiMH) battery modules.

HV Battery Pack

- The HV battery pack is enclosed in a metal case and is securely mounted in the luggage compartment area behind the rear seat. The metal case is isolated from high voltage and concealed by fabric covers.
- The HV battery pack consists of 20 low voltage (14.4 Volt) NiMH battery modules connected in series to produce approximately 288 Volts. Each NiMH battery module is non-spillable and sealed in a metal case.
- The electrolyte used in the NiMH battery module is an alkaline mixture of potassium and sodium hydroxide. The electrolyte is absorbed into the battery cell plates and will not normally leak, even in a collision.
- In the unlikely event that the battery pack is overcharged, the modules vent gases directly outside the vehicle through a vent hose.

HV BATTERY PACK	
Battery pack voltage	288-Volts
Number of NiMH battery modules in the pack	20
NiMH battery module voltage	14.4-Volts
NiMH battery module dimensions	18x542x86mm
NiMH module weight	2.2 kg
NiMH battery pack dimensions	515x842x257mm
NiMH battery pack weight	67 kg

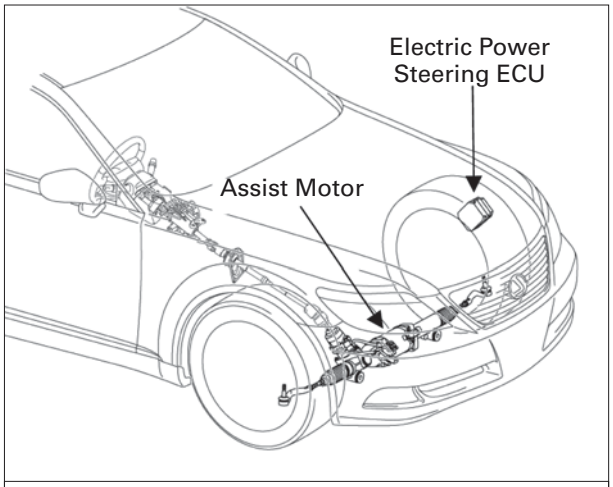
Components Powered by the HV Battery Pack

- Electric Motor
- Power Control Unit
- Power Cables
- Electric Generator
- A/C Compressor
- DC-DC Converter for 12 Volt Auxiliary Battery
- DC-DC Converter for EPS and Active Stabiliser Suspension System

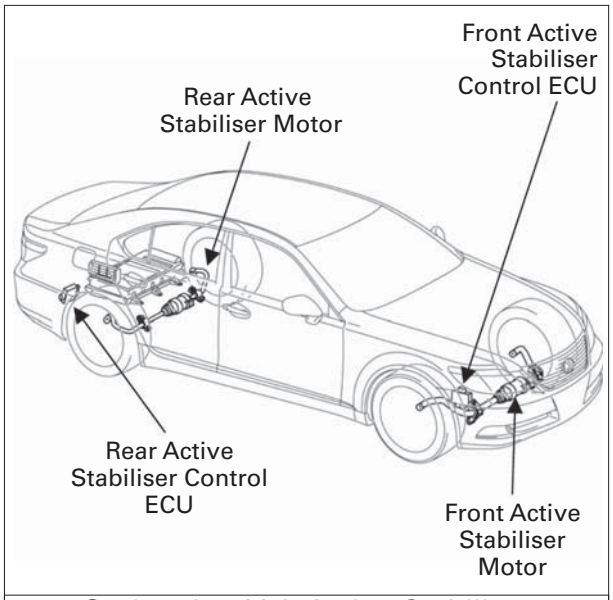
HV Battery Pack Recycling

- The HV battery pack is recyclable. Contact the nearest Lexus dealer or Lexus Australia.

46 VOLT SYSTEM



46 Volt Electric Power Steering System

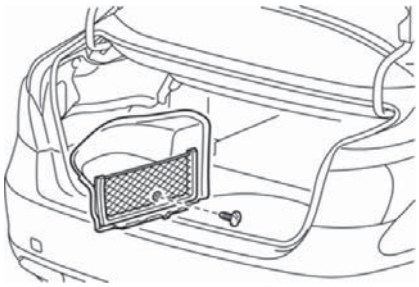


Optional 46 Volt Active Stabiliser Suspension System

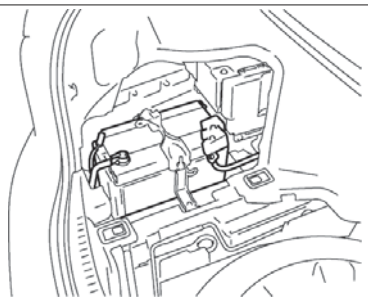
The LS 600hL is equipped with a 46 Volt electrical system that powers the Electric Power Steering (EPS) assist motor in the engine compartment and the optional Active Stabiliser Suspension System motors for the front and rear stabiliser bars.

- 46 Volt electrical system wires are bundled in dull yellow sheathing for identification.
- The 46 Volt electrical system does not contain a storage battery. It is powered by converting high voltage battery power. The wires are routed underneath the vehicle from the HV battery pack DC-DC converter.
- If the HV battery pack malfunctions, backup power is provided to the EPS motor by boosting the 12 Volt electrical system.

NOTE:
46 Volts has a higher arc potential than 12 Volts.



12 Volt Auxiliary Battery Fabric Cover

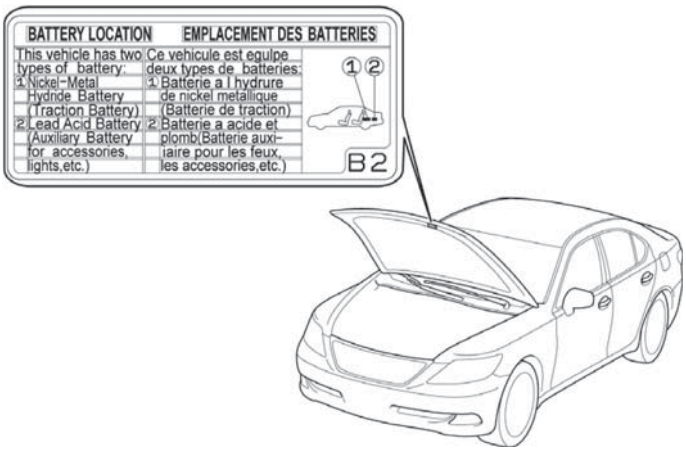


12 Volt Auxiliary Battery Mounted in the Luggage Compartment (Left Side)

Auxiliary Battery

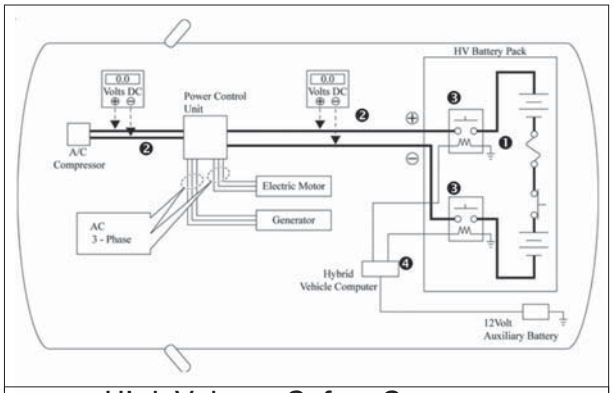
- The LS 600hL contains a sealed lead-acid 12 Volt battery. The 12 Volt auxiliary battery powers the vehicle's electrical system similar to a conventional vehicle. As with conventional vehicles, the negative terminal of the auxiliary battery is grounded to the metal chassis of the vehicle.
- The auxiliary battery is located in the luggage compartment. It is concealed by a fabric cover on the left side in the rear quarter panel well.

NOTE:
An underhood label shows the location of the HV battery (traction battery) and 12 Volt auxiliary battery.

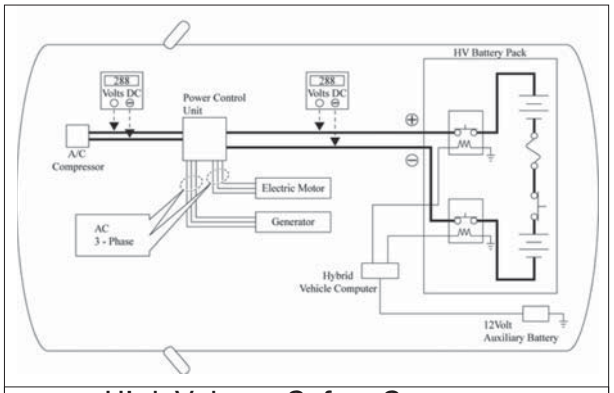


Battery Location Label

HIGH VOLTAGE SAFETY



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



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

The HV battery pack powers the high voltage electrical system with DC electricity. Positive and negative orange coloured high voltage power cables are routed from the battery pack, under the vehicle floor pan, along the propeller shaft and transmission tunnel to the inverter assembly.
The inverter assembly contains a circuit that boosts the HV battery voltage from 288 to 650 Volts DC.
The inverter assembly creates 3-phase AC to power the motor and generator located in the transmission. Power cables are routed from the power control unit to each high voltage motor (electrical 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:

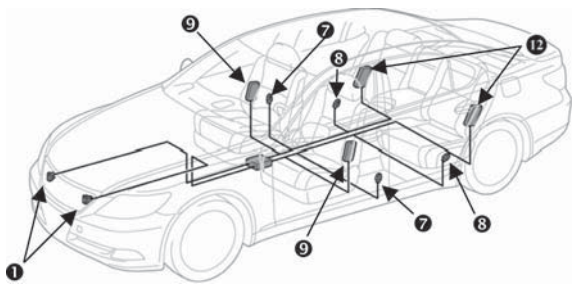
High Voltage Safety System

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

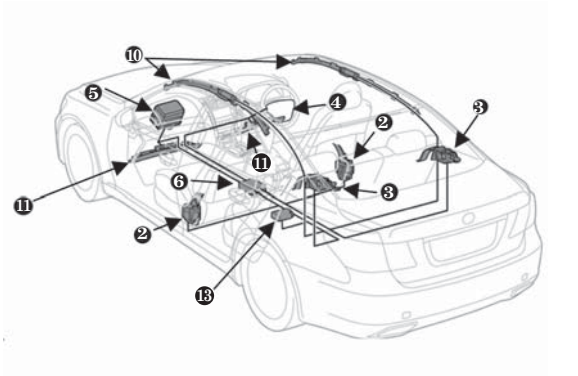
> ⚠ **WARNING:**
> *The high voltage system may remain powered for up to 10 minutes after the vehicle is shut off or disabled. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or opening any orange high voltage power cable or high voltage component.*

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

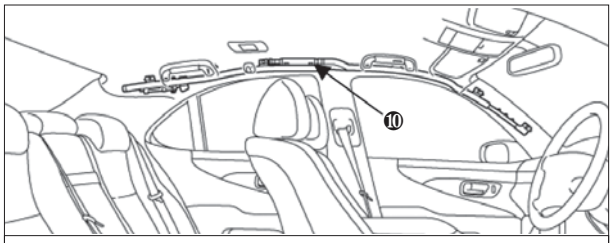
SRS AIRBAGS & SEAT BELT PRETENSIONERS



Electronic Impact Sensors, Front and Optional Rear Seat Side Airbags



Standard Frontal Airbags, Seat Belt Pretensioners, Knee Airbags, Curtain Airbags, and Optional Seat Cushion Airbag



Curtain Airbag Inflator in Roof Rail

⚠ **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

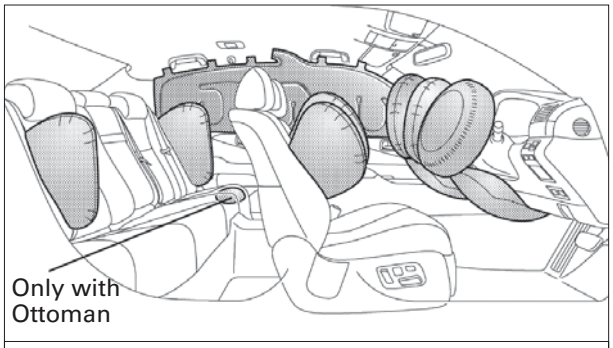
Standard Equipment

- Electronic frontal impact sensors (2) are mounted in the engine compartment ❶ as illustrated.
- Front seat belt pretensioners are mounted near the base of the B-pillars ❷.
- Rear seat belt pretensioners are mounted near the C-pillar on the rear seatbacks. ❸
- A frontal dual stage driver airbag ❹ is mounted in the steering wheel hub.
- A frontal twin-chamber shaped dual stage passenger airbag ❺ is integrated into the dashboard and deploys through the top of the dashboard.
- The SRS computer ❻, which contains an impact sensor, is mounted on the floor pan underneath the centre armrest console.
- Front electronic side impact sensors (2) are mounted near the base of the B-pillars ❼.
- Rear electronic side impact sensors (2) are mounted near the base of the C-pillars ❽.
- Front seat side airbags ❾ are mounted in the seatbacks.
- Curtain airbags ❿ are mounted along the outer edge inside the roof rails.
- Front knee airbags ⓫ are mounted on the driver side and passenger side lower portion of the dash.

Optional Equipment

- Rear seat side airbags ⓬ are mounted in the rear seats.
- The optional passenger side rear ottoman power seat contains an airbag ⓭ mounted in the bottom seat cushion.
- The pre-crash safety system contains a radar sensory system, occupant seat sensor, and an electric motor-pyrotechnic pretensioner system. During a pre-collision event, an electric motor in the pretensioners retracts the slack in the front seatbelt. When conditions stabilise the electric motor will reverse itself. When the airbags deploy, the pyrotechnic pretensioners function normally.

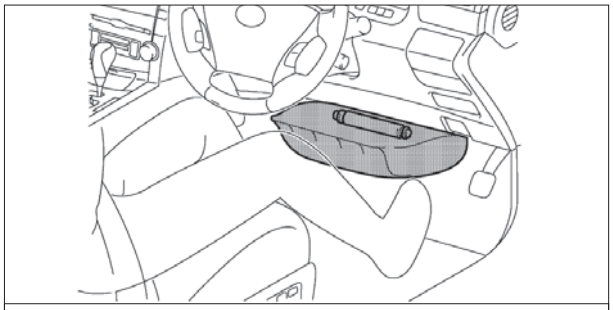
SRS AIRBAGS & SEAT BELT PRETENSIONERS



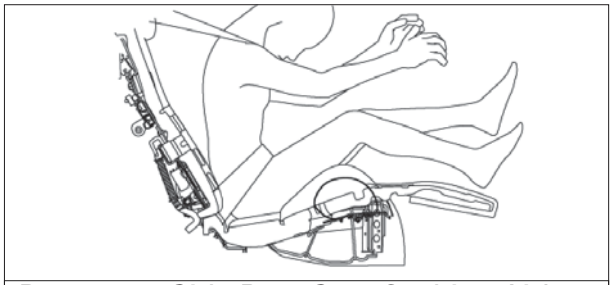
Frontal, Knee, Front Seatback Mounted Side, Curtain, Optional Rear Seat Side and Seat Cushion Airbags

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

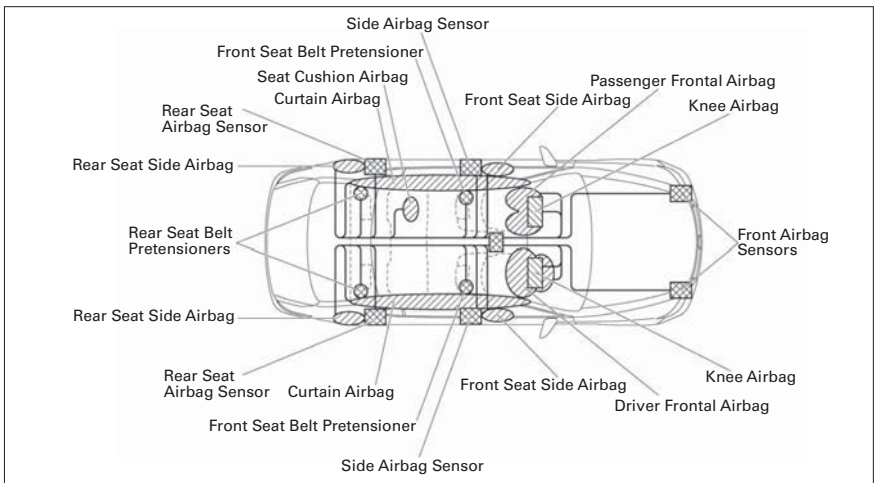
The knee airbags deploy simultaneously with the frontal airbags and seat belt pretensioners.



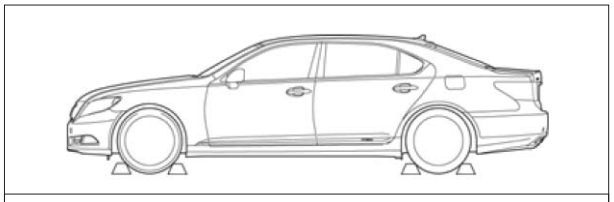
Driver Knee Airbag and Inflator



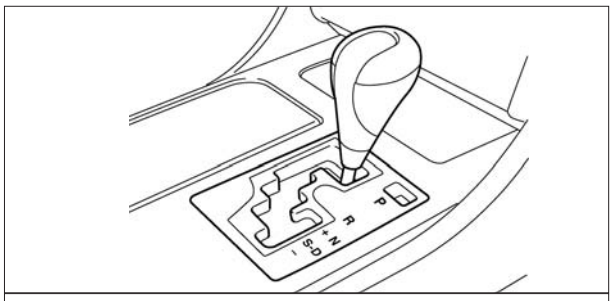
Passenger Side Rear Seat Cushion Airbag (Standard with Optional Ottoman Seat)



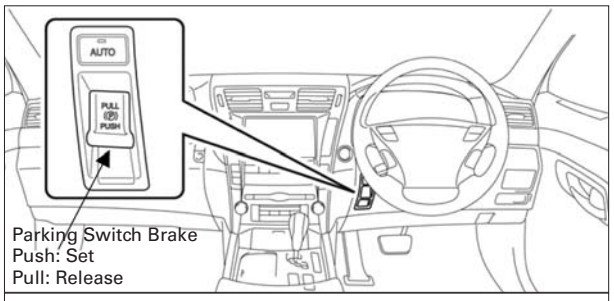
SRS System Diagram



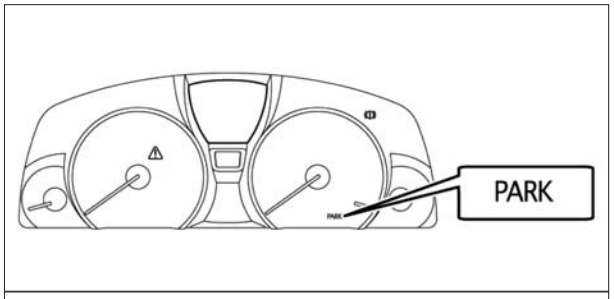
Chock Wheels



Shift Lever in **P**ark



Set Parking Brake



Parking Brake Indicator Light

On arrival, emergency responders should follow their standard operating procedures for vehicle incidents. Emergencies involving the LS 600hL may be handled like other vehicles except as noted in these guidelines for Extrication, Fire, Overhaul, Recovery, Spills, First Aid, and Submersion.

⚠ **WARNING:**

- ***Never*** *assume the LS 600hL 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 is shut off when the* **READY** *indicator is off.*
- *Failure to shut off 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

- **Immobilise Vehicle**

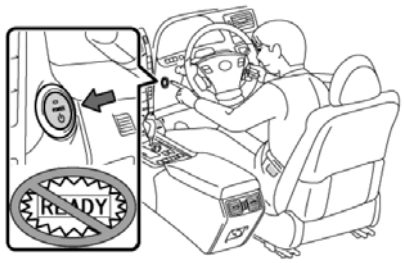
  Chock wheels and set the parking brake.

  Move the shift lever to the **P**ark position.

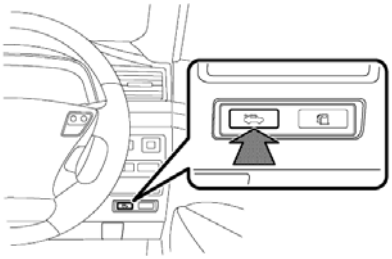
  NOTE:

  The LS 600hL utilises a push/pull parking brake switch that electro-mechanically sets/releases the rear parking brakes.

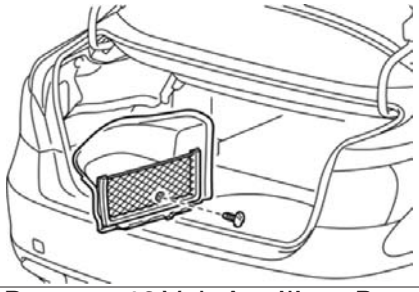
  - To set/release, push/pull the parking brake switch located on the dash to the left side of the steering column (refer to illustration).
  - If the AUTO button is set and illuminated, the parking brake will automatically set when the vehicle is shifted to the **P**ark position.
  - To verify that the parking brake is set, confirm that the **PARK** light illuminates on the instrument cluster (refer to illustration). The **PARK** light will turn off after approximately 15 seconds.



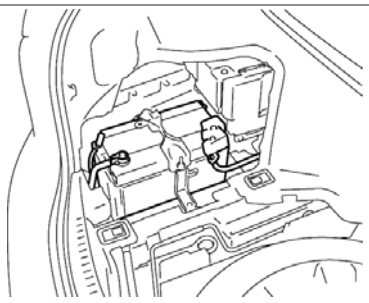
Shut Off Vehicle (**READY**-Off)



Luggage Compartment Opener Button



Remove 12 Volt Auxiliary Battery Fabric Cover



12 Volt Auxiliary Battery in Luggage Compartment

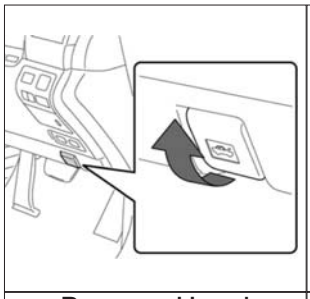
Extrication *(Continued)*

- **Disable Vehicle**

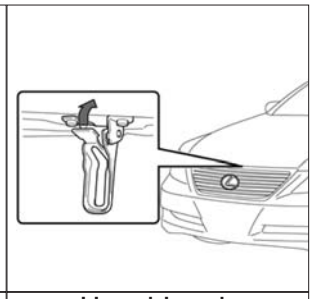
  Performing either of the following two procedures will shut the vehicle off and disable the HV battery pack, SRS, and petrol fuel pump.

  Procedure #1

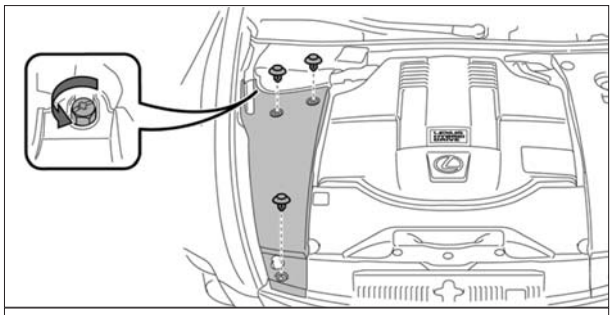
  1. Confirm the status of **READY** indicator in the instrument cluster.
  2. If the **READY** indicator is illuminated, the vehicle is on and operational. Shut off the vehicle by pushing the power button once.
  3. The vehicle is already shut off if the instrument cluster lights and the **READY** indicator 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 5 metres away from the vehicle.
  5. If the Smart Key cannot be found, disconnect the 12 Volt auxiliary battery in the luggage compartment to prevent accidental restarting of the vehicle.



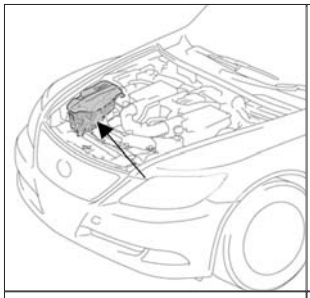
Remote Hood Release



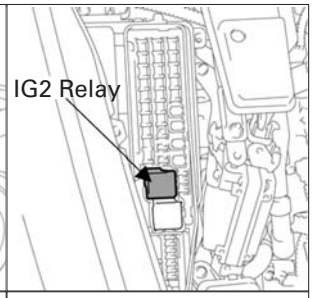
Hood Latch Release



Remove Engine Compartment Cover



Remove Fuse Box Cover



IG2 Relay Location in Engine Compartment Fuse Box

Extrication *(Continued)*

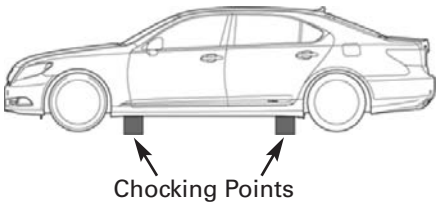
Procedure #2 (Alternate if power button is inaccessible

1. Remove the engine compartment and fuse box covers.
2. Remove the IG2 relay in the engine compartment fuse box (refer to illustration). If the correct relay cannot be recognised, pull both relays in the fuse box.
3. Disconnect the 12 Volt auxiliary battery in the luggage compartment.

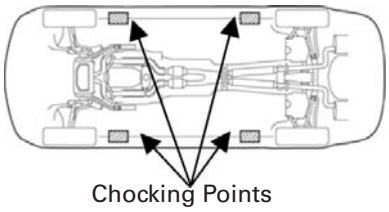
NOTE:
Before disconnecting the 12 Volt auxiliary battery, if necessary, set the parking brake, reposition the power seats, tilt/telescoping steering wheel, lower the windows, unlock the doors, open the luggage compartment and the fuel door as required. A manual fuel door release is located in the luggage compartment (see the illustration in the Roadside Assistance section on page 26). Once the 12 Volt auxiliary battery is disconnected, power controls will not operate.

WARNING:

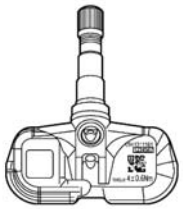
- *The high voltage system may remain powered for up to 10 minutes after the vehicle is shut off or disabled. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or opening any orange high voltage power cable or high voltage component.*
- *The SRS may remain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



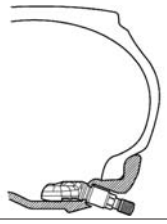
Chocking Points



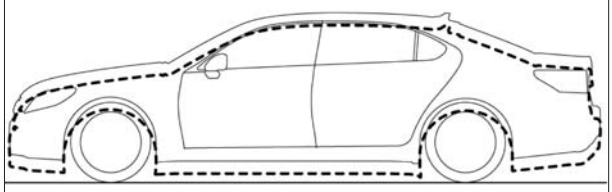
Underbody View



Tyre Pressure Sensor Metal Valve Stem with Integral Transmitter



Metal Valve Stem with Integral Transmitter Installed on Wheel



Air Suspension System Drop

Extrication *(Continued)*

- **Stabilise Vehicle**

  Chock 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.

  NOTE:
  The LS 600hL may be equipped with a tyre pressure warning system that by design prevents pulling the metal valve stem with integral transmitter. Snapping the stem with pliers or removing the valve cap and Schrader valve will release the air in the tyre.

  The LS 600hL is equipped with an air suspension system. In the event of a collision, fire or malfunction, air leakage may occur, allowing the body to drop.

- **Access patients**

  Glass Removal

  The LS 600hL is equipped with laminated side windows having similar properties as laminated windshield glass. If side glass removal is required, use the same techniques as the front windshield glass.

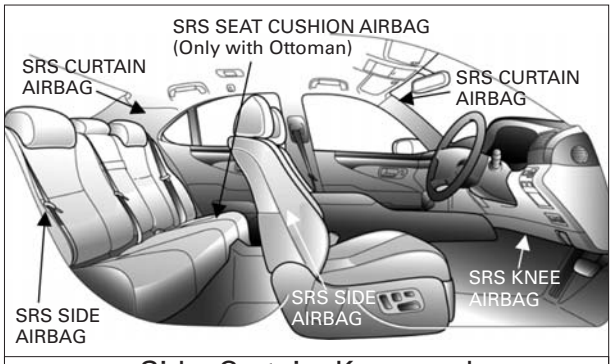
  Types of glazing found on the LS 600hL
  - Laminated front windshield
  - Laminated side windows
  - Tempered rear window

  SRS Awareness

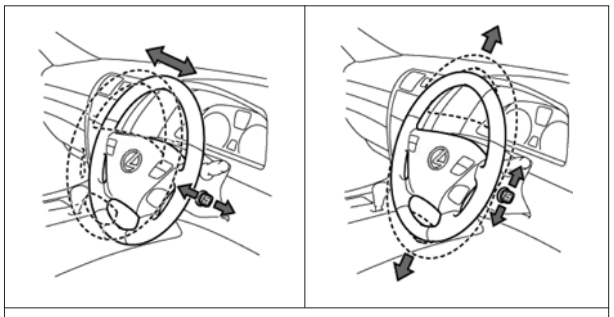
  Responders need to be cautious when working in close proximity to undeployed airbags and seat belt pretensioners. Front dual stage airbags automatically ignite both stages within a fraction of a second.

  Door Removal/Displacement

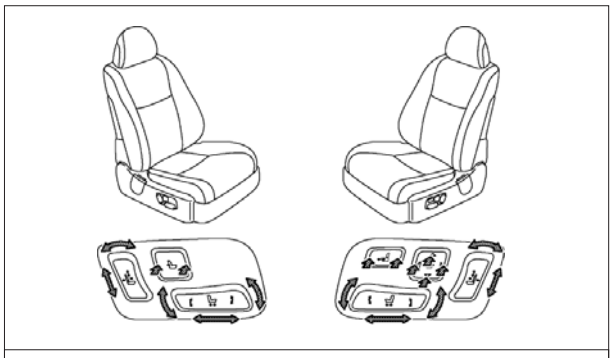
  Doors can be removed by conventional rescue tools such as hand, electric, and hydraulic tools. In certain situations, it may be easier to pry back the vehicle body to expose and unbolt the hinges.



Side, Curtain, Knee, and Cushion Airbag Identifiers



Power Tilt and Telescoping Controls



Front Power Seat Controls

Extrication *(Continued)*

Roof Removal

The LS 600hL contains curtain airbags. If undeployed, it is not recommended to remove or to displace the roof. The curtain airbags may be identified as illustrated.

Dash Displacement

The LS 600hL contains curtain airbags. Do not remove or displace the roof during a dash displacement to avoid cutting into undeployed airbags or inflators. As an alternative, dash displacement may be performed by using a Modified Dash Roll.

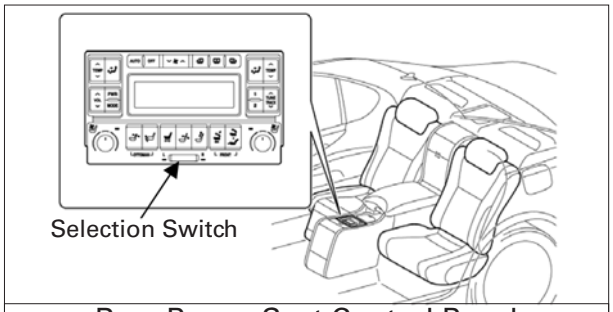
Rescue Lift Air Bags

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

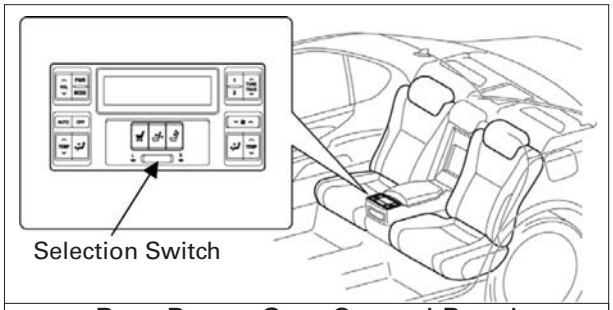
Repositioning Steering Wheel and Front Seats

Power tilt/telescopic steering wheel and seat controls are shown in the illustrations.

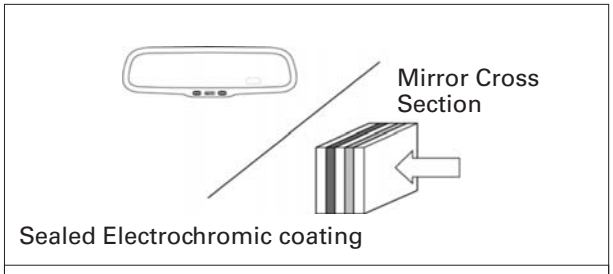
NOTE:
The LS 600hL is equipped with front seat power adjustable headrests using the power seat controls. The headrest cannot be removed. Reposition the seat and headrest prior to disconnecting the 12 Volt auxiliary battery.



Rear Power Seat Control Panel
(4 Passenger with Optional Ottoman Seat)



Rear Power Seat Control Panel
(5 Passenger)



Electrochromic Auto Dimming Mirror

Extrication *(Continued)*

Repositioning Rear Seats

Power adjustable rear seats are standard in the LS 600hL. The rear seat control panel shown in the illustration should be used if it is necessary to adjust the rear seat position. Before adjusting the position of a rear seat, select either the left or right hand seat using the selection switch.

NOTE:
In the event that a rear door is opened, the optional rear seat ottoman may automatically fold closed. To prevent the rear seat from retracting, disconnect the 12 Volt auxiliary battery before opening the rear doors.
The LS 600hL has an 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.

Fire

Approach and extinguish a fire using proper vehicle fire fighting practices.

- **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 an LS 600hL until the fire has been knocked down and overhaul operations have commenced.

  NOTE:
  The LS 600hL is equipped with an air suspension system. In the event of fire, air leakage may occur, allowing the body to drop.

Fire *(Continued)*

- **Fire in the HV Battery Pack**

  Should a fire occur in the NiMH HV battery pack, attack crews should utilise a water stream or fog pattern to extinguish any fire within the luggage compartment except for the HV battery pack.

> ⚠ **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.*
> - *The battery modules 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 pack cover under any circumstance including fire.*

When allowed to burn themselves out, the LS 600hL NiMH battery modules burn rapidly and can quickly be reduced to ashes except for the metal.

Offensive Fire Attack

Normally flooding a NiMH HV battery pack with copious amounts of water at a safe distance will effectively control the HV 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 LS 600hL HV 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 LS 600hL HV 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 utilise a water stream or fog pattern to protect exposures or to control the path of smoke.

Overhaul

During overhaul, immobilise and disable the vehicle if not already done. See illustrations on page 15. The HV battery cover should ***never*** be breached or removed under any circumstances including fire. Doing so may result in severe electrical burns, shock, or electrocution.

- **Immobilise Vehicle**

  Chock wheels and set the parking brake.
  Move the shift lever to the **P**ark position.

  NOTE:
  The LS 600hL utilises a push/pull parking brake switch that electro-mechanically sets/releases the rear parking brakes.

  - To set/release, push/pull the parking brake switch located on the dash to the left side of the steering column (refer to illustration on page 15).
  - If the AUTO button is set and illuminated, the parking brake will automatically set when the vehicle is shifted to the **P**ark position.
  - To verify that the parking brake is set, confirm that the **PARK** light illuminates on the instrument cluster (refer to illustration on page 15). The **PARK** light will turn off after approximately 15 seconds.

- **Disable Vehicle**

  Performing any one of the following two procedures will shut the vehicle off and disable the HV battery pack, SRS, and petrol fuel pump.

  Procedure #1

  1. Confirm the status of **READY** indicator in the instrument cluster.
  2. If the **READY** indicator is illuminated, the vehicle is on and operational. Shut off the vehicle by pushing the power button once.
  3. The vehicle is already shut off if the instrument cluster lights and the **READY** indicator are not illuminated. Do **not** push the power button because the vehicle may start.
  4. If the key is easily accessible, keep it at least 5 metres away from the vehicle.
  5. If the key cannot be found, disconnect the 12-Volt auxiliary battery in the luggage compartment to prevent accidental restarting of the vehicle.

Overhaul *(Continued)*

Procedure #2 (Alternate if power button is inaccessible)

1. Remove the engine compartment and fuse box covers.
2. Remove the IG2 relay in the engine compartment fuse box as illustrated on page 17. If the correct relay cannot be recognised, pull both relays in the fuse box.
3. Disconnect the 12 Volt auxiliary battery in the luggage compartment.

- **Stabilise Vehicle**

  If not already done, properly chock the vehicle to prevent the vehicle body from dropping.

Recovery/Recycling of NiMH HV Battery Pack

Clean up of the HV battery pack can be accomplished by the vehicle recovery crew without further concern of runoff or spillage. For information regarding recycling of the HV battery pack, contact the nearest Lexus dealer or Lexus Australia.

Spills

The LS 600hL contains the same common automotive fluids used in other non-hybrid Lexus vehicles, with the exception of NiMH electrolyte used in the HV battery pack. The NiMH battery electrolyte is a caustic alkaline (pH 13.5) that is damaging to human tissues.
The electrolyte, however, is absorbed in the cell plates and will not normally spill or leak out even if a battery module is cracked.
A catastrophic crash that would breach both the metal battery pack case and a metal battery module would be a rare occurrence.

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

NOTE:
Electrolyte leakage from the HV battery pack is unlikely due to its construction and the amount of available electrolyte contained within the NiMH modules. Any spillage would not warrant a declaration as a hazardous material incident. Responders should follow the recommendations as outlined in this emergency response guide.

In an emergency, check the Material Safety Data Sheets (MSDS) on page 29.

Fire *(Continued)*

- **Handle NiMH electrolyte spills using the following Personal Protective Equipment (PPE):**

  Splash shield or safety goggles. Fold down helmet shields are not acceptable for acid or electrolyte spills.
  Rubber, latex or nitrile gloves.
  Apron suitable for alkaline.
  Rubber boots.

- **Neutralise NiMH Electrolyte**

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

First Aid

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

> ⚠ **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.*

- **Wear Personal Protective Equipment (PPE)**

  Splash shield or safety goggles. Fold down helmet shields are not acceptable for acid or electrolyte spills.
  Rubber, latex or nitrile gloves.
  Apron suitable for alkaline.
  Rubber boots.

- **Absorption**

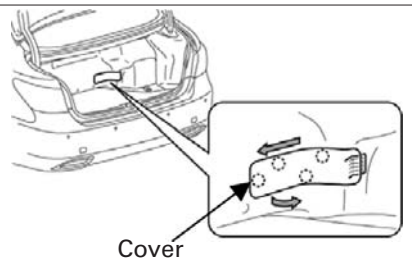
  Perform gross decontamination by removing affected clothing and properly disposing of the garments.
  Rinse the affected areas with water for 20 minutes.
  Transport patients to the nearest emergency medical care facility.

- **Inhalation in Non-Fire Situations**

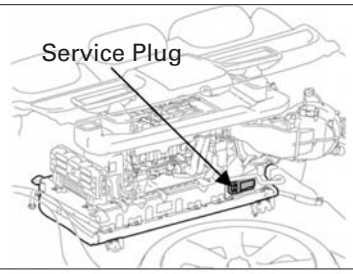
  No toxic gases are emitted under normal conditions.

- **Inhalation in Fire Situations**

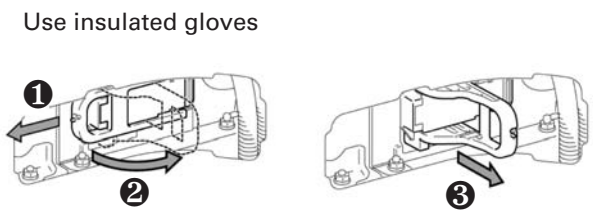
  Toxic gases are given off as by-products of combustion. All responders in the Hot Zone should wear the proper PPE for fire fighting including SCBA.
  Move a patient from the hazardous environment to a safe area and administer oxygen.
  Transport patients to the nearest emergency medical care facility.



Remove the Service Hole Cover



Service Plug Location



Remove the Service Plug

⚠ **WARNING:**

After removal from water, while the vehicle is drying, a discharge path may be created by impurities being deposited between electrical terminals. To reduce the chance of a fire due to these deposits, the service plug must be removed.

First Aid *(Continued)*

- **Ingestion**

  Do not induce vomiting.
  Allow a patient to drink large quantities of water to dilute electrolyte (Never give water to an unconscious person).

  If vomiting occurs spontaneously, keep the patient's head lowered and forward to reduce the risk of asphyxiation. Transport patients to the nearest emergency medical care facility.

Submersion

- **Extrication**

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

  Access patients
  Responders can access the patient and perform normal extrication procedures without the fear of high voltage shock. High voltage orange colour coded power cables and high voltage components should never be touched, cut, or breached.

- **Vehicle Recovery**

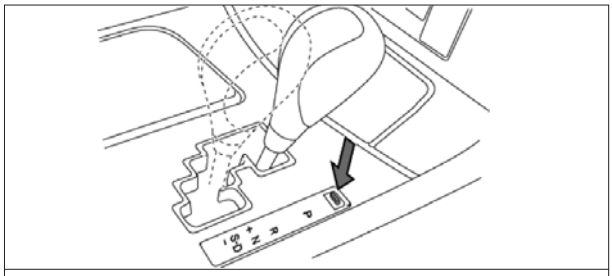
  If a hybrid vehicle is fully or partially submerged in water, emergency responders may not be able to determine if the vehicle has been automatically disabled. The LS 600hL may be safely handled by following these recommendations:

  Remove the vehicle from the water
  Drain the water from the vehicle if possible
  Follow immobilising and disabling procedures on page 15.

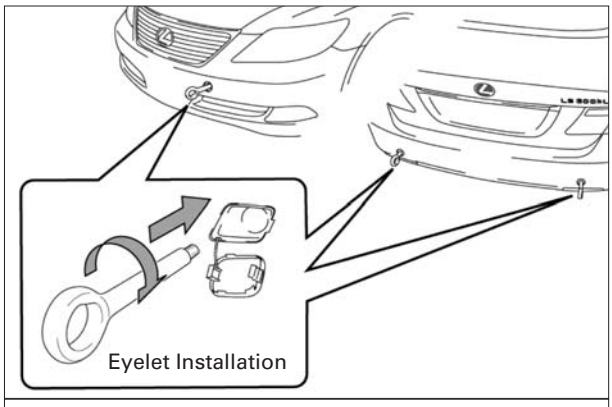
  Remove the service plug.
  After draining the water from the vehicle, put on insulated gloves and remove the service plug (refer to illustration).

  Remove the service hole cover.
  ❶ Slide the service plug handle.
  ❷ Rotate the service plug handle outward.
  ❸ Pull the handle and remove the service plug.

ROADSIDE ASSISTANCE



Push in Shift Lock Release



Towing Eyelet Mounting Locations

Lexus LS 600hL roadside assistance may be handled like conventional Lexus vehicles except as noted in the following pages.

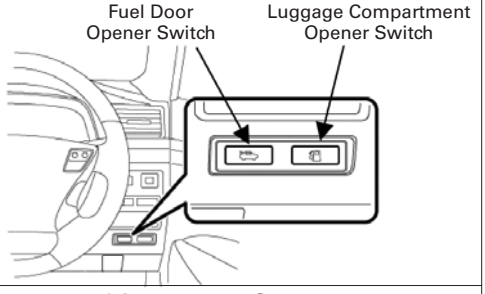
Shift Lever

Similar to most Lexus vehicles, the LS 600hL uses a gated shift lever as shown in the illustration. However, the LS 600hL shift lever includes an S position for 8 levels of engine braking.

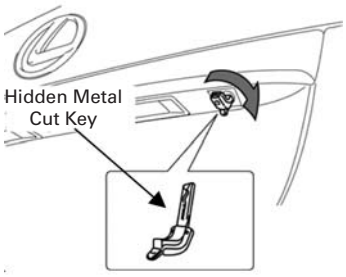
Towing

The LS 600hL is a mechanical all-wheel drive vehicle and it must be towed with all four wheels off the ground. Failure to do so may cause serious damage to vehicle components.

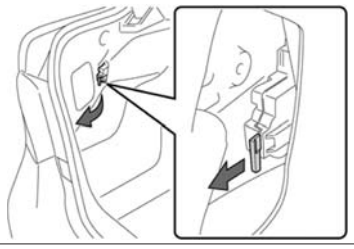
- The vehicle may be shifted out of Park into Neutral by turning the ignition-on, depressing the brake, then moving the gated shift lever to N.
- If the shift lever cannot be moved out of Park, a shift lock release button is provided near the shift lever as shown in the illustration.
- If a tow truck is not available, in an emergency the vehicle may be temporarily towed using a cable or chain secured to the emergency towing eyelet. This should only be attempted on hard, paved roads for short distances at low speeds. The eyelet is located with the tools in the luggage compartment, refer to the illustration on page 26.



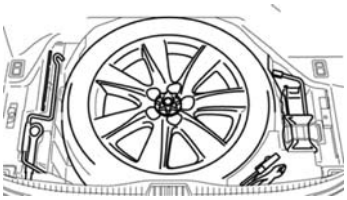
Fuel Door and Luggage Compartment Opener Switches



Manual Luggage Compartment Opening with the Metal Cut Key



Manual Fuel Door Release



Tools and Spare Tyre in the Luggage Compartment

Electric Luggage Compartment Opener

The LS 600hL is equipped with an electric luggage compartment opener. In the event of 12 Volt power loss, the luggage compartment can be opened with the metal cut key hidden in the Smart Key.

Electric Fuel Door Opener

The LS 600hL is equipped with an electric fuel door opener. In the event of 12 Volt power loss, the fuel door can only be opened using the manual release located inside the luggage compartment.

Spare Tyre

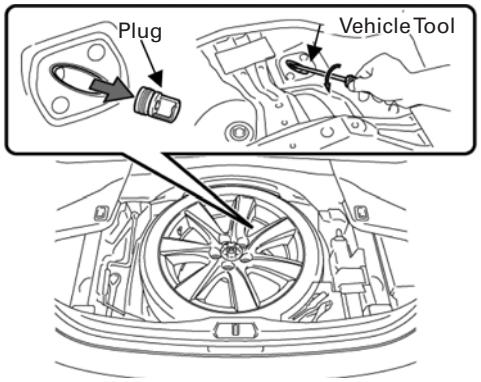
The jack, tools, and spare tyre are provided in the luggage compartment as illustrated.

Electric Parking Brake

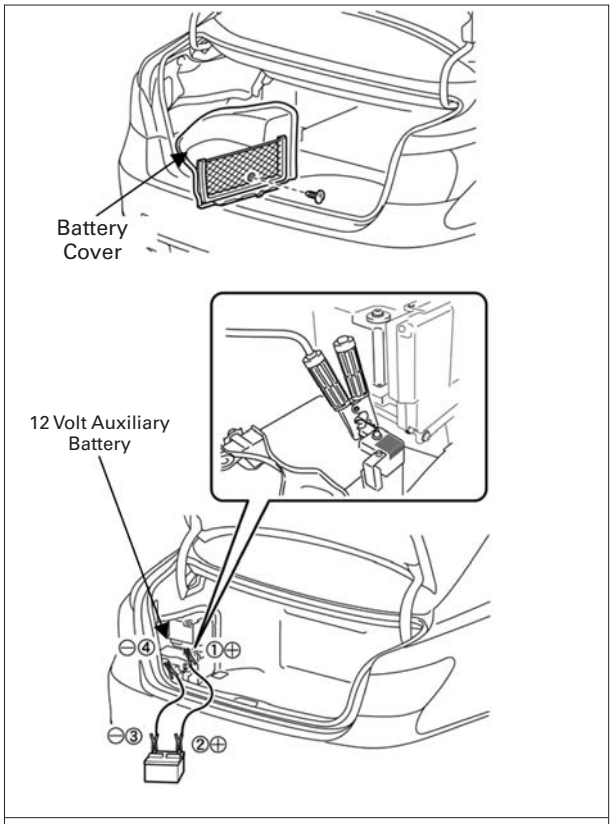
The LS 600hL is equipped with an electric parking brake set/release switch.

In the event of a 12 Volt power loss, the parking brake cannot be electrically operated. The parking brake can be manually released using the on-board tools.

- Remove the spare tyre from inside the luggage compartment.
- Remove the plug as illustrated.
- Insert the vehicle tool in the hole. While pressing firmly on the tool, turn it counter-clockwise until the parking brake is released.



Manual Parking Brake Release



Jumper Cable Connections

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 luggage compartment. The luggage compartment opener will not operate if the auxiliary battery is discharged. Instead use the metal cut key hidden in the key to open the luggage compartment.

- Open the luggage compartment, and remove the 12 Volt auxiliary battery cover on the driver side.
- Connect the positive jumper cable to the positive battery post.
- Connect the negative jumper cable to the negative battery post.
- Place the key in proximity to the interior of the vehicle, depress the brake pedal, and push the power button.

  NOTE:
  If the vehicle does not recognise 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 Lexus emblem side of the key to the power button during the start sequence. See the instructions and illustrations on page 7 for more details.

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

Immobiliser & Anti-Theft Alarm

The LS 600hL is equipped with an immobiliser system and an anti-theft alarm as standard equipment.

- The vehicle can be started only with a registered key.
- To disarm the anti-theft alarm, unlock the door by using the Smart Key button, hidden metal cut key, or door handle touch sensor. Turning the ignition on or starting the vehicle will also disarm the anti-theft alarm.

PRODUCT SAFETY DATA SHEET

1. Product and Company Identification

Name of Product	Prismatic Nickel Metal-hydride Battery (module)
Model name	EV-MP6R5R20 (GEN NP2.5 8cells module type) EV-MP6R5R27 (GEN NP2.5 12cells module type)
Company name	Panasonic EV Energy Co., Ltd.
Address	555, Sakaijyuku, Kosai-City, Shizuoka, 431-0452 Japan
Division	Engineering Department
Telephone/Fax	+81-53-577-3112 / +81-53-577-3114
Issue date	Issue date Jan 30th, 2006
Issue number	p0056

2. Substance Identification (Main substances of Prismatic Nickel Metal-hydride Battery [module])

(1) Positive	Substance	Nickel Hydroxide
	CAS No.	12054-48-7
(2) Negative	Substance	Hydrogen storage alloy
	CAS No	Not specified
(3) Electrolyte	Substance	Alkaline solution Potassium hydroxide (Substance in alkaline solution)
	CAS No.	1310-58-3

3. Hazardous and Toxicity Class

(1) Class Name	Not applicable.
(2) Hazard	No hazard in-normal situations. However, heat generation and/or alkaline electrolyte leakage may occur in the event of positive/negative terminal short circuiting by metallic or highly conductive objects.
(3) Toxicity	No toxicity in-normal situations. In the event of a burning battery pack, there is a possibility that an alkaline mixed gas may be emitted, which may in turn irritate eyes, nose, and/or throat. If the battery is stored for very long time periods, electrolyte and/or metal materials may leak and result in surface soil pollution.

4. First Aid Measures

In the event of alkaline electrolyte and/or alkaline mixed gas leakage.

(1) Eye contact	Contact may cause corneal injury and blindness. Wash eyes with large amounts of running water for at least 15 minutes. Seek medical treatment immediately. If appropriate actions are not taken, eye disorders may result.
(2) Skin contact	Wash the contact area with plenty of water and seek medical treatment immediately. Clothing, shoes, and socks, etc. which have come into contact with alkaline electrolyte should be taken off immediately. If appropriate actions are not taken, skin inflammation may occur.
(3) Inhalation	Move the exposed person to fresh air area immediately. Cover up the affected person with a blanket. Seek medical treatment immediately.
(4) Swallowing	Do not induce vomiting. Seek medical treatment immediately.

PRODUCT SAFETY DATA SHEET

5. Fire Fighting Measures	
(1) Firefighting measures and extinguisher	(1) Use powder-type ABC extinguisher. (2) When corrosive gas could be generated in the event of fire fighting, use appropriate breathing apparatus. (3) Extinguishing a fire with a large amount of water may be an effective method. However, this should be considered as a supplementary means. If there are no readily available large amounts of water, use dry sand instead; as the application of only a small amount of water may temporarily act as an accelerant and affect the fire adversely while the hydrogen storage alloy is burning. (4) Remove the flammable materials from the fire. (5) If fire occurs nearby to batteries, move them to a safe place.
(2) Possibility of fire and explosion	(1) Fire may occur when: Short circuit-induced arcing occurs. A large current is applied to a module or a cell. (2) Explosion may occur when: The battery is contained in a hermetic container, since oxygen and/or hydrogen may be generated by the battery. The battery itself will not explode in normal conditions. (3) Fire and explosion may occur when: The battery is over-charged or over-discharged. The battery is over 100 deg C. The battery is in a hermetic container with an ignition source nearby and overcharge or overdischarge occurs.

6. Measures for electrolyte leakage	*When the alkaline electrolyte leaks from battery.*
	(1) Wipe off with a towel. (2) Keep away from flames. (3) Protective glasses and rubber gloves should be worn.

7. Handling and Storage	
(1) No short circuit	Short circuit should be prevented since heat generation and/or fire may result.
(2) No disassembly and reconstruction	The battery should not be disassembled and/or reconstructed for the following reasons: • If a cell is disassembled, alkaline electrolyte may leak. • If a module is disassembled, short circuiting may occur. • If a module is disassembled, cells will be damaged and alkaline electrolyte may leak.
(3) No over-charge or over-discharge	Battery should not be over-charged or over-discharged to prevent possible oxygen and/or hydrogen generation.
(4) No usage in hermetic container	Battery should not be used in a hermetic container since the container may explode due to gas generated from the battery.

8. Exposure Control	*When alkaline electrolyte leakage from the battery occurs, necessary action should be taken as follows:*
(1) Acceptable concentration	Not specified in Japanese Industrial Hygienic association and ACGIH.
(2) Facilities	(1) Ventilation should be considered. Limited exhaust device or other ventilation device should be used. (2) Exhaust system or exhaust hole is required when the battery is used in a container.
(3) Prevention measures	Safety glasses, mask, and gloves should be worn.

9. Physical and Chemical Properties

(1) Appearance	The nickel hydrogen battery (cell and module) is contained within a plastic resin case. The module geometry is basically a thin rectangular trapezoid. A fixed voltage value cannot be specified.

10. Hazardous Information

As indicated in Sections 3 and 5.

11. Toxicological Information

In the event of alkaline electrolyte leakage.

(1) Acute toxicity	LD50 2g/kg oral rat (based on material safety data sheet of liquid potassium hydroxide).
(2) Stimulation	Inflammation of the cornea can be caused from scratching/rubbing one's eyes. Exposure for extended time periods can irritate bronchial tubes and eyes.

12. Transportation Information

(1) Battery terminal should be packaged to prevent external short circuits. Batteries should not be allowed to contact each other as prevention against short circuiting when packaged.

(2) There should be a marking on the package that indicates that Nickel Hydrogen Storage batteries are contained.
(Refer to Section 14).

(3) Packaging should be stable and durable enough to protect batteries from vibration, shock, dropping and stacking.
Batteries should not fall down and/or be allowed to be inverted/tilted during shipping.

(4) Packaging should not become wet (rain and/or dew, etc), during storage and shipping.

(5) Keep away from fire/flame during storage and shipping, and do not store batteries in a hot environment.

NOTE: One example of storage in a hot environment is that of exposing a vehicle with a battery installed in very hot weather for a long time.

13. Disposal

(1) Battery should be disposed in accordance with provisions of vehicle manufacturer or dealer.

(2) Domestic waste disposal is not allowed.

14. Regulatory Information

(1) Hazardous Materials Transportation (Hazardous shipping transportation and storage regulation)	This Type Batteries are not regulated by DOT (Department of Transportation) and IATA (International Air Transport Association)

15. Others

Not specified.

NOTES

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